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Summary of International Energy Research and Development Activities

1974-1976

Prepared by
Smithsonian Science Information Exchange, Inc.

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1730 M Street N.W.
Washington, D.C. 20036

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National Science Foundation
Directorate for Research Application
and
Directorate for Scientific, Technological & International Affairs
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EDITOR'S NOTE

Included in this directory is information covering 3017 ongoing and recently completed energy research projects conducted in Canada, Italy, the Federal Republic of Germany, France, The Netherlands, the United Kingdom, Denmark, Sweden, Israel and 18 other countries. This information was registered with the Smithsonian Science Information Exchange by supporting organizations in the nine countries listed and by international organizations such as the International Atomic Energy Agency. All narrative information presented in the directory and, in some cases, organization names have been translated into the English language.

In addition to the title and text of project summaries, the directory contains the following indexes; Subject Index, Investigator Index, Performing Organization Index, and Supporting Organization Index. To reflect particular facets of energy research, the Subject Index has been cross-referenced. The Subject Index is based upon the SSIE classification system which organizes index terms in hierarchies to relate groups of narrow subject areas within broad areas. Each project has been indexed to an average of six index points. Index terms are followed by the project titles and the corresponding chapter and item numbers of the projects indexed to that term. "See" and "See also" cross-references are used in the Subject Index to indicate where a specific item or additional related terms may be located.

All of the indexes in this catalog were computer generated, necessitating a limitation in the number of characters available for index terms and captions, so in some instance abbreviations were used. The information which appears in the summaries and indexes was taken directly from the project records as received by the Exchange. Entries in the Supporting and Performing Organization Indexes are followed, where space permits, with the names of the city and country in which they are located. This was done in order to partially alleviate the difficulties created by the use of English language translations of some organization names.

We hope that the users of this directory will advise SSIE of any ways in which these volumes can be improved in the future. Critiques of this volume are encouraged so that the information in future directories may be presented in a format and with indexes of maximal convenience and utility.

PREFACE

The emergence of energy research and development as an activity of critical importance to every country in the world has made access to international information about energy research in progress more important than ever before. This information is not only necessary to help avoid undesired and costly duplication of effort, but it is needed as well to support the development of opportunities for international communication and cooperation.

This second directory is the product of a data collection effort undertaken by the Smithsonian Science Information Exchange (SSIE) on behalf of interagency committee formed under the U.S. Department of State for the purpose of providing a mechanism for the multilateral assessment of alternatives for international cooperation in energy research and development. The study was undertaken on a pilot basis in order to determine whether project level information on current energy research could be collected on an international scale, and whether it could be processed and disseminated in a manner which would encourage initiatives toward cooperative research and thereby promote the timely development of alternative sources of energy.

Information from a large number of organizations covering many aspects of current energy research activities is brought together in this volume in a consistent and accessible form. Earlier, information on 1766 ongoing and recently terminated energy research projects, gathered between October 1974 and September 1975, was published as Report No. NSF/RA-760057, "Information on International Research and Development Activities in the Field of Energy." Because many of these projects are ongoing, all the projects gathered since October 1974 are included in this publication. This information was collected between October, 1975 and April, 1977 in Canada, Denmark, the Federal Republic of Germany, France, Italy, Israel, The Netherlands, and the United Kingdom. A limited number of projects sponsored by international organizations such as the International Atomic Energy Agency are also included. In all, some 3017 ongoing and recently terminated energy research projects are represented on the pages which follow.

SSIE's initial effort was made possible through NSF Grand AER 74-20678 awarded by the Advanced Energy and Resources Research and Technology Division, Research Applications Directorate and the Division of International Programs of the Directorate for Scientific, Technological, and International Affairs of the National Science Foundation. The NSF program manager was Mr. George S. James.

The completion and production of this directory, "Summary of International Energy Research and Development Activities 1974-1976" was promoted and supported through contract EX-77-C-01-2639, provided by the Office of Technical Information, Assistant Administrator for Institutional Relations, Energy Research and Development Administration. The ERDA project manager was Mr. Charles Gottschalk.

The cooperation and assistance of many individuals in each of the countries covered facilitated the collection of this information. Although they are too numerous to mention here, their efforts are gratefully acknowledged. Those organizations in Canada, The Netherlands, and France which served as national focal points, the Department of Energy Mines and Resources (EMR) in Ottawa, the Central Organization for the Advancement of Applied Research (TNO) in the Hague, the Bureau National de l'Information Scientifique et Technique (BNIST) in Paris, the Swedish Energy Research and Development Commission, Stockholm, the Danish Research Administration, Copenhagen, and the Israel National Council for Research and Development, deserve a special note of thanks for their extensive contributions.

Coverage of energy research in each country varies greatly, and the research projects included here do not necessarily represent complete national programs in energy research. Specifically excluded are projects classified for reasons of national security or otherwise considered to be proprietary in nature, and in some cases, project level information was not available in a form which could be registered with SSIE. But, the coverage does represent a major step in the direction of increased international communication and, hoepfully, cooperation in the field of energy. To the extent and it also represents a base which can be strengthened in the future, it can be expected to serve all who contribute to it as an even more valuable and useful information resource.

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DESCRIPTION OF RESEARCH TASKS

1. ORGANIC SOURCES OF ENERGY

1A. GAS AND OIL

1.0001, LOW PRESSURE GAS AS AN AUTOMOTIVE FUEL
W.P. EGAN, Bureau of Transport. Economics, *Canberra, Australia* (115624 (HRB NO.))

The use of L.P.G. as an automotive fuel was investigated, especially in regard to chemical and economic aspects. /IRF/

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY Australia - Australian Government - Canberra

1.0002, PHASE III, GEOLOGIC, ENVIRONMENTAL, AND RESOURCES STUDY OF THE SOUTH EASTERN SPANISH ZONE AND CONTINENTAL SHELF
P.D. SNAVELY, U.S. Dept. of The Interior, Geological Survey, *Menlo Park, California* 94025

This project is part III of a cooperative program between the U.S. Geological Survey and its Spanish counterpart ADARO which is designed to provide training and basic geologic information necessary to appraise the resource potential (including sand and gravel, fresh water, heavy mineral placers, oil and gas) and to understand the environmental framework (geologic hazards, coastal erosion, marine pollution, and sediment transport) of the coastal zone of southeastern Spain.

This third phase of the project will concentrate on interpretation and reporting of data collected in phases I and II of the program. Such interpretation will provide guidelines for new directions in geological and marine research along the southeastern coast of Spain.

SUPPORTED BY U.S. Natl. Science Foundation, Div. of International Programs

1.0003, TERRESTRIAL HEAT FLOW IN INDONESIAN OIL FIELDS
V. VACQUIER, Univ. of California, Graduate School, *San Diego, California* 92037

Prof. Vacquier will use the bottom hole temperatures (BHT) from wells in Sumatra oil fields to obtain the thermal gradient through the sedimentary section. The thermal conductivity will be calculated from measurements made on core and/or electric logs of wells. The thermal gradient times the conductivity equals the heat flow. This value will be useful in understanding the deep tectonic forces at work across S.E. Asia and processes at work forming hydrocarbon accumulation and mobilizing mineral deposits. This work will be carried out in Indonesia using data provided by the Indonesians as well as laboratory and other logistic support.

SUPPORTED BY U.S. Natl. Science Foundation, Div. of Ocean Sciences

1.0004, DEVELOPMENT OF COST ESTIMATES FOR OIL AND GAS PRODUCTION SYSTEMS FOR THE NOVA SCOTIA AND LABRADOR SHELVES
W.J. COOKE, Unknown Inst. or Indiv. Grant, *Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0005, MICROPALEONTOLOGICAL AND PALYNOLOGICAL STUDIES OF CUTTINGS AND CORE SAMPLES FROM FOUR WELLS IN THE DISTRICTS OF MACKENZIE AND FRANKLIN
UNKNOWN, Assoc. Petroleum Consultants, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0006, PREPARATION OF ESTIMATES OF DEVELOPMENT COSTS FOR TREND OIL AND GAS POOLS EXPECTED TO BE DISCOVERED IN PARTS OF CANADA (ABBREV)
UNKNOWN, D & S Petroleum Consultants, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0007, STUDY AND COST ANALYSIS OF ACCELERATED DELIVERABILITY IN THE GAS FIELDS OF WESTERN CANADA
UNKNOWN, D & S Petroleum Consultants, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0008, ACQUISITION AND ANALYSIS OF DATA ON OIL POOLS IN SOUTH LOUISIANA
UNKNOWN, D.R. Mccord & Associates, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0009, STUDY DISCOVERED CRUDE OIL AND NATURAL GAS RESERVES AND UNDISCOVERED POTENTIAL OF WESTERN CANADA (ABBREV)
UNKNOWN, J L J Exploration Consult. Ltd, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0010, COSTING STUDY FOR FRONTIER GAS AND OIL PRODUCTION
UNKNOWN, J.C. Sproule & Assoc. Limited, *Calgary, Alberta, Canada*

1. ORGANIC SOURCES OF ENERGY

SUPPORTED BY Canada - Department of Energy, Mines and Resources Ottawa

1.0011, IMPLEMENTATION OF REVISIONS TO THE COMPUTER PROGRAM ENTITLED COSTING STUDY FOR FRONTIER OIL AND GAS PRODUCTION
UNKNOWN, J.C. Sproule & Assoc. Limited, *Calgary*, *Alberta*, *Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0012, A DETAILED STUDY OF THE GEOLOGY RELATED TO THE HEAVY OIL OCCURRENCES OF THE LLOYDMINSTER TYPE IN ALBERTA AND SASKATCHEWAN
UNKNOWN, James Stanley Brown Consulting, *Calgary*, *Alberta*, *Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0013, DETAILED ANALYSIS OF HEAVY OIL OCCURRENCES IN THE LLOYDMINSTER AREA OF ALBERTA AND SASKATCHEWAN FOR OIL AND GAS POTENTIAL (ABBREV)
UNKNOWN, James Stanley Brown Consulting, *Calgary*, *Alberta*, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0014, PRELIMINARY ANALYSIS OF OIL AND GAS RESOURCES OF THE BEAVERHILL LAKE FORMATION IN THE DEEP BASIN OF WESTERN ALBERTA
UNKNOWN, L.D. Grayston & Assoc. Limited, *Calgary*, *Alberta*, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0015, THE TECHNICAL AND ECONOMIC FEASIBILITY OF THE NATIONAL RESEARCH COUNCIL TAR SAND AGGLOMERATION PROCESS IN A PILOT PLANT OPERATION
UNKNOWN, M.H.G. International Limited, *Calgary*, *Alberta*, *Canada*

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

1.0016, HEAVY OIL RECOVERY
H.Y. LO, Petroleum Recovery Res. Inst., *Calgary*, *Alberta*, *Canada*

Objectives: 1. To examine enhanced recovery methods for recovering viscous oil from Alberta heavy oil deposits and to evaluate influence of major factors. 2. To investigate and develop techniques to improve viscous oil recovery.

In Alberta, besides containing high viscosity oil, many of the heavy oil reservoirs have only thin pay zone thickness and often are underlain by a water zone. Designing and implementing a heavy oil recovery scheme becomes even more difficult and uncertain when there is a lack of relevant information available for consideration. Very little scientific and basic laboratory data can be found in published literature for processes possibly amenable to viscous oil recovery such as steam flooding and in-situ combustion. In view of this, under this project, effort will be put into examining some of the enhanced recovery methods for recovering viscous oil from Alberta heavy oil deposits, to evaluate the influence of various major factors and at the same time to study and, if possible, develop techniques to improve heavy oil recovery.

Steam flooding has been considered a possible method to recover viscous oil. A known characteristic of steam drive is the effect of gravity override. Vertical sweep efficiency depends on several factors such as flow rates, formation thickness, oil viscosity, etc.

Future work: After careful evaluation of available results and information received from persons with experience in the process, a more detailed plan or approach including the type of models, parameters and their range to be selected for the study and the conditions under which the study will be conducted will be prepared. Some immediate effort will be directed to examining the scaling problems and to developing appropriate scaling criteria for the laboratory model studies.

SUPPORTED BY Canada - Petroleum Research Institute - Calgary

1.0017, OIL-WATER RELATIVE PERMEABILITIES AT LOW INTERFACIAL TENSIONS
H.Y. LO, Petroleum Recovery Res. Inst., *Calgary*, *Alberta*, *Canada*

Objective: To measure water-oil relative permeability characteristics for very low interfacial tension systems as related to methods of improved oil recovery.

Relative permeability curves have been obtained for three fluid systems having interfacial tensions of the order of 50, 0.1 and 0.01 dyne/cm. These measurements were made in oil-wet porous medium at 80 degrees F by the steady-state technique. A pressure gradient of 0.6 psi/ft. was applied in these experiments. Results indicated that residual oil saturation was found to decrease with the decrease in water-oil interfacial tension for the three levels experimented. Only small effects on the relative permeabilities were noticed. Relative permeability curves for water were extended to higher values at lower interfacial tensions as a result of the lowered residual oil saturations. Work is continuing to examine the effects of pressure gradient, initial saturation and other factors on relative permeabilities and residual saturations. Plans are also being made to repeat some measurements by the unsteady-state method.

Future work: Measurements of oil-water relative permeabilities are to be continued on the same systems to obtain data on increasing oil saturation sequence and on increasing water saturation sequence when the medium contains an initial water saturation. Some experiments are planned to study the effect of pressure gradient on relative permeabilities and residual saturations. Attempts will also be made to conduct some relative permeability measurements by the unsteady-state method under similar experimental conditions for comparison purposes.

The spinning drop interfacial tension apparatus will be modified to enable its use at elevated temperatures. Measurements will be made to probe the effect of surfactant and salt concentrations on the interfacial tension. Another effect currently being investigated concerns the preliminary indication that interfacial tensions become higher after surfactant solutions are stored for a few months. Some imbibition tests are planned with equilibrated sulfonate solution versus octane and decane to check the feasibility of using imbibition rate data as a measure of the interfacial tension that is operative at the displacement front. These imbibition results may also be important for interpreting the unsteady-state relative permeability tests that are planned.

SUPPORTED BY Canada - Petroleum Research Institute - Calgary

1.0018, CONTACT ANGLE AND INTERFACIAL TENSION MEASUREMENTS WITH RESERVOIR FLUIDS
F.G. MCCAFFERY, Petroleum Recovery Res. Inst., *Calgary*, *Alberta*, *Canada*

Objective: This project involves measurements of contact angles and interfacial tensions with reservoir fluids at reservoir temperatures and pressures, as well as at ambient conditions. The objective is to establish the most reliable method of measuring representative reservoir values for these two parameters.

A detailed contact angle study has been completed with Swan Hills oil and brine on calcite (limestone) surfaces at both ambient and reservoir conditions of temperature and pressure. The results suggested that the reservoir is of intermediate wettability. It was also found that use of the correct reservoir tempera-

ture and avoidance of oxidation of the crude oil was more important for consistent contact angle results than was the need to keep dissolved gas in the crude.

Tests are next planned with Pembina Cardium crude oil and water. Main concern will be to evaluate wettability and determine whether the presence or absence of dissolved gas in the paraffinic Pembina crude, which has a low produced asphaltene content, affects oil/water contact angles on quartz at the reservoir temperature.

Experiments have lately concentrated on interfacial tension determinations between caustic solutions and two medium gravity crudes. Use of a recently assembled spinning drop apparatus has permitted more accurate determinations of low interfacial tensions and interfacial tension aging behavior for these systems than was possible from pendant drop measurements.

SUPPORTED BY Canada - Petroleum Research Institute - Calgary

1.0019, HYDROCARBON RECOVERY FROM CARBONATE RESERVOIRS

F.G. MCCAFFERY, Petroleum Recovery Res. Inst., *Calgary, Alberta, Canada*

Objectives: 1. To prepare a treatise on 'Carbonate Oil and Gas Reservoirs in Alberta' containing a review and critique of published work relating to their geology, geochemistry, petrophysical properties, recovery processes, and possibilities for enhanced recovery. 2. To conduct displacement experiments with selected carbonate oil and gas reservoir rocks for establishing reliable laboratory displacement procedures and to evaluate the effects of factors such as pore geometry, wettability, saturation history, and flow rate on the recovery performance. Laboratory evaluations of potential enhanced oil recovery processes will be part of this work.

Future work: Immiscible displacement tests of the type outlined in the project proposal will commence in the near future. For Windfall cores, the aim is to be able to interpret the recovery curves and magnitude of the trapped gas saturations determined from forced displacement and imbibition tests in terms of the pore structure of the rock that is revealed by the pore cast and capillary pressure information. The same applies to oil/water or gas/oil displacement tests with Rainbow and Swan Hills cores. With Swan Hills cores, in particular, experiments will also be performed to examine the potential benefits to oil recovery of water injection in the presence of free gas and of alternate gas-water injection.

Some experimental and theoretical work will be performed to evaluate the effects of heterogeneities, such as vugs and contrasting permeability streaks, on immiscible displacement behavior. A comparison and evaluation will be made of recovery and relative permeability data determined by the steady state and dynamic methods, with the plan of extending the work of Owens et. al. and Archer and Wong on this question.

Screening tests are planned to assess the value of using surfactants, sodium hydroxide, and polymers in carbonate oil reservoirs. Initial vertical displacement tests on the Southesk Reef D-3 dolomite outcrop blocks are planned at lower rates than those used in the previous work - that is, less than 110 ft/yr. Woods metal pore casts of large vuggy Rainbow and Windfall rock samples will be made in order to determine how the vugs are distributed and interconnected.

SUPPORTED BY Canada - Petroleum Research Institute - Calgary

1.0020, RESIDUAL OIL

N.R. MORROW, Petroleum Recovery Res. Inst., *Calgary, Alberta, Canada*

Objectives: 1. To determine the factors controlling recovery in the contacted zone of a waterflood and quantify the conditions under which residual oil can be mobilized. 2. To evaluate the reliability of laboratory flooding tests as means of determining residual oil saturation.

The effect of gravity on trapping has been determined for packings of both angular and spherical particles. The effect on magnitude of residual saturations of grain size distribution of unconsolidated packing is now being investigated for completely wetted systems. In work on systems which are not completely wetted, the forces required for mobilization of entrapped liquid slugs in tubes have been found to be in close agreement with those predicted from statically determined advancing and receding contact angles. The effect of wettability on mobilization of residual oil is currently under study.

Bibliographic references: (1) Marrow, N.R., 'The Effects of Surface Roughness on Contact Angle,' PRRI Research Report RR-22, January 1974. (2) Marrow, N.R., 'Capillary Phenomena in Uniformly Wetted Porous Media,' PRRI Research Report RR-23, January 1974.

SUPPORTED BY Canada - Petroleum Research Institute - Calgary

1.0021, A THEORETICAL AND EXPERIMENTAL CONING STUDY

N. MUNGAN, Petroleum Recovery Res. Inst., *Calgary, Alberta, Canada*

Objectives: To study theoretically and experimentally water coning into oil wells, under two phase immiscible flow. The objectives are to develop a quantitative understanding of: 1. The role of various factors on formation and behaviour of a cone. 2. Effect of cone on well productivity and ultimate recovery from the drainage area of the well. The study will include the influence of production rate, extent of well bore penetration into the producing zone, formation thickness, reservoir heterogeneities, well spacing, angle of dip, and mobility ratio. Some consideration will also be given to the best methods of averaging available data for use as input into coning models.

Experimental and numerical studies were made of water coning into an oil producing well under two-phase, immiscible, incompressible flow. The model chosen was a pie-shaped, cylindrical sand pack having radial symmetry. Saturations were measured in situ by 70 micro-resistivity probes embedded in the sand pack. Results indicated that the numerical model simulated the experiments adequately. Increasing the production rate or the well bore penetration led to earlier water breakthrough, however, oil recovery was independent of production rate. The higher the ratio of gravity to viscous forces the greater was the oil recovery at any given water-oil ratio; wells should be spaced closer if the horizontal permeability was low or the vertical permeability was high. High vertical permeability decreased the oil recovery while the opposite held true for horizontal permeabiity. In stratified formations, highest oil recovery resulted when the most permeable section was located near the top of the oil bearing zone.

Future work: A newly constructed Delrin coning model has been packed with fine and coarse sand to give a pack with two thin, low permeability layers. The resistivity measuring probes, built of 316-SS, have been installed and tested. Two experiments will be carried out in this model to study the effect of oil viscosity and production rate on oil production and oil recovery.

SUPPORTED BY Canada - Petroleum Research Institute - Calgary

1.0022, CHARACTERISTICS OF COUNTER JET MIXING INCLUDING WARM WATER INJECTION

A.S. RAMAMURTHY, Petroleum Recovery Res. Inst., *Calgary, Alberta, Canada*

To establish guidelines for the design of thermal discharge diffusers. Develop an experimental set-up (modifying existing set-up) for testing the effectiveness of proposed diffuser design using warm water injection. Recording and analyzing near temperature field data for the case where warm water is injected as a counter-jet into the main stream.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0023, AQUEOUS POLYMER SOLUTION FLOODS

W.P. SHYLUK, Petroleum Recovery Res. Inst., *Calgary, Alberta, Canada*

Research on aqueous polymer solution floods is being resumed at the Institute. The objective will be to increase our knowledge about the retention and shear degradation of

hydrolyzed polyacrylamides during flow through porous media. Such knowledge is important in the prediction of the performance of a polymer flood and in the design of more effective polymers. This research is still in the planning stage, and there are no experimental results at present. The question of whether the polymer molecules are individually dispersed will be raised. The answer to this question is essential to the correct molecular interpretation of retention and shear degradation. Retention of polymers plays a major role in the reduction of water mobility. The latter is due to a temporary and/or a permanent reduction of the reservoir permeability to water but not to the oil. Shear degradation, on the other hand, leads to a decrease in the ability of the polymer to reduce the mobility of the water. Basic knowledge about the retention and shear degradation is the key to an accurate prediction of the performance of a polymer flood by reservoir engineers. Also, this is the key to the tailoring of the best possible polymer.

Initial lab work will be on polymer retention. Emphasis will be on the effect of flow rate. The polymer retention will be monitored as the flow rate is decreased or increased in a stepwise manner (without stopping the pump). A change in the polymer retention will be reflected in the polymer concentration in fractions of the effluent from the core sample. Differential pressures will also be continuously measured at 1/4 and 3/4 of the way along a core sample. The effect of retained polymer on water mobility will thus be determined. The core sample will finally be washed with water and short sections of this core sample will be analyzed for polymer. This will establish whether the retained polymer can be displaced along the core sample and at what rate.

SUPPORTED BY Canada - Petroleum Research Institute - Calgary

1.0024, RETROGRADE PHENOMENA IN POROUS MEDIA

P.M. SIGMUND, Petroleum Recovery Res. Inst., *Calgary, Alberta, Canada*

Objectives: From fundamental thermodynamic and other considerations to predict: 1. The manner and rate of revaporization of condensate by standard depletion and upon the sweeping of the porous medium with a gas undersaturated with respect to the retrograde liquid. 2. To supplement, confirm or modify the theoretical predictions by experimental measurements.

Over the past year or so, experiments have been conducted to study the revaporization of retrograde condensate from porous media by dry gas injection. The flow tests were performed in packings of glass beads and in the Berea sandstone core. In all of the experiments, methane was used to revaporize the immobile condensate that remained in the porous media after pressure depletion from 2000 psia to 1000 psia of n-butane-methane mixtures at 100 degrees F. The influence of particle size, initial condensate saturation, dry gas injection rate, and immobile water saturation on the revaporization process was studied by measuring effluent concentration profiles as a function of volume of dry gas injected.

The rate of condensate revaporization was estimated by matching the solution of a mathematical model, in which mass transfer is expressed by a first-order rate expression, to the experimental effluent concentration data. The rough values of the mass transfer coefficients obtained in this way indicate that the rate of condensate revaporization is controlled by diffusion through a flim between the condensate surface and the flowing gas stream. In general the rate of mass transfer is found to increase with: decreasing particle size, increased condensate saturation, and increased immobile water saturation. The increase in each case is attributed to increasing the interfacial area between the gas and the liquid condensate. The results indicate that for the reservoir, provided the fraction of non-flowing gas is small, high mass-transfer rates result, and thermodynamic equilibrium between flowing gas and liquid may be assumed.

SUPPORTED BY Canada - Petroleum Research Institute - Calgary

1.0025, MICROPALEONTOLOGICAL AND PALYNOLOGICAL STUDIES OF CUTTINGS AND CORE SAMPLES FROM ISACHSEN J-37 WELL, DISTRICT OF FRANKLIN

UNKNOWN, Robertson Res N America Ltd, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0026, COMPUTER MODEL DEVELOPMENT FOR THE SIMULATION OF 'IN-SITU' RECOVERY PROCESSES FOR OIL SANDS

K. AZIZ, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0027, PROBLEMS ASSOCIATED WITH THE RECOVERY, PRODUCTION, AND TRANSPORTATION OF CRUDE OIL AND NATURAL GAS

K. AZIZ, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

1.0028, DEVELOPMENT OF A COMPUTER MODEL FOR THE SIMULATION OF THERMAL RECOVERY PROCESSES OF OIL FROM OIL SANDS

K. AZIZ, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0029, IN SITU RECOVERY OF OIL FROM THE ALBERTA OIL SANDS

D.W. BENNION, Univ. of Calgary, *Calgary, Alberta, Canada*

OBJECTIVES: Investigate the use of fire flooding, both wet and dry, for recovery of oil from the oil sands. To determine the optimal air and water requirements and to develop mathematical models to simulate the process.

Ten burns have been made during the past 15 months. Wet combustion runs at a water-air ratio of 1.70 cubic feet MSCF of air gave an air-fuel ratio of 183.6 SCF/pound of fuel. Oxygen utilization for the stabilized portion was 99 percent. Fuel consumption was 3.09 pounds fuel/cubic foot of reservoir. The oil recovery was 73 mass during the run. Initial viscosity - 1,000,000 cp, lowest oil viscosity - 3 cp. Peak temperature - 642 degrees C.

In addition, a study on thermal cracking was commenced. The data obtained from this study will be used in the numerical simulation studies.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0030, ANHYDROUS RECOVERY OF BITUMEN IN A FLUIDIZED BED REACTOR

D.W. BENNION, Univ. of Calgary, *Calgary, Alberta, Canada*

The objective of this project is to examine a method of recovering bitumen from oil sands by direct coking in a fluidized bed reactor.

This is a three-stage project. The first stage has been completed. This consisted of a preliminary material and energy balance on the proposed extraction process. The main conclusion is that 10-20 percent of the bitumen will be consumed to provide the energy to operate the process. It is concluded also that, as several major assumptions are made, operating data will be required from the pilot reactor to verify the calculation (of 10-20 percent).

The second stage has been started, the majority of purchased items received, and fabrication and installation of the extractor should be complete by February, 1975. A shakedown run of the equipment can begin when the extractor is assembled.

SUPPORTED BY Canada - Alberta Environmental Research Trust - Edmonton

1.0031, RECOVERY OF OIL FROM THE TAR SANDS

J.K. DONNELLY, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

1.0032, THE SOCIAL AND ECONOMIC IMPACT OF OIL INDUSTRY DEVELOPMENT IN ALBERTA, NEWFOUNDLAND, AND THE NORTH OF SCOTLAND
J.D. HOUSE, Univ. of Calgary, *Calgary, Alberta, Canada*

The project, which is part of a long-term research interest in the sociology of the petroleum industry, seeks to understand the dynamics by which a province or country is transformed through the discovery and development of its natural resources of oil and natural gas, under a system of competitive corporate capitalism regulated by competing local and central governments.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0033, CHEMISTRY AND TECHNOLOGY OF ALBERTA SOUR NATURAL GAS PROCESSING SYSTEMS
J.B. HYNE, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

1.0034, COMBUSTION PROPERTIES OF VARIOUS GASEOUS FUELS INCLUDING NATURAL GAS
G.A. KARIM, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

1.0035, THE MEDIUM-RUN SUPPLY OF CONVENTIONAL CRUDE OIL IN ALBERTA
A.J. MACFADYEN, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0036, RECOVERY OF BITUMEN FROM THE ATHABASCA OIL SANDS
R.G. MOORE, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

1.0037, THE COLLECTION OF FIELD DATA ON WATER CONTENT OF SOUR NATURAL GAS
R.G. MOORE, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

1.0038, REMOVAL OF HYDROCARBONS FROM AQUEOUS WASTE WATER FROM OIL SANDS RECOVERY OPERATIONS
E.L. TOLLEFSON, Univ. of Calgary, *Calgary, Alberta, Canada*

Results to date indicate that an activated carbon of moderate adsorption capacity can be produced from G.C.O.S. coke. Several activation methods have been tried. The coke is abrasion resistant, possesses good wettability in water, and contains 2-3 percent sulfur. The iodine number of the coke thus far made ranges between 220-400 (400 is about 1/3 - 1/2 the value of commercially available activated carbon products).

Equipment is now being set up to contact tar sands coke with 'polluted' water. A series of experiments should show the effectiveness of the activated carbon in removing the hydrocarbons from the water. Analyses before and after will also be made to determine if certain metal ions are reduced (in particular, Hg, V, Cr, Ni, Pb, Cd, and Zn).

Adsorption studies to be done will include the regeneration of activated carbon.

SUPPORTED BY Canada - Alberta Environmental Research Trust - Edmonton

1.0039, PETROLEUM ZONES OF WESTERN CANADA
N.L. BALL, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objective: To compile, in computer usable form, a file containing data on the major petroleum zones of Western Canada as part of a worldwide file being built by IFP of France, in order to examine the distribution and relationships to variables of oil and gas deposits. Potential plays of northern Canada will be compared to analogs in the file, with the hope of gaining insight into what may be found in lightly explored areas.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0040, FORAMINIFERAL ZONATION OF THE MESOZOIC AND LOWER CENOZOIC ROCKS OF THE MACKENZIE DELTA AND ADJACENT ARCTIC COASTAL PLAIN
T.P. CHAMNEY, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objective: Detailed biostratigraphic subdivision of the Mesozoic and lower Cenozoic rocks to aid explorations of the petroleum resources.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0041, SEDIMENTOLOGY OF SELECTED UPPER PALEOZOIC CARBONATES AND EVAPORITES, QUEEN ELIZABETH ISLANDS, ARCTIC ARCHIPELAGO
G.R. DAVIES, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To clarify selected aspects of carbonate and evaporite sedimentology in Upper Paleozoic rocks of the Queen Elizabeth Islands that relate to Basin development and porosity controls; specifically: 1. cementation and porosity development in Upper Paleozoic carbonate mounds (reefs); 2. identification of mound-building biota, and their role in development of carbonate build-ups; 3. depositional environment of evaporites, and their relationship to basin evolution.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0042, CLAY AND CLAY MINERALS INVESTIGATION
A.E. FOSCOLOS, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To improve and develop techniques for routine mineralogical and chemical analyses of clay; to develop better techniques for quantitative, semiquantitative and qualitative analyses of clays and clay minerals in sedimentary rocks; to conduct research relative to the crystal lattice structure of clay minerals. These studies should also determine those parameters that affect: 1) the degree of sediment diagenesis and oil generating potential; 2) migration of fluids from source rocks which carry heavy metals.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0043, CORRELATION OF HYDROCARBON OCCURRENCES AND THE NATURE OF DISPERSED ORGANIC MATERIAL IN THE MACKENZIE DELTA AREA
P.R. GUNTHER, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To correlate coal petrographic data to petroleum occurrences. The petrographic data includes vitrinite reflectance (used to determine coal rank) and evaluation of the nature of the dispersed organic material. Both reflected and transmitted light microscopy are required.

1. ORGANIC SOURCES OF ENERGY

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0044, A STUDY OF OPTICAL PROPERTIES OF SEDIMENTARY ORGANIC MATERIALS IN RELATION TO OIL AND GAS OCCURRENCES IN THE SVERDRUP BASIN
P.R. GUNTHER, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To evaluate the data from 54 samples already processed under a Hacquebard project (680102). They are Sverdrup Basin samples. To more fully investigate the total spectrum of microscopic organic materials using their measurable, maturable qualities to evaluate oil and gas potentials in the Sverdrup Basin.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0045, PETROLEUM GEOLOGY OF TERTIARY, MESOZOIC AND UPPER PALEOZOIC STRATA NORTH OF 70 DEGREES
N.E. HAIMILA, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objective: To provide a reliable and adequate data base for assessment of the area's hydrocarbon potential and to document proven and potential hydrocarbon occurrences in the area.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0046, PETROLEUM GEOLOGY OF DEVONIAN AND OLDER STRATA IN THE NWT AND NORTH OF 70 DEGREES
N.E. HAIMILA, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objective: To provide a reliable and adequate data base for assessment of the area's hydrocarbon potential and to document proven and potential hydrocarbon occurrences in the area.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0047, MESOZOIC PALYNOLOGY AND BIOSTRATIGRAPHY, ARCTIC ISLANDS
W.S. HOPKINS, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: Description of microfloras from Mesozoic rocks of the Sverdrup Basin. Establishment of sequence of floral zones necessary for biostratigraphic control in this region of active exploration for petroleum resources. Ultimately the project will allow description of floral evolution and migration through the Mesozoic and into the Tertiary.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0048, MESOZOIC AND TERTIARY ON THE WEST COAST OF VANCOUVER ISLAND AND IN QUATSINO SOUND
J.A. JELETZKY, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objective: A detailed stratigraphical-paleontological study with special attention to the Lower Cretaceous-Jurassic contact and possibilities of Tertiary strata with respect to oil and gas.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0049, BOOTHIA PENINSULA AND SOMERSET ISLAND (OPERATION BOOTHIA)
J.W. KERR, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To improve the understanding of the stratigraphy and structure of the region, which is a key area for information in both of these fields. The purpose is twofold: 1) to aid in evaluation of the resource potential, particularly petroleum and base metals, of this part of the North; and 2) to provide background knowledge and maps to assist in future natural gas pipeline construction.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0050, S.W. ELLESMERE - W. DEVON ISLANDS (OPERATION GRINNELL)
J.W. KERR, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To improve the understanding of the stratigraphy and structure of the region, which is a key area for information in both of these fields; a primary purpose is to aid in evaluation of the resource potential - particularly petroleum and base metals - of this part of the north.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0051, MISSISSIPPIAN PHYSICAL STRATIGRAPHY, SEDIMENTOLOGY AND CORRELATION
R.W. MACQUEEN, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objective: To determine the stratigraphic relationships and correlation of these strata including formational subdivision; their depositional diagenetic, and geochemical history; their macrofaunal and microfaunal content; and their potentialities as source rocks for oil and gas and their suitability as reservoirs for these fuels.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0052, EVALUATION OF CANADA'S PETROLEUM POTENTIAL
R.G. MCCROSSAN, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objective: To provide the necessary data base in support of departmental oil and natural gas energy programs and policy; to research methods for a basin-by-basin analysis of the liquid hydrocarbon reserves and/or potential in the sedimentary basins of Canada both onshore and offshore; to create and maintain an inventory of liquid hydrocarbon deposits in Canada.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0053, NORTHERN BASIN ANALYSIS PROGRAM - THOMSEN RIVER MAP-AREA
A.D. MIALL, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To provide a thorough understanding of the geological history of the sedimentary basins north of the 60th parallel of latitude, stressing the interrelationships of tectonics, sedimentation, biostratigraphy, geochemistry and hydrocarbon distribution. To evaluate the oil and gas potential of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0054, STRATIGRAPHY AND SEDIMENTOLOGY OF THE SEDIMENTARY SUCCESSION OF SOMERSET ISLAND AND BOOTHIA PENINSULA
A.D. MIALL, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To improve understanding of the stratigraphy and sedimentology of the region. The purpose is twofold: 1) to aid in the evaluation of the resource potential, particularly of petroleum and base metals; 2) to provide background knowledge to assist in future natural gas pipeline construction.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0055, GEOLOGY OF THE SOUTHERN ALBERTA FOOTHILLS, HIGHWOOD RIVER TO ATHABASCA RIVER
N.C. OLLERENSHAW, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To provide a new and improved basis for mineral evaluation and oil and gas development of the region, through the publication of new and revised geological maps and cross sections, on scale of 1:50,000; integrated analyses of surface and sub-surface geology; the description, correlation and facies relationships of all major rock units; and the description, genetic analysis and relationships of the major, structural elements. A secondary objective is to provide data for 1:250,000 scale map compilation (Project 690017) and regional structural syntheses.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0056, CRETACEOUS AND TERTIARY CONGLOMERATES AND SANDSTONES OF THE EASTERN CORDILLERA
N.C. OLLERENSHAW, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: The first objective is to answer some of the questions relating to the tectonic history of the eastern Cordillera, such as: the distribution, and tectonic implications of the Cretaceous and Tertiary conglomerate facies, the sequence and distribution of uplifts and the nature of the sedimentation pattern. The second objective is to provide the oil and gas industry with more facts on which to base the interpretation of the migration and present structural and stratigraphic distribution of hydrocarbons. The third objective is to analyse the relationship between tectonic activity and facies distribution in orogenic belts of the Rocky Mountains and Alpine types.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0057, ROCKY MOUNTAIN FOOTHILLS MAP AND CROSS-SECTION COMPILATION
N.C. OLLERENSHAW, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To provide a hitherto unavailable, comprehensive geological map and structure cross-section coverage on a scale of 1:250,000 of the Rocky Mountain Foothills of south and central Alberta, based on Geological Survey and company geologic and seismic data, through the liaison of the C.S.P.G. These maps and sections will be an invaluable direct, basic guide to mineral exploration and evaluation, in this active oil and gas development area, and indirectly through their contribution to the knowledge of Cordilleran tectonics.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0058, ORIGIN AND MIGRATON OF PETROLEUM IN WESTERN CANADA
T.G. POWELL, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objective: To develop a method of relating reservoired hydrocarbons to organic material in source rocks; to reconstruct the evolutionary history of the organic material; to determine the pattern of and timing of hydrocarbon migration and entrapment; and to evaluate the application of this type of geochemical investigation to the assessment of ultimate pooled hydrocarbon reserves in the study area as well as other basins.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0059, GEOCHEMISTRY OF WESTERN AND NORTHERN CANADA
T.G. POWELL, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objective: To determine presence or absence and quality of petroleum source rocks, product petroleum type so that reasonable gas/oil ratios may be used to calculate probable and/or maximum geothermal gradients so that temperature isotherms can be plotted and used to map probable petroleum regions; to quantitatively evaluate hydrocarbons dispersed in fine-grained rocks in order to estimate relative amounts of petroleum in various regions and plays.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0060, DIAGENESIS OF ORGANIC MATTER AND CLAY MINERALS IN SEDIMENTS IN RELATION TO PETROLEUM GENERATION
T.G. POWELL, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To correlate various methods of determining the diagenesis of sediments in relation to oil and gas source potential so that the accuracy of each can be determined. To define the ranges in which petroleum generation can be expected in each method. To estimate the relative effects of time and temperature on these parameters.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0061, HYDROCARBON GEOCHEMISTRY OF ARCTIC ARCHIPELAGO
T.G. POWELL, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To determine presence or absence and quality of petroleum source rocks and product petroleum type so that reasonable gas/oil ratios may be determined; to calculate probable and/or maximum maturation levels so that maturation isopleths can be plotted and used to map probable petroleum regions; to quantitatively evaluate hydrocarbons dispersed in fine grained rocks in order to estimate relative amounts of petroleum in various regions or plays.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0062, HYDROCARBON GEOCHEMISTRY OF CANADIAN EAST COAST OFFSHORE
T.G. POWELL, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To determine presence or absence and quality of petroleum source rocks and product maturation types so that reasonable gas/oil ratios may be determined; to calculate probable or maximum maturation levels so that maturation isopleths can be plotted and used to map probable petroleum regions; to quantitatively evaluate hydrocarbons dispersed in fine grained rocks in order to estimate relative amounts of petroleum in various regions or plays.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0063, USSR-CANADA EXCHANGE - HYDROCARBON GEOCHEMISTRY
T.G. POWELL, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To exchange information on methods of geochemical investigations of oil, gas and organic matter and application of their results of exploration and resource assessment. To gain a broader knowledge of geochemical criteria for petroleum generation and accumulation in various geological settings.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0064, OPERATION BOW - ATHABASCA
R.A. PRICE, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

1. ORGANIC SOURCES OF ENERGY

OBJECTIVE: To complete the systematic reconnaissance geologic study of the Rocky Mountains south of Lat. 53 degrees N, to obtain information on the character, structure, distribution, age, stratigraphic relationship, and origin of the bedrock of this area, and other geological data that are required to evaluate the mineral potentialities of the area and to assist in the exploration for oil, gas, coal, and other mineral deposits in this and adjacent areas.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0065, AAPG OIL AND GAS FIELD MAP AND DATA BANK OF NORTH AMERICA
R.M. PROCTER, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

To prepare a wall map of North America showing the distribution of all oil and gas pools as well as of the tectonic elements which are related to their regional location, and the creation of a geological data file of information on selected oil and gas field characteristics. This information may assist in the evaluation of Canada's petroleum potential.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0066, NORTHERN BASIN ANALYSES PROGRAM PEEL RIVER MAP-AREA
D.C. PUGH, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To provide a thorough understanding of the geological history of the sedimentary basins north of the 60th parallel of latitude, stressing the interrelationships of tectonics, sedimentation, biostratigraphy, geochemistry, and hydrocarbon distribution. To evaluate the oil and gas potential of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0067, NORTHERN BASINS ANALYSIS PROGRAM
K.J. ROY, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objective: To provide a thorough understanding of the geological history of the sedimentary basins north of the 60th parallel of latitude, stressing the interrelationships of tectonics, sedimentation, biostratigraphy, geochemistry, and hydrocarbon distribution. To evaluate the oil and gas potential of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0068, LOWER DEVONIAN (GEDINNIAN) BIOSTRATIGRAPHY AND BRACHIOPOD FAUNAS, PRINCE OF WALES AND BATHURST ISLANDS, DISTRICT OF FRANKLIN
R.E. SMITH, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: Refinement of the biostratigraphic zonation of lowermost Devonian rocks of part of the Innuitian Orogen, based on brachiopods, and establishment of their paleoecology and paleogeography. These objectives are expected to assist exploration for petroleum and other mineral resources in the Arctic Islands.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0069, REGIONAL DISTRIBUTION OF GASEOUS HYDROCARBONS IN THE NORTHWEST TERRITORIES AND WESTERN CANADA
L.R. SNOWDON, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objective: To extract hydrocarbon gases from drill cuttings from wells in the N.W.T. and western Canada in order to determine the level of thermal alteration of the sediments and to detect potential oil source rocks to aid in an estimate of the hydrocarbon potential in Arctic basins.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0070, DEVELOPMENT OF EXTRACTION, IDENTIFICATION AND CORRELATION SYSTEMS FOR ORGANIC COMPOUNDS FROM SEDIMENTARY ROCKS AND CRUDE OILS
L.R. SNOWDON, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To extract and separate organic compounds found in sedimentary rocks and crude oils in order to determine properties of crude oils, extractable oils and extractable protopetroleum, and to develop and apply techniques to specific problems for which the routine procedure is unsatisfactory.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0071, HYDROCARBON GEOCHEMISTRY OF NORTHERN INTERIOR PLAINS AND BEAUFORT SEA
L.R. SNOWDON, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To determine the presence or absence and quality of petroleum source rocks and product petroleum types so that reasonable gas/oil ratios may be determined; to calculate probable or maximum levels so that maturation isopleths can be plotted and used to map probable petroleum regions; to quantitatively evaluate hydrocarbons dispersed in fine grained rocks in order to estimate relative amount of petroleum in various regions or plays.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0072, CRETACEOUS STRATIGRAPHY, PEACE RIVER TO 60 DEGREES
D.F. STOTT, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To describe the stratigraphic successions, to collect samples for laboratory studies and to collect fossil flora and fauna; to provide data on the correlation of Cretaceous strata, their lateral variations, their potentialities as sources of oil and gas and their suitability as reservoirs for those fuels; to establish the relationships with equivalent successions studies between Peace and Smoky Rivers and in the region of Liard and Mackenzie Rivers.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0073, METHODOLOGY OF RESOURCE APPRAISAL OF OIL SANDS
D.F. STOTT, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To develop methods to acquire, interpret and manipulate surface and sub-surface data within a system that will provide rapid and accurate evaluations of the petroleum resources of oil sands and heavy oil deposits.

WORK: Development and testing of systems for the incorporation and retrieval of all available geological, petrophysical and engineering data in formats suitable for rapid statistical analysis; development and testing systems for the analysis of oil sands data leading to probabilistic estimates of the amounts, quality and spatial location of crude bitumen (both in-place and recoverable) and recoverable synthetic crude. These estimates must be in a form amenable to subsequent economic analysis in consideration of rates of supply and in a form consistent with heavy oil and conventional oil and gas estimation techniques.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0074, STRUCTURE AND STRATIGRAPHY OF WESTERN DEVON ISLAND
R. THORSTEINSSON, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: Improve the understanding of the age, structure, sequence, relationship, and thickness of bedrock formations with a view to helping assess the size, grade, mode of occurrence, origin and potentialities of any fuel or mineral deposits that may occur in the areas of investigations.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0075, PETROLEUM GEOLOGY OF TERTIARY AND MESOZOIC STRATA NORTH OF 64 DEGREES ON THE NWT MAINLAND AND YUKON
J.V. VANELSBERG, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objective: To provide a reliable and adequate data base for assessment of the area's hydrocarbon potential and to document proven and potential hydrocarbon occurrences.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0076, NORTHERN BASIN ANALYSIS PROGRAM - SLAVE RIVER MAP-AREA
G.K. WILLIAMS, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To provide a thorough understanding of the geological history of the sedimentary basins north of the 60th parallel of latitude, stressing the interrelationships of tectonics, sedimentation, biostratigraphy, geochemistry, and hydrocarbon distribution. To evaluate the oil and gas potential of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0077, NORTHERN BASIN ANALYSIS PROGRAM - REDSTONE RIVER MAP-AREA
G.K. WILLIAMS, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To provide a thorough understanding of the geological history of the sedimentary basin north of the 60th parallel of latitude, stressing the relationships of tectonics, sedimentation, biostratigraphy, geochemistry and hydrocarbon distribution. To evaluate oil and gas potential of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0078, NORTHERN BASIN ANALYSIS PROGRAM - GREAT BEAR RIVER MAP-AREA, (MESOZOIC)
G.K. WILLIAMS, Dept. Energy Mines & Resources, Inst. of Sed & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To provide a thorough understanding of the geological history of the sedimentary basins north of the 60th parallel of latitude, stressing the interrelationships of tectonics, sedimentation, biostratigraphy, geochemistry and hydrocarbon distribution. To evaluate the oil and gas potential of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0079, MESOZOIC STRATIGRAPHY AND BASIN ANALYSIS OF EASTERN SVERDRUP BASIN, ARCTIC ARCHIPELAGO
D.G. WILSON, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To provide a thorough understanding of the geological history of the Eastern Sverdrup Basin, stressing the interrelationships of tectonics, sedimentation, biostratigraphy, geochemistry, and hydrocarbon distribution. To evaluate the oil and gas potential of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0080, NORTHERN BASIN ANALYSIS PROGRAM - FIRTH RIVER AND HORTON RIVER MAP-AREAS
F.G. YOUNG, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To provide a thorough understanding of the geological history of the sedimentary basins north of the 60th parallel of latitude, stressing the interrelationships of tectonics, sedimentation, biostratigraphy, geochemistry, and hydrocarbon distribution. To evaluate the oil and gas potential of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0081, BIOSTRATIGRAPHIC ZONATION (FORAMINIFERA-OSTRACODA) OF THE MESOZOIC AND CENOZOIC ROCKS OF THE ATLANTIC SHELF
P. ASCOLI, Dept. Energy Mines & Resources, Atlantic Geoscience Centre, *Dartmouth, Nova Scotia B2Y 4A2, Canada*

OBJECTIVE: To determine the biostratigraphic zonation (foraminifera) of the Mesozoic and Cenozoic rocks in offshore wells to form the basis of local, regional, and worldwide correlation, and to accurately reconstruct geological events and ecological environments to aid in the economic evaluation of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0082, SUBSURFACE GEOLOGY OF THE PALEOZOIC BASINS OF EASTERN CANADA
R.D. HOWIE, Dept. Energy Mines & Resources, Atlantic Geoscience Centre, *Dartmouth, Nova Scotia B2Y 4A2, Canada*

OBJECTIVE: By the microscopic examination of sample cuttings and cores from wells drilled for oil and gas aided by geophysical profiles to establish lithostratigraphic and tectonic framework of Eastern Canada Paleozoic basins. To more accurately predict the possible habitat of oil and gas, thus to facilitate the calculation of potential hydrocarbon resources.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0083, HYDROCARBON GEOCHEMICAL ANALYSIS OF SAMPLES FROM EASTERN OFFSHORE WELL SAMPLES - GASEOUS HYDROCARBONS AS A MEASURE OF OIL AND GAS POTENTIAL
J.D. LEONARD, Dept. Energy Mines & Resources, Atlantic Geoscience Centre, *Dartmouth, Nova Scotia B2Y 4A2, Canada*

OBJECTIVE: The general objective is to provide the geochemical data for the estimation of offshore oil and gas potential.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0084, ORGANIC GEOCHEMISTRY RELATED TO THE PETROLEUM POTENTIAL - ATLANTIC COAST OF CANADA
L.P. PURCELL, Dept. Energy Mines & Resources, Atlantic Geoscience Centre, *Dartmouth, Nova Scotia B2Y 4A2, Canada*

OBJECTIVE: To integrate data generated from samples submitted from industry with geological data to aid basin analysis and hydrocarbon inventory.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0085, HYDROCARBON GEOCHEMICAL ANALYSIS OF EASTERN OFFSHORE WELL SAMPLES (HEAVY HYDROCARBONS AS SOURCE AND MATURITY INDICATORS)
M.A. RASHID, Dept. Energy Mines & Resources, Atlantic Geoscience Centre, *Dartmouth, Nova Scotia B2Y 4A2, Canada*

1. ORGANIC SOURCES OF ENERGY

OBJECTIVE: To provide comprehensive geochemical data for the evaluation of the oil and gas potentials of the eastern offshore areas.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0086, BIOSTRATIGRAPHIC ZONATION (PALYNOLOGY) OF THE MESOZOIC AND CENOZOIC ROCKS OF THE ATLANTIC SHELF

G.L. WILLIAMS, Dept. Energy Mines & Resources, Atlantic Geoscience Centre, *Dartmouth, Nova Scotia B2Y 4A2, Canada*

OBJECTIVE: To determine the biostratigraphic zonation (palynology) of the Mesozoic and Cenozoic rocks in offshore wells to form the basis of local, regional, and worldwide correlation, and to accurately reconstruct geological events and paleoclimatic environments, to aid in the economic evaluation of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0087, HYDROGEOLOGICAL EVALUATION OF THE ATHABASCA OIL SANDS

D.A. HACKBARTH, Alberta Groundwater Division, *Edmonton, Alberta, Canada*

SUPPORTED BY Canada - Alberta Provincial Government - Edmonton

1.0088, TELEMETRY SYSTEMS AND RESOURCE RECOVERY UTILIZING ELECTRICAL TECHNOLOGY

F.S. CHUTE, Univ. of Alberta, School of Graduate Stu. & Res., *Edmonton, Alberta, Canada*

CURRENT RESEARCH AND OBJECTIVES: 1. Telemetry systems for environmental and wildlife management: investigations related to the application of the state-of-the-art communications techniques to the development of telemetry systems for environmental and wildlife monitoring. 2. Resource recovery utilizing electrical technology: the development of alternative recovery methods in the Athabasca Tar Sands.

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

1.0089, PETROLEUM ENGINEERING

P.M. DRANCHUK, Univ. of Alberta, School of Graduate Stu. & Res., *Edmonton, Alberta, Canada*

CURRENT RESEARCH AND OBJECTIVES: Current research deals with a variety of Petroleum Engineering topics. Laboratory studies are being conducted in the area of liquid gas and two-phase flow through porous media, pattern flooding, and modified waterflooding. Theoretical studies are being conducted in flow through conduits, natural gas behavior, and bottom hole pressure analysis. The matters of resource economics and exploitation strategies are also being investigated.

ADDENDA: This project is also supported by: Department of Energy, Mines and Resources and Petroleum Aid to Education Fund.

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

1.0090, UNIQUE TECHNIQUES OF RECOVERY OF VERY VISCOUS CRUDE OILS AND/OR BITUMEN

D.L. FLOCK, Univ. of Alberta, School of Graduate Stu. & Res., *Edmonton, Alberta, Canada*

CURRENT RESEARCH AND OBJECTIVES: Current research deals with the study of unique techniques of recovery of very viscous crude oils and/or bitumen from the oil sands of Alberta. The study involves mathematical modeling of thermal behaviour, a laboratory study of the effect of certain chemicals on interfacial and surface phenomena in porous media and a laboratory study of the use of steam and/or sodium hydroxide or high viscosity polymer solutions in the displacement of very viscous crude oil from porous media.

ADDENDA: This project is also supported by: Chevron Oil Field Research and Petroleum Aid to Education Fund.

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

1.0091, GOVERNMENT INITIATIVE AND RESPONSE IN THE PETROLEUM SECTOR - CANADA AND NORWAY, A COMPARATIVE STUDY

R. MORSE, Univ. of Alberta, *Edmonton, Alberta, Canada*

To note and compare the international and domestic (non-governmental as well as governmental) pressures potentially having an impact on energy developments in selected areas of the two countries; to analyze Canadian/Norwegian government/industry response to these pressures; to analyze Canadian/Norwegian government/industry attitudes re. state/private development of fossil fuel reserves; to use the data gathered to define and explain government/industry positions in Canada/Norway comparatively, as well as to suggest possible areas of mutual concern.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0092, A STUDY OF THE EQUILIBRIUM PHASE PROPERTIES OF HYDROCARBON AND RELATED SYSTEMS

A.B. ROBINSON, Univ. of Alberta, School of Engineering, *Edmonton, Alberta, Canada*

ADDENDA: This project is also supported by: Alberta Research Council, Canadian Natural Gas Processing Association, Gas Processors Association, Hydrocarbon Research Center.

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

1.0093, REVIEW OF POLLUTANT TRANSFORMATION PROCESSES IN THE ALBERTA OIL SANDS AREA--PART OF THE ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

O.P. STRAUSZ, Univ. of Alberta, *Edmonton, Alberta, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0094, STUDIES IN PHOTOCHEMISTRY AND CHEMICAL KINETICS

O.P. STRAUSZ, Univ. of Alberta, *Edmonton, Alberta, Canada*

Kinetic mechanistic investigations are being continued on several thermal and photochemical decompositions, rearrangements, energy transfer processes, the chemistry of atoms, free radicals, ions and other unstable intermediates. The techniques employed involve conventional gas and condensed phase thermolysis, low temperature matrix isolation, photolysis and flash photolysis in the near and vacuum ultraviolet region with kinetic optical spectroscopy and mass spectrometry. A nanosecond laser flash photolysis apparatus is also under construction. Efforts are currently concentrated on the following projects: the role of oxirenes in the decomposition of diazoketones, diazoesters and ketenes and the chemistry of oxirene; the generation and chemistry of the monovalent carbon radicals, carbynes; the chemistry of thiirenes; the reactions of group VIa atoms and various excited metal atoms; the decomposition of silicon hydrides, hydrocarbons, episulfides, mercaptans and the chemistry of silicon hydride free radicals; the chemistry of SH and the reactions of H atom with organosulfur molecules for the elucidation of the mechanism of hydrodesulfurization in petroleum refining.

The experimental data are correlated with theoretical results obtained from absolute rate theory and molecular orbital computation, H/D kinetic isotope effects are investigated by experimental and theoretical means and potential energy hypersurfaces computed for a number of reactions using semiempirical as well as ab initio molecular theories.

SUPPORTED BY No Formal Support Reported

1.0095, NEW METHODS OF GUIDING, FOCUSSING AND CONFINING HEAVY CHARGED PARTICLES (ABBREV)
F. VERMEULEN, Univ. of Alberta, *Edmonton, Alberta, Canada*

A helical electrostatic field is produced by uniformly twisting a quadrupole about its longitudinal axis. The particle focussing, guiding and confinement properties of this structure are studied analytically and by experiment.

A prototype accelerator is being studied in which a particle of arbitrary charge to mass ratio programs each accelerating gap it approaches so that it experiences synchronous acceleration.

The dissipate and dielectric properties of bitumen-sand mixtures and studied over a large frequency range.

The recovery of bitumen from bitumen-sand mixtures by direct electrical methods is studied.

SUPPORTED BY No Formal Support Reported

1.0096, PRELIMINARY SITE SELECTION IN THE HALIFAX AREA FOR APPLICATION OF COAL-IN-OIL TECHNOLOGY IN OIL-FIRED BOILERS - PHASE I
UNKNOWN, Maclaren Atlantic Limited, *Halifax, Nova Scotia, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0097, MICROBIAL ENZYMATIC COLD WATER EXTRACTION PROCESS FOR THE EXTRACTION OF BITUMEN FROM THE BITUMINOUS SANDS OF ALBERTA
J.E. ZAJIC, Univ. of Western Ontario, *London, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0098, DETERMINATION OF THE COMBUSTION CHARACTERISTICS OF AN OIL-SAND MIXTURE
UNKNOWN, Trecan Limited, *Mississauga, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0099, EVALUATION OF RESIDUAL DESULPHURIZATION PROCESSESS FOR PETROLEUM REFINERIES
UNKNOWN, S N C & F W Limited, *Montreal, Quebec, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0100, REVIEW OF SPRAY ON, OR GROUTING SEALANTS FOR, PETROLEUM PRODUCT STORAGE AREAS AND DYKES IN THE ARCTIC AND SUB-ARCTIC AREAS
UNKNOWN, Acres Consulting Services Ltd., *Niagara Falls, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0101, SITE INVESTIGATIONS IN PERMAFROST AREAS
G.H. JOHNSTON, Research Council of Canada, Div. of Building Research, *Ottawa, Ontario, Canada* (110246 (HRB NO.))

Site selection techniques, methods and equipment are being developed obtaining sub-surface information in permafrost areas. Data is being collected on permafrost conditions at various locations in the permafrost region of Canada for engineering purposes. /RTAC/

Reports issued: Evaluation of In Situ Creep Properties of Frozen Soils with the Pressuremeter, B. Ladanyi and G.H. Johnston, 2nd Intl. Conf. on Permafrost, Yakutsk, U.S.S.R., July 1973. Environmental Conditions Influencing Arctic Decisions and Design Criteria, J. Hnatiuk and G.H. Johnston, Conf. on 'Oil and Gas: Problems and Possibilities', Le Havre, France, May 1973.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

1.0102, CATALYTIC HYDRODENITRIFICATION
R.S. MANN, Univ. of Ottawa, *Ottawa, Ontario, Canada*

The object of the proposed research is to investigate the kinetics of the hydrodenitrification of several representative nitrogen-containing compounds, like pyridine, quinoline, pyrrole, carbazole, etc. over suitable catalysts and study the effect of several process variables on the conversion and yield. Kinetic analysis of experimental data would ultimately help in better understanding of the functions of various catalysts towards various type of reactions. Suitable practical catalysts with high stability and resistance to poisoning would be developed for hydrodenitrification of petroleum feed stocks.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0103, SURFICIAL GEOLOGY, GEOMORPHOLOGY AND TERRAIN PERFORMANCE OF MELVILLE ISLAND
D.M. BARNETT, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To map, describe and explain the surface and near-surface materials, landforms, permafrost conditions and other aspects of the geomorphology on a reconnaissance scale, with particular reference to terrain information pertinent to the implementation of the Territorial Land Use Regulations, and to petroleum exploration and associated activities.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0104, OFFSHORE QUATERNARY GEOLOGY, ARCTIC ISLAND CHANNELS
B.D. BORNHOLD, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To investigate the submarine unconsolidated deposits, geomorphic and structural features of the Arctic island channels in order to: 1) provide areal geological knowledge including distribution of materials and the Quaternary stratigraphy and history; 2) to identify the sedimentary and geomorphic processes controlling sediment distribution, seabed stability and disturbances; and 3) to assemble regional environmental geology data base relative to areas of potential development, e.g., pipeline crossings, harbours and landing areas, offshore petroleum exploration and production areas, ship channels and anchorages, etc.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0105, OPERATION STRAIT OF BELLE ISLE
L.M. CUMMING, Dept. Energy Mines & Resources, Regional & Econ. Geology Div., *Ottawa, Ontario K1A OE8, Canada*

Objective: To determine the structure and origin of Strait of Belle Isle for possible future engineering works and to assess petroleum and mineral potential of the operation area.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0106, CENTRAL FOOTHILLS OF ALBERTA
R.J. DOUGLAS, Dept. Energy Mines & Resources, Director Generals Office, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: (1) Standard 1 mile mapping with emphasis on stratigraphy and structure; revision of mapping by B.R. Mackay; oil, gas and coal potentialities. (2) To prepare for publication available geological data on 83 C/15 and 83 F/2; and revise in light of drilling 83 C/8, 9, 10E 1/2.

1. ORGANIC SOURCES OF ENERGY

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0107, NATURAL GAS AND HELIUM EVALUATION
R.G. DRAPER, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

This project involves the analysis of natural gases for hydrocarbon species as well as the sour and inert gases; the necessary field work to ensure that the samples are representative and that the geological information and location are correctly represented; the marshalling of the data in a form that will facilitate sorting and correlation of the various properties of the gases that are of particular importance to specific types of utilization. The technical objective is to secure the basic technical data characterizing the Canadian natural gas resources in a form that may be used by industry and government for future planning. To carry out this essential function, continuous research to improve the analytical methods for isolating and characterizing the various gaseous compounds is required.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0108, CRUDE OIL QUALITY EVALUATION
R.G. DRAPER, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

This project involves the analysis of liquid hydrocarbons for hydrocarbon species and sour and inert gases. Representative samples will be sought. Characterization of these liquids by chemical compounds is not possible owing to the extremely large number of compounds present. Consequently, an inspection type of analysis has to be performed. The technical objective is essentially to secure the basic data concerning Canadian liquid hydrocarbons and put them in a form that may be used by industry and government for future planning.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0109, HEAVY OIL, BITUMEN, VEIN HYDROCARBONS
R.G. DRAPER, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

This project involves analyzing the heavy oils and bitumens of Canada. The technical objectives fall into three categories characterizing heavy oil and bitumens as an aid to pilot plant processing, characterizing these substances in a manner which has the greatest possible significance from a geological point of view and, finally, characterizing these materials in a manner that will correctly indicate their future industrial potential.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0110, OIL SHALE EVALUATION
R.G. DRAPER, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

This project involves characterizing shale oil in a manner which has the greatest possible significance from a geological point of view and that will correctly indicate their future industrial potential.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0111, IN-SITU RECOVERY PARAMETERS
D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To develop the technical framework by 1985 that will provide a basis for reasonable policy options to be formulated for the future development of the tar sands for domestic use and possible export.

WORK: Studies of the performance of a physical laboratory model of tar sand when subjected to conditions corresponding to underground combustion and steam flooding and other secondary and tertiary recovery methods to determine the parameters necessary to characterize the energy requirements and oil yield. This is a Research Agreement Program Project.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0112, NEAR SURFACE MINING SYSTEMS
D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To develop the technical framework by 1985 that will provide for reasonable policy options to be formulated for the future development of the tar sands for domestic use and possible export.

WORK: Development of knowledge base and in-house expertise that will enable the viability of underground mining recovery techniques to be evaluated with respect to mining hazards, productivity, and environmental impact.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0113, OPEN PIT MINING SYSTEMS
D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To develop the technical framework by 1985 that will provide a basis for reasonable policy options to be formulated for the future development of the tar sands for domestic use and possible export.

WORK: Identification of the main problem areas in mining tar sand by open pit method to a depth of 250 feet, including water control, slope control, control of disturbance of the face to facilitate mining dyke stability, tailings dams, and disposal systems. Also identification of potential areas of joint research with industry and the provincial government.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0114, CANADIAN PARTICIPATION IN THE INTERNATIONAL ENERGY AGENCY
D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To investigate, by 1982, gasification and liquefaction processes utilizing Canadian energy resource commodities, in cooperation with the provincial governments and industry, in order to select process options for demonstration scale gasification plants for the alleviation of near and mid-term deficiencies of natural gas and liquid fuels, and to provide a source for the generation of hydrogen for processing tar sands.

WORK: The federal government participates in four IEA services which foster international cooperative coal R/D and information dissemination. These are: 1. The Economic Assessment Service. 2. The World Coal Resources and Reserves Data Bank Service. 3. The Coal Technical Information Service. 4. The Mining Technology & Clearing-house Services.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0115, ENVIRONMENTAL GEOLOGY - ATHABASCA TAR SANDS DEVELOPMENT
J.E. HARRISON, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

Objective: 1) To evaluate the need for information on terrain conditions involved in tar sands development and implement a program to provide that data; 2) to develop an understanding of the natural physical processes affecting the tar sands area and the interrelationship of these with development, operations and subsequent land use.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0116, SURFICIAL GEOLOGY AND LAND CLASSIFICATION, MACKENZIE VALLEY TRANSPORTATION CORRIDOR (SOUTHERN PART)

R.J. HAWES, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To map, describe, and explain the unconsolidated deposits, landforms, permafrost, ground ice, and organic (muskeg) cover of the Mackenzie Valley Transportation Corridor (southern part) in order to (1) provide areal knowledge of geology and terrain, bearing particularly in mind the needs of government for terrain information in connection with land-use planning, pipeline proposals and other aspects of petroleum development and engineering construction; and (2) determine the Quaternary history of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0117, SURFICIAL GEOLOGY AND GEOMORPHOLOGY OF CENTRAL ELLESMERE ISLAND

D.A. HODGSON, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

Objective: To provide an inventory of surficial materials, landforms, geomorphic processes (active and inactive) and permafrost conditions, with particular reference to terrain information pertinent to the implementation of Territorial Land Use Regulations and to the effects on the terrain of petroleum exploration and associated activities.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0118, FEDERAL-PROVINCIAL AEROMAGNETIC SURVEYS - LABRADOR, MELVILLE PENINSULA, AND COPPERMINE AREAS

P. HOOD, Dept. Energy Mines & Resources, Resources Geophy. & Geoch. Div, *Ottawa, Ontario K1A OE8, Canada*

Objective: 1. To provide the Geological Survey of Canada with adequate aeromagnetic maps of areas selected on the basis of the needs of Regional and Economic Geology Division in relation with the mapping program. 2. To provide the mining and oil industries with basic information which could help in orienting their mineral exploration program.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0119, FEDERAL-PROVINCIAL AEROMAGNETIC SURVEYS - KEEWATIN AND MACKENZIE

P. HOOD, Dept. Energy Mines & Resources, Resources Geophy. & Geoch. Div, *Ottawa, Ontario K1A OE8, Canada*

Objective: To provide the Geological Survey of Canada with adequate aeromagnetic maps as an aid in orienting the geological mapping program. 2. To provide the mining and oil industries with an aid in exploration and geological research.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0120, FEDERAL-PROVINCIAL AEROMAGNETIC SURVEY - QUEBEC

P. HOOD, Dept. Energy Mines & Resources, Resources Geophy. & Geoch. Div, *Ottawa, Ontario K1A OE8, Canada*

Objective: To provide the GSC and the Department of Natural Resources of Quebec with adequate aeromagnetic maps as an aid for orienting their geological mapping programs. To provide the mining and oil industries with an aid in mineral exploration and geological research.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0121, SURFICIAL GEOLOGY AND LAND CLASSIFICATION, MACKENZIE VALLEY TRANSPORTATION CORRIDOR

O.L. HUGHES, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

Objective: To map, describe and explain the unconsolidated deposits, landforms, permafrost, ground ice, and organic (muskeg) cover of the Mackenzie Valley Transportation Corridor in order to: (1) provide areal knowledge of geology and terrain, bearing particularly in mind the needs of government for terrain information in connection with land-use planning, pipeline proposals and other aspects of petroleum development, and engineering construction; and (2) determine the Quaternary history of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0122, SURFICIAL GEOLOGY AND GEOMORPHOLOGY - MACKENZIE BAY-CONTINENTAL SHELF

C.F. LEWIS, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

Objective: To map, describe and explain the unconsolidated deposits, associated organic remains, geomorphic and structural features, and permafrost occurrence on the Continental Shelf, Mackenzie Canyon and offshore part of the Mackenzie Delta in order to: (1) provide areal geological knowledge including information required in connection with petroleum exploration and production; (2) determine Quaternary stratigraphy and history; and (3) identify the sedimentary and geomorphic processes operating in the area.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0123, SUB-SEABOTTOM PERMAFROST DISTRIBUTION IN THE SOUTHERN BEAUFORT SEA

H. MACAULAY, Dept. Energy Mines & Resources, Resources Geophy. & Geoch. Div, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To provide an inventory of permafrost conditions in an area of active oil and gas exploration with the goal of understanding the environment of hydrocarbon resources. To prepare a map of sub-seabottom permafrost distribution in the southern Beaufort Sea from seismic record data acquired by the major oil companies who hold leases in the area.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0124, BLUE FLAME

E.R. MITCHELL, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

Having the capability to measure the fluid mechanics of flames it has been found that aerodynamics has an overwhelming influence on chemical kinetics and heat transfer. This is achieved through control of the oxygen diffusion mechanism which has resulted in the production in the laboratory, on a small scale, of a clean flame called a 'blue flame' when burning No. 2 furnace oil. This concept is being applied to large burners and lower grade (quality) fuels by rationalizing burner designs using the flame research tunnel furnace.

An attempt will be made to develop a standard burner-design criterion based on either momenta ratio or swirl number.

The present, small-scale blue flame will be developed into a commercial burner for domestic space heating.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0125, COMBUSTION PROCESS PHENOMENA

E.R. MITCHELL, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

1. ORGANIC SOURCES OF ENERGY

Fundamentals, elucidated from basic research, are related to practice in overall combustion phenomenological studies in both dry and slagging systems using a laboratory research boiler. The mode of transport of alkali ash constituents, mechanism of ash deposition, control of electrical resistivity of particulates for efficient separation in gas streams, SO2 to SO3 conversion, NO to NO2 conversion and decay, rate of acid build-up, and many more are rationalized. The resulting criteria are applied to the design of combustion systems for burning all fuels (coal, lignite, crude oil, residual oil, refined oil, natural gas, and wastes) for power generation, industrial steam raising, and heat processes.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0126, IMPROVED HEAT RECOVERY SYSTEMS
E.R. MITCHELL, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To optimize conditions for efficient operation of conventional domestic oil heating systems control of variables such as furnaces operating conditions, air circulation, filtering and insulating characteristics, and to develop and demonstrate new allied technologies including oil burner heat recovery systems.

WORK: Development of a fuel gas heat recovery unit for domestic heating systems using the heat pump principle.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0127, IMPROVEMENT OF FLAME CONTROL SYSTEMS
E.R. MITCHELL, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To optimize conditions for efficient operation of conventional domestic oil heating systems control of variables such as furnace operating conditions, air circulation, filtering and insulating characteristics, and to develop and demonstrate new allied technologies including oil burner and heat recovery systems.

WORK: Development of 'blue-flame' detection system by the adaption of photo-electric flame detector to transparent flames.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0128, TRANSFER OF DOMESTIC FLAME OPTIMIZATION TECHNOLOGY TO INDUSTRY
E.R. MITCHELL, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To optimize conditions for efficient operation of conventional domestic oil heating systems control of variables such as furnace operating condition, air circulation, filtering and insulation characteristics, and to develop and demonstrate new allied technologies including oil burner heat recovery systems.

WORK: This project deals with the testing of 'blue-flame' burner prototypes, the licensing of Canadian companies for manufacture of 'blue-flame' burners and encouragement of industry to upgrade burners and furnaces by applying 'blue-flame' technology wholly or partly. Blue-flame technology was developed by the Department of Energy, Mines and Resources.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0129, THERMAL AND CATALYTIC HYDROCRACKING (EXTENDOIL)
D.S. MONTGOMERY, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To investigate, by 1981, in time to contribute to the third generation tar sand processing development and in cooperation with other interested agencies (provinces, industry, etc.), various processes for the extraction and refining of bitumen and heavy oils in order to select the best options for demonstration-scale projects, and to assist in the formulation of government policy leading to a maximum liquid yield form these resources with minimum resultant impact on the environment.

WORK: The crude oil produced from the tar sands by in-situ production methods, water separation schemes or by pyrolysis, as in the Lurgi process, contain a large proportion of impurities such as 4 percent sulphur, 200 ppm vanadium, 75 ppm nickel, and nitrogen, which have to be removed. The objective of these projects is development of refining method which will remove these impurities ad provide a higher liquid yield than the conventional coping methods now used. In addition it will provide a wider opportunity to substitute coal to achieve higher oil yields. Specifically, the projects will determine fundamental hydrocracking process on the scale of 1 barrel per day that will permit the rational design of larger demonstration and full scale plants (100,000 hpd) (Extendoil) to refine bitumen from the tar sands and heavy oils.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0130, LURGI RUHR-GAS FEASIBILITY STUDY
D.S. MONTGOMERY, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To investigate, by 1981, in time to contribute to the third generation tar sand processing development and in cooperation with other interested agencies (provinces, industry, etc.), various processes for the extraction and refining of bitumen and heavy oils in order to select the best options for demonstration-scale projects, and to assist in the formulation of government policy leading to a maximum liquid yield from these resources with a minimum resultant impact on the environment.

WORK: Analysis of the heat balance and thermal requirements of this process to assess its merits relative to the water separation processes. This information is to assist the Alberta Oil Sand Technology and Research Authority in its more comprehensive evaluation off this process for heating surface mined tar sand.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0131, BITUMEN SEPARATION PROCESSES
D.S. MONTGOMERY, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To investigate, by 1981, in time to contribute to the third generation tar sand processing development and in cooperation with other interested agencies (provinces, industry, etc.), various processes for the extraction and refining of bitumen and heavy oils in order to select the best options for demonstration-scale projects, and to assist in the formulation of government policy leading to a maximum liquid yield from these resources with a minimum impact on the environment.

WORK: The problem of separation of the bitumen from the sand is presently (1976/77) being approached in 4 'new' ways in addition to the hot water separation method employed currently by Great Canadian Oil Sands. Three of these are being done by contracts. They are as follows: development of a cold water energy-saving and relatively non-polluting process, a fundamental study involving solvent extraction and shear phenomena to provide scale-up data, and separation by microbiological action to further improve the cold water process, NRC is currently developing in-house a spherical agglomeration process for the extraction of bitumen and combination of sand and clay for reduced environmental pollution.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0132, DESULPHURIZATION OF PETROLEUM FLUID COKE
B.N. NANDI, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The growing air pollution problems in the cities necessitate the desulphurization of petroleum feed stocks. Using present technology, this requires a greater production of high-sulphur content fluid coke. The problem is to find new techniques to desulphurize this material in the metallurgical industry.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0133, QUATERNARY GEOLOGY-TERRAIN INVENTORY, BOOTHIA PENINSULA, NORTHEAST KEEWATIN, SOMERSET AND PRINCE OF WALES ISLANDS

J.A. NETTERVILLE, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To finalize maps and prepared detailed summary reports for publication utilizing data collected under Projects 740074, 750071, and related projects, which include information on the unconsolidated deposits, landforms, permafrost, ground ice, soils and vegetation cover, in order to: 1) provide areal knowledge of geology and terrain as background information relevant to land use planning and various aspects of petroleum exploration and related activities and engineering construction; 2) provide data relevant to terrain sensitivity rating; and 3) explain the Quaternary history of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0134, BENCH SCALE EVALUATION OF CATALYSTS AND CATALYTIC PROCESSES FOR REMOVING IMPURITIES FROM HEAVY FUEL OILS

B.I. PARSONS, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The objectives are (1) Improved techniques for refining low-quality crude oils by low pressure hydrogenation schemes. The low pressure approach was chosen as, from an economy standpoint, industry will not consider high pressure procedures at this stage of development.

The bench scale program operates in advance of the pilot plant research with a view to charting the course for the larger scale experiments to follow. Four rigs are in operation on various problems and two are automated for continuous catalyst life testing experiments. Catalyst activity and life is studied along with methods of minimizing gas losses and coke formation.

Improved catalysts for refining heavy fuel oils-low-grade residual oils contain metallic impurities (and frequently clay and mineral matter) which poison or promote coking on the surface of conventional catalysts and seriously reduce their effectiveness. The experimental program in this project is concerned with the development of long-lived species of catalysts specifically resistant to the coking and tarring of the asphaltic fractions. At the present time the emphasis is one the development of low-density catalyst forms for liquid phase hydrogenation and hydrocracking.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0135, PILOT PLANT SCALE CATALYST SLURRY HYDROGENATION PROCESS

B.I. PARSONS, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The objective is to determine by continuous pilot scale experiments the product quality and yield and the catalyst activity and life when refining low-grade crudes and bitumens. As the feed material is very likely to contain metal contaminants and mineral matter, which would poison and plug the pores of conventional pelleted catalysts reducing their activity, the slurry process using inexpensive powdered catalyst was chosen for this work. Mineral matter along with spent catalyst can be continually removed and replaced with fresh catalyst while the plant is in operation. Any range of pressures can be tested up to 10,000 psi. The oil industry is keenly interested in this procedure.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0136, PILOT PLANT SCALE FIXED CATALYST BED HYDROGENATION PROCESS

B.I. PARSONS, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The Fuels Research Centre has a facility for testing the refining of crude oil fractions or coker distillates by continuous fixed bed pilot plant scale experiments. The hydrodesulphurization of oils has been thoroughly studied using this process and the effect of the operating variables, pressure, temperature, throughput and catalyst studied. This process is used for final refining of pre-heated crude oils.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0137, GASEOUS FLUID BED PROCESSING OF HEAVY FUEL OILS

B.I. PARSONS, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The objective is to provide reliable data for predicting the behaviour of catalysts and Canadian charge stocks in commercial fluid catalytic cracking units, but requiring only small amounts of feed stock, catalyst and manpower for operation. The equipment is capable of operating at pressures up to 1500 psi which will permit investigation of hydrogenation reactions in a fluidized catalyst bed. The unit has both a once-through batch catalyst circulation system and a continuous catalyst recirculation and regeneration system. This is the only pilot plant in existence in Canada capable of conducting pressure, fluid hydro-cracking experiments and it will assist in the developement of Canada's large bituminous sand and low-grade crude areas.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0138, DISTILLATION

B.I. PARSONS, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The processses of separation of hydrocarbon material into simpler products form the 'backbone' of refining technology. Distillation is the principal separation process. Not only is distillation used to obtain the primary or virgin petroleum products, it is also used to prepare feed stocks for, and recover secondary products from, thermal and catalytic conversion processes. It acts as a support project for the other work of the Petroleum Processing sub-activity and is an absolute necessity in this regard.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0139, QUATERNARY GEOLOGY, BEAUFORT-MACKENZIE

V. RAMPTON, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To map and explain Quaternary deposits and land forms in order to: (1) establish their sequence and age and outline the history of preglacial, interglacial, glacial and postglacial events; and (2) provide areal and stratigraphic geological information including data applicable to permafrost and engineering studies and petroleum development.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0140, LOWER PALEOZOIC GEOLOGY OF EASTERN CANADA

B.V. SANFORD, Dept. Energy Mines & Resources, Regional & Econ. Geology Div., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: 1) To continue detailed and regional studies of lower Paleozoic terrain of eastern Canada, (I) in northern and eastern offshore regions, reconnaissance mapping on an opportunity basis and (II) in the southern regions, detailed mapping when required for terrain studies. 2) To study all data that become available from petroleum exploration for purposes of hydrocarbon evaluation of the frontier basins.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0141, CHARACTERIZATION OF THE ASPHALTENE COMPOUNDS OF BITUMINOUS SUBSTANCES

H. SAWATYKY, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

1. ORGANIC SOURCES OF ENERGY

The technical objective is to study the sulphur linkages in the asphaltenes by degradation techniques.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0142, CHARACTERIZATION OF THE SULPHUR COMPOUNDS IN THE MIDDLE DISTILLATE BOILING RANGE - ATHABASCA BITUMEN
H. SAWATYKY, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The technical objective is to isolate the compounds containing sulphur in the dicyclic aromatic class in Athabasca bitumen.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0143, SURFICIAL GEOLOGY INVENTORY - BANKS ISLAND
J.S. VINCENT, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To map, describe and explain the unconsolidated deposits, landforms, permafrost, ground ice, and organic cover in order to: 1) provide areal knowledge of geology and terrain that will aid in the implementation of the Territorial Land Use Regulations, be pertinent to engineering construction, petroleum exploration and related activities, and provide data relative to terrain sensitivity rating; and 2) determine the Quaternary history of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0144, TREATMENT OF TAR SANDS TAILINGS WITH FLY ASH
N.N. BAKHSHI, Univ. of Saskatchewan, *Saskatoon, Saskatchewan, Canada*

The main objective is to find the best method to use fly ash, activated fly ash and coke (all produced at the plant site) to treat the tailings from the tar sands operations.

Preliminary work has shown that fly ash treatment of tailings streams improves the characteristics of the tailings so that the slurry can be filtered easily. The result is a clear filtrate that can be recycled into the operation and a fairly dry filter cake that can be stacked, or used as land refill.

An attempt will be made to understand the mechanism of the action of the fly ash on the tailings during the treatment process. It may also be possible to study the regeneration of fly ash by calcining (converting to a powder by use of heat) the filter cake and reusing it for the tailings treatment.

SUPPORTED BY Canada - Alberta Environmental Research Trust - Edmonton

1.0145, STUDY OF THE ZONATION OF THE WINDSOR INTERVAL FOR EVALUATION OF THE PETROLEUM POTENTIAL
J. UTTING, Univ. of Quebec, Natl. Inst. of Scientific Res., *St. Foy, Quebec, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0146, STUDY OF THE ZONATION OF THE WINDSOR INTERVAL FOR EVALUATION OF THE PETROLEUM POTENTIAL
J. UTTING, Univ. of Quebec, Natl. Inst. of Scientific Res., *St. Foy, Quebec, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0147, MECHANICAL UPGRADING AND SOLVENT EXTRACTION OF ATHABASCA OIL SANDS
C.R. PHILLIPS, Univ. of Toronto, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0148, A STUDY OF THE RAPID DEVOLATILIZATION OF TAR SAND
P.C. STANGEBY, Univ. of Toronto, Inst. for Aerospace Studies, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0149, INTERPRETATION OF DATA AND EXAMINATION OF SAMPLES FROM THE OIL COMPANIES
UNKNOWN, Council of Natural Sciences, *Copenhagen, Denmark*

Since the Greenland Geological Survey is responsible for keeping the Greenland Ministry informed on the outcome of the operations of the private oil companies, extensive interpretation of geophysical data has already been done, and detailed examination of core samples will likewise be done. For this purpose a section for petroleum geology has been established in the Greenland Geological Survey, where at present five scientific and five non-scientific associates are employed. The purpose is through the collection of information on the geophysical, geological, and environmental studies conducted by all the oil companies with permission to search for oil at sea and on land, to keep the Greenland ministry informed and to contribute to the supervision of the research work and possible exploitation of Greenland's potential petroleum resources (section established 1972).

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0150, BASIN STUDIES IN WEST CENTRAL GREENLAND
UNKNOWN, Council of Natural Sciences, *Copenhagen, Denmark*

Project is directed toward collection of information on the west Greenland sedimentary basin and is part of the current investigatory work of the Greenland Geological Survey. The purpose is to obtain the best possible information on the sedimentary rocks found on land in west central Greenland. Rocks of the same age are found along the west Greenland socle, and it is presumed that they are quite similar to those on land; therefore it is of great importance that the detailed knowledge of the rocks on land be utilized in future drilling in the socle.

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0151, GEOPHYSICAL INVESTIGATIONS ON THE GREENLAND SOCLE
UNKNOWN, Council of Natural Sciences, *Copenhagen, Denmark*

The project is directed toward the collection of information on the socle around Greenland, including mapping of the sedimentary basins. It represents an extension of the Greenland Geological Survey mapping from land areas to areas covered by the sea. The purpose is to investigate the innermost part of the Greenland socle with, among other things, a view of mapping the inner limits of the sedimentary areas, and to investigate the bottom at the coast and farther out, with a view toward collecting information on the rocks that lie immediately below the bottom.

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0152, PROPOSAL FOR AEROMAGNETIC SURVEY OF THE EAST GREENLAND CONTINENTAL SOCLE
UNKNOWN, Council of Natural Sciences, *Copenhagen, Denmark*

Purpose is to expand the general knowledge of Greenland's substratum by utilizing the knowledge of the geophysical structure of the continental socle and by determining the location and extent of the sedimentary basins with a view toward the planning of future petroleum geological activity.

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0153, PROPOSAL TO THE PROGRAM EMBRACING THE SEA BOTTOM EXPLORATIONS IN WEST GREENLAND
UNKNOWN, Council of Natural Sciences, *Copenhagen, Denmark*

Proposal made by Greenland Geological Survey to Greenland Fishery Research, Geotechnical Institute, Academy of Technical Sciences, Greenland Technical Organization and Institute of Engineering Geology, Denmark Technical College, with an invitation to a discussion on cooperation.

The purpose is to map the geology of the sea floor and the geotechnical condition in the areas of West Greenland that lie outside the three main areas that were opened to applications for oil concessions in 1974. The results will thus be accessible along with the results of similar work done by the oil companies in the concession areas.

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0154, PALYNOLOGICAL INVESTIGATIONS IN WEST CENTRAL GREENLAND
UNKNOWN, Council of Natural Sciences, *Copenhagen, Denmark*

The project is directed toward the compiling of information on the sedimentary basin of West Greenland and is part of the present investigatory work of the Greenland Geological Survey.

The purpose is to find out and to describe the pollen and spore content of the rock and to determine whether this content can be used to determine the age of the rock. The work is being done with special regard to future drilling on the West Greenland socle, where rocks of the same age are expected to be found.

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0155, MICROPALEONTOLOGICAL INVESTIGATIONS OF THE SEDIMENTS OF WESTERN GREENLAND
UNKNOWN, Council of Natural Sciences, *Copenhagen, Denmark*

The project is one aspect of the complete exploration of the sedimentary basin of western Greenland. It is part of the energy research program started on the initiative of the State Council of Natural Sciences in cooperation with the Greenland Survey and the Institute of Historical Geology.

On the basis of the investigation of the microfossils (dinoflagellates) of the sediments, an attempt is made to separate the deposit series according to age. Experience with these microfossils from other regions is promising.

The work is being done with special regard to future drilling on the west Greenland socle, where the results are expected to facilitate the age determination of the core samples.

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0156, GEOCHEMICAL INVESTIGATION OF SEDIMENTARY ROCKS FROM WESTERN GREENLAND
UNKNOWN, Council of Natural Sciences, *Copenhagen, Denmark*

The project is one part of the compilation of information on the sedimentary basin of western Greenland. It is part of the energy research program that was started on the initiative of the State Council of Natural Sciences in cooperation with the Greenland Geological Survey and Institute of Historical Geology.

Preliminary investigations have been conducted for the clarification of the project.

The purpose is to reveal the organic material content of the West Greenland schist, and its inorganic composition. The chemical investigations will, among other things, be important for the understanding of the composition of any possible petroleum deposits under the land, and particularly below the socle.

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0157, SEDIMENTATION STUDIES IN THE EAST GREENLAND BASIN
UNKNOWN, Council of Natural Sciences, *Copenhagen, Denmark*

Project is directed toward collection of information on the West Greenland sedimentary basin. It is part of the energy research program initiated by the State Council of Natural Sciences in cooperation with the Greenland Geological Survey and Institute of Historical Geology.

The purpose of the project is to advance the knowledge of the geological development of the East Greenland basin in order to increase the understanding of the sedimentary stratification along the one edge of the continent encountered before the actual ocean deposit, since oil deposits are often associated with stratification of this type.

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0158, MICROPALEONTOLOGICAL EXPLORATIONS OF EAST GREENLAND SEDIMENTS
UNKNOWN, Council of Natural Sciences, *Copenhagen, Denmark*

The project is part of the research on the sedimentary basin of East Greenland. It comprises one aspect of the energy research program established on the initiative of the State Council of Natural Science in cooperation with Greenland Geological Survey and Institute of Historical Geology.

The purpose of the project is to coordinate the age information based on macrofossils with age information based on microfossils. This task can be solved on the basis of the East Greenland sediments, since the classification of the macrofossils of these sediments has been worked out in great detail. The investigations will be of great value for the age determination of the Jurassic parent rock for oil that is distributed over a large part of the North Atlantic.

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0159, SEDIMENTOLOGICAL-TECTONIC INVESTIGATION OF THE EAST GREENLAND BASIN
UNKNOWN, Mineralogical Museum, *Copenhagen, Denmark*
1350

An understanding of the mechanisms of formation of the East Greenland sedimentary basin is being sought with the aid of sedimentological and tectonic investigations. The main part of the oil deposits in the northern part of the North Sea is associated with a condition that is completely analogous geologically. East Greenland represents the only 'on-shore' region where these deposits can be studied and is therefore a key area for the interpretation of the geology of the shelf.

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0160, NUCLEAR PROBES FOR USE IN ENERGY RAW MATERIALS PROSPECT
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

Energy policy decisions require a knowledge of the extent and accessibility of the energy resources. In recent years there has been an increasing transition to the use of nulcear probes in connection with prospecting. For several years the Department has been conducting theoretical and experimental work on such probes.

The purpose of the first phase of the project is to build a probe that, when lowered into a bore hole, can measure the purity of any uranium ore that be situated there. In the second phase the question of the use of the nuclear probe for petroleum prospecting will be investigated also, for example for measurements of porosity.

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0161, IMPROVED FUEL OIL COMBUSTION
UNKNOWN, Technological Inst., *Copenhagen, Denmark*

Purpose of the project is to investigate whether conditioning of the fuel oil during combustion is an effective means of obtaining a better, more economical, and environmentally safe process.

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0162, PALEONTOLOGICAL AND STRATIGRAPHIC INVESTIGATIONS OF THE GREENLAND BASIN
UNKNOWN, Univ. of Copenhagen, Inst. of Hist. Geol. & Paleon., *Copenhagen, Denmark* 1168

The project is based on material collected during geological mapping of eastern Greenland conducted for the Greenland Geological Survey. The aim is a better understanding of the development in time and space of the sedimentation basin in eastern Greenland. The stratigraphic studies will provide a basis for a more modern analysis of the basin and also a basis for micropaleontological investigations.

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0163, RECENT MODELS WITH RESPECT TO OIL DISCOVERY
UNKNOWN, Univ. of Copenhagen, Inst. of Hist. Geol. & Paleon., *Copenhagen, Denmark* 1168

On the initiative of the micropaleontological laboratory at Copenhagen University, an investigation has begun on the distribution with depth of recent and fossilized terrestrial microfauna. The program includes recent distribution in the Bay of Guinea (material collected by the Galathea and Atlantide expeditions, respectively), as well as a joint undertaking with the Geological Institute, Jerusalem, to be reported in a description of the Red Sea. Moreover, the department is presently involved in initial discussions regarding a corresponding investigation of the Persian Gulf.

The purpose of the project is to move toward a more accurate determination of the paleobathymetry of oceanic sedimentation. This, together with seismic and biostratigraphic methods, is the most important tool of petroleum geology.

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0164, ENERGY RESOURCES, OIL RESOURCES, OIL SHALE
H. KROEPELIN, Unknown Inst. or Indiv. Grant, *Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0165, DISTILLATION OF OIL SHALES
H. RECHMEIER, Rudolf Rohrbach Port. Cem. Pl., *Balingen 1, Baden Wuerttemberg, Federal Republic of Germany* 7460

MAIN OBJECT: Prospecting and disclosure of oil and gas.
FIELD: Oil shale.

OBJECTIVE: It is the object of the tests to obtain results providing detailed information about possibilities of economically obtaining fuels from German oil shale.

WORK PROGRAM: 1) With the help of the evaluation of heating power, Fischer-smoldering, elementary analysis, evaluation of C content, the total content of fuel will be ascertained. Further, searches will be made for fuel variants with as high a heating power as possible. 2) Pilot-plant tests shall evaluate the practical utilization of the results.

STATUS: The tests are done and are being evaluated at present.

ADDENDA: Subcontractor: Lurgi Mineraloltechnik GmBH. Performing organization: Portlandzementwerk Dotternhausen.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0166, PRELIMINARY EXPERIMENTS FOR THE DIMENSIONING OF A PLANNED PILOT PLANT FOR OIL SHALE LOW TEMPERATURE CARBONIZATION
H. RECHMEIER, Rudolf Rohrbach Port. Cem. Pl., *Balingen 1, Baden Wuerttemberg, Federal Republic of Germany* 7460

DESCRIPTION OF PROJECT: The goal of this experiment to solve specific problems in order to be able to avoid difficulties in a later planned demonstration-plant.

PROGRAM: Erecting a low temperature carbonization plant with a throughput of 4 t/h, in which the feeding of heat carriers and shale, the transport of the mixture, the low temperature carbonization procedure as well as the removal of the carbonized material can be viewed; and in which the machine aggregates can be optimally laid out.

Furthermore the products of the low temperature carbonization are to be collected in large quantities and investigated as to their calorific value and composition. The measurement and regulation problems occurring during the experiments are to be solved.

STATUS: The project plant parts are assembled. The experiments began in the last days of 1975.

ADDENDA: Performing organization: Portlandzementwerk Dotternhausen Rudolf Rohrbach KG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0167, DEVELOPMENT OF NEW POLYMER TYPES FOR TERTIARY OIL RECOVERY
J. KLEIN, Technical Univ. Braunschweig, Inst. for Chemical Technology, *Braunschweig, Niedersachsen, Federal Republic of Germany* 3300

DESCRIPTION OF PROJECT: Development of new polymer types, which are applicable in tertiary oil recovery processes under the condition of high salinity of soil water.

WORK PROGRAM: a) Synthesis of water-soluble polymers of neutral and ionic type. b) Polymer characterization, solubility behaviour. c) Rheology of polymer solutions in viscosimetric flow. d) Flow behaviour of polymer solutions in porous media. e) Sorption and mobility behaviour in porous media. f) Investigation of the mechanism of polymer deposition in porous media by direct methods.

STATUS: Synthesis and investigation of some polymers (solubility, rheology) have been studied.

Preliminary investigations to establish the methods applicable to the studies of flow and sorption behaviour in porous media. Preliminary studies on the problem of direct polymer detection in porous media by scanning electron microscopy.

ADDENDA: Performing organization: Institut fur Chem. Technologie, TU Braunschweig.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0168, DEVELOPMENT OF NEW METHODS AND IMPROVEMENT OF EXISTING TECHNOLOGIES FOR TERTIARY OIL RECOVERY, IN PARTICULAR BY MEANS OF TENSIDES
H. BECKMANN, Technical Univ. of Clausthal, Inst. for Petroleum Geology, *Clausthal Zellerfeld, Nieder., Federal Republic of Germany* 3392

DESCRIPTION OF PROJECT: Petrographical and petrophysical sediment investigations of oil carrier rocks and partitioning rocks.

WORK PROGRAM: a) Investigation of carrier rocks as to their specific petrographical properties. b) Investigation of new mineral formations and transformations in the pore space of carrier rocks and their influence on reservoir fluids. c) Investigation of clays and carrier rocks on parameters, which are important in tertiary measures. d) Variations in pore contents during flooding experiments on a laboratory scale.

STATUS: Procurement and adaptation of equipment for specific problems. Procurement of sample material from Valendis

and Dogger-beta carrier rocks. Investigation of rocks as to their specific petrographical properties, for the preparation of flooding experiments. Construction of measuring equipment for the analysis of clay content, degree of cementation, porosity and permeability and variations thereof - due to the use of tensides.

ADDENDA: Performing organization: Institut fur Erdolgeologie, TU Clausthal.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0169, DEVELOPMENT OF NEW METHODS AND IMPROVEMENT OF EXISTING TECHNOLOGIES FOR TERTIARY OIL RECOVERY, IN PARTICULAR BY MEANS OF TENSIDES

C. MARX, Technical Univ. of Clausthal, Inst. for Drill. Tec. Oil Prod, *Clausthal Zellerfeld, Nieder., Federal Republic of Germany* 3392

DESCRIPTION OF PROJECT: The development of certain tenside polymer flooding methods for the oil fields in the Federal Republic of Germany.

WORK PROGRAM: a) Selection of tensides, if necessary also polymers. b) Investigation of solubility, stability and viscosity of the developed flooding media, as a function of electrolyte, tenside and polymer concentration. c) Determination of the interfacial surface tension, as a function of an oil water tenside system, tenside concentration and reservoir temperature. d) Test of selected flood media in one-dimensional linear flood models, predominant under reservoir conditions. e) Development of simulation models.

STATUS: Development and construction of test equipment for tenside solutions, with a view of their suitability for the mobilization of residual oil under reservoir conditions (pressure, temperature, etc.).

Tests of tensides of different classes, concentration and quantities in the test equipment, at defined saturation ratios in the pore space, in relation to differing high saline reservoir waters.

Concepts of flooding equipment for the development of optimal flooding techniques.

Development of a large flooding plant for the preparation of field experiments.

ADDENDA: Performing organization: TU Clausthal.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0170, DEVELOPMENT OF NEW AND THE IMPROVEMENT OF EXISTING CORE EXTRACTION METHODS

C. MARX, Technical Univ. of Clausthal, Inst. for Deep Drill. Pet. Rec, *Clausthal Zellerfeld, Nieder., Federal Republic of Germany* 3392

DESCRIPTION OF PROJECT: The aim of the project is in cooperation with the oil industry, to improve the existing core extraction methods, to develop a few procedures and to build prototypes for field tests.

WORK PROGRAM: a) Avoidance of core blocking and the increase of the success rate of core extraction and the reduction of the core drilling costs through constructive measures. b) Development of suitable core catchers in order to prevent loss of previously obtained core material, especially loose sand. c) Reduction of damage to core material by rinsing during drilling in order to increase the inherent information. d) Drilling of side cores at arbitrary depths of a bore hole section. e) Evaluation of drillings for the determination of characteristic quantities that otherwise can be measured only on core material. f) Investigation of methods of continuous cores as an alternative to integral drilling.

STATUS: Work has begun. Existing core devices were analyzed and concept for coring in unsolidified formations was developed.

ADDENDA: Performing organization: Inst. fur Tiefbohrkunde und Erdolgewinnung der TU Clausthal.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0171, DEVELOPMENT AND TESTING OF A DYNAMOMETER HUB FOR DEEP DRILLING EXTRUSION

C. MARX, Technical Univ. of Clausthal, Inst. for Deep Drill. Pet. Rec, *Clausthal Zellerfeld, Nieder., Federal Republic of Germany* 3392

DESCRIPTION OF PROJECT: Development and construction of a dynamometer hub which enables the measurement and recording with sufficient resolution, of the axial forces, the torque and the oscillations ocurring in the drilling extruder.

WORK PROGRAM: a) Analysis of existing publications on the dynamics of deep drillng extrusion. b) Development of measuring systems. c) Investigation of these measuring systems in simulation equipment. d) Drafting and construction of a dynamometer hub for field use. e) Testing in the deep drilling extruder.

STATUS: At present, solutions are being drawn up for the measurement and storage of values measured in the dynamometer hub. It is planned to make alterations in the existing test bench of axial force and torques, in order to be able to measure loads in the pressure-swelling region.

ADDENDA: Performing organization: Inst. fuer Tiefbohrkunde und Erdoelgewinnung, der TU Clausthal.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0172, CRITERIONS FOR ADDITIVES IN POLYMER FLOODING

G. REHAGE, Technical Univ. of Clausthal, Inst. for Physical Chemistry, *Clausthal Zellerfeld, Nieder., Federal Republic of Germany* 3392

DESCRIPTION OF PROJECT: Development of criterions for polymers regarding their applicability for polymer flooding. The purpose is to get a higher yield in tertiary oil recovery.

WORK PROGRAM: 1975 - Study of viscoelastic and thermodynamic properties of selected watersoluble polymers and preliminary experiments in methods of structural analysis. 1976 - The studies mentioned above will be applied to a broad polymer spectrum. The ascertainment of the reasons for viscosity stability will be tried. 1977 - Investigations of those polymers which proved to be successful by the measurements made in the proceeding years under the aspect of the structural properties.

STATUS: The dependence of the viscosity of polyacrylamide (PAAm) on temperature, concentration and addition of salts was investigated. The main result was an extreme decrease of the viscosity of hydrolysed PAAm when adding salts even in concentrations of only one percent. Preliminary experiments by electron microscopic technique have shown that it is possible to get an information of the number and the size distribution of the molecules of the investigated polymers.

ADDENDA: Performing organization: Physikalisch-Chemisches Inst. der TU Clausthal.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0173, REALIZATION OF A PILOT PLANT FOR THE PRODUCTION OF FUEL FROM THE DISTILLATION OF GERMAN OIL SHALE

H. RECHMEIER, Rudolf Rohrbach Port. Cem. Pl., *Frankfurt, Hessen, Federal Republic of Germany* 6000

DESCRIPTION OF PROJECT: It is the object of the tests to obtain results providing detailed information about possibilities of economically obtaining fuels from German oil shale.

WORK PROGRAM: a) With the help of the evaluation of heating power, Fischer-smoldering, elementary analysis, evaluation of C content, the total content of fuel will be ascertained. Further investigations will be made for fuel variants with as high a heating power as possible. b) Pilot-plant tests shall evaluate the practical utilization of the results given under a).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0174, STUDY - PROCEDURE FOR THE WIRELESS TRANSMISSION OF DATA FROM THE BORE HOLE BASE TO THE EARTH'S SURFACE

BANKWITZ, Soc. for Petroleum Sciences, *Friedrichshafen, Baden Wuertt., Federal Republic of Germany* 7990

DESCRIPTION OF PROJECT: Contribution to increase the technical productivity and economical efficiency of drillings in order to tap and develop oil and natural gas reservoirs in greater depths.

An examination and evaluation according to theoretical consideration of different procedures relative to their capability for wireless transmission of data from deep on- and off-shore bore holes.

WORK PROGRAM: Drawing up a feasibility study for the development of suitable technical procedures for a continuous exact supervision of certain drilling parameters at the bore hole base and the wireless transmission of the data to the surface.

The following technical possibilities were investigated: electromagnetic pulses and C-W, acoustic wave procedures, shock wave procedures, flush current pulse procedures, magnetization of boring rods, the use of boring rods as wave guides and as a twin conductor system.

STATUS: The further development of some of the investigated methods is considered not only physically, but also technically feasible.

ADDENDA: Subcontractor: Dornier System GmbH., Friedrichshafen. Performing organization: Deutsche Gesellschaft fur Mineraloelwissenschaften und Kohlechemie E.V. (DGMK).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0175, DEVELOPING NEW & IMPROVING EXISTING METHODS OF TERTIARY PETROLEUM RECOVERY, ESPECIALLY BY APPLYING TENSIDES, SUBPROJECT DGMK

BEHRMANN, Soc. for Petroleum Sciences, *Hamburg 1, Hamburg, Federal Republic of Germany* 2000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0176, DEVELOPMENT OF NEW METHODS AND IMPROVEMENT OF EXISTING PROCEDURES FOR TERTIARY OIL RECOVERY, ESPECIALLY BY MEANS OF TENSIDES

R. BEHRMANN, Soc. for Petroleum Sciences, *Hamburg 1, Hamburg, Federal Republic of Germany* 2000

DESCRIPTION OF PROJECT: The development and subsequent application of appropriate tenside flooding systems with an aim for the improvement of the oil recovery from domestic oil reservoirs.

WORK PROGRAM: Coordination and writing-up of Projects ET 3121-3123 A.

STATUS: Petrological and petrophysical research on different types of reservoir rocks is being done. Core samples of reservoir rocks of the Jurassic (Dogger beta) and Lauer Cretaceous (Valendis) ages from different German oil reservoirs are under investigation. Compatability tests of selected surfactants with specific types of crude oils and formation waters are under way. Flood devices in the laboratory were upgraded. Tests with different surfactant solutions under varying conditions of concentration and other parameters were started for a systematical evaluation of oil recovery by continuous as well as slug flooding operations.

ADDENDA: Performing organization: Dt. Gesselschaft fur Mineralol-wissenschaft und Kohlenchemie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0177, TERTIARY OIL RECOVERY BY POLYMER FLOODING, EVEN IN CONJUNCTION WITH APPLICATION OF SURFACTANTS (ABBREV)

R.B. BEHRMANN, Soc. for Petroleum Sciences, *Hamburg 1, Hamburg, Federal Republic of Germany* 2000

DESCRIPTION OF PROJECT: Development of polymers pointing to an improvement of mobility ratio of crude oils and formation waters under specific reservoir conditions for an enhanced tertiary oil recovery in German oilfields.

STATUS: Preliminary investigations of viscosity behavior of selected polymers were made under varying conditions of temperature, time, concentration, shear and with or without addition of electrolytes. Synthesis and characterization of available polymer substances were started. Commenced first investigations regarding the problems of flow and deposition of polymer matters in porous media.

ADDENDA: Performing organization: Deutsche Gesellschaft fuer Mineraloelwissenschaften und Kohlechemie E.V. (DGMK).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0178, DEVELOPMENT OF NEW METHODS AND IMPROVEMENT OF EXISTING PROCEDURES FOR TERTIARY OIL RECOVERY, ESPECIALLY BY MEANS OF TENSIDES

H.J. NEUMANN, Petroleum Research Institute, *Hannover, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: Development of tenside flooding media for types of reservoirs important in the Federal Republic of Germany.

WORK PROGRAM: a) Establishment of the conditions for the formation and stability of oil emulsions of suitable viscosity. b) Investigation of specific crude oil and reservoirs in order to find suitable tenside-flooding media. c) Preliminary tests of the results.

RELATION TO OTHER PROJECTS: Et 3157 A - ET 3159 A.

STATUS: Crude oil and reservoir water have been investigated. Tests of selected tenside materials as flooding water additions.

Development of flooding pipes.

Completion of a series of experiments for the establishment of flooding conditions.

Flooding experiment under laboratory conditions with differing tenside solutions at various concentrations.

ADDENDA: Performing organization: Institut fur Erdolforschung.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0179, PRODUCING VELOCITY LOGS AND FURTHER DEVELOPMENT OF DECONVOLUTION

R. BORTFELD, Prakla Seismos Gmbh, *Hannover 1, Niedersachsen, Federal Republic of Germany* 3000

Addenda: Performing organization: Prakla Seismos GMBH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0180, DEVELOPMENT OF A FLOATING POINT CONVOLVER (ARRAY PROCESSOR) AND INTEGRATION INTO A COMPUTER SYSTEM FOR THE PROCESSING OF SEISMIC DATA

R. BORTFELD, Prakla Seismos Gmbh, *Hannover 1, Niedersachsen, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: An array processor (floating point convoler) will be designed, built, and integrated into a minicomputer system for the processing of seismic data.

WORK PROGRAM: a) Preparatory work - Basic concepts for the realization of an array processor, elaboration of the in-

dividual functions and logical connections, and investigation of the technical realization possibilities with respect to the integrated function of the array processor. b) Design of the prototype and integration into the total system. In cooperation with the basic software development, the individual steps to take are to be found out, realized and tested. After realization of the total concept, the individual seismic processes of the program system with respect to utilization of the array processor, must either be modified or updated. Realization of the entire floating point processing to be completed.

STATUS: The work will be begun on February 1, 1976. From requirements encountered in practice, especially with regard to applied seismics, a concept has been made in cooperation with Prakla-seismos GmbH and PCS (Peripheral Computer System) for a freely programmable array processor. This array processor system, in the following called APS, operates with 32 Bit floating point numbers, is built up in modules and consists of four different programmable processors: input/output processor, bus-master processor and floating point processor.

All processors, calculating units and registers are connected to an internal rapid bus. The bus-processor supervises the interaction of the individual processors. Several input/output processors and floating point processors can be connected. The working storage of the array processor can be extended to 32 K x 32 Bit words. Because of its modular set-up, free programming and extension-possibilities, the system fits many future requirements. The APS is connected to a PDP 11-system via an interface. It can, as a host computer, use any other computer system because the interface to the host computer has been kept very 'small'. The system was largely tested out in 1975 so that a first installation to a PDP 11/45 system can be realized in Hannover by March 1976.

ADDENDA: Subcontractor: Prof. Farber, Lehrstuhl fur Prozessrechner, TU Munchen.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0181, THREE-DIMENSIONAL MIGRATION OF TRAVEL-TIME MAPS

R. BORTFELD, Prakla Seismos Gmbh, *Hannover 1, Niedersachsen, Federal Republic of Germany* 3000

MAIN OBJECT: Prospecting and disclosure of oil and gas.

FIELD: Geophysical methods.

OBJECTIVE: A procedure shall be developed with which a three-dimensional conversion of travel-time maps to depth maps is performed. Starting from interpreted, plotted, discrete seismic horizons, the true position of layers in space shall be displayed by making use of three-dimensional seismic velocity distributions that can be specified.

WORK PROGRAM: 1) Preparatory studies (which gridding procedure, how can faults be handled). Nov. 15, 1974 to June 30, 1976. Decision point. 2) Implementation of procedures, July 1, 1976 to Dec. 31, 1976 (without g). a) Input program for 3D velocities and travel-times b) Definition of faults for the input c) Gridding program for handling of faults d) Program for 3D-ray-tracing e) Program for display f) Operating system for a) to e), Decision point. g) Combining parts a) to e), Sept. 1, 1976 - March 31, 1977. 3) Preparation for application, April 1, 1977 - Dec. 31, 1977.

STATUS: The contract was signed at the end of 1974. Work mentioned under item 1 has been started.

ADDENDA: Performing organization: Prakla-Seismos GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0182, THREE-DIMENSIONAL MIGRATION/APPROXIMATION PROCEDURE

R. BORTFELD, Prakla Seismos Gmbh, *Hannover 1, Niedersachsen, Federal Republic of Germany* 3000

MAIN OBJECT: Prospecting and disclosure of oil and gas.

FIELD; Geophysical methods.

OBJECTIVE: A method shall be developed with which the spatially true positions of the reflecting boundaries can be determined from seismic surveys. These boundaries shall be displayed with good approximation, but without any manual interpretation, by means of vertical cuts through the line surveyed.

WORK PROGRAM: 1) Preparatory work - feasibility study, Nov. 15, 1974 - June 30, 1976. a) Extrapolation of a reflector element on to the cut with the vertical plane through the line surveyed. b) Max. possible spacing between reflection point and vertical plane. c) Behavior of diffractions, refractions, surface wave etc. Decision point. 2) Implementation of procedures. a) Extrapolation and cut of the reflector with the vertical plane through the spread, July 1, 1976 - Dec. 31, 1976. b) Modifications and improvements of program parts for the determination of the apparent velocity and of the incline and offline dips, May 1, 1975 - April 30, 1977. c) Application to constructed examples; comparison with the result obtained from exact procedures. Jan 1, 1977 - June 30, 1977. 3) Preparation of the procedure for application. a) Processing of field examples and checking of the results, Jan. 1, 1977 - Sept. 30, 1977. b) Comparison with the result obtained from exact procedures, Jan. 1, 1977 - Sept. 30, 1977. c) Repetition of 3.a) and improvement of 2.a) to 2.c) within a learning process, Oct. 1, 1977 to Dec. 31, 1977.

STATUS: Item 1 of the work program has been started.

ADDENDA: Performing organization: Prakla-Seismos GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0183, THREE-DIMENSIONAL VELOCITY DETERMINATIONS

R. BORTFELD, Prakla Seismos Gmbh, *Hannover 1, Niedersachsen, Federal Republic of Germany* 3000

MAIN OBJECT: Prospecting and disclosure of oil and gas.

FIELD: Geophysical methods.

OBJECTIVE: The relationship between three-dimensional velocity layering with arbitrary dips and curvatures and the travel-time relations measured at the surface are to be investigated; therefrom, procedures are to be developed with which the velocities in depth can be determined.

WORK PROGRAM: 1) Preparatory work, Nov. 15, 1974 - Sept. 30, 1975. Decision point. 2) Work with constructed examples, Oct. 1, 1975 - Aug. 31, 1977. 3) Work with field examples, from Sept. 1, 1977.

ADDENDA: Performing organization: Prakla-Seismos GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0184, ESTABLISHING VELOCITY LOGS, AND FURTHER DEVELOPMENTS OF THE DECONVOLUTION PROCESS, BII

R. BORTFELD, Prakla Seismos Gmbh, *Hannover 1, Niedersachsen, Federal Republic of Germany* 3000

MAIN OBJECT: Prospecting and disclosure of oil and gas.

FIELD: Geophysical methods.

OBJECTIVE: A possibility for obtaining detailed velocity layering (velocity log) by means of surface-measurements is investigated. This velocity layering shall approach the quality of acoustic logs in deep wells. A procedure which has still to be developed shall make full use of this possibility. A prerequisite for a procedure like this is the still better elimination of secondary events and noise (deconvolution); therefore, the improvement of the deconvolution process is a vital objective of this project.

WORK PROGRAM: 1) Preparatory work, Nov. 15, 1974 - June 30, 1976. a) General theoretical preliminary investigations. b) Investigations for the possibility of extracting absorption, velocity and density. c) Investigation for the determination of filter opertors. Decision point: 2) Implementation of procedures. Building and testing of the modules 1.b) and 1.c) with synthetic material, April 1, 1976 - May 31, 1977. Decision point: 3) Preparations for application. a) Application to field examples, April 1, 1977 - Oct. 31, 1977. b) Comparison with known data, April 1, 1977 - Oct. 31, 1977. Repetition of a) and b), Aug. 1, 1977 - Dec. 31, 1977.

STATUS: Preparatory work has been started.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0185, THREE-DIMENSIONAL VELOCITY DETERMINATIONS

D. RISTOW, Prakla Seismos Gmbh, *Hannover 1, Niedersachsen, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: The relationship between three-dimensional velocity layering with arbitrary dips and curvatures and the travel-time relations measured at the surface are to be investigated; hence procedures are to be developed in which the velocities in depth can be determined.

WORK PROGRAM: a) Preparatory work, b) Work with constructed examples, c) Work with field examples.

STATUS: Theoretical investigations have yielded two solution-methods. The first method represents a strict direct solution for small shotpoint-geophone distances. The second solution-method involves an iterative solution to determine interval velocities without restriction to small shot-point-geophone distances. Both solution-methods, however, require a computer program for the rapid determination of ray-path and travel-time of the sound by strictly considering the refraction law after Snellius. Therefore, ray-tracing computer program has been designed that computes the ray-path and the reflection time for specified shotpoints and geophones. The first step of the program where velocity boundaries are represented as planes is completed. Presently, ray paths and reflection times for multilayer models are investigated where velocity boundaries are found in space with arbitrary dips.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0186, THREE-DIMENSIONAL MIGRATION/APPROXIMATION PROCEDURE

D. RISTOW, Prakla Seismos Gmbh, *Hannover 1, Niedersachsen, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: A method will be developed in which the spatially true positions of the reflecting boundaries will be determined from seismic surveys. These boundaries will be displayed with good approximation, but without any manual interpretation, by means of vertical cuts through the line surveyed.

WORK PROGRAM: a) Preparatory work - feasibility study - Extrapolation of a reflector element on to the cut with the vertical plan through the line surveyed. Maximum possible spacing between reflection point and vertical plane. Behavior of diffractions, refractions, surface waves etc. b) Implementation of procedures. Extrapolation and cut of the reflector with the vertical plane through the spread. Modifications and improvements of program parts for the determination of the apparent velocity and of the incline and offline dips. Application to constructed examples, comparison with the results obtained from exact procedures. c) Preparation of the procedure for application. Processing of field examples and checking of the results. Comparison with the result obtained from exact procedures. Repetition of a 1) and improvement of b) within a learning process.

STATUS: The question of extrapolating a reflector-piece up to the intersection with the vertical plan through the survey spread has been restricted to a general study of a possible extrapolation or interpolation of seismic traces. Test results have shown the difficulties of the procedure obtained during the identification of faults within the reflection horizon shape. Two ways have been designed to perform an extrapolation within the problem of the respective project. Both ways start from vertical time sections. As to the first case the three-dimensional migration is reduced to a near-dynamic correction of every stacked trace in dependence of the size of the true incidence of every boundary. The second design is concerned with the correction of the attacked section based on the cross dip. This is followed by a two-dimensional conventional migration which automatically corrects the dip errors in line direction. The first design for the two-dimensional case was realized on simple synthetic models by means of FORTRAN-programs in order to detect the limits of the procedure. To analyze the inline dip and cross dip, existent programs were used. Their efficiency has been tested using both synthetic and measured data.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0187, ESTIMATION OF VELOCITY LOGS, AND FURTHER DEVELOPMENTS OF THE DECONVOLUTION PROCESS

D. RISTOW, Prakla Seismos Gmbh, *Hannover 1, Niedersachsen, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: A possibility for obtaining detailed velocity layering (velocity log) by means of surface-measurements is investigated. This velocity layering shall approach the quality of acoustic logs in deep wells. A procedure which has yet to be developed shall make full use of this possibility. A prerequisite for a procedure like this is the still better elimination of secondary events and noise (deconvolution), therefore, the improvement of the deconvolution process is a vital objective of this project.

WORK PROGRAM: a) Preparatory work. a1) General theoretical preliminary investigations. a2) Investigations for the possibility of extracting absorption, velocity and density. a3) Investigation for the determination of filter operators. b) Implementation of procedures. Building and testing of the modules a2) and a3) with synthetic material. c) Preparation for application. c1) Application to field examples. c2) Comparison with known data. c3) Repetition of c2) and c3).

STATUS: Investigations have yielded that the computation of velocity logs from seismic measurements, carried out at the surface, yield useful solutions in practice if disturbing effects of the measurements are largely eliminated. Disturbing effects include, among others, additive noise, filterings of most different kind and multiples. Various procedures to suppress multiples have been tried, developed anew and tested on synthetic and real material. A new time-variant deconvolution process that works according to the principle of updating has been designed and successfully applied to synthetic material. The actual development shall be the basis for the new deconvolution process. The reduction of a further disturbing factor, the noise, has been investigated with the help of a simple multichannel filter. An essential element for the computation of synthetic velocity logs from seismic measurements at the earth's surface is a good Real-Amplitude-Processing that is investigated within the research project 'Direct Recognition of Hydrocarbons with Seismic Methods' (ET-3114 A).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0188, BASIC STUDY ON THE DEVELOPMENT OF A COLOR PLOTTER TO BE USED IN SEISMICS

K. WEISSENSTEINER , Prakla Seismos Gmbh, *Hannover 1, Niedersachsen, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: The study is designed to yield the basis for the development of a colour plotter for seismic applications and to investigate the applicabilities outside seismics.

WORK PROGRAM: a) Studies on available colour film material, available cathode ray tubes and available colour filters. b) Investigation on developing units and copying apparatus. c) Further development of the seismic colour plotter into a raster mode plotter. d) Applicabilities of the colour plotter, especially outside seismics. e) Requirements for the colour plotter if used outside seismics.

STATUS: On the one hand only very few types are available in sufficiently large sizes and from these the most current types must be refused because of thir orange coloured masking (ratio of spectral sensitivities more than 2 powers of ten).

On the other hand the manufacturers do not provide us with details on absolute sensitivities especially at short exposure times in the range of one microsecond.

The procedures of development are relatively complicated in particular for special films. Thus there is another restriction in the selection of the films.

For reproduction exist some suitable ways. The selection of adequate colour filters does not cause any difficulties.

From estimates and previous studies with the help of a black-white plotter it is evident that the intensity of 3' flying spot tube used up to now is much too low. The aim could probably be

achieved using a 5'-tube. However, no data on the absolute intensities could be obtained. Because of this and the same difficulties with colour films, experiments have to be performed.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0189, THREE-DIMENSIONAL MIGRATION OF TRAVEL-TIME MAPS

E. WIERCZEYKO, Prakla Seismos Gmbh, *Hannover 1, Niedersachsen, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: A procedure will be developed in which a three-dimensional conversion of travel-time maps to depth maps is performed. Starting from interpreted, plotted, discrete seismic horizons, the true position of layers in space shall be displayed by making use of three-dimensional seismic velocity distributions that can be specified.

WORK PROGRAM: a) Preparatory studies (gridding procedures, how can faults be handled?), b) Implementation of procedures, c) Input program for 3 D velocities and travel-times, d) Definition of faults for the input, e) Gridding program for handling of faults, f) Program for 3 D ray-tracing, g) Program for display, h) Operating system for c) and g) i) Combining parts c) to g), j) Preparation for application.

STATUS: A design has been made according to which reflection seismic travel-time maps can be converted to depth line maps. In this conversion there are two essential sub-problems: (1) Computation of depth and true position in the sub-surface of a reflector given by its travel-time, by taking account of three-dimensional velocity distributions and refraction of hanging boundaries the depth and position of which in the subsurface has already been computed. (2) Presentation of computed depths in a depth line map. The handling of faults in both sub-problems plays an important part. Further, the gridding procedure must be a position to process very different data-densities. To 1: A 3D-ray-tracing method has been developed and tested on simple models. To 2: Known gridding procedures were investigated, and it was stated that because of faults and different data densities new gridding procedure has to be designed, by taking account of already known techniques. The investigation of partial aspects of this new development has been started.

ADDENDA: Performing organization: Prakla-Seismos GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0190, MAGETOTELLURIC MEASUREMENTS OF DEEP TIERS IN NORTH GERMANY TO PROVIDE INFORMATION FOR POSSIBLE OIL-GEOLOGICALLY INTERESTING STRUCTURES

W. LOSECKE, Geosciences & Mineral Inst., *Hannover 23, Niedersachsen, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: Examination and securing of knowledge of magnetotelluric and refraction seismical anomalies and refinement of resulting structure of deep tiers in north Germany to rovide information for possible oil-geologically interesting areas.

WORK PROGRAM: a) To exhaust existing data and selection of oil-geologically interesting areas. b) Detailed measuring in these areas. c) Production of rough metals of lower stratum in the areas measured in detail. d) Refined interpretation and presentation of the results.

STATUS: The work has begun. The results are not yet present.

ADDENDA: Performing organization: Bundesanstalt fuer Geowissenschaften und Rohstoffe (BGR).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0191, DEVELOPMENT OF NEW ORGANIC-GEOCHEMICAL AND ISOTOPIC METHODS FOR APPLICATION IN THE EXPLORATION FOR HYDROCARBONS

W. STAHL, Geosciences & Mineral Inst., *Hannover 23, Niedersachsen, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: To support the exploration for oil and gas by organic-geochemical and isotopic investigations on the organic material in sediments and on traces of hydrocarbons.

WORK PROGRAM: a) Comparison of optical and geochemical parameters in order to identify source rocks and to diagnose the degree of maturity and the nature of the organic material (September 1, 1975 - March 31, 1977). b) Aromatic hydrocarbons as correlation parameters for crude oils (September 1, 1975 - March 31, 1977). c) 13C/12C-isotope ratios of methane as parameters of the maturity of the organic source material (January 1, 1975 - December 31, 1977). d) Characterization of subsurface hydrocarbon accumulations by means of 13C/12C-isotope analyses of gases dissolved in drilling mud (January 1, 1975 - December 31,1977).

STATUS: To a): Two series of samples differing in age and maturity of their organic material were analysed. It was found that the type of organic material need not correspond to the facies of the depositional environment. An enrichment in certain organisms influences the chemical composition of the extracts and also the isotope data. The application of the monochromatic fluorescence spectroscopy yielded encouraging results.

To b): Tests by means of high-pressure liquid chromatography were carried out using standards. The first tests with the aromatic fraction of an oil sample were satisfactory.

To c): A correlation has been found in the isotopes in post-Devonian oil source-rock pairs. In most cases, this correlation can be used to distinguish between those liquid hydrocarbons that migrated into potential source rocks, and autochthonous extractable organic matter. These relations are useful for correlating oil with source rocks.

To d): 13C/12C analyses of the methane of natural gas provide quantitative information as to the maturity of source material from which the gas originated. The possibilities resulting herefrom were successfully applied in some wildcat wells.

To e): A literature study showed that isotope analyses of methane in gas (1) from well cuttings, and (2) out of solution in the drilling mud can, without undue effort, yield information about the maturity of the relevant source material. (Text Abridged.)

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0192, REGISTRATION OF SHEAR WAVES

G. DOHR, Preussag, *Hannover, Niedersachsen, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: Additional parameters should be calculated by means of the interpretation of shear waves in order to receive information about lithology of the layers traversed by seismic waves as well as changes in facies.

WORK PROGRAM: a) Theoretical studies of the propagation of shear waves, tests and programming. b) Test measurements in two different areas; registration should be done with three-component geophones (two per trace), 6-12 cover of the subsurface. c) Processing of the data recorded (different methods of stacking, velocity analysis, theoretical studies based on the results obtained). Theoretical discussion of the results obtained.

STATUS: The following activities were carried out: 1. Survey of the literature on generation and observation of S-waves. 2. Program: 'Reflection Amplitudes'. Composition of a program that computes the reflection amplitudes for P-, S- and composite waves associated with special plane interfaces. 3. Test measurements will be done in February/March 1976, postponement due to the availability of technical equipment. 4. Planning field measurements for the observation of S-waves in an appropriate area with special consideration given to the results of points 1. and 2. above. 5) Work on a program for the identification of S-wave reflections by means of hodographs.

ADDENDA: Subcontractor: Geophysikalische Bodenuntersuchungen.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0193, EXTENSION OF THE PROGRAM 'MIGRATION VELOCITY DETERMINATION' (MVD)

G. DOHR, Preussag, *Hannover, Niedersachsen, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: An existing program for seismic velocity determination using the principle migration is to be further developed and upgraded in order to make it applicable in areas of difficult geology. Upgrading includes such objectives as extension to three dimensions and reduction of error range to satisfy current requirements in preparation of deep well sites. A reduction of the error range of around 50% relative to that of classical procedures is required.

WORK PROGRAM: a) Extension of the two-dimensional MVD (Migration Velocity Determination). b) Development of a three-dimensional MVD for line intersections. c) Development of a general three-dimensional MVD. d) Development of a program to derive interval velocities from MVD velocities (MVDINT).

STATUS: Three-dimensional MVD and dip selective MVD have been completed under this project. Three-dimensional MVD may be applied to three-dimensional data as well as to data in line intersections. Dip selective MVD separates energy according to reflector dip. This allows to read dip for every time velocity pair picked from the display. Dip selection has shown improvement in cases of difficult data, however, side effects are being observed (spurious events along curves of constant depth in the time velocity graph). The problem will be investigated next. A process MVDINT for the calculation of interval velocities is currently under development.

ADDENDA: Subcontractor: Dr. Johann Stattlegger, Geophysical Consultant. Performing organization: Preussag AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0194, THREE-DIMENSIONAL SEISMIC DATA COLLECTION AND PROCESSING

G. DOHR, Preussag, *Hannover, Niedersachsen, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: A three-dimensional reflection seismic procedure is to be developed providing the highest possible flexibilty in recording arrangement along with reliable spatial subsurface information. Assumptions based upon two-dimensional models are invalid for seismic data processing in areas of complex geology. A three-dimensional method consisting of three-dimensional field recording as well as processing along lines derived from three-dimensional subsurface models is to provide more accurate velocities and uniquely interpretable sections.

WORK PROGRAM: a) Synthetic test data generation program, b) Field data conversion program, c) Method and program for three-dimensional surface consistent amplitude correction, d) Program for three-dimensional surface consistent residual statics estimation, e) Basic research on wavelet stretching, spectra and true amplitude estimation, f) Computation of recording geometry characteristics, g) Three-dimensional SEMISTACK, upgrading of existing program. h) 3-D planning of experimental field work, i) Processing of experimental field data, j) Testing and upgrading of total 3-D seismic system.

STATUS: Efforts on project A I have reached the point where the first actual three-dimensional field data collection was performed in November 1975. All parts of this project are on time.

Data collection was preceded by the design of the recording geometry using so-called 'field recording characteristics' as well as by experiments with synthtic data. Programs required for these tasks had been developed and tested during the month before.

An experiment has been made by merging the data of a dense, conventional seismic grid to a quasi three-dimensional data set. The data set was successfully subjected to three-dimensional migration. Thus, one tool for processing of three-dimensional field data is available.

Another tool for processing of these data will be '3-D beam steering'. Development of the necessary software has been started. This method should allow three-dimensional processing even in cases where data are fragmentary because of topography or where a dense grid of conventional lines is to be processed in three dimensions.

Methods for three-dimensional residual statics and amplitude correction are under development. (Text Abridged.)

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0195, ECONOMICAL PRODUCTION AND UTILIZATION OF POSIDONIAN SHALE FROM SCHANDELAH

H.U. KRUK, Braunschweigische Kohlen Berg., *Helmstedt, Niedersachsen, Federal Republic of Germany* 3330

DESCRIPTION OF PROJECT: In regard to the economical production and utilization of Posidonian shale of the type deposited in Schandelah, testing of modern technologies in the fields of chemical and mining technology.

WORK PROGRAM: a) Core drilling in the Schandelah bed. b) Mapping out of the bed. c) Chemical analysis of the cores. d) Geochemical, hydrogeological and soil analysis of the cores. e) Economical comparison of the carbonization methods. f) Semi-industrial carbonization tests. g) Tests of fractionation of the products of carbonization. h) Analysis of the finished products and of the water of distillation. i) Tests of dust extraction from heavy fuel oil. j) A study for a large low temperature carbonization and chemical plant.

STATUS: At present, program points a) - h) are being worked on.

ADDENDA: Subcontractor: LURGI Mineraloltechnik GmbH Bundesanstalt fur Geowissenschaften und Rohstoffe. Performing organization: Braunschweigische Kohlen-Bergwerke, VEBA-Chemie AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0196, PROGRAM GROUP FOR 'CRUDE OIL AND ORGANIC GEOCHEMISTRY' AT THE KFA JULICH

D. WELKE, Juelich Nuclear Res. Ctr., *Juelich 1, Nordrhein Westfalen, Federal Republic of Germany* 5170

DESCRIPTION OF PROJECT: Development of organic geochemical methods applicable in petroleum exploration.

WORK PROGRAM: a) Origin of oil and natural gas. b) Migration of oil and natural gas. c) Correlation between petroleum and their source beds. d) Alterations of resevior petroleums. e) Mathematical modelling of the process of generation, migration and accumulation of petroleum. f) Indicators for proximity of hydrocarbon accumulation in the subsurface. g) Generation of hydrocarbon in recent offshore sediments. h) Application of organic geochemical methods to solve problems related to underground storage of petroleum, environmental protection and characterization of natural products.

STATUS: The creation of the program group will be completed shortly. Preparations for the work program points 'Origin of oil and natural gas' and 'Indicators for proximity of hydrocarbon accumulation in the subsurface' have been completed.

ADDENDA: Performing organization: KFA Julich GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0197, SIMULTANEOUS CONVERSION AND METHANATION OF CO-RICH GASES

K. HEDDEN, Univ. of Karlsruhe, Engler Bunte Institute, *Karlsruhe, Baden Wuerttemberg, Federal Republic of Germany* 7500

DESCRIPTION OF PROJECT: Investigations into the technical-economical feasibility of the methanation of CO-rich gases in fluidized beds. Optimization of the synthesis conditions.

WORK PROGRAM: a) Planning, erection, and operation of a laboratory fluidized bed apparatus, b) Investigations into abrasion behavior of selected catalysts in the fluidizaed bed under the following conditions: 1. without reactions with air: cold and hot, 2. without reactions with H2; cold and hot, 3. with reactions, c) Erection of a stationary bed reactor for the execution of reaction kinetic investigations under various conditions (T, p, v, etc.), d)

Development and testing of catalysts which produce kw of higher calorific value.

STATUS: The erection of the fluidized bed experimental arrangement for cold experiments has been completed.

The planning and erection of the fluidized bed reactor has begun.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0198, STUDY OF OIL SHALE STUDY

H. KROEPELIN, Univ. Tubingen, *Tubingen, Federal Republic of Germany* 7400

MAIN OBJECT: Prospecting and disclosure of oil and gas.

FIELD: Oil shale.

OBJECTIVE: This is a literature study to show the importance of the oil shale deposits and to judge the economic feasibilities in relation to the crude oil situation.

WORK PROGRAM: 1) Survey of the oil shale deposits (in Germany and foreign countries). 2) Properties and estimation of technical possibilities. 3) Oil shale pyrolysis and gasification. 4) Properties and refining of shale oil. 5) Utilization of the residues.

REFERENCE TO OTHER PROJECTS: ET 81: Distillation of oil shale.

STATUS: Finished in September 1974; the study shall be evaluated to find out ways and extent of further activities. The study will be published in Spring 1975.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0199, LNG STORAGE IN SALT CAVITIES - IN SITU EXPERIMENT IN HANSA POTASH MINE

H. LORENZEN, Kavernbau & Betriebs Gmbh, *3000 Hannover, Federal Republic of Germany*

MAIN OBJECT: Conversion, transport and storage of energy.

FIELD: Storage of primary energy.

OBJECTIVE: Test of the geomechanical stability of a cryogenically cooled salt cavity environment.

WORK PROGRAM: 1) Planning phase: a) Theoretical preinvestigation of test cavity size, temperature field and salt rock movement. b) Development of methods to construct the cavity. c) Acquisition and transportation of the liquefied gas. 2) Preparation phase: a) Test $ field, cavity and measuring equipment. b) Leaching of the experimental cavity. 3) Experiment performance: a) Installation of measuring equipment into the cavity and environmental rock. b) Liquid gas injection. c) Removal of the test facility. 4) Documentation and evaluation of the experimental data.

STATUS: The experiment has been finished. Evaluation is going on.

ADDENDA: Performing organization: Kavernen Bau- und Betriebs-GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0200, PHYSICS AND CHEMISTRY OF FACTORS DETERMINING THE FORM OF MICELLE PARTICLES IN ACCORDANCE WITH THE AREAS CHARACTERIZING THESE SOLUTIONS

P. DELORD, Scientific Research Center, Lab. of General Chemistry, *Bellevue, France* 92190

DESCRIPTION OF WORK: Writing a computer calculation program. Studying water-surfactant binary systems (for example, the dodecylbenzene sodium-water sulfonate system): characteristics of phases determined by highly monochromatic x-raying with a focalization chamber (Guinier chamber). Studying cosurfactant-water-surfactant-ternary systems: structural modifications of micelles, using the Reiss-Husson method. Studying hydrocarbon cosurfactant-water-surfactant-quaternary systems: attempting to apply the Reiss-Husson method.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

1.0201, FINDING THE OPTIMAL MOLECULAR STRUCTURE OF SURFACTANT AGENTS USED IN RECOVERING PETROLEUM

P. BOTHOREL, Univ. of Bordeaux, *Bordeaux, France*

DESCRIPTION OF WORK: Theoretical analysis of interactions between chains of water-surfactant petroleum interface hydrocarbons and their effect on surfactant film pressure. Effect of the surface concentration of the surfactant agent, temperature and length on the pressure on this film, parity and polydispersity of chains, ramifications (comparing 2 agents, one polyethylene type, the other polypropylene type).

Experimental analysis of interactions between hydrocarbon chains of surfactant metals and petroleum: studying oriented molecular interactions in standard oils, using depolarized Rayleigh diffusion. Analyzing the importance of interactions between single hydrophobic stems, then in the presence of petroleum, classifying agents according to their attraction to petroleum.

SUPPORTED BY France - French Government - Paris

1.0202, RESEARCH ON A NEW METHOD OF REMOVING PARAFFIN FROM PETROLEUM BY CRYSTALLIZATION

MARVILLET, French Refining Company, *Harfleur, France* 76700

DESCRIPTION OF WORK: Setting up of continuous crystallization: examination with a microscope, measurement of filtration. Setting up crystallization-rotating filter.

ADDENDA: Performing organization: Compagnie Francaise De Raffinage.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

1.0203, A METHOD OF RECOVERING OIL BY INJECTING A POLYPHENOLIC COMPOUND INTO AN ACID AREA

J. DONNET, Central University of Mulhouse, Center for Res., *Mulhouse, France*

DESCRIPTION OF WORK: Studying desorption isotherms of various simple organic molecules retained, using rock samples (reconstituted rock from deposits), and polyphenol compounds.

Studying mechanisms that destroy absorbent-non absorbent equilibrium, using dynamic calorimetry to measure energies.

Studying the surface state of the mineral substratum during processing.

Studying the water-oil-polyphenol system; studying parameters, structure, and stability of emulsions formed.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

1.0204, MICRO-EMULSIONS WITH A HYDROPHOBIC-HYDROPHILOUS GRAFTED COPOLYMER BASE

G. RIESS, Central University of Mulhouse, Lab. of Macromol. Phys. Chem., *Mulhouse, France*

DESCRIPTION OF WORK: Studying the formation of microemulsions using grafted copolymers consisting of a hydrophobic skeleton, compatible with oils and hydrophilous grafts assuring the stability of the microemulsion in water.

Studying different parameters using a model system (polystyrene -polyoxyethylene or polysionene - polyoxyethylene) in order to establish a correlation between the characteristics of copolymers and the properties of the microemulsion.

Possible extension to other grafted copolymers, including, for example, poly type hydrophilous grafts (acrylamide), poly(methacrylic acid), poly(pyrrolidone vinyl).

Addenda: Supporting agency: Delegation Generale a la Recherche Scientifique et Technique. Performing organization: Centre Universitaire de Mulhouse, Laboratoire de Chimie Physique Macromoleculaire.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

1.0205, ANALYZE POLAR CRUDE OIL BY HIGH PRESSURE LIQUID CHROMATOGRAPHY & GASEOUS COUPLED MASS SPECTROSCOPY (ABBREV)

G. GUIOCHON, Ecole Polytechnic, Analytical Physical Chem. Lab., *Palaiseau, France* 91120

DESCRIPTION OF WORK: Make a crude oil solution. Fractionally separate out the soluble acid and do not analyze it. Separate the non-acid solutions into neutral and basic fractions. Analyze completely the basic fraction--analyze briefly the neutral fraction.

ADDENDA: Performing organization: Ecole Polytechnique, Laboratoire De Chimie Analytique Physique.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

1.0206, ULTRA-LIGHT GRANULES AND THOSE CURRENTLY IN USE

UNKNOWN, Coal Fields Research Center, *Paris, France* 75007

OBJECTIVES: Use barren rock from mines to derive ultra-light granules and sands with a bulk volume mass under 350 kg/m3 and high pyroscopic resistance for heat insulation.

Develop the use of these granules and sands for fabricating ultra-light and insulating materials: blocks, aggregate panels, and polymer foams. PROCEDURE: This study is being funded by CECA. It will take several years to complete; we will begin its different sections this year.

We will continue our basic studies on the expansion of carboniferous shales: the chemical reactions that cause gas to be liberated: physical changes of silico-aluminum materials when heated with or without additives; the process of expansion by varying the partial pressure of a gas.

Using the results on the expansion mechanism, we hope to produce granules over 5 mm in diameter and sands under 5 mm in diameter under laboratory conditions.

These studies are oriented toward fabricating insulating panels and construction blocks. For fabricating insulating panels, we must chose polymers capable of producing foams and meeting certain requirements in mechanical properties, resistance to aging, and inflammability. We will also examine the best formulations of mixtures of resins, catalyst, progenic agent, tension active agent in order to obtain a regular foam filling intergranular spaces. We will particularly examine the compatibility of aggregate foams and facing foams. The fabrication of concrete blocks out of light granules is common; we will verify that the fabrication conditions required for ultra-light granules and carboniferous shales do not differ greatly from those used for other materials. N.B.: This notice invalidates and replaces notice 069 registered at the end of the first half of 1975 entitled: Light Self-Contained Insulating Panels.

ADDENDA: Project Location: laboratoires de Verneuil en Halatte. Supporting Agency: Ministere de l'Industrie et de la Recherche. Performing Organization: Centre d'Etudes et Recherches des CHARbonages de France (CERCHAR).

SUPPORTED BY France - Ministry of Industry & Research - Paris

1.0207, CHEMICALLY UP-GRADING SMALL HYDROCARBONIC MOLECULES

UNKNOWN, Natl. Scientific Res. Center, *Paris, France* 75700

OBJECTIVE: Develop prospecting techniques capable of sustaining traditional petrochemistry, using carburized recovery products. The dimensions of the problem will lead to a significant saving of naphtha, the basis of present petrochemistry, and would selectively yield: ethylene and ethanol; propene or isopropanol; aromatic hydrocarbons; olefins; long-chain alcohols; liquid fuels;

PROCEDURE: Find new methods of synthesis, using alkane, CO, CO2, and CH4.

ADDENDA: Supporting agency and performing organization: Centre National de la Recherche Scientific.

SUPPORTED BY France - National Science Research Center - Paris

1.0208, UP-GRADING HEAVY OIL PRODUCTS

UNKNOWN, Natl. Scientific Res. Center, *Paris, France* 75700

OBJECTIVE: As the development of nuclear energy results in significant quantities of heavy oil products (fractions, residues, heavy fuel), we need to study these products in order to up-grade them.

SUMMARY: Structure and properties of asphaltene compounds, particularly solubility, adsorption, interactions; demetallation procedures: determination of sites of metal fixation, dyes, methods of elimination; hydrodesulfuration processes.

ADDENDA: Supporting agency and performing organization: Centre National de la Recherche Scientific.

SUPPORTED BY France - National Science Research Center - Paris

1.0209, STRATIGRAPHIC RESULTS OF THE GEOMANCHE II SURVEY (1972) IN THE WESTERN ENGLISH CHANNEL

P. ANDREIEFF, Ministry of Industry & Res., Bureau of Geol. Mining Res., *Paris 15E, France*

By studying the micropaleontology of 90 rock samples taken during the Geomanche II survey, we can fill the gaps in our knowledge of the post-Paleozoic stratigraphy of the western English Channel. The samples date from the Trias to the Paleogene. By integrating these results with previously gathered data from this region, we developed a 1/100,000 geologic map of the English Channel; our results also contributed to local studies in connection with the petroleum prospecting in progress.

ADDENDA: Supporting and performing organization: Ministere de L'Industrie et de la Recherche Bureau de Recherches Geologiques et Minieres Service Geologique National.

SUPPORTED BY France - Ministry of Industry & Research - Paris

1.0210, STRUCTURE OF CENTRAL CONTINENTAL SHELF OF THE CELTIC SEA BETWEEN 7 DEGREES AND 8 DEGREES WEST

P. BOUYSSE, Ministry of Industry & Res., Bureau of Geol. Mining Res., *Paris 15E, France*

Following the exploration of the Periarmerican continental shelf, which has been in progress since 1967 north of the Gulf of Gascony and in the nearby western sections of the English Channel, BRGM began a study of the central region of the Celtic Sea's continental shelf.

In addition to taking samples of surface sediments, this survey used seismic methods to obtain 1/800 km of continuous reflection profiles that coincided with the E-W paths laid along bathymetric rises. The area under study was located between 47 degrees 55' N, 48 degrees 40' N, 6 degrees 55' W, and 8 degrees 04' W.

The continental shelf of the southern Celtic Sea is a continuation of the western English Channel that greatly extends the vast sedimentary synclinorium of the E NE-W SW axis of the western Channel. The area under study is located on the southern shelf of this basin. The Meriadzek terrace extends downward at its southwest extremity, represented by the continental shelf.

We identified and numbered five seismic series, ranging from those affected by tectonic forces during the Cretaceous to Quartenary sands. Since it was impossible to get core samples of basement rocks, we must largely guess about the stratigraphic classification of these series. The structure of the area studied is easily fitted into the pattern determined for the western English Channel.

ADDENDA: Supporting and performing organization: Ministere de L'Industrie et de la Recherche Bureau de Recherches Geologiques et Minieres Service Geologique National.

SUPPORTED BY France - Ministry of Industry & Research - Paris

1.0211, SYNTHESIS OF GEOPHYSICAL STUDIES FOR DETERMINING THE IN-DEPTH STRUCTURE OF THE BRESSANE SINK

R. FERRANDES, Ministry of Industry & Res., Bureau of Geol. Mining Res., *Paris 15E, France*

The Geophysics Division tried to synthesize the available geophysical data on the Bresse to study the possibility of drilling gas fields being formed by the degasification of underground oil deposits. Bresse was selected as one of the sites for this interdisciplinary study.

A great deal of geophysical data is available: a 1/1,000,000 magnetic map of France, a 1/10,000 gravimetric map of France, an earth map and maps of electric drilling, and different seismic maps developed primarily for oil prospecting in the Upper and Middle Jurassic and Limestones.

Based on this data and on the results of mechanical drilling, we can accurately determine the appearance of the Tertiary base. Dogger's roof is also relatively common in a section of the Bresse. The lower levels, on the other hand, have not been reached except for some localized exploration of the metamorphic substrate.

Based on the two maps of the isobaths at the bottom of the Tertiary formation and of the Dogger roof that were derived, we can define three main zones in the Bresse.

One, northeast of a Chalon-Cuiseaux line (probably a major fault) has a relatively shallow sink, highly asymmetric, with a more or less regular western flank with a slight gradient, and a well-defined eastern talus. The predominant structural orientations here are NE/SW. A second zone, south of the discontinuous Chalon-Cuiseaux, characterized by Cuiseaus-Cormoz horst inside the sink. The faulted edges of this horst are oriented in a NE/SW direction, but N/S structural orientation is predominant in the west. A third zone, that of the Bresse sink itself, is located south of the E/W line passing through Macon. It is bordered by high axes, both in the east and in the west, oriented in a N/S to N NE/S SW direction.

ADDENDA: Supporting and performing organization: Ministere De L'Industrie et de la Recherche Bureau de Recherches Geologiques et Minieres Service Geologique National.

SUPPORTED BY France - Ministry of Industry & Research - Paris

1.0212, PRESENT STATE OF RESEARCH ON BITUMINOUS SHALES IN FRANCE

C. MEGNIEN, Ministry of Industry & Res., Bureau of Geol. Mining Res., *Paris 15E, France*

The 1974-1975 program had the following objectives: determine the potential of hydrocarbons and of other compounds derived from bituminous rocks in France; study the quantities and the extractibility of the metals associated with them; study their potential use as sources of various materials (cements, mineral wools). A) Examination of Lower Toarcian bituminous shales in the Paris region. Core samples were taken from this formation during two successive surveys.

Different tests--for metal content, mineral composition, the study of organic matter, and particularly for oil extractable through pyrolysis--were done on each hole. Twenty-five kg of Fecocourt shales were also subjected to pyrolysis tests in order to determine the principal characteristics of the oil, which compares favorably with oil derived from the shales of Colorado. B) List of bituminous rocks in France. C) Preliminary economic study.

This study dealt with the cost price of shale oil, particularly in the Paris region, under present conditions of exploitation in quarries or in lines. It is based on the technical and economic data derived from two pilot processes in operation in the United States: TOSCO and PARAHO. Our results indicate that the only process that can be used for the shales of the Paris region is quarrying without much strip mining.

As our work continues in 1975-1976, we will use a research permit in Lorraine and develop a methodology for processing and upgrading shale oils.

ADDENDA: Joint project with the General Delegation for Scientific and Technical research, Paris, France. Supporting and performing organization: Ministere de L'Industrie et de la Recherche Bureau de Recherches Geologiques et Minieres Service Geologique National.

SUPPORTED BY France - Ministry of Industry & Research - Paris

1.0213, PRELIMINARY STUDY OF THE ENERGY AND METALLIC POTENTIAL OF BITUMINOUS ROCKS IN FRANCE

B. TISSOT, Ministry of Industry & Res., *Paris 15E, France*

Determining France's potential in hydrocarbons and organic compounds associated with bituminous rocks plus the content and extractability of related metals.

Two operations will be carried out simultaneously in order to do this. General overview of bituminous rocks in France in order to prepare subsequent tapping of lesser-known deposits (Permian, Kimmeridgian, Tertiary). Detailed study of toarcian schists east and southeast of the Paris region: drilling for core samples (at depths of 10 to 60 meters), air injectivity tests, laboratory tests of the major geochemical parameters affecting oil output.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

1.0214, FABRICATION OF 1975 BEAUFORT SEA MOSAICS FROM SIDE SCAN IMAGERY

UNKNOWN, Bureau of Industrial Studies, *Reuil Malmaison, France*

ADDENDA: Performing organization: Bureau d'Etudes Industrielles L'Institut Francais du Petrole.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0215, RESEARCH ON WEAR PHENOMENA AND WAYS TO COMBAT THEM WITH THE HELP OF A LUBRICANT

J. AYEL, Petroleum Institute, *Rueil Malmaison, France* 92502

Research on abnormal wear phenomena on metal surfaces in machinery, and especially in the thermal engines, in relation to lubricant composition and additive structure.

Research more specifically has to do with: Adhesive wear and seizure of surfaces, and in particular piston/ring scuffing and contacts between cam and tappet or cam and valve lever.

Superficial mechanical fatigue wear, and especially pitting of heavily loaded cam and tappet surfaces.

In both cases, the influence of technological and metallurgical parameters, of operating conditions and especially of the nature of the lubricant is analyzed, both during the deterioration initiation phase and during the burning phase. In particular, relations are sought after between antiwear performances and the structures of antiwear additives as well as new synthetic base stocks.

Experimenting is done with laboratory simulation equipment, two-disc and ball-on-plate tribometers and engine test benches.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0216, RHEOLOGICAL ANALYSIS OF LUBRICANTS WITH VISCOSITY IMPROVERS

J. BRIANT, Petroleum Institute, *Rueil Malmaison, France* 92502

SUMMARY OF PROJECT: Lubricating oils to which viscosity improvers have been added have a non-Newtonian behavior. Their viscosity decreases as their shear rate rises. They are viscoelastic.

The influence of such phenomena on lubrication is still poorly understood and highly controversial. A study of them is thus of great interest for determining whether their properties are beneficial or harmful, whether they should be amplified or reduced.

1. ORGANIC SOURCES OF ENERGY

Our study in this field began with the development of a method for measuring viscosity at high shear rates. A capillary viscosimeter was chosen. A computing method and mathematical program are being worked out so as to clearly distinguish the effects caused by shearing in experimental measurements along with those caused by temperature rise.

An experimental bearing was also built to analyze the behavior of such oils under conditions approaching those of actual use. It is capable of performing several measurements, i.e. torque as a function of speed and load, oil film thickening, temperature and pressure distribution.

The equipment is undergoing start-up tests.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0217, ACTION OF SURFACE PHENOMENA IN LUBRICATION

J.F. BRIANT, Petroleum Institute, *Rueil Malmaison, France* 92502

SUMMARY OF PROJECT: Many additives used in lubricating oils act by fixation on solid-oil interfaces (e.g. antiwear, anticorrosion and detergent additives). The aim of this project is to connect the action mechanism of these additives with their surface properties.

The project began with the creation of equipment for measuring the amount of solute adsorbed on alumina powders. A fontal chromatography method was used. A thermodynamic interpretation of the measurements was made. It served to determine the free enthalpies of adsorption.

Equipment was also developed for measuring adsorption heat. A series of known-structure esters was compiled with this equipment. Among other results, a phase transition in adsorbed layers was something revealed.

The findings were compared with those from friction experiments. This project will be continued with other additives that will be examined with the equipment thus developed. At the same time, experimental methods are being studied to determine the electrical properties of adsorbed layers and to detect the chemical or electrochemical reactions occurring in them.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

BIBLIOGRAPHIC REFERENCES: (1) BRIANT Jean, BELOT Dominique, HIPEAUK Jean-Claude C.R. Ac. Sc. Paris, t. 280 (21 Mai 1975) Serie C. (2) BRIANT Jean, BELOT Dominique C.R. Ac. Sc. Paris, t. 280 (9 Juin 1975) Serie C.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0218, RESEARCH ON A NEW METHOD OF REMOVING PARAFFIN FROM PETROLEUM BY CRYSTALLIZATION

D. DEFIVES, Petroleum Institute, Div. of Chemistry Refining, *Rueil Malmaison, France* 92502

Different immiscible refrigerant agents mix oil solvents. Dispersion properties - coalescence couples oil-solvent/refrigerant. Efficiency of oil phase heat transfer-refrigerant agent. Floatability of paraffin under the conditions above.

ADDENDA: Performing organization: Institut Francais du Petrole.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

1.0219, DEVELOPMENT OF NEW WAYS OF QUALIFYING PETROLEUM

F. ROUX, Petroleum Institute, *Rueil Malmaison, France* 92502

The special requirements of European equipment linked to the evolution of the qualities of petroleum products, especially lubricants and fuels, demand the research and development of new methods or test equipment for evaluating the performances of such products.

The Applications Division at the Institut Francais du Petrole is actively participating in this effort, both by doing its own research on original methods and by participating in cooperative research projects with specialized French and European organizations.

Efforts are mainly being made to develop test methods for spark ignition and diesel engines along with simulation tests on laboratory machines to evaluate the antioxidant, anticorrosive, detergent, dispersive, antiwear, antiseizure and antifriction properties as well as the thermal and mechanical stability of modern motors oils and of various industrial lubricants (transmission oils, hydraulic fluids, metal working lubricants, etc...).

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0220, UNDERWATER SEISMIC DEVICES THAT USE AN EXPANDED SPECTRUM

UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

OBJECTIVE: In order to study fields and to prospect in areas where results are currently unfavorable, we need to improve the quality of seismic devices; they must have a greater power of resolution (clarity of registered horizons) and a better signal-to-noise ratio.

SUMMARY: The seismic devices power of resolution, or its ability to 'see' two geological beds that are quite different but are situated in close proximity to each other, depends on the frequency spectrum and on the form of signal used. Our objective is to expand the spectrum toward high frequencies, for emission and reception, while reserving enough power to obtain good penetration. To achieve this objective, we intend to use a combination of small flexihocs that emit a high frequency signal without rebound.

We will study ways of improving the signal-to-noise ratio by use small multiple flexihocs spread over a wide area.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0221, CONTINUOUS GROUND GEOPHONE

UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

OBJECTIVE: Simplify the use of ground geophones in order to reduce the number of personnel needed.

SUMMARY: Many people are needed to lay cables and geophones. We will develop equipment similar to an underwater cable which will make it possible to lay and recover cables and geophones with a much smaller number of people.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0222, SEISMICS WITH TRANSVERSE WAVES

UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

OBJECTIVE: Facilitate the industrial use of a seismic method that uses transverse waves.

SUMMARY: The project has three parts: a) compare surface sources for transverse waves, b) record on the spot with these sources to acquire documents of sufficient quality, c) treat P and S waves in combination.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0223, EXPLORING BASICALLY SEQUENTIAL FORMS FOR DETECTING SEISMIC HORIZONS

UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

OBJECTIVE: Improve the detection of seismic horizons by exploring forms.

SUMMARY: Study the exploration of seismic horizons by using the apprentice theory and by linear, factorial, and non-linear discriminary analysis in order to measure the coherence or the similarity between seismic horizons, for example: correlation of certain horizons resulting from a fault, a deaf zone, or even a bevelled area.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0224, VOICE PROCESSING OF SEISMIC DATA
UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

OBJECTIVE: Improve the quality of geophysical interpretations and, in some cases, introduce geological data.

SUMMARY: Develop methods which, through dialogue with the computer, will allow us to follow the results of computer processing and to modify its parameters so that the obtained result is satisfactory.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0225, SEISMIC PROCESSING - TWO AND THREE DIMENSIONAL HOLOSEISMICS
UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

OBJECTIVE: Migration for reconstructing structures in two and three dimensions.

SUMMARY: Improve existing holoseismic methods and programs. Compare the results of improved holoseismic methods with other migration methods. Simultaneously study the rate of wave propagation.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0226, IMAGE PROCESSING AND NEW DETECTION TECHNIQUES
UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

OBJECTIVE: Develop automatic mapping and image processing for more precise and methodical use.

SUMMARY: Processing: Improving images when there is too little contrast for adequate photointerpretation; Replay images in the largest possible size through super-resolution programs; Use automatic mapping, particularly to locate anomalies of form or color in hydrocarbon fields.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0227, IMPROVING THE ENERGY YIELD OF REFINERIES AND PETROCHEMICAL PLANTS
UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

This project involves two areas: energy converters (coolers, heat pumps); conversion/use/recovery systems (study of optimizing energy in refinery).

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0228, EQUILIBRIUM CONDITIONS AND STUDY OF MOLECULAR TRANSFERS IN MULTI-PHASE SYSTEMS
UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

In order to exploit hydrocarbon fields and to up-grade petroleum products, we must determine as precisely as possible the prerequisites for equilibrium under different conditions: temperature, pressure, existence of polar components, etc. We must also understand as completely as possible the effects of physical conditions on transfer phenomena that occur between phases. This project will apply and develop more precise methods of computation and measurement.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0229, PETROLEUM RESIDUES - TREATMENT AND CONVERSION
UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

The current economic picture (particularly in countries with few sources of crude oil within their own boundaries) and the need for environmental protection force us to reconsider heavy oil fractions. This is particularly necessary in certain European countries that get crude oil of varying quality and whose significant investments in nuclear energy will completely change the market for petroleum product consumption. This project will separate heavy fractions, produce light distillates, and high quality methods, and up-grade asphalt sections.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0230, ROLLER BITS - HYDRAULIC CONTRA-FLOW SYSTEM FOR HOLLOW DRILLS
UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

OBJECTIVE: Improve safety conditions when hollow drills are used for drilling; Increase the drilling speed of roller bits by modifying their hydraulic system.

SUMMARY: By simultaneously creating a contra flow of mud within the borehole and at points of tool-rock contact and forming an in-depth connection, called a 'hollow connection', we can speed up rock destruction and remove debris under better conditions than possible with direct flow; part of the material will no longer be deposited under the tool. This will result in increased drilling speed.

This hollow connection can be attached to a mechanism operated from the surface which will make it possible to reverse the direction of the flow of mud from the borehole to the tool, if necessary.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0231, SLOW DRILL TURBINE
UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

OBJECTIVE: Reduce the revolution speed of drill turbines to increase torque on the tool, make it possible to accomodate heavier loads, and increase drilling speed.

SUMMARY: We will reduce revolution speed by using a mechanical reducing gear lubricated with oil.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0232, IMPROVING CEMENTS AND CEMENTING
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Improve the economy and performance of present techniques. Develop new techniques needed to complete offshore wells.

PRODUCE: Improve the quality of the cements used in columns. Study the cementing methods made necessary by oil prospecting in new areas, particularly the ocean. The project will devote equal time to cementing materials and methods.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0233, CEMENTING DRILL
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Improve technical methods of controlling column cementing in wells.

PROCEDURE: Locally determine the quality and possible defects of cement; measure thickness, particularly in off-center casings (deflected wells); detect gas flows behind the casing.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0234, EXPLORATION OF BITUMINOUS SHALE DEPOSITS
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Explore and enumerate bituminous shale deposits in France.

SUMMARY: Bituminous shales are accumulations of organic material which will be studied in two ways: a geochemical study of the nature of the organic material that potentially contains hydrocarbons and associated organic compounds plus a list of possible sites of exploitation. Relationship between the nature of the organic material and the possible concentration of various useful metallic elements.

ADDENDA: Supporting agency and performing organization: Institute Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0235, MEASUREMENTS IN BOREHOLES
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Determine the configurations of gas or oil deposits in a reservoir by locating the anomalies in resistivity that exist in geological formations.

PROCEDURE: A fixed or movable drill lowered into a borehole before casing will pick up Hertzian waves emitted by the surface of the site. If an oil or gas well is located on the path of the Hertzian waves, it will be revealed by an anomally in resistivity. The signal recorded by the drill in the borehole will thus be modified. We will use a mathematical model to interpret the measurements recorded while the drill is being brought up. This will enable us to determine the limits of a field in various azimuths.

ADDENDA: Supporting agency and performing organization: Institute Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0236, MEASUREMENTS DURING DRILLING
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Measurements during drilling constitute one of the essential ways and one of the most obvious needs of improving drilling techniques. We must therefore develop pick-ups for in-depth measurements or improve the performance and the reliability of existing pick-ups.

PROCEDURES: We will study many types of measurements: tilting and azimuth measurements for directional shafts; in situ detection of hydrogen in the liquid or gaseous state; measurement of the revolution speed of turbo-drills used in directional boreholes.

ADDENDA: Supporting agency and performing organization: Institute Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0237, PROBLEMS OF MARINE SOIL ENGINEERING
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Improve our knowledge of marine soil engineering to optimize the relationship of petroleum structures to marine soils.

SUMMARY: We will study three subjects: the behavior of the soils under heavy collar rigs; estimate the holding capacity of anchoring systems for fixing floating structures; determine the friction coefficients of pipelines laid along the ocean floor.

ADDENDA: Supporting agency and performing organization: Institute Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0238, EXPLORING MARINE SOILS - METHODS AND INSTRUMENTATION
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Improve methods of exploring marine soils.

SUMMARY: This project will: Study and suggest new methods of exploring ocean floors and marine soils; design and develop equipment in collaboration with the appropriate agencies; accumulate information on the nature of marine soils, particularly at great depths.

ADDENDA: Supporting agency and performing organization: Institute Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0239, COMPOSITE TUBES FOR UNDERWATER PIPES
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Develop light, highly resistant tubes adapted to deep sea oil drilling.

SUMMARY: This study involves: the continuous fabrication process; link-up technology and transportation and repair problems; mechanical and fatigue tests.

ADDENDA: Supporting agency and performing organization: Institute Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0240, MEASUREMENTS IN THE SEA
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Design and develop a complete system of measurement (pick-up, transmission, recording) for testing materials in the sea.

SUMMARY: We need a system of measurement for underwater tests using small scale models, for tests of actual size materials in the sea, or for the surveillance of ocean installations according to standing directives. Such a system would be adopted to the different problems that may arise and deliver the information picked up in a form compatible with the use of the results.

ADDENDA: Supporting agency and performing organization: Institute Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0241, REMOTE CONTROL APPARATUS
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Improve and develop remote control apparatus for under-water observation and intervention.

SUMMARY: This project has two aspects: Study the possibilities of application and participate in operations designed to show their technical and industrial feasibility; do a preliminary study of components needed for developing the apparatus.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0242, DEEP SEA DRILLING
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Develop techniques and materials that will make it possible to do exploratory drilling in deep water.

ADDENDA: Supporting agency and performing organization: Institute Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0243, DEEP SEA PRODUCTION - TECHNIQUES AND EQUIPMENT
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Design and develop techniques for exploiting deep sea wells up to depths of 1000 m.

ADDENDA: Supporting agency and performing organization: Institute Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0244, THERMODYNAMIC STUDIES IN POROUS AREAS
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Improve our understanding of polyphase flow in porous areas that show evidence of thermodynamic phenomena (interphase transfer, compositions that vary significantly by pressure and by temperature).

SUMMARY: Effect of the composition of phases in existence (oil and gas) on diphasic flows: We will study the variations in relative permeability and capillary pressure when compositions are very different, to examine: the depletion of light oil or a condensed gas; miscible displacements.

HOT WATER DISPLACEMENT: Hot water and steam: Effect of temperature on relative permeability and residual saturation. Steam stripping. Application to hot water injection and to in situ co-current combustion, dry or wet.

Dynamics of interphase transfer when polyphase displacement occurs. Determining the unfavorable effects on the equilibrium of two phases in a case of flow in a porous area when interphase transfer occurs.

ADDENDA: Supporting agency and performing organization: Institute Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0245, POLYPHASE FLOWS IN A POROUS AREA
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Improve general knowledge on non-miscible two-phase flows in a porous area in order to improve the representation of physical phenomena, our use of mathematical models, and oil recovery techniques.

SUMMARY: Water-gas hysteresis of feeder pressure and relative permeability: Determine relative permeability and feeder pressure in water-gas displacement--inward and outward--in order to locate subterranean store deposits of gas.

ADDENDA: Supporting agency and performing organization: Institute Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0246, FISSURE RESERVOIRS
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Improve techniques of exploiting fissurized fields through a better understanding of the fissuration phenomena related to water displacement and of estimating the behavior of reservoirs.

ADDENDA: Supporting agency and performing organization: Institute Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0247, INJECTING WATER-CONTAINING POLYMERS
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Improve recovery by adding water-soluble polymers to the water that is injected.

SUMMARY: Study products. Study operating conditions.

ADDENDA: Supporting agency and performing organization: Institute Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0248, THERMAL METHODS USED TO RECOVER HEAVY OILS
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Improve the exploitation of oil fields by using thermal methods, particularly in situ combustion.

SUMMARY: In situ combustion. This project includes: laboratory studies on the phenomena involved; an exploratory study of fracturing and combustion in bituminous shales. Injection of hot fluids. This project includes: laboratory studies on relative permeability and stripping, a study of injecting steam derived from warm water with additives.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0249, CARBURIZED RESERVOIRS
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Acquire the basic knowledge needed to understand the mechanisms that affect the development and the properties of carburized reservoirs in order to devise descriptive models of these reservoirs to serve the engineering needs.

SUMMARY: Sedimentary and diagenetic processes determine the definition of the reservoir and the evaluation of its properties. In order to take into account the present state of the sediment, we must reconstruct the history which led to the development of one or several complex porous networks and must define the models that divide petrophysical properties by local area and by region. We will find missing information through experiments carried out under conditions reproducing those of the natural environment.

ADDENDA: Supporting agency and performing organization: Institute Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0250, BEHAVIOR OF OIL FIELDS - MATHEMATICAL AND NUMERICAL MODELS FOR ESTIMATION AND INTERPRETATION
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Develop new numerical tools and improve existing mathematical models for use in interpreting and estimating behaviour of fields in order to improve economy and performance in production methods and to chose the best method for recovery.

SUMMARY: This project has two parts: Use mathematical models for taking into account numerous and complex physical phenomena, such as those caused by new recovery methods; - improve performance and precision. The precision of present models, related to the method of approximation they use, is not satisfactory in areas of fixed anomalies (wells) or moving anomalies (faces).

ADDENDA: Supporting agency and performing organization - Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0251, MICROEMULSIONS - USE IN OIL RECOVERY
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Increase oil recovery by using microemulsion plugs activated by polymers.

SUMMARY: Study complex formulas based on oil, water, tension-active and contension-active substances that may improve the microscopic displacement of oil in initial or residual saturation through the effects of interfacial phenomena.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0252, PROCESSING GEOLOGIC INFORMATION
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Improve the quality of geologic data processing:

Compare and classify geological features for which we have a great deal of data (crude oil, parent rocks, sedimentary beds).

SUMMARY: Apply data processing techniques to geology.

Use them for other projects, particularly geochemistry projects (comparing and classifying crude oils, relationship between crude oil and parent rocks and petroleum areas (classifying beds, comparing new beds to previously explored ones).

ADDENDA: Supporting agency and performing organization - Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0253, ORGANIC GEOCHEMISTRY OF DEEP SEDIMENTS
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Study the conditions affecting the deposit and the initial development of organic material in existing deep marine sediments.

SUMMARY: Study the origin constants involved in the transformation of organic material into oil under the conditions affecting deep marine sediments. Continental talus areas seem to be especially favorable for the accumulation of organic material and for its transformation into oil. The project has three aspects: (1) Test the application of existing methods: mathematical models simulating the geometric evolution of folds and the spread of fractures. (2) Continue studying the effect of tectonic deformation action on the modification of the petrophysical properties of lome reservoirs (porosity). (3) Study the effect of substratum deformations on the structural and sedimentological characteristics of the overlying sedimentary beds.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0254, USE OF GEOPHYSICAL METHODS FOR CHARACTERIZING ROCKS
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Increase the information derived from geophysical campaigns on seismic reflection, add lithological information to structural information.

SUMMARY: As we now have new techniques of acquiring geophysical data (numerical source recording and instant processing), we should be able to obtain information on the nature and the physical properties of deep geological horizons.

This project will develop a methodology that should enable us to use the petrochemical characteristics of reservoirs to interpret lithological information and to acquire data on lateral variations.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0255, CHARACTERIZING PETROLEUM ZONES
UNKNOWN, Petroleum Institute, *Rueil Malmaison*, *France* 92502

OBJECTIVE: Contribute to estimates in exploration from the choice of permit to all phases of exploration.

SUMMARY: It can be shown that the known fields occur in petroleum zones, sections of sedimentary areas where hydrocarbons formed and the reservoirs in which they accumulate; these zones seem to be invariable at first glance.

By analyzing and comparing a large number of petroleum zones all over the world, which correspond to most possible geological situations, we can define and characterize a certain number of models of hydrocarbon sources.

Each model has particular petroleum properties. By determining the model to which a given region belongs, we will contribute to the evaluation of its petroleum possibilities.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

1.0256, ADSORPTION OF SURFACTANTS IN SOLUTION BY CRYSTALLINE SURFACES
J. ROUQUEROL, Scientific Research Center, Center for Res. Microcalor., *Thiais*, *France*

DESCRIPTION OF WORK: Textural characteristics of the three adsorbents studied (siliceous, calcareous such as pulverulent callite or dolomite, natural silico-aluminate such as koalinite); specific area and, if necessary, porous distribution (by nitrogen adsorption or immersion).

Studying water-rock and oil-rock interactions. Substituting a heavy alkane for oil (dodecane or tetradecane): measurements by immersion microcalorimetry.

Studying rock-surfactant molecule interactions. Surfactant molecules are: Several elements of a homologous sulfate series, several elements of a homologous series of alkyl-phenol-oxyethylene derivatives.

Measuring liquid flux by microcalorimetry (device to be perfected) and determining adsorption (isotherms of surfactant bodies).

SUPPORTED BY France - French Government - Paris

1.0257, THE ACTION OF PERFLUORATED SURFACTANT AGENTS IN AN OIL-WATER SYSTEM
C. WAKSEKLAWN, Scientific Research Center, Applied Org. Chem. Res. Ctr., *Thiais*, *France*

DESCRIPTION OF WORK: Testing products already synthesized in an oil-water system.

Synthesizing other fluorated compounds such as phosphates or polyoil sulfates and sulfonates in which the equilibrium between the importance of fluorated chains and oleophilous chains will be studied to obtain stable oil-water emulsions.

Comparing obtained ternary diagrams with type I compound families (RF-(M)-(O)) and type II (RF-(O)(H)) in which H is the hydrophilous part and O the oleophilous part.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

1.0258, EFFECT OF BIOSURFACTANTS AND THEIR SYNTHETIC HOMOLOGUES ON THE PHYSICAL PROPERTIES OF HYDROCARBONS

G. DURANT, Inst. for Applied Sciences, *Toulouse, France*

DESCRIPTION OF WORK: Tests of water-hydrocarbon systems from raw fermentation areas. Tests of water-hydrocarbon-rock systems from raw fermentation areas. Tests from purified portions. Seeking optimal production conditions.

ADDENDA: Supporting agency: Delegation Generale a la Recherche Scientifique et Technique. Performing organization: Institute National des Appliques de Toulouse, Departement de Chimie - Genie Biochimique.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

1.0259, BITUMINOUS SCHISTS IN THE JURAS AND SURROUNDING AREAS

P. BROQUET, Univ. of Besancon, Lab. of Applied Geology, *25 Besancon, France*

DESCRIPTION OF WORK: Determining bituminous schist reserves under the Juras in order to estimate the amount of hydrocarbons that these schists can provide, plus the possibility of other uses (adobe, cement, fills, etc.).

Using surface data for this purpose (surface deposits of toarcieu) and in depth data (reserves).

Work completed in sedimentary petrography and geological mapping.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

1.0260, RECOVERING OIL BY USING STEAM INJECTIONS TO INTRODUCE ACTIVE-TENSION AQUEOUS SOLUTIONS INTO DEPOSITS

M. COMBARNOUS, Polytechnic Institute, *31 Toulouse, France*

DESCRIPTION OF WORK: Achieving one-directional displacement in porous areas: Overall displacements in porous areas partially saturated with oil. Systematic study of injecting wet steam carrying different types of tracers into a porous area saturated with liquids, showing the concentration of tracers below the samples and conditions under transfer between tracers and water condensed in a mass which takes place, using development curves. Similar study of compounds capable of great absorption in the solid phase. Theoretical analysis of phenomena that occur.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

1.0261, FLOW DURING THE DISPERSED PHASE IN POROUS SURROUNDINGS

M. MARTIN, Polytechnic Institute, *31 Toulouse, France*

DESCRIPTION OF WORK: Defining a totally or partially dispersed fluid phase. Experimental analysis: Experimental method for obtaining oil flows in the dispersed phase, experimental program. Theoretical analysis: Looking for microscopic laws, analyzing the microscopic scale.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

1.0262, MECHANISM OF HYDROCARBON RETENTION IN SOILS - HYDROPHOBIC INTERACTIONS

A. LATTES, Univ. of Toulouse, *31076 Toulouse Cedex, France*

DESCRIPTION OF WORK: Hydrophobic interactions: Factors influencing structural modifications in water (additives such as urea, thiourea, guanidine chlorohydrate, quaternary ammonium salts), testing mixed solutions, studying their effect on hydrocarbon solubility, and on the separation of the latter from a solid support (testing alkanes, aromatic hydrocarbons, and crude oil). Relation to the rock (verifying the theory of hydrocarbon retention by hydrophobic interaction with long chains of molecules). Effect of destructive solutions on micelle solutions.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

1.0263, STUDYING SILICON AEROGELS FOR ASSISTED RECUPERATION OF PETROLEUM

M. TEICHNER, Claude Bernard University, Lab. of Thermody. & App. Chem., *69621 Villeur Banne, France*

Studying the standardization of the putting into suspension process of aerogels derived under preparation conditions with different pH levels: neutral, basic and acid. Measuring the viscosity of water in accordance with the way the aerosol in suspension was obtained. Measuring the viscosity of water in accordance with the amount of aerogel in suspension. Studying the effect of salinity (CaCl2, NaCl) and pH (acids varying from 3 to 6, base 8) on the viscosity of silica aerogel suspensions.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

1.0264, STATIC STUDY OF THE STABILITY OF MICROEMULSIONS USED TO RECOVER PETROLEUM

G. MANEL, Applied Chemistry Institute, *74 Paris 4E, France*

A number of sizes are encountered under microscopically static conditions (sample equilibrated as regards temperature and salinity). Static: Size and average distance between micelles chemical displacement of the system's protons (eventually of carbons and cations). Dynamics: Correlation time of molecular motion: Dynamic parameters of this motion.

The results will enable us to specify: The localization of the molecules present in the microheterogeneous system, plus their degree of freedom. Interactions between ions and molecules, hydrogen containing molecules (water, alcohol, even amine), organic molecules (surfactant, cosurfactant, hydrocarbon).

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

1.0265, CHEMICAL FACTORS IN THE ADSORPTION OF WATER-SOLUBLE POLYMERS BY MINERALS

R. SIBUTPINOTE, Applied Chemistry Institute, *74 Paris 4E, France*

We will work with solids as well-defined as posible, representing naturally porous areas whose essential characteristics will be determined in the laboratory (specific surface, porosity, nature of superficial cations, exchange capacity, etc.).

We will study the surface interactions of model solid-molecules (equipped with functional groupings found in polymers) using 2 methods: Adsorption in the gaseous phase: surface interactions of functional solid molecules (specific interactions). Liquid phase adsorption extended to certain multifunctional molecules in order to determine the relationship between adsorption of simple molecules and macromolecules having the same functions.

SUPPORTED BY France - French Government - Paris

1.0266, AQUEOUS OIL-SOLUTION SYSTEM WITH VERY LOW INTERFACIAL TENSION, MEASURING INTERFACIAL TENSION AND INTERFACE POTENTIAL

M. DUPEYRAT, Univ. of Paris, Lab. of Physical Chemistry, *75 Paris 5E, France*

Systematic study of superficial size (interface tension and potential) in aqueous oil-solution systems of various sulfates in order to correlate them with observed emulsifying properties.

Possible role of micelles in obtaining contact miscibility during the phases studied; Role of a fine solid suspension added to the fluid in the appearance of the emulsion.

Interpretive test for deducting the structure of the ideal additive under given surrounding conditions. Eventual examination of other types of additives.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

1.0267, THE OUTFLOW OF LNG ON WATER AND THE CONSEQUENCES OF LNG CATCHING FIRE
G. SNELLINK, Central Org. Adv. Appl. Res., Central Technical Inst., *Apeldoorn, Netherlands*
Part 7 of 7.

SUPPORTED BY Netherlands - Ministry of Social Affairs - The Hague

1.0268, COORDINATIVE INVESTIGATION - RISK ANALYSES
W. VANDEELEN, Central Org. Adv. Appl. Res., Org. for Industrial Research, *Apeldoorn, Netherlands*
Part 4 of 7.

SUPPORTED BY Netherlands - Ministry of Social Affairs - The Hague

1.0269, ORIGIN OF A LEAK AND ESCAPE OF GAS
H.H. HART, Central Org. Adv. Appl. Res., Inst. for Mechanical Constr., *Delft, Netherlands*
Part 5 of 7.

SUPPORTED BY Netherlands - Ministry of Social Affairs - The Hague

1.0270, RESPONSE OF CONSTRUCTIONS TO BLAST WAVES
H.H. HART, Central Org. Adv. Appl. Res., Inst. for Mechanical Constr., *Delft, Netherlands*
Part 6 of 7.

SUPPORTED BY Netherlands - Ministry of Social Affairs - The Hague

1.0271, FATIGUE PROPERTIES OF CONNECTIONS IN JACKET OFFSHORE CONSTRUCTIONS
H. KUIPER, Central Org. Adv. Appl. Res., Inst. for Building Constr., *Delft, Netherlands*
Part 2 of 10.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

1.0272, RISK ANALYSIS CONCERNING OFFSHORE CONSTRUCTIONS
H.J. LOMBAERS, Central Org. Adv. Appl. Res., Inst. for Building Constr., *Delft, Netherlands*
Part 3 of 10.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

1.0273, DETERMINATION OF FATIQUE OF CONCRETE IN OFFSHORE CONSTRUCTIONS
J.C. SLAGTER, Central Org. Adv. Appl. Res., Inst. for Building Constr., *Delft, Netherlands*
Part 4 of 10.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

1.0274, DETERIORATION OF CONCRETE IN OFFSHORE CONSTRUCTIONS
J.C. SLAGTER, Central Org. Adv. Appl. Res., Inst. for Building Constr., *Delft, Netherlands*
Part 5 of 10.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

1.0275, WAVE FORCES AND STREAM FORCES ON OFFSHORE JACKET CONSTRUCTIONS
C. VANBOVEN, Delft Hydraulics Laboratory, *Delft, Netherlands*
Part 8 of 10.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

1.0276, APPLIED RESEARCH ON OFFSHORE STRUCTURES FOR EXPLORATION AND EXPLOITATION OF OIL AND GAS
J.H. VANOORSCHOT, Delft Hydraulics Laboratory, *Delft, Netherlands*

The studies generally deal with: Collection and processing of basic data (waves, currents, bottom topography, etc.); determination of design conditions; determination of forces due to waves and currents on platforms, storage tanks, etc; determination of the behaviour and anchor forces for floating equipment; local scour around structures; pipelines; trenching, wave and current forces, scouring; mooring and fender forces for tankers; single point moorings.

The investigations are made applying field surveys, small scale; hydraulic models and mathematical models. The duration varies from one month to one year.

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

1.0277, EXAMPLE OF APPLIED RESEARCH ON OFFSHORE STRUCTURES - OFFSHORE GRAVITY STRUCTURE, 'ANDOC PLATFORM-4'
J.H. VANOORSCHOT, Delft Hydraulics Laboratory, *Delft, Netherlands*

Structure: Concrete gravity production platform for about 160 m water depth.

Location: Northern part of North Sea.

Items which have been studied and methods applied: Overall wave forces have been computed applying a diffraction-type mathematical model. Forces on the columns of the structure have been computed, as well as determined in a hydraulic model with reproduction of random wave motion. The behaviour during towing has been investigated in a model. The operation of submergence and positioning at the site has been studied in hydraulic models.

SUPPORTED BY Netherlands - Anglo Dutch Offshore Concrete - Rijswijk

1.0278, APPLIED RESEARCH ON INTERNAL COOLING WATER CIRCUITS AND PIPELINE SYSTEMS
J. WIJDIEKS, Delft Hydraulics Laboratory, *Delft, Netherlands*

The studies generally deal with: Performance of pumps and pumping stations; water-hammer phenomena in internal cooling water circuits, including condensors; water-hammer phenomena (surge-analysis) in oil-transport systems, in loading and unloading facilities; water injection systems.

The investigations are made applying a mathematical model for water-hammer studies and model studies on test rigs for pumps, operating valves, etc.

The duration of the investigations varies from about one to three months.

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

1.0279, FOUNDATIONS OF GRAVITY CONSTRUCTIONS FOR OFFSHORE PURPOSES
A.F. VANWEELE, Delft Soil Mechanics Lab., *Delft, Netherlands*
Part 9 of 10.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

1.0280, DETERMINATION OF THE YIELD OF HEAVY CRUDE OIL BY COMBINING STEAM PROPAGATION AND STEAM DISTILLING

D.N. DIETZ, Delft Univ. of Technology, *Delft, Netherlands*

A pilot plant is to be designed for the determination of the yield of heavy crude oil by means of a combination of steam propagation and steam distilling. On the basis of the results obtained, the yield may be improved.

SUPPORTED BY Netherlands - Delft University of Technology

1.0281, REDUCING THE FORMATION OF NITROGEN OXIDES DURING THE COMBUSTION PROCESS OF OIL AND GAS

T.T. PAAUW, Delft Univ. of Technology, Lab. for Thermal Power Engin., *Delft, Netherlands*

The oxidation of nitrogen (atmospherical nitrogen and nitrogen chemically bonded to the fuel) to nitrogen oxides is studied during the combustion processes of gas and oil by means of mathematical models and experiments. The objectives are to define criteria for the reduction of nitrogen oxide emissions by power plants. There is an exchange of information with: a) International Flame Research Foundation, Ymuiden, the Netherlands; b) Imperial College, London, England.

SUPPORTED BY Netherlands - Delft University of Technology

1.0282, FORECASTING OF HYDROCARBON DISCOVERIES BASED ON THE RELATIONSHIP BETWEEN RECENT STOCKS AND PAST PRODUCTION

W.H. VANEEK, Delft Univ. of Technology, *Delft, Netherlands*

A new method has been developed to make more adequate estimates of the world stocks of oil and gas. The method is based on the relation between the cumulative production and the stocks.

At the spring meeting of the Society of Petroleum Engineers of the AIME, held on the 30th of May, 1974, Prof. ir. W.H. van Eek presented paper regarding this subject titled 'Forecasting future hydrocarbon discoveries based on a relationship between past production and reserves' (paper SPE 4828).

SUPPORTED BY Netherlands - Delft University of Technology

1.0283, STUDIES CONCERNING OFFSHORE CONSTRUCTIONS FOR EXPLORATION AND EXPLOITATION OF THE SEA BOTTOM FOR NATURAL GAS, OIL, COAL, & MINERALS

C.L. FOCK, Industriele Raad de Oceanolog., *Delft, Netherlands*

Part 1 of 10.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

1.0284, COMPARATIVE STUDY OF THE ECONOMICS OF THE PRODUCTION OF METHANOL BASED ON RESIDUAL OIL, FUEL OIL & NATURAL GAS, RESPECTIVELY, AS RAW MATERIAL

A. HUISMAN, A K Z O, *Delfzijl, Netherlands*

Comparative study of the economics of the production of methanol based on residual oil, fuel oil and natural gas, respectively, as raw materials.

SUPPORTED BY Netherlands - A K Z O N.V. - Arnhem

1.0285, RESERVOIR TECHNIQUES

UNKNOWN, Dutch State Mines, Netherlands Res. & Pat. Dept., *Geleen, Netherlands*

Studies on the behaviour of gas and oil accumulation during production.

Addenda: Supporting agency: Naamloze Vennootschap DSM.

SUPPORTED BY Netherlands - Dutch State Mines - Heerlen

1.0286, BITUMINA - IDENTIFICATION

UNKNOWN, Ministry of Economic Affairs, *Harlem, Netherlands*

Identification of bitumina accumulations by means of seismographic (reflex) recordings for the assessment of potential fuel stocks.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

1.0287, TECHNOLOGICAL AND ECONOMICAL ASPECTS OF THE STORAGE OF CRUDE OIL AND DERIVATIVES IN ROCK SALT LAYERS

E.A. DEWIT, A K Z O, *Hengelo, Netherlands*

The study concerns the technological aspects of the storage of crude oil and derivatives in rock salt layers. The costs are lower than for the conventional method of storage in tanks in the neighbourhood of Dutch refineries. In the short run (six months' preparation), 300,000 500,000 tons of oil can be stored in already existing and approved cavities. In case of a study induced by the Dutch Government concerning the disposal of radioactive waste, AKZO is willing to cooperate and to provide the specific acquired information. The disposal problem of radioactive waste will become urgent about 1980.

SUPPORTED BY Netherlands - A K Z O N.V. - Arnhem

1.0288, AXIAL STRENGTH OF STEEL POLES OF OFFSHORE JACKET CONSTRUCTIONS

A.F. VANWEELE, F U G R O, *Leidschendam, Netherlands*

Part 10 of 10.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

1.0289, INVESTIGATIONS INTO THE HAZARDS CONNECTED WITH STORAGE AND TRANSPORT OF LNG (LIQUID NATURAL GAS)

J.G. DEGRAAF, Cental Org. Adv. Appl. Res., Bureau of Explosion Safety, *Rijswijk, Netherlands*

Part 1 of 7.

SUPPORTED BY Netherlands - Ministry of Social Affairs - The Hague

1.0290, DISPERSION OF A GAS CLOUD

A.J. OOMS, Cental Org. Adv. Appl. Res., Chemical Laboratory, *Rijswijk, Netherlands*

Part 3 of 7.

SUPPORTED BY Netherlands - Ministry of Social Affairs - The Hague

1.0291, BLAST OF DEFLAGRATION AND DETONATION AND THE DEFLAGRATION TO DETONATION TRANSITION

H.J. PASMAN, Cental Org. Adv. Appl. Res., Technological Laboratory, *Rijswijk, Netherlands*

Part 2 of 7.

SUPPORTED BY Netherlands - Ministry of Social Affairs - The Hague

1.0292, SIMULATION MODEL OF NORTH SEA OIL PROVINCE

P.R. ODELL, Erasmus Univ. of Rotterdam, Economic Geography Institute, *Rotterdam, Netherlands*

Present conventional estimates of North Sea oil production envisage a steady rise to a level of 250-300 million tons a year by the early 1980's, thereafter levelling off through the 80's, before declining.

This study, carried out at the Economisch-Geografisch Instituut, Erasmus University, Rotterdam, indicates a continued rise in production, not only through the 1970's, but also through the 1980's, to peak levels of production of the order of 1,000 million tons a year by the early 1990's. It is based on simulation techniques and simulation methodology.

Whilst conventional wisdom thinks in terms of a maximum total potential reserve of 40 million barrels, this study indicates the possibility of a range of 80-140 million barrels, with a mean figure of 110 million.

The simulation has been made on the basis of a complex computer programme, a full listing of which, in Fortran IV language, forms part of this presentation.

There are profound implications, both at the policy making and the practical levels, to be drawn from the results of this study. The main conclusion is that Western Europe can look forward to achieving energy self-sufficiency, based on North Sea oil and gas, through the 1980's and up to the year 2000. This must inevitably lead to a development and production period and market potential for suppliers to the industry twice as long and much more intense than previously indicated.

SUPPORTED BY Netherlands - Erasmus University of Rotterdam

1.0293, SURFACE CATALYSIS OF HYDROCARBONS BY NI, CO, AND FE FOR SYNTHESIS OF FUELS - CARBIDE REACTIVITY WITH H2, H2O, CO2 AND O2 (ABBREV)

J.W. GEUS, State University at Utrecht, *Utrecht, Netherlands*

Objectives: 1) The development of improved catalytical processes for the conversion of hydrocarbons. In processes regarding the conversion of hydrocarbons, metal catalysts are important, e.g., for the production of ammonia and methanol from natural gas, the conversion of natural gas or coal into liquid hydrocarbon (Fischer-Tropsch process), and the production of synthetic natural gas (SNG). 2) Improvement of catalytical oxidation processes. Nearly all thermal energy is generated through combustion reactions. Catalytic oxidation might play an important part. A good oxidation catalyst might make it possible to distribute fuel gas with a varying heat of combustion to the natural gas piping system without modification of the equipment (use of natural gas from elsewhere or additional supply of hydrogen). If, in case of scarcity of fossil fuels, hydrogen (e.g. from nuclear energy) will be distributed, it will be possible to generate thermal energy very efficiently through catalytic oxidation of hydrogen; also, many important raw materials are produced through catalytic oxidation processes. An insight into the factors governing the reactivity of oxygen present in or on solid surfaces makes it possible to improve catalytic oxidation processes by means of specific catalyst synthesis methods. 3) Development of catalysts for the decomposition of nitrogen oxides and of a highly selective catalytic oxidation process through nitrogen oxides. In air pollution, nitrogen oxides play an important part. Decomposition or selective oxidation of nitrogen oxides has so far proved very difficult. One of the reasons for this is the lack of knowledge on the interaction of nitrogen oxides with solid surfaces. The primary aim of this investigation is, therefore, to acquire information on this interaction. Moreover, nitrogen oxides make it possible to carry out highly selective oxidations.

Addenda: Supporting agency and Performing organization: Rijksuniversiteit Utrecht.

SUPPORTED BY Netherlands - State University at Utrecht

1.0294, DRIFTING OF GRAVITY CONSTRUCTIONS IN THE FINAL STAGE OF CONTROLLED SINKING

C. VANBOVEN, Ship Model Basin, *Wageningen, Netherlands*

Part 7 of 10.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

1.0295, PROCESS FOR REMOVAL OF OIL FROM 'TAR SANDS'

A.R. GLOBUS, Guardian Chemical Corporation, *Hauppauge, New York* 11787

DESCRIPTION: The development consists of a method of recovering oil values from the Athabasca Tar Sands located in Alberta, Canada. This deposit is estimated to contain approximately 600 billion barrels of potential oil. The process developed extracts the petroleum residue in a single stage utilizing a minimum of water and energy expenditure to make the extraction. The process consists of mixing of tar sands with water and a special separative chemical (in very low concentration) for about 15 minutes at approximately 100 degrees F. When the mixer is stopped the clean sand settles to the bottom, a water layer is formed, and on top of this is a layer of the oil values. The latter goes to the refinery and the water layer with makeup chemical returns to the system. According to the completed studies high yields are possible at a low cost, and the pilot plant has just been completed to demonstrate this process. If successful, this process could yield a greater source of oil than that of the combined countries of the Middle East.

SUPPORTED BY Canada - New Western Oil Sands Limited - Vancouver

1.0296, NEUTRON ACTIVATION ANALYSIS IN THE OIL AND MINING INDUSTRIES

J. USMAN, Atomic Energy Agency, *Bandung, Republic of Indonesia*

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

1.0297, HEATING COSTS AND PROFITABILITY LIMITS IN CONJUNCTION WITH HEATING USING VARIOUS OIL GRADES IN EXISTING BOILER PLANTS

A. KASZA, Kommunernas Konsultb. I Goteb., *Gothenburg, Sweden*

The trend of energy costs in recent years with a constant increase in oil prices has given rise to the start of collaboration work between AB Goteborgshem and K Konsult in Gothenburg with a view to detailed studies and research on profitability when using various oil grades in hot-water and high-temperature hot-water boilers. We intend to carry out field investigations in a number of existing boiler plants and to study and map out the total annual heating costs which vary considerably when using different oil grades and the technical-economical consequences of which have not yet been charted. The relevant state and municipal authorities, boiler, burner, chimney stack manufacturers etc, oil companies, chimney sweeps, pipework and oil contractors, operational personnel for various boiler plants etc. will all be contacted. Estimates and calculations will be carried out and will be used as a basis for three different charts in which profitability limit curves for various oil grades will be presented. It will also be possible to read the total annual heating costs directly from these charts when the maximum fuel output for the boiler plant and the prevailing price for the respective oil grades are known. The charts will also make it possible to select the most advantageous oil price/oil grade at any given time from the point of view of the total annual heating costs.

SUPPORTED BY Sweden - Council for Building Research

1.0298, STUDIES AND DEVELOPMENT OF METHODS FOR GASIFICATION OF SHALE IN FLUIDIZED BEDS

I. BJERLE, Univ. of Lund, School of Technology, *Lund 7, Sweden*

OBJECTIVE: To make a study of fuel with a low heating value, to develop an experimental plant where the fluidized bed is to be studied and to study the gases obtained from the thermal treatment. The fuel of most interest is shale.

APPROACH: Stage 1 of the project (research project No. 53 3064 011) has covered acquisition and installation of measuring equipment and of a continuous fluidized reactor in a laboratory size.

The experiments have included development of the measuring methods, turning up the plant and introductory tests of the gasification of shale.

PROGRESS: In stage 2 of the project (the current phase of the project) the conditions of the gasification of shale and of the remainder from the leach in Ranstad will be investigated. Among others, investigations concerning the properties of gasification are carried out in order to reach the optimum of variables such as temperature cycling time, combustion efficiency and gas composition. A cold model of plexiglass equipped with a circulating fast fluidizing reactor is to be built. The reactor will consist of one gasification and one combustion reactor. The investigations include experiments of transport, circulation and regulation of gas.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

1.0299, INVESTIGATIONS REGARDING EXTRACTION OF THE FOSSIL ENERGY CONTENT OF SHALE IN RANSTAD

O. CARLSSON, Luossavaara Kiirunavaara Ak., *Stockholm, Sweden*

OBJECTIVE: To investigate the technical and economical conditions regarding utilizing the energy content of shale when uranium is extracted.

APPROACH: Stage 1 of the project includes: Studies of literature, also investigations, experiments and collecting data concerning processes, systems and environment from a technical and economical point of view. Investigations concerning carriers of energy and their market. Establishing principles for the continuation of the research.

PROGRESS: In future stage 2 experiments at some existing Swedish or foreign plants, preparing planning of new plants and deepening investigations of different parts of the problem will be carried out.

In a stage 3 a pilot plant is planned to be built and complex studies of the design of plants and cost estimations will be carried out.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

1.0300, STUDY OF CHEMICALLY ACTIVE FLUID BED GASIFIER FOR REDUCTION OF SULPHUR OXIDE EMISSIONS

G.L. JOHNES, Esso Petroleum Company Ltd., *Abingdon, England, United Kingdom*

DESCRIPTION: The overall objective of the Chemically Active Fluid Bed (CAFB) project is the development of an economical process for avoiding SO(2) pollution when burning heavy fuel oil for generation of power. The CAFB system is a regenerative process using a shallow fluid bed of lime to remove sulphur while gasifying the oil prior to combustion. The lime is regenerated, producing a concentrated (6-10%) stream of sulphur dioxide which can be recovered as acid or elemental sulphur. The development strategy calls for six phases of activity culminating in demonstration of the process in a commercial boiler of approximately 150 megawatt capacity. These six phases are as follows: II - Operation of continuous pilot plant to provide process data and know-how for design of conversion on commercial unit. Development of conceptual design for conversion and economic evaluation of process viability. III - Full study design of proposed conversion. Additional laboratory and pilot plant studies to answer specific design questions. IV - Detail design of conversion. V. Boiler conversion and commissioning. VI - Boiler operation in normal duty while evaulating long term performance of CAFB gasifier.

ADDENDA: Estimated calendar year funding reported as 1975 $81,500.

SUPPORTED BY U.S. Environ. Protection Agy., Office of Research & Dev.

1B. COAL

1.0301, THE REMOVAL OF SULFUR FROM COKE PRODUCED DURING RECOVERY OF SYNTHETIC CRUDE OIL

E.L. TOLLEFSON, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

1.0302, MAKING ACTIVATED CARBON FROM COAL OR COAL CHAR

E.L. TOLLEFSON, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

1.0303, PETROGRAPHIC ANALYSES OF COAL SEAMS IN THE KOOTENAY FORMATION OF SOUTHEASTERN BRITISH COLUMBIA

T.F. BIRMINGHAM, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: 1) Correlation of the seams to assist in determining the extent of the mineable coal seams in the area; 2) the origin, sedimentation and lateral variations in composition, quality, thickness, etc. of the seams; 3) from the petrographic composition and rank determinations, to predict the coking properties.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0304, PETROGRAPHIC EXAMINATION OF COKING COALS FROM THE CROWSNEST COAL FIELD, ALBERTA AND BRITISH COLUMBIA

A.R. CAMERON, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objective: To determine the coking properties and to prepare seam profiles for correlation and environmental studies of coal seams from coking coals of the Crowsnest coal field.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0305, PETROGRAPHIC ANALYSIS OF SASKATCHEWAN LIGNITES

A.R. CAMERON, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objectives: a) Petrographic characterization of Saskatchewan lignites; b) determination of vertical and lateral changes in petrographic composition; c) relation of petrographic composition to environments of deposition.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0306, STRATIGRAPHIC AND SEDIMENTOLOGICAL STUDIES OF THE CRETACEOUS GETHING FORMATION, PEACE RIVER CANYON OF NORTHEASTERN BRITISH COLUMBIA

D.W. GIBSON, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To describe the stratigraphic succession; to collect samples for laboratory studies; to provide data on the distribution and continuity of coal seams throughout the region; to attempt to determine criteria useful in determining the sub-environments in which the deltaic sediments were deposited; and to eventually provide a regional geological model that will be of assistance in determining the potential coal resources of other regions in Canada.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0307, STRATIGRAPHIC & SEDIMENTOLOGICAL STUDIES OF LOWER CRETACEOUS ROCKS, ROCKY MOUNTAIN FOOTHILLS & FRONT RANGES, ALBERTA & BRITISH COLUMBIA

D.W. GIBSON, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

1. ORGANIC SOURCES OF ENERGY

OBJECTIVE: To describe the Lower Cretaceous stratigraphic succession, to collect samples for laboratory studies, and to collect fossil flora and fauna; to provide data on the distribution and continuity of coal seams throughout the region; to attempt to determine criteria useful in determining the sub-environments in which deltaic sediments were deposited; and to eventually provide a regional geological model that will be of assistance in determining the potential coal resources of other regions in Canada.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0308, EVALUATION OF COAL DEPOSITS IN WESTERN AND NORTHERN CANADA
P.S. GRAHAM, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To establish a coal resource base from which quantitative, qualitative, mineability and environmental studies can be made.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0309, INVESTIGATIONS CONCERNING THE OPTICAL PROPERTIES OF COALS AND DISPERSED ORGANIC MATERIALS
P.R. GUNTHER, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To provide minimal amounts of critical information concerning paleotemperatures and maximum depths of burial to GSC geologists in western Canada.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0310, COAL RESERVES OF CANADA AND STUDIES OF COAL DEPOSITS IN CANADA
J.A. IRVINE, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To prepare estimates on the coal reserves of Canada; to prepare for publication reports and illustrations concerning Canada's coal reserves; to advise and prepare reports for other branches or departments when so requested; to have up-to-date knowledge of coal fields in Canada.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0311, SASKATCHEWAN COAL EVALUATION PROGRAM
J.A. IRVINE, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To determine the quantity, quality, mineability and recoverability of the coal resources of southern and central Saskatchewan to a sufficient degree of accuracy so that their relative position in the framework of Canada's energy supply and demand can be established so that reasonable and knowledgeable energy policies can be formulated concerning them.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0312, TEST STUDY PRELIMINARY TO A PROPOSED HAT CREEK COAL EVALUATION PROGRAM
J.A. IRVINE, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objectives: To study the exposed surface geology in order to reconstruct as far as possible the lithological section of the coal measures; to locate possible drill sites to penetrate the coal measures without duplicating surface exposures and to determine available access to proposed drill sites.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0313, PRELIMINARY GEOLOGICAL MAPPING OF THE DOMINION COAL BLOCKS
J.A. IRVINE, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objective: To study exposed surface geology, road cuts, and bulldozer trenches of the coal measures of Parcel 73 of the Dominion Coal Blocks.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0314, PLANNING, DIRECTING AND COORDINATING COAL RESOURCE EVALUATION PROGRAMS
B.A. LATOUR, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To develop and maintain a resource evaluation system of coal deposits in Canada upon which authoritative advice and information can be based.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0315, LITHOSTRATIGRAPHY AND SEDIMENTOLOGY OF THE COAL-BEARING BLAIRMORE GROUP IN THE ROCKY MOUNTAIN INNER FOOTHILLS BELT
J.R. MCLEAN, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: Detailed evaluation of lithostratigraphy and sedimentology (depositional environments, paleocurrent analysis, petrography) of the Blairmore Group with emphasis on the correlation and origin of coal seams and their relationship to associated sediments.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0316, HEAD, COAL GEOLOGY SUBDIVISION
D.K. NORRIS, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: Advise the Director of the Institute of Sedimentary and Petroleum Geology on areas of investigation required to evaluate the coal resources of Canada, and to administer the coal geology and evaluation program within the Geological Survey of Canada.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0317, STRUCTURAL ANALYSIS OF THE FERNIE BASIN
N.C. OLLERENSHAW, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To establish a detailed structural model of the Fernie Basin, and to elucidate the structural behaviour of coal as an element of the sedimentary succession as an aid to the evaluation of the coal resources of the Fernie Basin.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0318, STRATIGRAPHIC AND SEDIMENTOLOGICAL STUDIES OF UPPER CRETACEOUS/PALEOCENE COAL-BEARING BEDS, CENTRAL FOOTHILLS, ALBERTA
D.F. STOTT, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To develop the scientific foundation for the quantitative assessment of Canadian coal reserves.

WORK: Studies of the detailed lithostratigraphy and depositional environments of the coal-bearing beds associated with Upper Cretaceous/Paleocene rocks of central Alberta.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0319, STRATIGRAPHIC, SEDIMENTOLOGICAL AND STRUCTURAL STUDIES OF CRETACEOUS COAL-BEARING ROCKS

D.F. STOTT, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To develop the scientific foundation for the quantitative assessment of Canadian coal reserves.

WORK: Studies of the detailed lithostratigraphy, depositional environments and structural fabric of the coal-bearing sediments of the Kootenay Formation and Blairmore Group of Eastern British Columbia and western Alberta, and of the unnamed Territory lignites of central and western British Columbia and southern Yukon Territory.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0320, COAL INVESTIGATIONS, UPPER ELK VALLEY

D.F. STOTT, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To develop the scientific foundation for the quantitative assessment of Canadian coal reserves.

WORK: Determination of the presence, number, distribution and quality of coal seams in the Kootenay Formation of upper Elk Valley and establishment of a positive correlation of these seams between the Fernie and Cascade coal basins.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0321, RANK AND PETROGRAPHIC STUDIES OF COAL AND ORGANIC MATTER DISPERSED IN SEDIMENTS

D.F. STOTT, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To develop the scientific foundation for the quantitative assessment of Canadian coal reserves.

WORK: Rank determination and petrographic evaluation on coal and dispersed coal-like particles in samples from projected coal drilling operations in eastern Canada.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0322, PALYNOLOGICAL STUDIES OF UPPER JURASSIC AND CRETACEOUS COAL MEASURES IN WESTERN CANADA

A.R. SWEET, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: (1) To establish a palyno-stratigraphic zonation of the coal measures, as an aid to coal petrological, sedimentological and structural interpretations of coal basins; (2) to correlate coal seams of suitable rank (exceeding 25% volatile matter) by means of spore and pollen histograms.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0323, PALYNOLOGICAL STUDY OF THE TERTIARY COALS AND ASSOCIATED CLASTIC ROCKS OF THE RAVENSCRAG AND FRENCHMAN FORMATIONS, SASKATCHEWAN

A.R. SWEET, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: 1) To use palynomorph assemblages to identify and correlate coal seams; 2) to provide a biostratigraphic zonation of the Ravenscrag and underlying Frenchman Formation.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0324, CONVERSION OF THE TOTAL SULPHUR CONTENT OF WASHING PLANT COAL REJECTS TO ELEMENTAL SULPHUR

J.A. BROTHERS, Nova Scotia Res. Found. Corp., *Dartmouth, Nova Scotia, Canada*

The principal objective is to recover the energy values of the coal fraction rejected from a coal washing plant. The fixed carbon content of the coal will convert calcium sulphate additions to calcium sulphide and the sulphur content of the coal will be contained by lime additions as calcium sulphide; both reactions require a final 900 degrees C or greater temperature to reach complete conversion.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0325, THE EXTENT OF CONVERSION OF ORGANIC SULPHUR IN COAL TO CALCIUM SULPHIDE IN PRESENCE OF CALCIUM SULPHATE AND LIME AT COKING TEMPERATURES

J.A. BROTHERS, Nova Scotia Res. Found. Corp., *Dartmouth, Nova Scotia, Canada*

OBJECTIVE: The principal objective is to recover the energy value of the coal fraction rejected from a coal benefication plant. The fixed carbon content of the coal will convert CaSO4 additions to CaS. The pyritic sulphur is known to be converted to CaS with lime additions. The goal of this work is to determine the degree to which organic sulphur is affected and reactions involved.

Sulphur content of coal rejects from a coal benefication plant is to be converted to CaS with lime, while the fixed carbon value of the coal is to be recovered by chemical reduction of CaSO4 to CaS. It is shown in earlier work that the pyritic sulphur and CaSO4 are totally converted to CaS in separate coal systems. The degree to which the organic sulphur is affected in a system of coal-lime-CaSO4 heated to coking temperature has not been studied in our past work. The present work indicates that all of the organic sulphur in the coal is accounted for in the analysis of the acid-washed residual solids. For example, the acid-leached residual coked solids from CaSO4-coal-CaO mixtures (weight ratio: 18-7-1) gave sulphur contents of 11.3 per cent and 12.7 per cent. The organic sulphur content of the original coal would represent 14.7% and 10.2% of the residual solids. These data therefore suggest that carbon bonded to sulphur is non-reactive as a reductant of CaSO4 and therefore organic sulphur will not be recovered from the coal rejects.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0326, PETROGRAPHY OF COAL SEAMS IN THE ROCKY MOUNTAIN FOOTHILLS BELT, NORTH OF THE PANTHER AREA

P.A. HACQUEBARD, Dept. Energy Mines & Resources, Atlantic Geoscience Centre, *Dartmouth, Nova Scotia B2Y 4A2, Canada*

Objective: To examine the petrography of these coals in order to determine their coking properties and prepare seam profiles for correlation and resource evaluation purposes.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0327, GEOLOGICAL ASSISTANCE WITH PROVINCIAL COAL DRILLING PROJECT IN NOVA SCOTIA

P.A. HACQUEBARD, Dept. Energy Mines & Resources, Atlantic Geoscience Centre, *Dartmouth, Nova Scotia B2Y 4A2, Canada*

OBJECTIVE: In cooperation with provincial authorities, to prepare an inventory of remaining coal reserves in Nova Scotia.

1. ORGANIC SOURCES OF ENERGY

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0328, MICROSCOPIC STUDY OF PYRITE IN MAIN SEAMS OF SYDNEY COAL FIELDS, N.S.
P.A. HACQUEBARD, Dept. Energy Mines & Resources, Atlantic Geoscience Centre, *Dartmouth, Nova Scotia B2Y 4A2, Canada*

OBJECTIVE: Through a detailed study of mode and distribution of pyrite in coal, to establish geological trends that may permit prediction of high sulphur areas ahead of present (submarine) workings.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0329, TO ADVISE THE CAPE BRETON DEVELOPMENT CORPORATION ON COAL GEOLOGY FOR ITS OPERATIONS IN THE SYDNEY COAL FIELD
P.A. HACQUEBARD, Dept. Energy Mines & Resources, Atlantic Geoscience Centre, *Dartmouth, Nova Scotia B2Y 4A2, Canada*

OBJECTIVE: To provide geological information as an input in the planning of new mines, and to interpret geological features in present underground workings as an aid to continued mining developments.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0330, FOOTHILLS COAL MINING
D.A. HACKBARTH, Alberta Groundwater Division, *Edmonton, Alberta, Canada*

SUPPORTED BY Canada - Alberta Provincial Government - Edmonton

1.0331, NATTA-ZIEGLER CATALYZED FISCHER-TROPSCH HYDROGENATION REACTIONS
N. BERKOWITZ, Alberta Research Council, *Edmonton, Alberta, Canada*

OBJECTIVES: Development of stereo-specific CO hydrogenation. A static reactor (55 ml volume) has been used to determine optimum conditions for CO hydrogenation over metal catalysts. The catalytic behaviour of several group VIII metals has been evaluated.

Several test runs with three different iron carbonyls were undertaken to determine whether, or to what extent, alkanes and alkenes form via chemisorption of CO on the metal catalyst and subsequent reduction of the resultant metal carbonyl. Results indicate that alkanes form by hydrogenation of iron carbonyls as well as by hydrogenation of CO over fresh iron surfaces generated by decomposition of the carbonyls.

Tests with a series of different catalysts yielded C1-C9 alkanes and ethylene, but supported catalysts were generally found to be somewhat less effective than unsupported ones. Relative concentrations of hydrocarbons in the product mixture proved sensitive to the conditions under which the catalysts were activated, but in all cases molar yields fell semi-logarithmically with increasing carbon number.

A series of experiments were undertaken to determine CO-H2 interactions over native iron ore. On the basis of CO conversion, molar yields of 60 percent CH4 and 14 percent ethane as well as progressively smaller yields of higher hydrocarbons were observed. A simultaneous water gas shift reaction was indicated; but formation of CO2 decreased as the reaction temperature and/or the H2:CO ratio increased.

Several potentially useful catalysts have been characterized by surface area determinations and measurements of CO/H2 chemisorption. Attention was also given to such matters as catalyst sintering.

A first draft of a review of Fischer-Tropsch chemistry has been prepared. Consideration is being given to the possibility of publishing this as a Research Council monograph.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0332, ECONOMIC STUDY OF COAL AS A MAKE-UP ENERGY SOURCE IN OIL SANDS PROCESSING
UNKNOWN, In Situ Research & Engin. Ltd., *Edmonton, Alberta, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0333, THE UPGRADING OF ORES
L.R. PLITT, Univ. of Alberta, School of Graduate Stu. & Res., *Edmonton, Alberta, Canada*

Research activities are concentrated in the field of mineral processing which involves the upgrading of ores. Research in this area includes work on industrial minerals, fossil fuels (coal and tar sands) and metalliferrous minerals.

SPECIFIC PROJECTS INCLUDE: Flotation of scheelite, fluorite and barite. Dewatering of Athabasca tar sands tailings. Mathematical modelling of the hydrocyclone classifier. Beneficiation of Bruderheim silica sand. Beneficiation of the Peace River iron-bearing minerals.

ADDENDA: This project is also supported by: Chevron Oil.

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

1.0334, AMENDMENT TO A CONTRACT FOR A PEDOLOGIC INVENTORY OF COAL WASTES
UNKNOWN, Research & Productivity Counc., *Fredericton, New Brunswick, Canada*

Amendment to a contract for a pedologic inventory of coal wastes in Cape Breton and New Brunswick and of gypsum in Nova Scotia and New Brunswick to include additional analytical work.

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0335, MACERAL SEPARATION AND PYRITE AND GANGUE REMOVAL FROM CANADIAN COALS BY MEANS OF FLUIDIZATION AND ELECTRIC FIELDS
I. INCULET, Univ. of Western Ontario, *London, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0336, APPLICATION OF THE COPELAND FLUIDIZED BED SYSTEM FOR BURNING UNWASHED LUSCAR COAL TO PRODUCE HOT GASES FOR COAL DRYING (ABBREV)
UNKNOWN, Copeland Systems Limited, *Montreal, Quebec, Canada*

Study of the technical feasibility application of the Copeland fluidized bed system for burning unwashed luscar coal to produce hot gases for coal drying at Caol Valley, Alberta, and prepare cost estimates for three options.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0337, STUDY OF THE COAL SUPPLY AND DEMAND SITUATION OF SECONDARY INDUSTRIES IN CENTRAL CANADA
UNKNOWN, Internat. Coal Consult. Inc., *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0338, DETERMINATION OF COKING PROPERTIES
J. BOTHAM, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To research the means by which coals, particularly Canadian coals, can be employed to the best advantages for metallurgical purposes in the domestic and export market.

WORK: Determination of the physical, petrographic, and chemical coking properties of Canadian coals in order to more fully understand the coking mechanisms.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0339, INNOVATIONS IN CONVENTIONAL CARBONIZATION

J. BOTHAM, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To research the means by which coals, particularly Canadian coals, can be employed to the best advantages for metallurgical purposes in the domestic and export market.

WORK: Improvement of the efficiency of conventional cokemaking in slot-type ovens by introducing innovations for the production of high quality coke, improved efficiency and increased productivity.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0340, NEW COKING METHODS

J. BOTHAM, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To research the means by which coals, particularly Canadian coals, can be employed to the best advantages for metallurgical purposes in the domestic and export market.

WORK: Production of metallurgical formed-coke using coking coals, non-coking coals, and chars or blends of these components, to obtain advantages relative to conventional coke-making.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0341, CONVERSION OF NON-COKING TO COKING COALS

J. BOTHAM, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To research the means by which coals, particularly Canadian coals, can be employed to the best advantages for metallurgical purposes in the domestic and export market.

WORK: Determination of the feasibility of converting non-coking coals to coking coals by hydrogenation in order to use them to make conventional and formed cokes.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0342, PROCESSING CANADIAN COALS

J. BOTHAM, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To research the means by which coals, particularly Canadian coals, can be employed to the best advantages for metallurgical purposes in the domestic and export market.

WORK: Determination of the conditions of carbonization of Canadian coals required to produce coke of optimum quality, and the blending compatibility of Canadian and U.S.A. coal sources.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0343, CONSULTING, COMMITTEE AND SCIENTIFIC SERVICES

J. BOTHAM, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To research the means by which coals, particularly Canadian coals, can be employed to the best advantages for metallurgical purposes in the domestic and export market.

WORK: Contribution on a continuing basis, to scientific committee work and consulting, scientific and experimental services in the field of carbonization of coal, to promote smooth and efficient industrial plant operations.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0344, COAL BENEFICIATION, CONVENTIONAL AND NON-CONVENTIONAL COKING PROCESSES, AND NEW APPLICATIONS FOR COAL IN METALLURGY

J.C. BOTHAM, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

Objectives: (1) To develop new test methods to provide a better insight into the coking mechanism; (2) to utilize marginal coking coals and other sources of carbon not normally used in the industry; (3) to increase the coke productivity and the efficiency of conventional coke plants; (4) to develop new processes for coke-making; (5) to study various beneficiation-agglomeration and coal pretreatment techniques applicable to the metallurgical industry.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0345, EXTRAMURAL COAL CONVERSION RESEARCH STUDIES

D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To investigate, by 1982, gasification and liquefaction processes utilizing Canadian energy resource commodities, in cooperation with the provincial governments and industry, in order to select process options for demonstration scale gasification plants for the alleviation of near and mid-term deficiencies of natural gas and liquid fuels, and to provide a source for the generation of hydrogen for processing tar sands.

WORK: Coal conversion studies will be contracted out to the private sector in order to provide the required technical background for decision making and energy policy formulation. The contracts wll be monitored by scientific authorities provided from among the In-House Federal R/D personnel.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0346, COAL CONVERSION

D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To investigate, by 1982, gasification and liquefaction processes utilizing Canadian energy resource commodities, in cooperation with the Provincial governments and industry, in order to select process options for demonstration scale gasification plants for the alleviation of near and mid-term deficiencies of natural gas and liquid fuels, and to provide a source for the generation of hydrogen for processing tar sands. Seven Research Agreement Proposals (RAP) were funded by FMR and NRC in 1976/77 as part of an ongoing program to involve research groups in coal conversion research, to provide solutions to problems by bench research, and to provide experienced Canadian personnel in this field against a future need for conversion specialists.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0347, MINEABILITY MODELLING

D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To adapt new, advanced or existing technology, ranging from critical subsystems to complete mining systems, from domestic or foreign sources to the planned exploitation of Canadian coal resources.

WORK: Saskatchewan coal reserve data banks, regional geology, market, transportation, cost factors and applicable mining systems are used to develop models for planning of mine development and policy decisions.

1. ORGANIC SOURCES OF ENERGY

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0348, ADAPTATION OF KNOWN TECHNOLOGY
D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To adapt new, advanced or existing technology, ranging from critical subsystems to complete mining systems, from domestic or foreign sources to the planned exploitation of Canadian coal resources.

WORK: Funds and expertise are provided for the adaptation of current or advanced technology to site-specific Canadian conditions, generally in shared cost projects with industry.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0349, GROUND STRATA CONTROL
D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To adapt new, advanced or existing technology, ranging from critical subsystems to complete mining systems, from domestic or foreign sources to the planned exploitation of Canadian coal resources.

Measurement of surface subsidence, interseam movement, floor to roof convergence, pressure transfer, pressure build-up and release, operation to reaction time dependence, pillar phenomena, roof stability, mine design documentation, etc., are aimed at solving difficulties involved in mining thick, multiseam coal measures in mountain or foothill areas and conventional measures where 'bumps' may occur.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0350, MINING HAZARDS
D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To adapt new, advanced or existing technology, ranging from critical subsystems to complete mining systems, from domestic or foreign sources to the planned exploitation of Canadian coal resources.

WORK: Hazards associated with CO/Methane/Coal Dust and Spontaneous Combustion of fine and broken coal in job areas must be controlled to maximize production and prevent mine closures. Work ranges from laboratory studies of coal, measurement of reservoir methane, monitoring of CO and feasibility contracts for methane control by face infusion and drainage, both improve productivity of miners and to provide methane for thermal use.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0351, SAFE EQUIPMENT AND MATERIALS
D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To adapt new, advanced or existing technology, ranging from critical subsystems to complete mining systems, from domestic or foreign sources to the planned exploitation of Canadian coal resources.

WORK: Operating research and certification of diesel equipment used in Canadian mines. Research, modification and certification of electrical ancillaries and instrumentation, equipment and supplies for underground operations.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0352, WATER TREATMENT FOR RECYCLING
D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To evaluate, by 1985, the major coal beneficiation options offered by the CANMET Auto-Medium Process and the NFC Spherical Agglomeration Process including studies on the heavy media processes, in order to help assure at reasonable cost and minimum wastage, an adequate supply of suitable Canadian coals for gasification/liquefaction, thermal-electric conversion, and metallurgical fuel production with minimum resultant impact on the environment.

WORK: The means of removing fine and ultra-fine solids (coal, ash, clay etc.) from process water by mechanical, flocculation and other techniques will be investigated in order to reduce the process water requirements in water-scarce areas and reduce the environmental impact.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0353, DEMONSTRATION CLARIFICATION PLANT
D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To evaluate, by 1985, the major coal beneficiation options offered by the CANMET Auto-Medium Process and the NFC Spherical Agglomeration Process including studies on the heavy media processes, in order to help assure at reasonable cost and minimum wastage, an adequate supply of suitable Canadian coals for gasification/ liquefaction, thermal-electric conversion, and metallurgical fuel production with minimum resultant impact on the environment.

WORK: The transfer of water clarification technology to coal processors will be undertaken by the construction and operation of a mobile version of the water clarification aspect of the CANMET process. The unit will be connected in parallel to a side stream of the operating plant or sludge pond for demonstration purposes.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0354, REMOVAL OF INORGANIC MATERIAL FROM COAL
D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To evaluate, by 1985, the major coal beneficiation options offered by the CANMET Auto-Medium Process and NFC Spherical Agglomeration Process including studies on the heavy media processes, in order to help assure at reasonable cost and minimum wastage, an adequate supply of suitable Canadian coals for gasification/ liquefaction, thermal-electric conversion, and metallurgical fuel production with minimum resultant impact on the environment.

WORK: In order to recover alumina from coal ash, reduce coal ash content and produce substitute material for electrode manufacture, a UBC/Research Agreement has been funded consisting of the following work elements: 1. X-ray identification of the inorganics of some BC coals (for example Hat Creek). 2. Application of these leaching techniques to remove or lower the inorganic content of these coals. 3. Study of the possibility of recovering alumina as a by-product of the leaching processes.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0355, DEHYDRATION OF COAL BY OIL TREATMENT
D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To evaluate, by 1985, the major coal beneficiation options offered by the CANMET Auto-Medium Process and the NFC Spherical Agglomeration Process including studies on the heavy media processes, in order to help assure at reasonable cost and minimum wastage, an adequate supply of suitable Canadian coals for gasification/liquefaction, thermal-electric conversion, and metallurgical fuel production with minimum resultant impact on the environment.

WORK: The work program will include studies designed to improve coal handling, maintain coal quality, improve safety aspects, and to reduce shipping cost, as follows: 1. The investigation of the removal of moisture from sub-bituminous and lignitic coals in heated fluidized beds of coal and of sand in the presence of hydrocarbon vapors. 2. The investigation of the effects of dehydration upon the coal susceptibility to oxidation

(spontaneous combustion) and, 3. The investigation of the effects of residual amounts of oil and its properties upon the coal susceptibility to oxidation.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0356, CLEANING OF HIGH AND LOW RANK COALS
D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To evaluate, by 1985, the major coal beneficiation options offered by the CANMET Auto-Medium Process and the NFC Spherical Agglomeration Process including studies on the heavy media processes, in order to help assure at reasonable cost and minimum wastage, an adequate supply of suitable Canadian coals for gasification/liquefaction, thermal-electric conversion, and metallurgical fuel production with minimum resultant impact on the environment.

WORK: The performance characteristics of the current improved CANMET beneficiation process will be defined by operating the 10-ton per hour pilot plant at CANMET's Western Regional Laboratory, and tonnage samples of cleaned Western coals for large-scale utilization tests by the steel industry will be prepared. The NRC agglomerative process will be developed further with concentration on (1) recovery of coal fines and rejection of inorganic constituents, (2) dewatering of coal fines, (3) recovery of process water.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0357, ENVIRONMENTAL GEOLOGY - MOUNTAIN COAL MINING
J.E. HARRISON, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To provide basic information to serve as a basis for coal resource development, the prediction of terrain behaviour during such development and for the sequential-use planning of coal resource lands.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0358, RESEARCH AND DEVELOPMENT OF METHODS OF ANALYSIS FOR COAL AND COKE
W.J. MONTGOMERY, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

Many methods of analysis become obsolete with advances in technology and must be up-dated and brought into line with modern concepts: (1) instrumental techniques to replace classical slower methods; (2) need for more rapid and accurate techniques requires development of new methods for proximate, ultimate, and ash analysis.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0359, COAL EVALUATION BY OPTICAL MICROSCOPY
B.N. NANDI, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The development and standardization of optical microscopic techniques for quantitatively assessing the quality of coal will continue, in association with the United States Bureau of Mines and the ASTM, with the object of extending the methods now used for coking coal to low-rank coals, including lignite.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0360, COAL EVALUATION BY ELECTRON MICROSCOPY
B.N. NANDI, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The optical microscopic methods for characterizing many special aspects of coal will be largely obsolete in three years. New techniques have to be developed associated with the secondary electron emission of polished coal samples. The electron probe will also play a dominant role in the assessment of the mineral matter distribution. These new techniques have to be developed and adapted to coal in a manner that will permit international standardization.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0361, REACTIVITY TEST OF COKE ANTHRACITE AND CHARS
B.N. NANDI, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The assessment of the quality of cokes and chars as reductants is complex problem. Areas which appear to require further research are those factors which give rise to the dust loss in blast furnaces and those associated with the reactivity of the carbon to gas and to molten iron oxide or calcium ferrite.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0362, WEATHERING OF COKING COAL
B.N. NANDI, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The slight oxidation which coal undergoes under atmospheric conditions has a deleterious effect on the coking properties of coal. Research is in progress to measure this deterioration in a quantitative manner.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0363, RESEARCH ON THE CHARACTERIZATION OF ELECTRODE PITCH
B.N. NANDI, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The type of coal carbonized and its degree of exposure to air influence tar quality, and particularly, the quality of the electrode pitch. The ability to measure the oxygen content of coal and coal tar opens up new avenues to assess the role played by oxygen in pitch quality.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0364, IMPROVEMENT OF CONVENTIONAL COAL-FIRING EQUIPMENT
E. SMITH, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To promote the conservation of energy and specific fuel resources by improving existing technology for the combustion of coal and developing new combustion technology for improved efficiency and for burning low-grade fuels; and to promote the transfer of combustion technology to industrial practice in Canada.

WORK: Evaluation of Canadian coals for suitability for pulverized-firing in existing equipment. Development of design criteria for improvement of existing, and construction of new pulverized-firing equipment for Canadian coals.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0365, ELECTROSTATIC FLY-ASH REMOVAL
E. SMITH, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To promote the conservation of energy and specific fuel resources by improving existing technology for the combustion of coal and developing new combustion technology for improved efficiency and for burning low-grade fuels; and to promote the transfer of combustion technology to industrial practice in Canada.

WORK: In cooperation with electrical utilities, identification of factors controlling the removal of fly-ash in equipment burning

specific Canadian coals and development of operating and design criteria for optimizing combustion efficiency and removal of fly-ash.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0366, TRANSFER OF COAL SUBSTITUTION TECHNOLOGY TO INDUSTRY
E. SMITH, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To promote the conservation of energy and specific fuel resources by improving existing technology for the combustion of coal and developing new combustion technology for improved efficiency and for burning low-grade fuels; and to promote the transfer of combustion technology to industrial practice in Canada.

WORK: Demonstration trials of the coal-in-oil slurry combustion technology developed by CANMET as a substitute for oil alone, in a Canadian power plant and/or other industrial installations.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0367, ADVANCED CONVERSION TECHNIQUES
E. SMITH, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To promote the conservation of energy and specific fuel resources by improving existing technology for the combustion of coal and developing new combustion technology for improved efficiency and for burning low-grade fuels; and to promote the transfer of combustion technology to industrial practice in Canada.

WORK: 1) Development of fluidized-bed technology for improved combustion efficiency and use of lower grade fuels which are discarded at present. 2) Encouragement of the implementation of fluidized-bed combustion system in an industrial coal-drying plant by December 1979. 3) Design and construction of a demonstration fluidized-bed combustor for hot building heating at the CANMET Bells Corners Laboratories.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0368, PHYSICAL AND CHEMICAL EVALUATION OF CANADIAN COAL SEAMS
T.E. TIBBETTS, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The objective is to evaluate and catalogue the geology, quality and potential of coal seams.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0369, BENEFICIATION OF COAL RESOURCES
T.E. TIBBETTS, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The objective is to utilize laboratory, pilot plant and industrial techniques and facilities to effect beneficiation of mined coal.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0370, COAL RESOURCES - RESERVE ASSESSMENT
T.E. TIBBETTS, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To determine the quality of Canadian coal and peat resources, reserves and production capability on annual and demand bases committed to March 1981, for the National Coal Inventory and supply demand reference so as to stimulate regional economies, increase reliance on indigenous coal, reduce imports and support exports.

FEDERAL-PROVINCIAL COAL INVENTORIES: Provision, as requested of evaluation and advice on Candian coal resources to provincial and federal government and to industry for development of coal resource policies.

COMMERCIAL COALS: Determination of, and report annually on, the quality of commercial thermal and metallurgical coals for the guidance of domestic and foreign purchasers; and investigation of new analytical technology.

COAL SEAM TRENDS: Determination of quality patterns and ensure the availability of data for economic coal reserve assessments.

PEAT RESOURCES AND RESERVES: Assurance of the availability of a data base and updated knowledge on peat science and technology developments for Canadian peat fuel resources assessment.

TRACE ELEMENT METHODOLOGY: Development by March 1981 of standard methods to determine undesirable trace elements, in coal and coal ash.

COMMITTEE SERVICES: Assurance, on a continuing basis, of participation in scientific and technical institutes so that the latest developments in science and technology are available for facilitating research and development.

STANDARDIZATION (COAL & COKE): Provision, as required, of Canadian technical information and requirements into national and international standards for the analysis of coal coke, thereby ensuring that Canadian coals do not have any disadvantages in international trade.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0371, XPS ANALYSIS OF SULPHUR
T.E. TIBBETTS, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To determine the quality of Canadian coal and peat resources, reserves and production capability on annual and demand bases committed to March 1981, for the National Coal Inventory and supply demand reference so as to stimulate regional economies, increase reliance on indigenous coal, reduce imports and support exports.

WORK: Research Assistance Grant to University of British Columbia.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0372, GRAVIMETRIC SEPARATION OF COAL, ORE AND INDUSTRIAL MINERALS
J. VISMAN, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

By water-only processes, using compound water cyclones in conjunction with pulp dividers, dual mix tank in automatic, controlled, two-stage circuit (three product separations), for the purpose of ash reduction and/or sulphur reduction of coal for metallurgical purposes and for steam raising.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0373, MECHANICAL DRYING OF COAL SLIMES WITH SLAGGING CYCLONES ASSISTED BY OIL
J. VISMAN, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

This process obviates the need for thermal drying of coal while eliminating air pollution of the latter, at generally lower cost, depending on the cost of oil. Application in coal washeries and for the long-distance hydraulic transport of coal (Cascade Pipeline Ltd.) Possible movement of coal to eastern Canada.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0374, THERMODYNAMIC ASPECTS OF ENERGY CONVERSION VOLATILIZATION OF LIGNITE
B.D. KYBETT, Univ. of Saskatchewan, *Regina, Saskatchewan, Canada*

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

1.0375, CATALYSIS, THERMODYNAMICS, POLYMER RHEOLOGY AND UTILIZATION OF RESOURCES
J.F. MATHEWS, Univ. of Saskatchewan, *Saskatoon, Saskatchewan, Canada*

CURRENT AREAS OF RESEARCH AND STUDY: a. Conversion of aspen poplar to a feed for ruminant animals. b. Conversion of aspen poplar to sugars and protein. c. Conversion of aspen poplar to liquid heavy fuels. d. Recovery of heavy hydrocarbons from tar sands deposits. e. Degradation of polymers by ultrasonics.

POTENTIAL AREAS OF RESEARCH, STUDY OR POTENTAL INTEREST: a. Gasification and methanation of lignite. b. Mechanical properties of semi-crystalline polymers.

OTHER AREAS OF PAST RESEARCH EXPERIENCE: a. P-V-T properties of gas mixtures - measurements. b. Polymerization processes - kinetics and reactor design. c. Mechanical properties of polymers at small deformations.

SUPPORTED BY Canada - University of Regina - Regina, Saskatchewan

1.0376, STUDY OF METHANE FACE CONTROL USING WATER INFUSION TECHNOLOGY IN HIGH SPEED COAL MINING FOR POSSIBLE APPLICATION IN CANADIAN COAL MINES
UNKNOWN, Dames & Moore, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0377, STUDY OF METHANE DRAINAGE PRACTICES IN COAL MINES AND THEIR POTENTIAL APPLICATION TO CANADIAN CONDITIONS
UNKNOWN, Dames & Moore, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0378, PYROLYSIS-GASIFICATION OF LIGNITE
A.D. MCINTYRE, British Columbia Res. Council, *Vancouver, British Columbia, Canada*

Objective: To examine, in an existing, fluidized bed pilot plant, the technical feasibility of the combined pyrolysis-gasification of woodwaste and coal at low temperatures (800 - 1400 degrees F) and low pressures (less than 15 psig).

Progress: To study the production of low Btu gas from Hat Creek coal in a fluidized bed, the following preliminary work has been carried out: 1. Cold modelling to collect data on the fluidization characteristics of the coal was done in two different small scale units, viz. 3 cm I.D. and 3 inch I.C. The beds were run both as fluidized beds and as spouted beds. Attempts to construct a bench-scale combined, fast/slow fluidized bed were unsuccessful because of problems with the star-feeder mechanism supplying material from the slow to the fast bed. 2. A bench-scale fixed bed apparatus for the determination of kinetics parameters was constructed. The apparatus was used to provide data on the gasification of Hat Creek coal with steam. Initial experimental data collected at 600 degrees and 800 degrees C indicate that volatile components are driven off about 4 times faster at 800 degrees C than at 600 degrees. The initial fuel value of the product gas mix is about 325 Btu/scf; as the volatiles are driven off, the fuel value decreases and tends to stabilize in the range of 235 to 240 Btu/scf.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0379, GASIFICATION OF HAT CREEK COAL
M.M. PAPIC, British Columbia Res. Council, *Vancouver, British Columbia, Canada*

OBJECTIVE: To investigate the kinetics of the Hat Creek coal gasification with steam at atmospheric pressure. Devolatilized Hat Creek coal was studied experimentally for the kinetics of gasification with steam to characterize the reaction rate-controlling mechanism. A batch fixed bed reactor was operated at 800 degrees C. and atmospheric pressure to produce gas containing a mixture of hydrogen approximately 60 percent, carbon monoxide approximately 10 percent, and carbon dioxide approximately 30 percent. The concentration of carbon dioxide is higher than that of carbon monoxide at this low temperature of gasification. The following reactions are significant at atmospheric pressure: C plus H2 yields CO plus H2; CO plus H2O yields CO2 plus H2.

Methane formation and other reactions are minimal. The rate of gas evolution decreased steadily throughout each experiment. No sinter formation was observed after completion of experiment.

The experimental results indicate that the carbon-steam reaction is slow and reaction rate controlled. The unreacted shrinking core model seems to approximate the kinetics of the reaction, but firm conclusions about the mechanism can not be drawn on the basis of available experimental data.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0380, X-RAY PHOTOELECTRON SPECTROSCOPIC ANALYSIS OF SULPHUR IN CANADIAN COALS
D.C. FROST, Univ. of British Columbia, *Vancouver, British Columbia, Canada*

OBJECTIVE: To determine the organic sulphur content of coal by a direct X-ray analysis (presently no direct method exists). To examine the weathering of the pyrite included in coal, and to correlate the results with present methods of benificiating the coal, and the agglomeration techniques used by Dr. E. Capes at N.R.C.

So far we have studied the oxidation of sulphur present in Cyprus and Spanish pyrite samples under controlled temperature and humidity conditions, in an attempt to determine the concentration of organic sulphur in coal. Our method is a direct one, employing a Varian IEE15 X-ray Photoelectron Spectrometer. So far we have studied the oxidation occurring under conditions of 100 percent oxygen and 100 percent relative humidity at 35 degrees C. for up to 200 hours total exposure. The results indicate that 100 percent sulphate can be generated very soon, at a high enough temperature.

Preliminary studies have been made to determine if the oxidation of pyrites in coal can be correlated with the process efficiency of beneficiating the coal, and the type of oil used in the agglomeration technique employed by Dr. E. Capes at N.R.C. Sulphur analyses have been made on both 'plant' samples and samples made under controlled laboratory conditions.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0381, SUBSTITUTION OF LIGHT FUEL OIL IN THE RANGE OF CENTRAL HEATING THROUGH PULVERIZED COAL
F. SCHOPPE, Unknown Inst. or Indiv. Grant, *Federal Republic of Germany*

DESCRIPTION OF PROJECT: Development of a central heating plant for the use of low volatile, pulverized coal in a medium power range.

WORK PROGRAM: a) Investigations of the availability and the properties of various types of pulverized coal, b) Construction of three complete model central heating plants in the power range of 0,1 - 0,6 Gcal/h, c) Erection of the test plants, d) Beginning of operation of the single elements and tests of the entire plant, e) Evaluation and proof of the environmental affability of the heating plants, f) Drawing up of a supply concept for the projected types of pulverized coal, g) Cost-benefit analysis for the economical large-scale operation.

STATUS: Research and development contract granted on Aug. 25, 1975. The heating plants are being constructed.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0382, PRESSURE CHANGE - UNDERGROUND GASIFICATION

F. BECKERVORDERSAN, Technical Univ. of Aachen, Inst. of Ferrous Metallurgy, *Aachen, Nordrhein Westfalen, Federal Republic of Germany* 5100

DESCRIPTION OF PROJECT: Extraction by means of the pressure change process of artificial natural gas, reduction gas or other fuel gases through the gasification of coal preferably with hydrogen in the deposit -particularly in deeper deposits.

Stimulation experiments and drawing up of a study of the economics.

WORK PROGRAM: Experimental: a) Investigation of a gasification procedure and the reaction stability of Saar coal towards hydrogen, water vapour, air and oxygen (basics). b) Development of the gasification process of coal blocks 200 mm 0, 300 mm long at pressures up to 60 bar with different gasification mediums and at different temperatures. c) Simulation of underground gasification in an autoclave with 1000 l volume, pressure 60 bar, max. temperature 1000 degrees C; test for alternative procedures. Theoretical: d) Mathematical description of the gasification procedure underground with regard to the influences with the deposit. e) Determination of the overall processes and a study of the economics.

STATUS: Erection of a gasification plant for a coal block. Planning of the simulation plant (100 l autoclave). Measurements of the reaction ability, the surface and the pore volume since the middle of December 1975.

ADDENDA: Performing organization: RWTH Aachen, Institut fuer Eisenhuettenkunde.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0383, DEVELOPMENT OF HOMOGENEOUS CATALYSTS FOR COAL HYDROGENATION

FELL, Technical Univ. of Aachen, Inst. of Appl. Chem. & Petro., *Aachen, Nordrhein Westfalen, Federal Republic of Germany* 5100

DESCRIPTION OF PROJECT: Coal hydrogenation should be made possible under more economical conditions through the development and use of cheap base metal homogeneous catalysts as well as through the use of synthesis gas instead of pure hydrogen.

WORK PROGRAM: 1) Literature study, b) Erection of laboratory equipment for hydrogenation experiments, c) Development of suitable catalysts (e.g. on an iron carbyle base), d) Tests of the catalysts on model substance, e) Development of an analysis process for the reaction products, f) Conversion of the reaction model, tested on the substances, to technical products such as primary bitumen as well as different types of brown and hard coal, g) Optimization of the homogeneous-catalysts coal hydrogenation, taking into consideration the economic feasibility of the process.

RELATION TO OTHER PROJECTS: Fundamental research is being carried out which will benefit all projects dealing with coal hydrogenation.

STATUS: R & D contract granted on Oct. 31, 1975. The first two points of the program are in preparation.

ADDENDA: Performing organization: RWTH Aachen, Lehrgebiet Technische Chemie und Petrolchemie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0384, THEORETICAL AND EXPERIMENTAL ANALYSIS OF BASIC ENGINEERING FOR COAL GASIFICATION UTILIZING PROCESS HEAT FROM HIGH TEMPERATURE REACTORS

R. PITT, Technical Univ. of Aachen, *Aachen, Nordrhein Westfalen, Federal Republic of Germany* 5100

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0385, FURTHER DEVELOPMENT OF A GAS COOLED HIGH TEMPERATURE REACTOR FOR USE IN COAL GASIFICATION

PRUSCHECK, Soc. for High Temp. React. Tec. *Bergisch Gladbach 1, Nordr. W., Federal Republic of Germany* 5070

ADDENDA: Performing organization: Gesellschaft fuer Hochtemperaturreaktortechnick MBH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0386, ERECTION AND OPERATION OF A FISCHER-TROPSCH PILOT PLANT WITH LIQUID PHASE (SLURRY) REACTOR

KURTH, Schering AG, *Bergkamen, Nordrhein Westfalen, Federal Republic of Germany* 4619

DESCRIPTION OF PROJECT: Acquisition of data concerning the Fischer-Tropsch process with a Kolbel liquid (slurry) reactor by means of experimental work. These results are intended for the study (ET 1055) in order to close a currently existing gap of know-how.

WORK PROGRAM: a) Design of a Fischer-Tropsch pilot plant with a Kolbel liquid phase (slurry) reactor. b) Erection and start-up of this plant. c) Systematic variation of the most important parameters. d) Preparation of the experimental results for input into the simulation program. e) Testing of the new catalysts.

RELATION TO OTHER PROJECTS: As the result of simultaneous work, intermediate results of the simulation program ET 1058 B may be taken into consideration at the experimental program. New catalyst developments in the field of liquid phase reaction (ET 1035) shall be included in the investigations.

STATUS: After the laboratory plant was working satisfactorily and the methods of analysis had been established and tested, systematic determination of the influence of the most important parameters was begun.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0387, SYNTHESIS OF RAW MATERIALS FOR THE CHEMICAL INDUSTRY BY MEANS OF THE FISCHER-TROPSCH PROCESS (STUDY, SIMULATION PROGRAM)

KURTH, Schering AG, *Bergkamen, Nordrhein Westfalen, Federal Republic of Germany* 4619

DESCRIPTION OF PROJECT: Study concerning the synthesis of raw materials for the chemical industry by means of the Fischer-Tropsch process, which is to be developed further.

WORK PROGRAM: a) Acquisition of present know-how regarding the Fischer-Tropsch synthesis. b) Establishment of the data bank. c) Development of a simulation program in order to investigate the substitution of chemical raw materials under special consideration of the economic and technical conditions. d) Evaluation of the results obtained from the simulation program, and fixing of an optimum procedure taking the current restrictions as a basis. e) Design of a pilot plant. f) Design of a demonstration plant. g) Establishment of a work program for further process development. h) Establishment of economic analyses.

RELATION TO OTHER PROJECTS: A pilot plant with a liquid phase (slurry) reactor of Kolbel (ET 1056) is working simultaneously. Its results are included in the study. The results of the projects 'Basic research on catalysts for carbon monoxide hydration' (ET 1131) and 'Development of catalysts for the Fischer-Tropsch process' (ET 1035) are also considered.

STATUS: R & D contract: Dec. 2, 1974. Original work and patents have been reviewed for the acquisition of present know-how and have been ordered according to fields. At present 1800 literature references exist.

Further technical discussions took place with the Firm SASOL, South Africa, about the Arge and the Synthol processes. Data was produced such as flow charts, quantitative balances, composition of the primary products and specifications about investment and operational costs of an F.T.-plant. The structure and programming for the simulation plant are essentially

completed. First computations were begun following an inspection and test phase.

A comparison has been developed between gas production, gas purification and synthesis processes in conjunction with the Firm LURGI.

The design for the experimental plant is in progress.

ADDENDA: Subcontractor: LURGI-Mineraloltechnik GmbH Frankfurt/Main.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0388, BASIC RESEARCH FOR THE SELECTIVE GUIDANCE OF THE FISCHER-TROPSCH SYNTHESIS

M. RALEK, Technical Univ. of Berlin, Inst. for Technical Chemistry, *Berlin 10, Federal Republic of Germany* 1000

DESCRIPTION OF PROJECT: OBJECTIVE: Conditions are to be developed to an optimal reaction control of the Fischer-Tropsch synthesis in the direction of short chained defines as a pre-product for the chemical industry through the development and supply of selective catalysts, as well as through fundamental investigations of the kinetics and the material transport in the liquid phase.

WORK PROGRAM: a) Thermodynamic calculations of the simultaneous equilibrium of the main and secondary reactions of the Fischer-Tropsch synthesis in a wide range of the operation variables. b) Development of selective iron precipitation catalysts for the objective in view. c) Development of iron contacts on the basis of the mud sludge occurring during the preparation of bauxite. d) Development of new selective Fischer-Tropsch catalysts with other basic metals of the transition group. e) Investigations of the Micro-Macro-Kinetics of the Fischer-Tropsch synthesis. f) Investigation of the optimal system and operation parameters for the carrying out of the Fischer-Tropsch snythesis in liquid phase. g) Optimization of reaction control of Fischer-Tropsch synthesis in the liquid phase.

RELATION TO OTHER PROJECTS: The attained information and developed catalysts will benefit all the projects dealing with the Fischer-Tropsch synthesis (ET 1035 A, 1056 B, ET 1131 A, ET 1174 A).

STATUS: R and D contract on July 23, 1975. The necessary laboratory equipment was developed. Point b) is in preparation.

ADDENDA: Performing organization: Inst. fuer Technische Chemie der TU Berlin.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0389, PHYSICAL-CHEMICAL INVESTIGATIONS OF BITUMINOUS COAL EXTRACTS AND THEIR FRACTIONATION

SIMONIS, Technical Univ. of Berlin, Inst. for Technical Chemistry, *Berlin 10, Federal Republic of Germany* 1000

DESCRIPTION OF PROJECT: OBJECTIVE: Assertions about the structure of bituminous coal by means of physical-chemical investigations of extracts and their fractionation.

WORK PROGRAM: a) Application of aprotic solvents to increase the extraction yield. b) Isolation of different fractions with a small distribution of molecular weight by means of various solvents. c) Spectroscopical investigations of these fractions. d) Further chemical disintegrations to determine their compositions. e) Comparative experiments with coals of varying rank.

STATUS: The first four points of the program are being completed. Thionyl chloride has been chosen as a solvent. It can be shown that there is a specific dependence of the yield of extraction on the degree of coalification. There is a strong maximum with a yield of extraction of more than 60% referring to carbon. During extraction a chlorination of coal takes place. The infrared spectra of coals, extracts and residues show that besides chlorination, no fundamental alteration of the primary structure results from extraction.

ADDENDA: Performing organization: Inst. fuer Chemieingenieurtechnik der TU Berlin.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0390, BASIC RESEARCH ON CATALYSTS FOR CARBON MONOXIDE HYDRATION

W. VIELSTICH, Univ. of Bonn, Inst. for Physical Chem., *Bonn, Nordrhein Westfalen, Federal Republic of Germany* 5300

MAIN OBJECT: Coal conversion.

FIELD: Synthesis.

OBJECTIVE: Improvement of the basic understanding of CO hydration as a basis for the selective synthesis of marketable products.

WORK PROGRAM: Construction of a small test reactor and testing of standard catalysts. Systematic variation of important parameters and evaluation of the results, correlating reaction conditions, catalytic properties and reaction products. Study of the elementary steps of CO hydration by modern chemical and physical methods. Investigation of the reaction in the liquid phase.

ADDENDA: Performing organization: Universitat Bonn Institut fur Physik, Chemie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0391, BASIC RESEARCH ON CATALYSTS FOR CARBON MONOXIDE HYDROGENATION

W. VIELSTICH, Univ. of Bonn, Inst. for Physical Chem., *Bonn, Nordrhein Westfalen, Federal Republic of Germany* 5300

DESCRIPTION OF PROJECT: OBJECTIVE: Improvement of the basic understanding of CO hydrogenation as basis for the selective synthesis of marketable products.

WORK PROGRAM: a) Construction of a small test reactor and testing of standard catalysts. b) Systematic variation of important parameters and evaluation of the results, correlating reaction conditions, catalytic properties and reaction products. c) Study of the elementary steps of CO hydration by modern chemical and physical methods. d) Investigation of the reaction in the liquid phase.

STATUS: In order to be able to make physical and chemical investigations on contracts which can direct the Fischer-Tropsch reaction in the desired direction, work was begun with the search for suitable catalysts. For this purpose a lab reactor has been developed and a large part of the analysis completed. For the examination of the system, an iron precipitation catalyst, provided by Ruhrchemie Oberhausen, was investigated (variation of temperature and volume velocity at reduction conditions). Furthermore, preliminary experiments have been carried out on the here developed catalysts in a lab reactor, whereby no systematic was used in the development of the contacts.

Hitherto a mixed catalyst has been found which must, however, be taken as a preliminary result, which can shift the product spectrum towards lower olefins as compared to commercial RCH-contacts.

ADDENDA: Performing organization: Universitat Bonn, Institut fur Physikalische Chemie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0392, COAL GASIFICATION IN THE TUBE-FURNACE GASIFIER (PILOT PLANT)

F.H. FRANKE, Rhine Lignite Works AG, *Cologne, Federal Republic of Germany*

DESCRIPTION OF PROJECT: OBJECTIVE: Production of synthesis gas and SNG in one process with a so-called tube-furnace gasifier. Technical scale-up of the process via an intermediate stage with a rated capacity of 100 kg C conversion/h at 40 bars. Gasification unit consits of a) Fluidized bed for smooth equal distribution of coal feed into the seprate horizontal gasification tubes. b) The tubes where the crushed raw lignite is dried, devolatized and gasified by its own water content, and c) The ash separation and gas cleaning system.

WORK PROGRAM: a) Development and projection of the pilot plant on the results of several experimental units. b) Pretrials and basic research. c) Planning and erection of the pilot plant,

start-up of the pilot plant. d) Cold test runs of the plant to evalute distribution of coal feed. e) Systematic hot test runs to obtain operational data for the design of the complete process (including conversion). f) Long test runs. g) Setting up a program for further development up to large-scale technical maturity.

In the scope of the basic research involved, successful tests were conducted at the 2.5 m single-tube plant in the Institut fur Eisenhuttenkunde, RWTH Aachen, regarding the feeding of fine-grained raw brown coal from a fluidized bed into the outer heated tube-furnace generator, and also taking into consideration the gasification of the coal with its own moisture. Another test plant with a 10 m single-tube (also heated externally) and fluidized bed feeding as well as a fludized coal bed model reactor with coal feeding through 15 horizontal tubes which are flanged on and not heated, was begun in March 1975.

Process schematics have been developed in regard to the planning of a large technical tube-furnace gasifier plant, with conventional heating and also with nuclear heating. In these schematics, the degree of coal conversion of the tube-furnace gas-generator was graduated and the differing resulting gas compositions were taken account of in regard to the production of a so-called multi-purpose gas.

ADDENDA: Subcontractors: Koppers, Essen; RWTH, Aachen. Performing organization: Rheinische Braunkohlenwerke AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0393, COAL GASIFICATION IN THE HIGH-TEMPERATURE WINKLER GASIFIER (PILOT PLANT)

F.H. FRANKE, Rhine Lignite Works AG, *Cologne*, *Federal Republic of Germany*

DESCRIPTION OF PROJECT: OBJECTIVE: Production of reducing gas with air or oxygen in the HTW gasifier for application in one heat to the blast furnace or to direct reduction shafts. Process characteristics: fluidizing in a pressure range of 1.5 - 5 bar, addition of limestone for desulfurization and increasing the melting point of the ash, gasification temperature of about 950 degrees C together with low hydrocarbons in the gas. Technical scale-up of the process via intermediate stages. First step with a rate capacity of 100 kg C conversion/h with air (greater coal throughput accordingly using oxygen).

WORK PROGRAM: a) Development and projection of the pilot plant based on the results of several experimental units. b) Pretrials and basic research. c) Planning and erection of the pilot plant, start-up of the pilot plant. d) Systematic test runs to obtain operational data for the combined operation of the gasification units with blast furnace, reduction shaft or gas turbines. e) Long test runs to assess operating reliability. f) Setting up a program for further development up to large-scale technical maturity.

STATUS: Further successful gasification tests, funded by the EGKS, for the transformation of dry brown coal with preheated air were carried out in the fluidization plant of the Technikum of the Institut fur Eisenhuttenkunde, RWTH Aachen, having a 230 mm fluidization diameter.

With regard to the planning of the large combination plants, e.g., consisting of coal gasification by the high temperature Winkler process and the subsequent direct reduction of iron ore, process schematics for a coal conversion not only with air but also with oxygen will be elaborated upon and evaluated. Coal conversion with oxygen specially favours the high temperature Winkler Process not only in the metallurgical but also in the chemical sector. It has become evident that a conversion of coal with air is advantageous in these combination plants in which subsequent process-stages produce electricity.

ADDENDA: Subcontractor: Uhde, Dortmund; RWTH, Aachen. Performing organization: Rheinische Braunkohlenwerke AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0394, DEVELOPING PROCESSES TO TRANSFORM SOLID FOSSIL RAW MATERIAL WITH HEAT FROM HIGH TEMPERATURE NUCLEAR REACTORS

TEGGENS, Rhine Lignite Works AG, *Cologne*, *Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0395, DEVELOPMENT OF PROCESSES FOR THE CONVERSION OF COAL BY USING HEAT FROM GAS-COOLED HIGH-TEMPERATURE NUCLEAR REACTORS (HYDROGASIFICATION)

H. TEGGERS, Rhine Lignite Works AG, *Cologne*, *Federal Republic of Germany*

DESCRIPTION OF PROJECT: Objective: Development of the technology of hydrogasification of coal using heat from gas-cooled high-temperature nuclear reactors to produce SNG of carbon monoxide and hydrogen-containing gas mixtures.

WORK PROGRAM: a) Design of a pilot plant with a throughput of approx. 100 kg carbon/h, b) Selection of suitable materials, c) Planning, construction, and start-up of the pilot plant, d) Experimental operation with systematic variation of the main process parameters, e) Experimental operation to solve problems concerning the process and apparatus, f) At the same time: Drawing up studies based on the test results of the pilot plant.

RELATION TO OTHER PROJECTS: The Bergbau Forschung, Essen, is developing the steam gasification of coal as an alternative gasification technology or an additional process step to hydrogasification.

STATUS: The establishment of the EDP system is advanced enough so that the first positive test runs can be carried out. Emphasized here is the compilation and storage of data, as well as extensive balancing of the gasification reactor. Beyond that, a draft of a schematic was begun for the process investigation of the hydrogasification in fluidized beds by means of mathematic statistical methods.

In regard to the planning of commercial plants for coal gasification with nuclear heat, process schematics for the water vapor gasification of brown coal and the hydrogasification of brown coal, combined with the water vapor gasification of the residual coal occurring during the hydrogasification were calculated quantitatively and with regard to energy aspects. Furthermore, the advantages and disadvantages of the existing concept for a commercial gas generator were investigated and a new draft was produced, which has distinct advantages compared to the former draft.

ADDENDA: performing organization: Rheinische Braunkohlenwerke AG, Koln.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0396, PRODUCTION OF SYNTHESIS GAS/SNG/TOWN GAS BY THE LURGI PRESSURE GASIFICATION PROCESS (DORSTEN PROJECT)

C. LOHMANN, Ruhr Coal AG, *Dorsten*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4270

DESCRIPTION OF PROJECT: OBJECTIVE: Further development of the LURGI pressure gasification process: increase in throughout capacity, preparation of the spectrum of properties in the input coal (size, caking power); reduction of the yield of by-products.

WORK PROGRAM: a) Development and construction of medium pressure gasifier process with subsequent process steps for gas processing. b) Experimental operation for 2 years under varying conditions and maximum operation pressure of 40 bar. c) Development of coal and ash delivery and discharge devices. d) Change of gasification unit for maximum operation pressure of 100 bar. e) Trial operation for a time span of years at varying conditions and maximum operation pressure of 100 bar. f) Parallel investigations for the degasification and gasification of differing coal forms under pressure.

ADDENDA: Subcontractor: LURGI Mineralotechnik Bergbau-Forschung.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0397, VEW COAL CONVERSION PROCESS (PILOT PLANT 1 T/H)

K. KNIZIA, V. Elektrizitaetswerke West AG, *Dortmund, Federal Republic of Germany* 4600

DESCRIPTION OF PROJECT: OBJECTIVE: Development of the VEW coal conversion process to the operational stage. This process is composed of the essential steps such as degassing, partial degassing and combustion of coke for the generation of energy, and excels in high flexibility and low environmental impact. The construction and operation of a 1 t/h plant is carried out as a first step of the technical development.

WORK PROGRAM: a) Projection of the test plant. b) Construction, installation and commencement of operation of the pilot plant (L. C. Steinmuller). c) Test operation for the discovery of the following connections and gassing grades, maximum coal sediment at reaction conditions which have been established as being optimal, influence of the characteristics of the hard coal used on the total turn-out. d) Try-out of additional parts of the plant under the parameter settings established as being optimal. e) Evaluation of the test results and preparation of the data for the projection of the 15 t/h plant.

STATUS: After the final laying-out of the plant with respect to the set process ends, the construction, as well as the manufacture could take place. At the end of the year the plant was being assembled. The anticipated data of beginning of operation is in April 1976. For the construction of the pilot plant it was possible to utilize the test results of simultaneous research concerned with the reaction kinetics in the gas generator as well as that concerned with flow problems. The construction of the plant was chosen in such a way that the two process objectives, the generation of electricity, and the coupling of electricity and gas delivery are taken into account. The gasification can be effected with the addition of air as well as oxygen. The generation of gas can be increased from a simple degasification of coal up to a gasification degree of about 70% of the carbon introduced. Through special equipment it is also possible to introduce the coke resulting from the rapid degasification into the gas generator.

ADDENDA: Subcontractor: L. U. C. Steinmuller Gummersbach. Performing organization: Vereinigte Elektrizitatswerke Westfalen AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0398, VEW COAL CONVERSION PROCESS (STUDY FOR 15 T/H PLANT)

K. KISZIA, United Electrical Power Plant, *Dortmund, Nordrhein Westfalen, Federal Republic of Germany* 4600

DESCRIPTION OF PROJECT: OBJECTIVE: Development of the VEW coal conversion process (partial degassing and gassing in the flight current reactor, combustion of coke) to the operational stage. A reduction of the development time shall be reached at a justifiable risk by drawing up the project study for the next test dimension (15 t/h).

WORK PROGRAM: a) Continuous preparation of the data of the pilot plant for the study, b) Basic engineering for the 15 t/h plant, c) Cost estimate (costs for plant and operation) for the 15 t/h plant, d) Economic considerations for the commercial plant.

STATUS: The planning of the 15 t/h plant is largely dependent on the test results of the 1 t/h plant. A calculation program has been developed with which the processes for the generation of electricity as well as for the combined delivery of electricity and gas can be optimized. According to the calculations made up till now, which were adjusted to the process for the generation of electricity, one assumes that a gasification degree of about 30 to 40% would be sufficient to reach the necessary desulphurization. In this process, air is used as an oxidation medium in the gas generator.

During future adjustments of the complete process, special attention must be given to the problem of gas purification. As the removal of tar, dust, and hydrogen sulfphite is always connected with heat losses or with a consumption of energy, it is here that the efficiency can be decisively influenced. However, under given conditions, a process efficiency for the generation of electricity can be reached as in the combined processes.

ADDENDA: Subcontractor: L. u. C. Steinmuller; Fa. Still; Fa. Uhde. Performing organization: Vereinigte Elektrizitatswerke, Westfalen AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0399, METHANIZATION OF COAL GASIFICATION GASES IN A FLUIDIZED BED

W. LOMMERZHEIM, Thyssengas Gmbh, *Duisburg, Nordrhein Westfalen, Federal Republic of Germany* 4100

DESCRIPTION OF PROJECT: OBJECTIVE: Development of a process for the production of v.L-SNG from coal gasification gases, which is advantageous in regards to economics and technical operation.

WORK PROGRAM: a) Carrying-out of preliminary investigations for the demonstration of the fundamental feasibility of the process principle in existing model plants, b) Development and construction of the principle components of an experimental plant (Nm3/h) synthesis gas), c) Carrying-out the engineering and construction of the experimental plant, d) Starting and carrying out of the experimental operation in order to collect data for the technical and economical evaluation, e) Optimization of the operational conditions, and further development of critical plant components, f) Determination of the data for lay-out and configuration of a commercial plant.

ADDENDA: Subcontractors: Didier Engineering GmbH, Essen; Ruhrchemie AG, Oberhausen; Uni Erlangen-Nurnberg; Fa. St. f. mech. Verfahrenstrechnik.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0400, FULLY MECHANIZED DRIVING OF GATE-END ROADS IN THE ROCK CONDITIONS PECULIAR TO THE AACHEN ANTHRACITE FIELD

NOERES, Eschweiler Mining Union Co., *Eschweiler, Federal Republic of Germany*

DESCRIPTION OF PROJECT: OBJECTIVE: Adaptation of the heading machine to the special rock conditions of the Aachen anthracite field, with their sharply differentiated tectonic structure, involving predominantly weak associated strata and high rock thrust. Ideally the machine should be adapted to roadway cross-sections of between 16 and 20 square meters, with erection of supports as soon as possible after room is excavated, should be adapted to operate in rising, inclining and laterally inclined roadways, and have a drift advance capability in excess of 12m/d.

WORK PROGRAM: a) Planning initiation of machine, defining the engineering design, in particular accessories such as dust-suppression apparatus, support-erecting aid, and lateral supports. b) Procurement of the heading machine, preparation of the first site. c) Conducting series of operating trials.

STATUS: Phase a) of the program has been completed, and work started on phase b).

Delivery of the VS 3 road heading machine was delayed by one month. The machine was taken into service on 23.12.1975.

ADDENDA: Subcontractor: DEMAG. Performing organization: Eschweiler Bergwerksverein.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0401, SHIELD-TYPE SUPPORTS AND IMPACT RIPPER MACHINES IN THE TRANSITION FROM COAL FACE TO ROADWAY

ABEL, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Development, testing and operation of special-purpose support systems in the T-junction with both ploughing and cutting coal-winning.

WORK PROGRAM: a) Shield support in roadways behind the face in conjunction with impact rippers. Examination of the feasibility of using impact rippers; inspection of potential test sites and discussions with suppliers. Operation of an impact ripper.

Modification and putting into operation of shield units. Design and construction of a cross conveyor. Carrying out of any necessary modifications. Continuation of project. b) Development of a high-performance technique for driving stalls and roads in seams with a high gas content and wall rock subject to high pressure: Procurement of a ripping machine, training of personnel, development of the machine to operational status, development of a support aid. Putting out to tender the development of a cutting machine for stalls, and acceptance trials. Putting out to tender the development of a suitable hydraulically-powered support unit for the area between the face-conveyor and the head-end of the advance behind the face, award of design and development contracts, and operating trials of the equipment.

STATUS: Owing to unfavourable geological circumstances it was not possible to make a start on trials in the Minister Aschenbach mine with an impact ripper from the Hausherr Company for advancing roadways behind the face in conjunction with the powered support system for stables made by the Becorit Company. The test program target is now limited in the first place to acquiring experience with operating the ripping machine and that at a later stage to use this in conjunction with the powered stable support system.

In the Nordstern pit the impact ripper produced by the Becorit Company, following modifications, was operated successfully on ripping heading with advancing behind the face. It is proposed to replace the unsatisfactory advancing mechanism with which the machine is at present equipped with a caterpillar track. A concept has been worked out for stable-cutting machines which it is intended should be integrated with the ripping machine and the stable support system. Whether the latter can be satisfactorily developed is dependent on whether the concept for the stable-cutting machine can be put into effect.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0402, COMPOUND SUPPORT SYSTEMS IN ROADWAYS WITH STEEL ARCHES

ABEL, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

MAIN OBJECT: Mining technology and coal preparation.

FIELD: New ground support system.

OBJECTIVE: Reduction of the time required for support operations by separating the support operation into a preliminary (rock bolts) and final support (steel arches) about 20 m behind the face. Increase of the drivage rate. Improved retention of the roadway cross-sections.

WORK PROGRAM: 1. Anchor drilling and anchor setting with suitable equipment for support at the face, observation of rock behavior. 2. Experiments at points of main interest with mechanized installation of the final support, and mechanized backfilling of the roadway support. 3. Operational trials under different geological and operating conditions.

STATUS: Selection analysis and the first experiments under item of the work program have started.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0403, SUPPORTS FOR THE TRANSITION BETWEEN COAL FACE AND ROADWAY

ADAMEK, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Development of a support system for securing the roof between the coal face in the stables and the gateside pack.

WORK PROGRAM: a) Project study on alternative solutions. b) Procurement of a prototype after detailed examination of the study. c) Operating trials. d) General overhaul of equipment. e) Continuation of operating trials.

STATUS: Because of the multiplicity of functions which the system is intended to fulfill, development work on a support system for the T-junction roadway in the Hansa mine proved to be harder than had been envisaged. The problem was first examined on a wooden model. After the most promising solutions had been selected, work was started on the construction of a prototype on the lines of the concept finally decided on.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0404, TRANSFER SYSTEM BETWEEN THE COAL FACE TO ROADWAY CONVEYOR AND THE HIGH-CAPACITY CRUSHER

ADAMEK, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Development of a low-dimensioned, mobile face-to-roadway transfer unit as a self-contained unit incorporating a high-capacity crusher for coal and wall rock.

WORK PROGRAM: a) Transfer system between coalface and gate conveyor: -Underground operation and operational studies. -after any necessary modifications and improvements. b) Development of a high-capacity crusher with dust-proof casing: -crusher by the Klockner-Ferromatik Company, with the collaboration of BAG Niederrhein. -Ferromatik Company. -up to operational status.

STATUS: Trial operations with a transfer system between the coalface and the gate conveyor system in a retreating heading of the Hansa pit showed that with the close interlinking of gate conveyor and gate-end loader, as opposed to the previous method of working, there was a saving of three manshifts a day.

The system was also found to have other inherent advantages. The good results achieved offer the possibility of adapting the system for successful operation with advancing with the face.

Preliminary trials with available crushers for the purpose of increasing throughput performance led to no recognizable improvement. Results analysis led to the concept of a new type of crusher, and this has been put out to order.

ADDENDA: Subcontractor: Klockner-Ferromatik. Performing organization: Rurhkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0405, PRODUCTION OF FORMED COKE (DEMONSTRATION PLANT)

AHLAND, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

MAIN OBJECTIVE: Coal conversion.

FIELD: Thermal processing.

OBJECTIVE: Manufacture of formed coke, for use in blast furnaces, by continuous blending of coke and caking coal at a temperature of 450 degrees C and subsequent compaction to briquettes. The process is distinguished by a low degree of emissions and low dependence on the properties of the input coal and coke. Building and operation of a demonstration plant on the technical scale will enable the development to a fully technical application in practice.

WORK PROGRAM: Construction and start-up of the demonstration plant. Operations planned for several years will serve the testing and perfecting of the process technology. Drawing up secured balances of material and energy in order to assess the economy of the process and to plan future operating plants. Making available the quantities of formed coke necessary for convincing blast furnace tests. Evidence of the fact that the process is 'non-polluting'.

REFERENCE TO OTHER PROJECTS: For supply of coke to the formed coke production plant, an LR plant or a low-temperature carbonization plant in a fluidized bed will have to precede the actual formed coke plant.

STATUS: Now that construction has been completed, the demonstration plant is at present being put into operation.

ADDENDA: Subcontractor: Fa. Still, Recklinghausen. Performing organization: Arbeitsgemeinschaft Formkoks, Bergbau-Forschung GmbH, and Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0406, FURTHER DEVELOPMENT OF ROTARY DRY DRILLING FOR SOFT ROCK CONDITIONS
ARCYPOWSKI, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Increased penetration rate and drift advance, reinforcing natural strength of the rock by use of rock bolts as road-way supports, application in shot-hole drilling. Definition of the range of applications.

WORK PROGRAM: a) Feasibility study on use of a rockbolt drilling and setting tower. b) Procurement of equipment, preparation for use. c) Trial runs, with emphasis on dust control, determining optimum operating method. d) Roof-bolting experiments, determining optimum drillboom configuration and drilling rod length, operational studies. e) Further development of the rotary drilling machine, and its application to shot-hole drilling.

STATUS: Work on stage c) was continued, and the problem of dust control with blast-holing was solved with the drilling of the hitherto customary diameters and with the employment in the first place of only one rotary drilling machine. There was a holdup lasting nearly five months because of delay in the delivery of a suitable dust suction appliance. During the next phase of activity the effectiveness of the process as a whole will be tested with the use of two rotary drilling units and the drilling of larger diameter holes.

A start was made on stages d) and e). Tests with expansion shell bolts were successful, but difficulties were experienced over test pinning with resin-bonded roof bolts.

ADDENDA: Subcontractor: Salzgittermaschinen AG. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0407, IMPROVEMENT OF DRILLING AND BLASTING TECHNIQUES IN GATE ROADS
BABUCKE, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

MAIN OBJECT: Mining technology and coal preparation.

FIELD: Drivage by shot firing.

OBJECTIVE: Reduction of the drilling time, utilization of the available older, experienced personnel, use of the same drill boom for boring shot holes and test holes, increasing the depth of pull, better power utilization, reduction of the explosives consumption, blasting precise profiles.

WORK PROGRAM: 1. Development of a basic concept, selection of a drill jumbo and a supplier for a laser shot pattern projector. Joint development of the requirements for employment underground. 2. Operational tests of the coordination between drill jumbo and shot pattern projector. 3. Drilling and blasting experiments, using various configurations of drill rods, drill bits, shot hole diameters, depth of pull and type of cut. 4. Determination of operational characteristics.

STATUS: Item 1 of the work program has been completed.

ADDENDA: Subcontractor: Ingersoll Company and Messerschmidt-Bolkow-Blohm Company and Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0408, MANUFACTURE OF NON-POLLUTING BRIQUETTES (OPERATIONAL TESTS)
H. BECKER, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

MAIN OBJECT: Coal conversion.

FIELD: Mechanical processing.

OBJECTIVE: Manufacture of hard coal briquettes producing only little smoke, complying with the requirements of the Federal Law for Protection against Emissions (Bundesimmissionsschutzgesetz). Development of a process on the operational scale and accompanying tests in the technical testing plants of Bergbau-Forschung GmbH.

WORK PROGRAM: Selection of suitable binders on a bitumen base and preliminary tests in the technical testing plant. Investigations on the availability of the selected binder. Modification of briquetting process for the use of bituminous binders instead of pitch binders. Trial operations and investigations of these briquettes in actual use by Bergbau-Forschung. Manufacture of larger quantities of briquettes. Tests serving the interests of the consumer, prior to changes in the production process for the briquettes.

REFERENCE TO OTHER PROJECTS: Operational tests for the conversion of the production process for the use of bituminous binders will be run at the same time in four briquetting plants (ET 37, ET 98, ET 99, ET 104. Preliminary selection of the binder and tests for their suitability will be run by Bergbau-Forschung GmbH (ET 96).

STATUS: At present, conversion of the equipment in briquetting plants is in progress.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0409, MINING METHODS WITH DETONATING CORD
M. BERNAUER, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Development and testing of a new, high output method of mining using long boreholes together with flameproof detonator cord.

WORK PROGRAM: a) Preparation of workings for test drilling: Test drilling to determine directional accuracy of boreholes with the use of a commercially available drilling machine. Evaluation of boreholes. Test drilling operations (in coal seams) to determine directional accuracy in drifts. Evaluation of the boreholes. b) Blasting tests, using flameproof detonator cord: Carrying out a series of tests. Evaluation.

STATUS: It is important if this system of mineworking is used that the boreholes for detonator-cord shooting should be drilled exactly parallel. Results of preliminary trials carried out in the Monopol pit up to the beginning of 1975 with drilling machines in coal seams, one of German and the other of British make, did not come up to the requirements that this particular method is called on to fulfill, either in terms of directional accuracy or performance. Following this experience, a contract was placed with the German firm concerned for the development and fabrication of a more powerful drilling machine for use in seams, which should be able to meet the requirements imposed. Design work has now been completed.

ADDENDA: Subcontractor: Schmidt Kranz. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0410, DEVELOPMENT AND TESTING OF A NON COMPRESSED-AIR HIGH-PERFORMANCE DRIVAGE SYSTEM WITH DRILLING AND BLASTING
M. BERNAUER, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Use of an electro-hydraulic loading and drilling system instead of machines driven by compressed air. Reduction of energy costs, elimination of leakage lossess occurring with compressed-air systems, reduction of noise level to between 90 and 95 dB (A), doubling of penetration rate to approx. 2m/min, increase of loading capacity by 2 1/4%.

WORK PROGRAM: Operating trials.

STATUS: The necessary modification and improvements on the electro-hydraulic loading machine are still to be completed because of delay over the start of preliminary trials, but there has been even greater delay with the electro-hydraulic wagon drill, which was only delivered towards the end of 1975, and as a result the completion date for the whole project has been set back by nearly twelve months.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0411, RE-DEVELOPMENT OF ROAD HEADING MACHINES

BERNDT, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Re-development and testing of 'VS2E' road heading machines under differing operating conditions, for improved drift advance.

WORK PROGRAM: a) Re-development of the DEMAG 'VS2E' road heading machine, driving more sharply inclined gate-end roads, e.g., with downgrade working, improvements to advancing mechanism. b) Testing the compact 'Roboter' road heading machine made by the Paurat Company for its ability to meet the combined requirements of future semi-automation, mechanized support-erection, and effective dust control. c) Re-development and testing of the road heading machine made by Voest-Alpine, which is equipped with shearer-drums rotating vertically to the axis of the boom. d) Initiation of a prototype (type WAV 200) machine produced by the Westfalia-Lunen Company, in which the cutting drums rotate vertically to the axis of the boom.

STATUS: Item a) of the program could not be carried out, owing among other things to inflated costs of modification and the faulty design of the machine. Ruhrkohle AG have therefore abandoned their part in the project.

Work on item b) continued, and work was started on items c) and d). There will be a delay of some four months over the completion of item b).

There was also a set-back over item c), due to a delay of nearly two months in the delivery of the machine, and not all the trials, scheduled for completion by the end of 1975, could therefore be carried out in time.

ADDENDA: Subcontractor: Westfalia-Lunen; Voest-Alpine; DEMAG; Paurat. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0412, MARRYING UP OF PREPARATION PROCESSES WITH NEW TECHNOLOGICAL APPLICATIONS FOR COAL PRODUCTS

W.P. BETHE, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: New forms of technology in the field of coal application demand a type of end product after dressing with very different characteristics from those possessed by coking coals and coals used in power plants. Moreover, these new technologies generate residue for which profitable uses must be found. This calls for the development of low-cost extra-fine grinding and drying techniques allowing for differences of dirt composition and rank, low-cost separation techniques for pure shale, and new techniques for exploiting the combustion residue from fluidized-bed firing of combustible materials with a high sulphur content.

WORK PROGRAM: a) Project study to determine feasibility of techniques and installations, cost-efficiency calculations on the basis of different effective factors (size range, shale content, and so on). b) Researching ways and means of exploiting combustion residue. c) Erection of prototype plant.

STATUS: The project study, 'Requirements imposed by new technologies on hardcoal products and the consequent effect on methods of coal preparation,' has been completed, but the question of further work on the project has not yet been decided.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0413, PROJECT STUDY ON PROCESS ENGINEERING TIE-UP BETWEEN HOMOGENIZATION OF RAW COAL AND END PRODUCTS

W.P. BETHE, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Because today coal-getting is concentrated at a few working places where output is greatest, 'natural' homogenization of raw coal in the course of mining has become limited. More coal homogenization depots or bunkers must therefore be provided in conjunction with mixed end product depots, which, apart from leading to improved qualities of end product, will also bring about considerable economic advantages in the area of coal preparation. It will besides enable the consumption requirements of coking plants to be met, in particular from the point of view of product uniformity, and mitigate the increasing risk of defective sortings arising from concentrated face-working.

OBJECTIVE: Examination of the question of the process engineering tie-up between homogenization of raw coal and end products. Determination of optimum siting of centralized mixing depots. Study of the effect of raw wash coal homogenization in terms of technical and economic advantage.

WORKING PROGRAM: a) Elaboration of a computer program. b) Calculations by means of models to determine optimum quantities, qualities, consumer locations, environmental norms, and so on. c) Design of prototype installations for homogenization of raw coal and end products.

STATUS: The computer program was worked out, and computations on optimum solutions were conducted. It emerged from these calculations that it would be a viable proposition to erect three mixing and homogenization installations for end products with a throughput capacity of 12 m tons a year. With the creation of intermediate mixing depots in the Ruhrkohle AG territory it will very soon be possible to supply the whole of the current output of smalls to customers for coking coal, and for coal-burning power stations to be supplied with the homogeneous, sulphur-free coal they require.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0414, COAL MINING OF THE FUTURE - EXTENSION OF MINING TECHNIQUES SUB-PROJECT 9 - SURFACE INSTALLATIONS

F. CLAES, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Formulation of planning concepts for main surface installations in large collieries, and for new forms of pit-head installations.

WORK PROGRAM: a) Creation of concepts of layout for the main surface installations of the future: New engineering solutions for winding, coal preparation and other surface activities. Capacity limits and increased outlay entailed with the machinery concerned. Automation of operating processes. Methods of ensuring optimum uniformity of coal qualities. Comparative model studies of economic factor with pits of differing capacities. b) Model studies to investigate new winding systems: Assessment of experiences with winding equipment in the coal mining industry and other mining sectors. Detailed design concepts for layout of winding installations, hoisting engine, ventilators and other equipment involving planning. Design proposals for pre-fabricated sub-pressure shaft sheds, pit-head baths of unit construction and proposals on multi-stage construction of the installations. Locational and economic considerations.

STATUS: Individual studies on planning of main surface installations completed and preparations made for comparative model studies. Detailed research on new forms of pit-head installations concluded.

ADDENDA: Subcontractor: Winkhaus & Patschul, Essen. Performing organization: Ruhrkohle AG, Essen; Gew. Sophia-Jacoba, Huckelhoven; Bergbau-Forschung GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0415, STEERING AND PARTIAL AUTOMATION OF WINNING INSTALLATIONS

CZAUDERNA, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Increased output coupled with increased security of the face by means of new steer-

ing and measuring units, workers transmission of data and maximum possible automation by means of freely programable steering-systems.

WORK PROGRAM: a) Steering and partial automation of coal-cutting machines: project analysis and concept definition. Procurement of individual components and licensing procedure. Surface and underground testing. Improvements. Start-up of operations at the face. Steering of plough and face conveyor: Project studies. Elaboration of sub-projects and awarding development contracts. Operating trials with a prototype and other equipment. Steering a face installation from the surface. c) Steering and partial-automation with ploughing: Project analysis and concept. Procurement of individual components and licensing procedure. Trial operation of the system. Improvements. Start-up of operations at the face.

STATUS: Progress on the development of new steering and automated systems for ploughs and coal-cutting machines has been uneven. In the work done on that part of the project entrusted to the Prosper-Haniel colliery, the automation of a shearer-loader, the feasibility of running the envisaged program was clearly demonstrated by the complete success of an experiment with computerised control using a model. By contrast, the work in the area of ploughing is still at the project analysis stage. This is very largely because the sub-contractors have experienced difficulties over fulfilling the orders placed on them, since for them it is still mainly 'new territory.'

ADDENDA: Subcontractor: Siemens; Cercha Industries; Funke and Huster. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0416, NEW WINNING SYSTEM THROUGH SIMULTANEOUS CUTTING AND CRUSHING

EICHBAUM, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Development of a new method of coal winning for limiting or eliminating the serious disadvantages of cutting and plaughing-winning in seams more than 1.8 m thick, and for better roof control.

WORK PROGRAM: a) Design and manufacture of a new type of cutting disc-loader. b) Trying out the cutting disc-loader at an artificial face - optimization of the winning tools. c) Underground testing. d) Final stages of work: Disassembly. Evaluation of trials.

STATUS: A more advanced type of cutting-disc loader with a driving power of 300kW and adapted for use in greater thicknesses of seam, larger cutting depths and for cuts on the incline, manufactured by the Eickhoff Company, was completed behind schedule, owing to production bottlenecks. Preparation for surface trials with this machine at a specially constructed artificial face at the Experimental Station for Mining Technology are nearing completion.

It was found necessary to expand the original targets for the research program to cover the testing of prototypes of a form of support suited to specific angles of cut at the coalface. The choice of support (a shield support) was finished, and three prototypes, after the successful surface testing of two further prototypes, were submitted to trials at a longwall face in the Rheinland combined mine where the underground trials with the cutting disc-loader are to take place at a later stage.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0417, PNEUMATIC STOWING WITH LATERAL OUTLETS

FREISENDORFF, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECT: Mining technology and coal preparation.

FIELD: Mining under special conditions.

OBJECTIVE: The objective is to achieve economical working progress by using a walking pneumatic line with mechanized lateral outlets and stowing shield.

WORK PROGRAM: 1. Acquisition, trial operation and necessary improvements of back-up caps to keep the stowage area open. 2. Trials with lateral pneumatic outlets, including stowage shields, walking device and remote control up to complete operational status.

STATUS: Item 1 of the work program has been completed; the trials under item 2 of the work program have been initiated.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0418, DEVELOPMENT OF A DEVICE TO SECURE THE COAL FACE IN CONJUNCTION WITH THE SHIELD-TYPE SUPPORTS USED FOR EXTRACTION FROM THICK SEAMS

B. GILJOHANN, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Development and trials of a device for securing the coalface with thick seams.

WORK PROGRAM: a) Preparatory design work. b) Delivery and installation of a prototype of lattice construction. c) Delivery and installation of a device for securing the coalface to be built into the shield support. d) Monitoring operating data and trying out modifications. e) Disassembly and general overhaul. f) Continued operational testing.

STATUS: The devices for securing the coalface hat were built into 95 shield support units supplied by the Klockner-Ferromatik Company and tried out in a thick seam in the Sachsen pit gave a good account of themselves. There were no further instances of accidents at work caused by falls of coal.

ADDENDA: Subcontractor: Klockner-Ferromatik. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0419, SUPPORT WITH PRECAST CONCRETE ELEMENTS (PANEL-TYPE SUPPORT)

GRUNDMANN, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Increased support resistance and highly developed mechanized support system with the use of a panel-type support.

WORK PROGRAM: a) Preparation of a project study based on experience to date, specific examination of conditions in the heading selected for tests. b) Strength calculations and model studies. c) Procurement of equipment. d) Surface trials, training of the team. e) Underground trials at 1000 m. f) Monitoring of rock behaviour and supports by means of measuring bolts.

STATUS: Work on items b) and c) was continued, functional assessments were performed under item d).

Model tests demonsrated that a rigid panel-type support will be crushed at an overburden pressure equivalent to that found at 1,000 m, whereas a flexible support system using panels can withstand pressures operating at between 1,600 and 1,800 m without suffering damage.

Some difficulty was experienced over the positioning of the compression blocks and in adapting them to the special requirements of panel-type support, both in regard to dimensions and to stability of the mechanical elements during the conveyance and installation of the sections. Work suffered considerable delay because of the amount of time needed to convert the support manipulator and to re-design the caterpillar mechanism, and then to put the two assemblies together.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0420, TESTING DIFFERENT SYSTEMS OF SHIELD-TYPE SUPPORT

HARSCH, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: To improve the constructional engineering and kinematic characteristics of the system of sheild support and the suppression of dust during use of this support in the face.

1. ORGANIC SOURCES OF ENERGY

WORK PROGRAM: a) Further development trials on the Hemscheidt type of shield support at faces nos. 57 and 59, 1.6.1974 - 31.12.1975: Control of floor, roof and direction. Improved mounting of the shield legs. Adapting the cantilevered bars for better fit with neighbouring shields by rounding off the edges. Improved dust control. b) Trials with new support system in fault conditions, 1.6.1974 -31.5.1977: System design. Transporting and installation at the face. Full-scale operational trials with evaluation of engineering problems, collection and processing of data, evaluation of questions of operating safety. Dismantling and removal, general overhaul. Fresh operational trials. c) Further development trials on Becorit face support equipment (shield support), 1.12.1974 - 31.10.76. Determining design factors for improved type of shield. Trials with new type of shield.

STATUS: In the further development trials with the Hemscheidt shield support in the Walsum mine, preliminary experiments with the use of aligning rams were successfully concluded; the mounting of the shield legs on the skid was improved, and the holding capability of the legs strengthened with the use of foam inserts. The dust-suppression equipment on the shield chocks was also improved.

Trials in the Monopol mine with the shield chock manufactured by the Westfalia-Lunen Company were completed. These registered good success even in the test area where there were an unusual number of geological faults to be overcome. This support system also proved to be advantageous when used in conjunction with the operation of a plough and with the removal of the face support installation.

Output proceeded according to plan in a test face in the General Blumenthal mine with the face partially supported by 30 improved shield support units from the Becorit Company. To date these shield units are proving themselves to be effective.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0421, EMPLOYMENT OF 5 KV MOTORS AND FAST CONNECTIONS FOR ROADWAY CONVEYOR SYSTEM DRIVES

HERMS, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

OBJECTIVE: Increased coal output through improvements on the electrical engineering side, including the installation of medium voltage motors. These measures should lead to increased output because of reduced make-ready and downtimes.

WORK PROGRAM: a) Development of high-speed connectors: Initial planning and commissioning of project studies. Review of project studies, obtaining licences to proceed from government testing stations, placing orders with suppliers. Fabrication of prototypes. Testing for protection against fire-damp. Operational trials. b) Development of equipment for 5 kV nominal voltage: Initial planning and commissioning of a project study on the motors. Commissioning of a project study on protection device and main. System concept, obtaining licences to proceed from government testing stations, placing orders with suppliers. Fabrication of prototypes. Testing for protection against fire-damp. Installation of system in a working mine. Operational trials.

STATUS: Results of tests carried out in the Rheinland combined mine demonstrated the feasibility of developing flameproof 5 kV motors with a high and dependable switching frequency, and with high starting and stalling torque. However, over the theoretical work with conventional motors and over installing monitoring equipment for motor performance, the companies concerned met with unexpected difficulties. The same applies to the development of high-speed connectors, for which orders have been placed with different firms.

ADDENDA: Subcontractor: AEG; Siemens. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0422, IMPROVEMENT IN OPERATING CONDITIONS AND ECONOMY OF WORKING IN FULLY MECHANIZED TUNNELLING WITH THE DEMAG/SVM SYSTEM

JEFFROY, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Reduction of downtimes caused by need to re-locate machines, improved mobility and conveying techniques, integration of the tunnelling machine into the full cycle of colliery operations, rationalization and mechanization of support operations and conveyance of support materials to the machine area, the provision of suitable measures against mud, rock consolidation and drivage through faulted zones.

WORK PROGRAM: a) Development and testing of improved loading and haulage facilities. b) Further development work on invert in fillment and packing. c) Re-design of screen belt conveyor and materials-handling scaffold. d) Development and testing of a device for mechanized positioning of roadway supports. e) Development and testing of methods of mud disposal and drainage in the infilled invert. f) Experiments with methods of rock consolidation and backfilling of supports, using dry-mix concrete.

STATUS: Work was continued on items d) and e) of the program, but not completed, and work was started on item f). The development and testing of a device for the mechanized positioning of roadway supports (d) - met with a considerable setback. After tests at the manufacturer's works the newly designed aid is due for underground operating trials some time in the second quarter of 1976. The development and testing of methods of mud disposal and drainage in the infilled invert - (e) -was nearing completion after a series of successful tests using drainage pipes intended to serve additionally as pressure-proof strutting. Under item f) of the work program a dust-free dry-mix concrete injection machine was developed and put into operation. The machine is still in operation, and it is too early as yet for a final verdict on this subject or on the observations carried out on the rock by means of measuring bolts.

ADDENDA: Subcontractor: DEMAG. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0423, COMPUTER-CONTROLLED COAL PREPARATION

M. KOCH, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Building a simulated model of the actual coal preparation processes used in a modern preparation plant, and practical analysis of the results.

WORK PROGRAM: a) Creation of general concept for data-collection and data processing for the following applications: monitoring of materials flow, monitoring of output and recording of raw coal flow from shaft hoists and via mixing depots to preparation plant and storage bunkers, automatic data collection on malfunctioning of conveying systems and installations. b) Assembly of monitoring and transmitting equipment. c) Selection and taking into service of a process computer system. d) Programming for complete system. e) Test runs.

STATUS: For computations with the simulated model the simultaneous equation method has been used, on the input/output principle. Only the inputs and outputs are abstracted and used in the equations. Unmeasured quantitative flowrates have been calculated retrospectively from the output data, since not all quantitative flowrates can as yet be obtained. Since, because of the lack of certain measured values, the equation cannot be completed, all measured values have been balanced out so that only a minimum number have an objective function. The problem is in fact a non-linear (i.e. quadratic) problem in optimization, which can be solved analytically with the use of the simultaneous equation method as an auxiliary linear condition.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0424, DEVELOPMENT OF HIGH-VOLUME FLOTATION PLANTS

R. KOHLING, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECT: Mining technology and coal preparation.

FIELD: Continued development of processing facilities and techniques.

OBJECTIVE: Development of a high-volume flotation plant for very fine slurries which are difficult to clean; optimization of operations.

WORK PROGRAM: Development of a project for a prototype system; Construction of a prototype system; Trial operation.

STATUS: This project remains frozen until the project study on 'Preparation of fines' (Program No. 2,5,1,7) is available.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0425, STEAM-CAP FILTER FOR DEWATERING FROTH FINES

K. KOPPITZ, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: The mechanization of coal-mining and intensified dust control have led to an increase in the fines and/or slurry content in the product for preparation. Consequently, water content in the market products often exceeds permitted levels under the quality standards imposed, with appreciable loss of revenue as a result. It is thought that steam curing has promising possibilities as a method of dewatering froth fines. The basic principles to be adopted for effective utilization of this particular method have already been determined by the operation of a pilot plant. The project proposal is therefore to carry out tests in operational conditions with the use of a steam-cap filter, to introduce improvements to the filter mechanism, and to prevent steam damage to the filter plant through use of appropriate materials.

WORK PROGRAM: a) Determining optimum operating conditions for the steam-cap filter, e.g., optimum quantities and temperatures of steam and hot air. b) Calculating service life of components and materials.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0426, FURTHER DEVELOPMENT WORK ON ROCK TUNNELLING ON THE DIP WITH THE FULL FACE TUNNELLING MACHINE SYSTEM WITH HYDRAULIC DEBRIS DISPOSAL

KORTENBUSCH, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: To investigate the feasibility of a hydraulic debris disposal system, development of a horizontal and vertical conveying system, from an approximate depth of 1,100 m to the refuse tips.

WORK PROGRAM: a) Preparing a project study for a single-chamber pipe feeder. b) Drawing up an organization plan for drifting with hydraulic debris disposal. c) Formulation of a plan for incorporating the mechanical elements required for hydraulic debris disposal in the Full Face Tunnelling Machine system. d) Preparing an order for a complete hydraulic disposal system. e) Underground operation.

STATUS: A start was made on phases a) and b), but the program is already far behind schedule.

As a result of the project study it has been decided to utilize a three-chamber, instead of a single-chamber pipe feeder. The additional work that this decision entailed consisted largely of bench testing and the taking of measurements, which have not yet been fully analysed.

ADDENDA: Subcontractor: Siemag GmbH. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0427, COMBUSTION OF TAILINGS WITH FLUIDIZED-BED FIRING

KOZIANKA, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Environmentally conscious disposal of tailings coupled with utilization of residual coal content for steam generation.

WORK PROGRAM: a) Experiments on combustion of froth tailings in an experimental plant by fluidized-bed firing. b) Provison of a project study on the building of an industrial scale combustion plant. c) Research on possibilities of influencing the quality of the combustion residue. d) Construction of a pilot installation. e) Operational trials.

STATUS: Combustion tests conducted by Rheinstahl AG, Anlagentechnik, using the fluidized-bed firing method, though yielding good results, did not provide sufficient evidence to justify the construction of an industrial scale pilot plant for the combustion of froth tailings. For example, the important environmental question of satisfactory levels of sulphur residue could not be adequately clarified. Further combustion tests were therefore conducted in an industrial plant for clarified slurry combustion. Approximately 150 cubic meters of pulp with 90 tons of solid matter were combusted. Evaluation of the extensive tests is now in course, and the analysis report will be produced early in 1976. It can be said in advance of the report that combustion proved to be satisfactory, that steam generation was feasible, and that with the addition of CaO the sulphur content was sufficiently well bonded into the ash.

ADDENDA: Subcontractor: Rheinstahl AG, Anlagentechnik, Essen. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0428, SELECTIVE EARTH-FAULT MONITORING IN MEDIUM VOLTAGE NETWORK

KRUSE, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Development of reliable techniques and equipment for the rapid detection of supply units affected by earth faults and for restricting disconnection to as little of the network system as possible.

WORK PROGRAM: A) Analysis of all theoretically possible underground systems to determine which of them are feasible in practice. b) Selection of optimum system on the basis of test layouts. c) Fabrication of pre-prototype and prototype equipment for surface testing. d) Operational trials underground.

STATUS: The results of the analysis at item a) in the program made it possible to allocate tasks and to draw up specification sheets. Several firms are now working on various equipment presentations. A decision on which method should be adopted will be taken by the end of the first quarter of 1976.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0429, INTERCOMMUNICATIONS SYSTEM FOR UNDERGROUND WORKING

W. KUGEL, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Development of portable intercommunications systems for use in parts of a mine subject to gas hazard.

WORK PROGRAM: a) Drawing up of specification list. b) Development of new or redevelopment of existing systems. c) Licensing tests. d) Trying out system under operational conditions.

STATUS: Two possible solutions for an intercommunications system meeting the specified requirements were examined in two separate studies, each based on a different principle of electromagnetic wave propagation. The criteria of choice between an inductive radio system (as one solution of the

problem) or of a solution using rediating coaxial cables (the AHF system for short) are at present being worked out.

ADDENDA: Performing organization: Rurhkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0430, HYDROPIT IN THE RUHR DEPOSITS

KUHN, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: The conversion of an entire pit into a 'hydropit'.

WORK PROGRAM: a) Planning work: Joint planning with the suppliers. Training mining personnel in hydro extraction at the Gneisenau pit. b) Preparations. c) System construction. d) Start-up of operations.

STATUS: To facilitate the planning and preparatory work at the Hansa mine, a planning team was set up in collaboration with the Siemag Company to work out the necessary equirements and conditions in the area of mining and process technology to enable working to be undertaken; and to place the necessary orders for the main items of plant entailing long delivery dates.

ADDENDA: Subcontractor: Siemag. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0431, DEVELOPMENT OF A CRUSHER INSTALLED IN THE FACE CONVEYOR SYSTEM

LANG, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTON OF PROJECT: Objective: Positioning a crusher ahead of the double-drum shearer, for the purpose of preventing conveyor stoppages caused by the piling up of large lumps of coal in front of the shearer portal, which account for some 20% of actual operating time. As a further contribution, this innovation is intended to ensure less wear and tear on the conveyor chain and thus increase its service life.

WORK PROGRAM: a) Preparatory work, transporting of equipment and installation. b) Trials with the prototype developed by the Eickhoff Company. c) Carrying out of any necessary improvements. d) Operating trials in seams with an increasing quantity of large coal-lumps.

STATUS: Trials with a crusher positioned ahead of a double-drum shearer-loader for preventing large lumps of coal from piling up in front of the portal of the machine, and so causing a stoppage, have not so far yielded any satisfactory results. The biggest problems were still in the area of the driving motor of the crusher, since the winding of the motor was unable to withstand the strain imposed on it by the action of crushing.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0432, DEMONSTRATION PLANT FOR THE PRODUCTION OF COAL OIL IN THE USA

J. LANGHOFF, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Obtaining know-how for the building and operation of plants for the production of least-volatile hydrocarbons from coal. Establishing the technical conditions for the utilization and refining of coal deposits outside the Federal Republic of Germany.

WORK PROGRAM: Phase I: Preparation of building boundaries for a demonstration plant with a daily throughput of 6000 tons of coal. Phase II: Erection and tests of a demonstration plant with a daily throughput of 6000 tons of coal. Phase III: Complete construction of the demonstration plant with a daily throughput of 6000 tons of coal for the production plant.

RELATION TO OTHER PROJECTS: Coal oil laboratory program of Bergbau-Forschung GmbH (sponsored by the Ministry for Economy, Middle Classes and Communications of the Land Nordrhein-Westfalen).

STATUS: The preliminary project (basic engineering, cost assessments) was completed by Stearus-Rogers, Denver, Colorado, U.S.A. based on process data from Gulf Mineral Resources & Co., Denver, USA.

A test program for the SRC-II process in the laboratory of Gulf-Oil in Merriam, Kansas, and in the SRC-I pilot plant in Tacoma, Washington, also ran parallel to the engineering work.

The guidelines for further work on the preliminary project were developed in several project committee meetings of the American and German partners. Decisions were made concerning the processes to be used. German personnel have been sent to the American project administration in order to gain direct insight into the project development. In December 1975, according to schedule, the work for the preliminary project was completed.

ADDENDA: Subcontractor: STEAG AG. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0433, DEVELOPMENT OF GEARED DRIVE SYSTEMS FOR GROUND-MOUNTED RAIL CONVEYOR AND SUSPENSION MONORAIL CONVEYOR

LEYERMANN, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Traction power in the type of diesel-operated, frictional resistance transmission drive units employed hitherto in inclined roadways is inadequate for the loads it is required to pull. It is accordingly intended to develop and test out geared drives with frictional transmission, together with the appropriate rail system.

WORK PROGRAM: a) Development of a ground-mounted rail system with diesel-hydraulic geared drive locomotion. b) Development of a geared drive for self-propelling drive units operating on suspension monorail conveyors. c) Construction of a prototype. d) Underground trials.

STATUS: There was some delay over the granting of a licence for the electrical remote control system. The working reliability of the system has been proved. Safety devices were improved according to plan. Average haulage capacity: 60 tonne kilometers per day.

Following the proposal of a project study a contract was placed for the construction of a prototype. Underground tests on a prototype model provided valuable information that could be used in the designing of the geared drive.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0434, TECHNOLOGICAL AND CONVEYING METHODS FOR THE USE OF WATER-SETTING CEMENTING MATERIALS

LUTZ, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Fully mechanized production, conveyance and handling of Blitzdammer - 'C' - slurry or paste for the formation of parallel roadway stoppings and or filling excavations.

WORK PROGRAM: a) Experiments with metering devices, mixers, pumps and pressure regulators already developed for similar purposes. b) Development and testing of pipe switches, flushing valves and mechanized lagging. c) Development of a process for the production and processing of filling paste.

STATUS: Work on all three items in the program was continued.

The development work on suitable flushing valves was successfully concluded.

Work on the development of a mechanized system of lagging has been deferred, since it has not so far been found possible to achieve proper co-ordination of different phases of activity, as the effective setting time of the materials is out of phase with the advance rate.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0435, TRANSPORT FACILITIES IN ROADWAYS BY MEANS OF SKI-LIFT TYPE INSTALLATIONS
MARKMANN, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Reduction of travelling time and physical effort for the men. Improvements in ski-lift type installations with respect to curve-travel, driving speed, safety.

WORK PROGRAM: a) Development, production and testing of various system units. b) Operating trials and operational studies underground.

STATUS: Two different engineering concepts were examined. One type of lift, with a cable-car travelling along flexible suspension tackle, when tested at the funicular traction research unit (WBK), demonstrated the feasibility of building curves both on the level and on the dip, and of an extension of travel of approximately 100 m.

The second type, with chairs firmly secured into the cable, is at present in operational use below ground for transporting personnel. After 200 hours of service the system is at present being extended in length.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0436, BELT CONVEYOR SYSTEM FOR OPERATION IN INCLINED ROADWAYS
MEIB, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECT: Mining Technology and Coal Preparation.

FIELD: Conveyor Equipment Automatic Conveyor Systems.

OBJECTIVE: Employment of belt conveyor systems allowing trouble-free and low-maintenance removal of the worked coal in roadways inclined by more than 20 grades.

WORK PROGRAM: Development of a removal concept; Award of design contracts; Trial operation.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0437, MINING IN INCLINED DEPOSITS
MEIB, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECT: Mining technology and coal preparation.

FIELD: Mining under special conditions.

OBJECTIVE: The objective is to investigate, test and develop to operational status potential techniques for high-capacity mining of inclined deposits.

WORK PROGRAM: 1. Stripping winning in seams on inclines over 50 centisimal degrees. a) Formation of in-plant working groups. b) Development of a concept in collaboration with interested companies. c) Planning of process technology, selection of a trial face. d) Trials and evaluation. 2. Cutting winning in strongly inclined deposits without mechanical conveyors. a) Preparation, prototype development. b) Fabrication and installation underground. c) Trial operation. d) Modifications. e) General overhaul and system improvements. 3. Anchor stations for the conveyors in dip faces. a) Preparations. b) Operation in the face, and observation of operational behavior. c) Modifications. d) Examination of possibilities for automating the anchor elements in collaboration with suppliers. 4. Supportless mining techniques, using caving material compaction. a) Concept definition and trial mining of chambers of 90 m length. b) Data acquisition and evaluation. c) Mining of five chambers of 150 m length.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0438, PERFORMANCE IMPROVEMENT BY USING LARGE CALIBER SAFETY CHARGES AND FLAMEPROOF DETONATOR CORD IN GATES AND GATE-END ROADS
MEIER, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Reduction in the number of shot-holes required with the use of larger caliber cartridges, experiments with new types of blasting agent, achievement of clean blasting excavations with precise profiles through the employment of flameproof detonator cord, use of a wagon drill to cut down on drilling time, reduction of mounting and resetting times, greater ease of drilling.

WORK PROGRAM: a) Procurement of equipment. b) Carrying out a series of tests with large caliber safety charges, trying out different shot patterns, checking effectiveness of the results. c) Carrying out a series of tests in profile blasting with the use of the detonator cord, combinations of shot-patterns with safety charges and profile blasting with detonator cord. d) Investigating operational effectiveness of drill hammers on carriages.

STATUS: Work on stage b) was continued in 1975, though comprehensive tests on new blasting agents in the gate and gate-end road could not be carried out as there was no suitable operating position available for the wagon drill.

Work on stage c) was continued. The series of tests carried out with the use of a detonator cord for clean, precise profile blasting were on the whole successful. Despite difficult geological conditions, i.e. unstable roof conditions, the advantages of the new system over the method employed hitherto were clearly established.

A start could not be made on stage d) owing to the lack of a suitable operating position for the wagon drill.

ADDENDA: Subcontractor: Deilmann-Haniel Atlas-Copco. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0439, MINING IN INCLINED DEPOSITS
MEISS, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: To study, try out and develop to operational status possible new techniques or procedures for high-production mining of inclined deposits.

WORK PROGRAM: a) Ploughing in seams on inclines of over 50 degrees: Formation of in-plant working groups. Concept development in collaboration with interested suppliers. Planning the process technology, selection of a trial face. Trials and evaluation. b) Cutting coal-winning in steeply inclined deposits without mechanized conveyors. Preparatory work, development of a prototype. Fabrication and installation underground. Operating trials. Modifications. General overhaul of system and any necessary improvements. c) Anchor stations for conveyors in dip faces: Preparation. Operation at the face and observation of behaviour. Modifications. Examining together with suppliers possibility of introducing an automated anchoring system. d) Mineworking without support system with use of compacted packing material: Conception of project and trial excavation of 8 chambers of 90 m level panel. Data acquisition and evaluation. Excavation of 5 chambers of 150 m level panel.

STATUS: The results of work on discovering new techniques for longwall working with inclined deposits during the period covered by the report have clearly shown that it is very much harder to find solutions to the numerous problems arising under these conditions than it is with level working. The main disadvantage was the considerable number of delays in the test program as a result of having to cut through the constantly changing geological formations found with inclined deposits, which in one or two particularly awkward instances called for the mining program to be altered and for some operations to be abandoned.

A working party was set up to study the problems involved in developing a support and haulage system for strike face caving method with inclinations of over 50 degrees. As part of the research on the adaptation of coal-cutting machinery for use in

sharply inclined deposits, work was done by the firms taking part on the design and fabrication of a shearer-loader suitably adapted for the purpose, and on the haulage technique to go with it. Bench tests on a selective anchorage system for the face with inclinations for over 35 degrees showed that the hydraulic controls for the anchor elements need bot (Text Truncated - Exceeds Capacity)

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0440, AUTOMATED SHAFT SINKING WITH THE USE OF A STAPLE-SHAFT DRILLING MACHINE, DEVELOPING A TECHNIQUE FOR DIAMETERS DRILLED IN EXCESS OF 5 M

NABER, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Fully mechanized drilling of staple shaft of 5390 mm diameter. Improvement of directional drilling techniques, development ex novo and testing of a quick-assembly drill rig, testing the drilling machine, improvements in cutting techniques and cutting tools.

WORK PROGRAM: a) Engineering and design. b) Erection of the equipment. c) Drilling of the borehole. d) Study of safety problems.

STATUS: Items b), c) and d) of the programs have been completed. An upwards target borehole was drilled, 106.5 m in length and 216 mm in diameter - the deviation was 0.5% - which was then enlarged downwards in various steps to the target diameters of 5.39 m. The large-caliber drilling machine recently developed by the Turmag Company, the EH-6000, worked without a hitch, apart from some slight damage to one of the couplings. The only problem was over keeping temperature of the coolant, a mineral oil, down to the permissible level.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0441, HIGH-PERFORMANCE DRIVAGE BY SHOT FIRING

OTTO, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

OBJECTIVE: Improved drilling techniques, automated drilling with program-controlled drill booms, use of large caliber cartridges, experiments to determine influence of type of rock and depth of pull, mechanization of support operations, overlapping of loading and support work.

WORK PROGRAM: a) Procurement and putting into service of a double boom wagon drill. b) Procurement and testing of a third drill-boom. c) Introduction of program control for drill-boom operation. d) Experimental drilling and blasting with large caliber cartridges and detonator cord. e) Development and putting into service of auxilliary equipment for support operations.

STATUS: Item c) of the program has been deleted, since the basic concept was insufficiently clear.

Work on stage d) was continued, although there was not enough time for experiments with the use of detonator cord. Experiments with large caliber cartridges (40 mm diameter) proceeded successfully.

As regards phase e), future emphasis in the development of a fully mechanized system for support erection will be on methods of back-filling.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0442, DEVELOPMENT OF ON-LOAD, DOUBLE-THROW DISCONNECTING SWITCHES AND USE OF VACUUM CONTACTORS

PHILIPP, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Increased operating safety through: Improvement of on-load double-throw disconnecting switches and use of vacuum connectors.

WORK PROGRAM: a) Improvement of on-load double-throw disconnecting switches: 1) Project study for researching on maximum of electrical data obtainable on an on-load doublt-throw disconnecting switch with specified external dimensions; 2) Construction of a prototype; 3) Conversion of existing flameproof devices, assembly of the newly developed disconnecting switch. b) Use of of vacuum connectors: 1) Project study; 2) Assembly of two vacuum contractors with electric cut-out device for reverse operation in an existing pressure-proof housing; 3) Assembly of one vacuum contactor with electronic cut-out device in an existing pressure-proof housing; 4) Assembly of six vacuum contactors with electronic cut-out devices in an existing self-contained terminal.

STATUS: After evaluation of the project studies an order was placed for three prototypes (see a 2). A high current-carrying capacity was achieved with the smallest dimensions by using blade contacts in the switch. Arc quenching is at present still unsatisfactory.

The apparatus manufactured under item b 2) of the program has been fitted to the top-speed reverse mechanism of the 132 kW/500 V prime mover of a plough machine, and is working satisfactorily.

The apparatus described at b 3), with which there is an option of 500 V or 1000 V at 50 Hz, was delivered in December 1975. It is intended to include a 100 kW motor pump in the water drainage in the circuit.

ADDENDA: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0443, DIESEL ENGINES FOR OPERATION IN HIGH CH4 CONTENT

PLATH, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

OBJECTIVE: Research into effects of dilution and turbulence in the airflow on the CO content. Obtaining maximum measured data on behaviour catalysts under different conditions of underground operating; the effects of dust, humidity, vibration, and so on.

WORK PROGRAM: Experiments with different types of engines: Measurements on exhaust gas catalysts in underground operating. Measurements of swirling and dilution with exhaust gas.

STATUS: In the period covered by the report, controlled operational tests using the interaction method with exhaust-gas catalysts PTX 4D and PTX 6D proceeded according to plan. The large quantity of readings obtained will make it possible to establish the effect of residual effect of the catalysts on the CO retention rate in terms of engine performance, CH4 content, service life and chemical regeneration.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0444, TESTS WITH NEW TYPES OF LAGGING

PUTZ, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Development of lagging materials complying with the safety standards, engineering requirements and economic considerations applying to working at great depths: of universal application and light in weight, but with extra-heavy-duty lagging and strutting materials.

WORK PROGRAM: a) Operating trials with expanded metal screens. b) Operating trials with plug and socket screens and prestressed struts.

STATUS: Item a) was further pursued, work was started on item b). The first trials with plug and socket screens showed decidedly better results than those obtained with the usual hooked screens, but still did not come up to requirements. There was difficulty in getting the screens to fit together, and there is a poorly designed arrangement of weld seams, which at present tend to fracture. Future research and development will be directed towards an improved system of weld seams and the designing of a so-called nodular screen.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0445, PNEUMATIC CONVEYING OF DUST-TYPE MATERIALS VIA PIPELINE FROM THE SURFACE TO THE FINAL USER UNDERGROUND (ABBREV)
REMES, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECTIVE: Mining technology and coal preparation.

FIELD: Conveyor equipment automatic conveyor systems.

OBJECTIVE: Development of a manless conveyor technique for dust-type materials from the surface to the final user underground, pneumatic conveying in pipelines.

WORK PROGRAM: 1) Selection and engineering of the system components; 2) Installation and testing; 3) Automation and operational monitoring; 4) Resolving operational problems.

STATUS: Item 1 of the work program has been completed. Most of the installation work has been completed.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0446, MONITORING AND CONTROL OF THE CONVEYANCE FLOW IN UNDERGROUND WORKING
W. ROSNER, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF OBJECT: OBJECTIVE: Collection of quantitative and qualitative data on Run-of-mine coal at underground loading points, feed-forward control of the preparation of end production and/or market products, optimization of yield.

WORK PROGRAM: a) Choice and installation of a process computer. b) Provision of applications software. c) Planning and set-up of data-processing equipment. d) Test runs.

ADDENDA: Subcontractor: Compac, Dr. Schafer, Essen. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0447, MINING METHODS WITH DETONATING CORD
RUHL, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECT: Mining technology and coal preparation.

FIELD: Mining under special conditions.

OBJECTIVE: Development and trials of a new, high-capacity mining method using long shot holes in conjunction with a flame-safe detonating cord.

WORK PROGRAM: 1) Preparation of mine workings for drilling experiments. a) Test drilling operation to determine the directional accuracy of shot holes, using a commercially available drilling machine. b) Evaluation of the shot holes. c) Test drilling operations (in coal seams) to determine the directional accuracy in drifts. d) Evaluation of shot holes. 2. Blasting tests, using flame-safe detonating cord. a) Implementation of blasting test series. b) Evaluation.

STATUS: Items 1a and 1b of the work have been completed.

ADDENDA: Subcontractor: Victor Products. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0448, IMPROVED DRIFT ADVANCE WITH ROAD HEADING MACHINES BY MEANS OF SUPPORT-ERECTING AIDS
SANDER, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Spatial separation of cutting and support operations. Reduction of downtime caused by the erecting of supports.

WORK PROGRAM: Two development approaches are envisaged: a) Support erection at the face with spatial separation of powered support frame-mounted unit and heading machine with universal application capability, coverage of entire machine area, transmission of supporting forces via multisectional longitudinal girders to pairs of cross beams, leapfrog system. b) Supporting materials to be loaded from the monorail to magazine carried by the heading machine, without intermediate storage. Pre-assembled arches to be lifted from the magazine by a handling aid and fed to the support-erecting aid at the installation point.

STATUS: Work was continued on items a) and b). Under item a, bench tests were conducted and two operating trials were carried out underground. In the course of trials with the powered support unit, it was found that so many technical modifications and improvements were necessary that the completion data has had to be extended by a further four months. Difficulty was experienced in cutting through a geological fault, when the support unit had to be left behind due to insufficient self-advancing capability. Tests on the transfer and support-erecting aids under item b) fell a long way behind schedule owing to delayed delivery of the road heading machine. Moreover, the No. 1 cutting drum on the machine was below requirements.

ADDENDA: Subcontractor: Hemscheidt, Wuppertal-E. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0449, NEW SUPPORT AND TRANSPORT PLATFORMS
SCHEDLBAUER, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECT: Mining technology and coal preparation.

FIELD: New ground support systems.

OBJECTIVE: Improved performance and ease of operation through parallel operation and development of support, transport and lifting platforms. Two development approaches are to be used: a) for drivage by shot firing (ATHB) and b) for drivage with impact rippers (ARTE). Improvement of support quality.

WORK PROGRAM: 1. Definition of operation cycles; 2. Development and acquisition of equipment; 3. Surface tests; 4. Trial operations.

STATUS: Items 1, 2 and 3 of the work program are almost completed.

ADDENDA: Subcontractor Becorit Company, Recklinghause, Bochumer Eisenhutte Co., Heintzmann and Co. - Bochum and Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0450, CAVING SCREEN FOR POWERED SUPPORT
SCHEDLBAUER, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: To develop a suitable caving screen and to carry out tests in operating conditions with seams of different thicknesses and on different inclines.

WORK PROGRAM: a) Caving screen for powered supports: -prototypes, operating and underground. -equipment, undertaking any necessary modifications. -project in the form of a project study. b) Screening for caving area and roof: -and their design. -with screens with working on the dip. -operating trials in a different working area.

STATUS: The Becorit Company developed four prototypes of a roof and caving-area screen intended to provide the kind of screening for the conventional powered support system that is used with shield support. Trials in the Schlagel and Eisen mine with four support chocks from the Becorit Company that were fitted with these screens, even despite the considerable stain imposed because of a turn at the face, showed better results than those registered by supports without the screens. One or two improvements that are proposed should increase the effectiveness of the screens still further.

In the Minister Stein pit it was found impossible to continue working the face because of the difficulties presented by the incidence of dip, so that further research and development on the caving-area screen had to be abandoned.

With the chock support developed by the Becorit Company a number of design modifications were found to be necessary as a result of bench tests and owing to various additional requirements of an ergonomic nature. It is planned to begin underground trials in the Minister Aschenbach mine in the course of 1976.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0451, DEVELOPMENT OF POWER LINES OF GREATER FLEXIBILITY FOR CUTTING MACHINERY
SCHRAMM, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Measures against possible failure of coal-cutting cables owing to fall of ground, cables being caught up on the supports, or for similar reasons, through special power lines to coal-cutters.

WORK PROGRAM: a) Project preparation. b) Project study by supplier of machinery. c) Project study by supplier of cables and main. d) Fabrication of pre-prototypes. e) Prototype construction. f) Assembly underground and testing.

STATUS: A project study was presented by the Eickhoff Company for the development of a new system of cablehandler and a cable. A thorough scrutiny of the study led to the decision that the cable run for the coal-cutters should be taken over slack pulleys on the spill-plate, and appropriate coal-cutter cabling for the system envisaged is now being developed by two electrical engineering companies. A specimen cable 100 m in length manufactured by these companies has been submitted to comparative bench tests alongside a conventional cable.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0452, MONITORING, EVALUATION AND STORAGE OF MEASURED VALUES AND OTHER DATA ON UNDERGROUND MINEWORKING WITH THE USE OF A PROCESS COMPUTER
SCHRODER, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: The creation of an operations information and monitoring system with the aid of a process computer, and the setting up of up-to-date standard peripheral hardware (data-processing terminals).

WORK PROGRAM: a) Creation of the concept for the acquisition and processing of data on atmospheric conditions in the mine. b) Project study on recording of data on downtime, breakdowns and operating data. c) Procurement of the necessary hardware and software. d) Operational trials.

STATUS: Work was completed on the original planning and subsequent expansion of the peripheral units, and the existing central process computer was exchanged for one of higher capacity. Work was also partly completed on the planning and assembly of suitable terminal equipment, the interface between operations and the computer, for making all the required measured values and other operating data readily available.

Before the operations information and monitoring system could be incorporated in the existing control system (for conveying systems), important modifications and additions had to be made to the programming because of the changed hardware configuration. The emphasis in the systems analysis that needed to be conducted on a new programming structure was in the area of breakdown and operating data. Preparatory work on the programming of routines for the monitoring of CO and CH4 has already begun.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0453, RATIONALIZATION OF THE PROCESS OPERATION THROUGH IMPROVED BACKFILLING TECHNIQUES
SCHULTHEIS, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Increasing drift advance by reducing time required for support activities, mechanization of backfilling setting in situ cementing materials, improving support resistance.

WORK PROGRAM: a) Trying out appropriate injection equipment, development of suitable lagging material. b) Planning the appropriate scheduling of drift advance. c) Comparative backfilling tests with the use of debris from the face and other material.

STATUS: Work on item a) was continued, work on items b) and c) started.

Some aspects of the project have incurred a delay of nearly twelve months. Among the reasons for this were delayed delivery of machinery and equipment, design modifications and improvements found to be necessary as a result of preliminary trials and underground testing, and difficulties encountered in operational underground from dust nuisance and the considerable amount of time involved in backfilling.

Preliminary results show an improved condition of the roadway, less convergence and greater ease of working from mechanized backfilling.

Because of the delay incurred, the work on the project will need to be extended to 31.12.1976 for the envisaged result to be achieved.

ADDENDA: Subcontractor: Brieden and Co. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0454, OPTIMUMIZED TRANSPORT SYSTEMS & NEW TRANSPORT TECHNIQUES IN LINE WITH ENVIRONMENTAL PRESERVATION & FULLY AUTOMATED LOADING FACILITIES
STAMM, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Exploration of options afforded by modern conveying techniques, optimization of intra-plant, regional and national transport systems. Optimum structure of colliery-fed rail terminals in the light of transport functions to be assumed by other means of transport.

WORK PROGRAM: a) Establishment of investment and operating costs involved for different products and tonnages and with different means of transport over a given route. b) Study of applicability of new transport systems. c) Development of models for loading facilities. d) Projections for pilot systems for pit-fed rail terminals and transport facilities. e) Construction and operation of a pilot installation.

STATUS: From basic study of the use of the ASBZ system by Bergbau AG Westfalen, it emerges that this particular system is more economically advantageous than either rail or belt-conveyor haulage, but a generalized statement on which of the systems is feasible is not possible since in many cases the form of haulage to be used is determined by local conditions and the construction aspect, a field that is outside the scope of this research project.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0455, LIGHT-WEIGHT IMPACT RIPPER FOR GETTING COAL AND ROCK MATERIAL IN STABLES, RISES, FAULTS (MINI-RIPPER)
STRASEN, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

MAIN OBJECT: Mining technology and coal preparation.

FIELD: Mechanized drivage systems.

OBJECTIVE: Fully mechanized stable and rise heading system of high performance and low labor intensity, mechanized exploration of faults. Requirements imposed on the envisaged impact ripper: compact design, flexible, resettable and demountable arrangement of the impact head so that it can cover the entire stable or rise cross-section with minimum dimensions. The complete heading system with debris disposal device must be self-propelled automatically and its dimensions must be designed so that the stable length can be kept as short as possible.

WORK PROGRAM: 1. Engineering contract to design the equipment; 2. Manufacturing of the equipment, testing on an artificial seam, testing underground; 3. Evaluation.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0456, IMPROVEMENTS OF DESIGNS AND TECHNIQUES OF WINNING WITH PLOUGHS
TEGETHOFF, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

DESCRIPTION PROJECT: Objective: Development of a plough without bottom plate for thin seams. Development of optimum blade configuration. Development of new design features to reduce the quantity of small coal.

WORK PROGRAM: a) Development of a plough without bottom plate (prototype): Testing by the Mining Research Institute. Production of equipment for underground working. Operating trials underground. b) Taking stock of available blades and materials. Planning and development work. Research by the Mining Research Institute. Manufacture of plough body, and assembly. Operating trials underground. c) Design study for a plough guide on the packing side: Manufacture of individual components. Operating trials underground.

STATUS: As part of the research and development work on a plough without bottom plate and without portal a wooden model as constructed. For strengthening the plough on the coalface, side support guides were developed and installed on a testing stand at the Experimental Station for Mining Technology. Tests will be able to start in 1976 after improvements have been carried out on the body of the plough. After the completion of comparative tests on the different makes of blades for ploughs available on the market, a test stand was set up at the Experimental Station for Mining Technology for determining the optimum blade configuration. A test bench for blade wear determination is under construction.

Orders were placed for test blades for use in underground tests, and a coal plough prototype built to a wooden model with an improved blade configuration is at the present time undergoing modification at the supplier's works.

Experiments on the reduction of small coal generated by ploughing have so far led to no positive results.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0457, TESTING AND FURTHER DEVELOPMENT OF THE HYDRAULIC DRILLING MACHINE DEVELOPED BY THE MONTABERT COMPANY
TEPESCH, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

MAIN OBJECT: Mining technology and coal preparation.

FIELD: Drivage by shot firing.

OBJECTIVE: Increasing the penetration rate, control of the impact rate and rpm as function of the rock conditions, reducing the noise level, reducing the operating cost.

WORK PROGRAM: 1. Equipment acquisition, preparing for operation. 2. Start-up operation, using mineral oil. 3. Conversion to HSC, i.e. Glycol fluids. 4. Trial operation.

STATUS: Item 1 of the work program has been completed.

ADDENDA: Subcontractor: Montabert Company and Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0458, BORESHAFT WITH HYDRAULIC HAULAGE SYSTEM
WAGENER, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

OBJECTIVE: By staple-shaft boring without underground access it is proposed to investigate debris disposal from full face shaft boring by hydraulical means from the shaft bottom to the upper level.

WORK PROGRAM: a) Preparatory work, preliminary experiments, preparation of a feasibility study. b) Construction of a prototype. c) Test rig trials. d) Operating trials.

STATUS: Preparatory work and tests have been carried out under item b).

There has been some twelve months delay over the preparatory work under item a). The main problem has been that so far it has not been possible to find the right sealing for the system.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0459, IMPROVEMENT AND MECHANIZATION OF SHOT CONCRETE TECHNIQUES BY DEVELOPING A MECHANIZED NOZZLE GUIDANCE
WASCHKIES, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

MAIN OBJECT: Mining technology and coal preparation.

FIELD: New ground support systems.

OBJECTIVE: Fast roadway drivage, using shot crete in conjunction with rock bolts as preliminary ground supports, final support operation independent of roadway drivage, improved performance and ease of operation.

WORK PROGRAM: 1. Development and acquisition of shot crete monitor. 2. Trial operation of the shot crete monitor on the surface and underground.

STATUS: Item 1 of the work program is now in progress.

ADDENDA: Subcontractor: Dielmann-Haniel Co. Gluckauf KG Company. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0460, DEVELOPMENT OF A DRIVE UNIT FOR CHAIN SCRAPER FACE-CONVEYORS WITH DEFINED CHAIN PRE-TENSION
WENZEL, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: The development of a conveyor drive unit with automatic load-dependent chain pre-tension.

WORK PROGRAM: a) Concept definition and development: 1/11/1974 12/31/75. b) Design work: 2/1/75 - 12/31/75. c) Fabrication: 10/1/75 - 7/31/75. d) Bench tests: 8/1/75 - 1/31/76. e) Operating trials underground: 2/1/77 -9/30/77. Preparatory work. Trial runs. Acquisition of instrument data during operation. f) Further development to state of readiness: 10/1/77 - 12/31/77.

STATUS: The concept arrived at for achieving the development target is the use of a magnetic sprocket wheel. Trials at the Experimental Station for Mining Technology of Bergbau-Forschung GmbH are expected to make it possible to do away with the, in many respects, unsatisfactory suspension chain in the driver of a scraper-chain conveyor, and to substitute a magnetic sprocket wheel in the intermediate frame. The necessary equipment for the tests has been ordered, and a start has been made on the erection of the test installation.

ADDENDA: Subcontractor: Eisenhutte Westfalia. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0461, BOWL CENTRIFUGE FOR DEWATERING FROTH TAILINGS
P. WILCZYNSKI, Ruhr Coal AG, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Production of a clean centrifuge effluent and running tailings. Less need for adding costly synthetic flocculants through utilization of a new type of centrifuge.

WORK PROGRAM: a) Planning, ordering and construction of plant. b) Operational tests.

STATUS: With a proportion of 0.063 mm sizing grade of between 61 and 76% by weight and an ash content with this grade of between 73 and 79% by weight of the froth tailing feed to the blow centrifuge, the best result achieved so far is a solids feed rate of approximately 10 tons an hour. This is double the rate obtained so far with the usual type of centrifuge. Water contents in the end product varied between 25 and 52% by weight. A mixture of larger-size washed dirt with up to 25% by weight of dewatered

froth tailings yields a product that can be handled satisfactorily from the point of view of processing and conveyance. The use of synthetic flocculants was disappointing in its results.

ADDENDA: Subcontractors: KHD Humboldt Wedag; AKA-Recklinghausen; Gluckaufbau GmbH. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0462, IMPROVED DRYING TECHNIQUES

P. WILCZYNSKI, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: The water content of R.O.M. coal has increased to such an extent in recent years that dry separation of fines by the dedusting process is likely to prove impracticable in the comparatively near future. Yet complete conversion to wet processing might well make it impossible for tolerance limits for the water content in coking coal and coal for power plant use to be adhered to. Consequently, apart from discovering ways of improving mechanized dewatering processes, new techniques and systems will have to be researched and developed to operational status for heat drying of the different types of product requiring preparation. The objective must therefore be to define the optimum process in terms both of technology and economy of working, and to draw up specifications for a large installation to be put out to tender.

WORK PROGRAM: a) Provision of a project study on the world-wide position with heat-drying, recommendations on the processes and plant that appear best suited for the purpose envisaged, determination of energy consumption entailed. b) Creation of system models. c) Preparation of construction plan for a large-scale installation.

STATUS: There are perceptible indications that advances in dewatering by mechanical means might make the far more costly method of heat-drying of fines and slurry superfluous. For this reason, it is desirable to await the findings of the current development project, 'Optimization of dewatering of hard coal of under 200 mm granulation', being financed by the state of Nordrhein-Westfalen.

ADDENDA; This project is also supported by the State of Nordrhein-Westfalen. Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0463, HOMOGENIZATION OF RAW WASHED COAL

WILLMANN, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECT: Mining technology and coal preparation.

FIELD: Automation and process control.

DESCRIPTION OF PROJECT: Trouble-free operation of processing facilities can be ensured only if the inhomogeneities due to underground operation are buffered and compensated within the conveyor system by installing a homogenization facility. At the same time this will achieve in the processing system a better precision of separation, better capacity utilization and operation independently of underground operations.

OBJECTIVE: Special-purpose facilities as well as control and monitoring systems for inputs and outputs are to be conceived and tested to achieve a roofed-over homogenization system which will combine the advantages of a mixing dump - large stacking quantity, good homogenization and low operating cost - with the requirements of environmental conservation.

WORK PROGRAM: 1. Development of special-purpose facilities for loading systems ensuring gentle treatment of the coal and preventing grain separation. 2. Testing of measuring and control equipment under the special conditions prevailing in the new input and output systems. 3. Investigation of different input and output systems. 4. Definition of an automatic program for optimum operation of the homogenization facility.

STATUS: Item 1 of the work program has been completed.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0464, LOW-TEMPERATURE CARBONIZATION IN THE FLUIDIZED BED (PILOT PLANT)

AHLAND, Steinkohlenbergbauverein, *Essen 13, Federal Republic of Germany*

MAIN OBJECT: Coal conversion.

FIELD: Low-temperature carbonization.

OBJECTIVE: Development of the process of low-temperature carbonization in the fluidized bed operation stage by the design and operation of a continuous large-scale pilot plant as a preliminary stage of the production of formed coke by hot briquetting.

WORK PROGRAM: Planning and projecting of a large-scale pilot plant. Invitation to tenders and placing of orders to well-known engineering firms. Realization and operation of the first stage: preliminary heating of the fluidized medium, additional heat by direct combustion (Ha equals 4300 kcal/Nm3). Realization and operation of the second stage: heat supply only by heating-up of the fluidized medium. Realization and operation of the third stage: heat supply by heating surfaces placed into the fluidized bed, these surfaces being treated by helium as heat-carrier, with a view to the later use of process heat. Optimization of the mode of operation by a suitable combination of the three possibilities.

REFERENCES TO OTHER PROJECTS: Prosper formed coke project (NT 366) which shall be preceded by this large-scale pilot-plant. LR process (ET 64) as an alternative for preliminary degasification.

STATUS: The projecting and invitation to tenders for the large-scale pilot plant have been completed.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0465, PRODUCTION OF FORMED COKE (DEMONSTRATION PLANT PROSPER)

AHLAND, Bergwerksverband Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Manufacture of formed coke, for use in blast furnaces, by continuous blending of coke and caking coal at a temperature of 450 degrees C and subsequent compaction to briquettes. The process is distinguished by a low degree of emissions and a low dependence on the properties of the input coal and coke. Building and operation of a demonstration plant on the technical scale will enable the development to a full technical application in practice.

WORK PROGRAM: a) Construction and start-up of the demonstration plant, b) Operations planned for several years will serve the testing and perfecting of the process technology, drawing up secured balances of material and energy in order to assess the economy of the process and to plan future operating plants, c) Making available the quantities of formed coke necessary for convincing blast furnace tests, d) Evidence of the fact that the process is 'non-polluting'.

ADDENDA: Subcontractor: Fa. Still, Recklinghausen. Performing organization: Bergwerksverband GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0466, RECONNAISSANCE OF AREA IMMEDIATELY IN FRONT OF FACE THROUGH LONG-DISTANCE HORIZONTAL DRILLINGS

M. BERNAUER, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Development of a method of drilling capable of producing underground horizontal drillings of approximately 1,000 m in length into coal and rock. By this means it should be possible to obtain evidence of the tectonic state of the immediate area of working. Drilling techniques and drilling equipment are the main issues in this connection.

WORK PROGRAM: a) Drillings through coal. b) Drillings through rock. c) Evaluation of results.

STATUS: Stage a) is completed, stage b) has been started according to plan.

ADDENDA: Performing organization: Bergbau-Forschung GmbH; Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0467, DEVELOPMENT OF FLAMEPROOF TELEVISION EQUIPMENT FOR PHOTOGRAPHING SEAMS & ADJOINING ROCK & TECTONIC SURFACES IN BOREHOLES (ABBREV)

W. BRENKEN, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Development and testing of flameproof television equipment for observation in underground boreholes down to depths of 600m for purposes of reconnaissance with electromagnetic display facility.

WORK PROGRAM: a) Development and manufacture. b) Testing and modification. c) Experiments with counterflush process. d) Expansion of areas of application. e) Start-up of operations. f) Research on possibilities with colour television.

STATUS: Stages a) and b) were initiated according to plan.

ADDENDA: Subcontractor: Ibak 2300 Kiel 14. Performing organizations: Bergbau-Forschung GmbH, and Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0468, COAL MINING OF THE FUTURE - EXTENSION OF MINING TECHNIQUES SUB-PROJECT 2 - LAYOUT

F. CLAES, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Model building for analysis of layout options for future working of deposits in the light of new technological know-how and the experiences of the hard-coal mining industry at home and abroad and of other branches of mining.

WORK PROGRAM: a) Cost effectiveness of multiple headings: Analysis of conditions and criteria governing decision to drive single or multiple headings, and construction of models based on practical examples. b) Layout solutions designed to avoid residual or peripheral deposits: Analysis of motives and model studies with different layout options. c) Feasibility and results of working residual and peripheral deposits: Estimate of reserves and model studies on working the seams by means of new and established techniques.

REFERENCE TO OTHER PROJECTS: Sub-project of Project No. ET 2100A.

ADDENDA: Subcontractors: Clausthal Technical College; Berlin Technical College. Performing organization: Bergbau-Forschung GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0469, COAL MINING OF THE FUTURE - EXTENSION OF MINING TECHNIQUES - SUB-PROJECT 6 - METHODS OF WORKING

F. CLAES, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Indication of new solutions for working coal seams in all types of dip conditions and possibilities of improvements in extraction methods.

WORK PROGRAM: The following individual research studies will be conducted: a) Available options in longwall mining process. b) Possibilities of improvement in excavating methods with steep formations: Dewatering of coal pulp in the circulating water in underground workings by hydraulic extraction. Rising pillar and stall working with automatic stowage strengthening. Excavation off steeply formed seams by the sub-level bord-and-pillar caving method. Evaluation and decisions model for resolving problem of whether to mine or to abandon steep-lying coal reserves. Methods of bring dirt to the workings. Feasibility and consequences of removing gate-heads in strainfree areas.

REFERENCE TO OTHER PROJECTS: Sub-project of Project ET 2100 A.

All has been prepared for research studies to begin on 1.1.1976.

ADDENDA: Subcontractors: Aachen College of Advanced Technology; Clausthal Technical College. Performing organization: Bergbau-Forschung GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0470, COAL MINING OF THE FUTURE - EXTENSION OF MINING TECHNIQUES SUB-PROJECT - BASIC PRINCIPLES AND COORDINATION

F. CLAES, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Establishing a basis for implementation of the project 'Coal-mining of the future'. Coordination of individual lines of research in terms of the general project. Evaluation of results obtained with the cooperation of specialist institutions. Presentation of project findings in the form of a general report.

WORK PROGRAM: a) Review of objectives and hoped-for solutions regarding current R and D projects. b) Analysis of the main problems of interest for purposes of planning and operation in regard to the coal-mining of the future. c) Allocation of research tasks. d) Formulation of objectives and work program broken down by individual research schemes. e) Evaluation of the more important information available from Germany and abroad on the present state of know-how and proposed solutions regarding coal-mining of the future. f) Establishing centralized control of the general project and coordination of individual lines of research. g) General evaluation of findings, establishment of requirements and indication of possible solutions and suggestions, together with additional proposals on subjects for further research regarding coal-mining of the future.

REFERENCE TO OTHER PROJECTS: Sub-project of Project ET 2100 A.

STATUS: Conducting a preliminary study, analysis of the problems posed, establishing the main lines of research and definition of specific tasks for the project as a whole. Examination of the relevant German papers on the subject, and those produced in other countries. Coordination of individual research schemes and analysis of results.

ADDENDA: Subcontractor: Clausthal Technical College. Performing organization: Bergbau-Forschung GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0471, DEVELOPMENT OF IMPROVED METHODS OF USING GEOPHYSICAL BOREHOLE SURVEYS FOR LOCATING CARBONIFEROUS STRATA

U. DICKEL, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: To re-evaluate existing results of geophysical borehole surveys in the light of current technological knowledge in order to arrive at a fresh interpretation. This should provide additional information on coal deposits.

WORK PROGRAM: a) Information retrieval from existing data. b) Preparation of report on potential applications of existing physical borehole survey methods. c) Development of a scraper-probe.

STATUS: Stage a) is at the evaluation stage, stage b) has been started.

ADDENDA: Subcontractor: Institute for Oil Geology of Clausthal Technical College; Schlumberger; Dresser Europe S.A; W. Dockhorn. Performing organization: Bergbau-Forschung GmbH; Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0472, COAL MINING OF THE FUTURE - EXTENSION OF MINING TECHIQUES SUB-PROJECT 10 - OPERATIONS MANAGEMENT AND ENGINEERING

E. FEISTKORN, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: To establish a basic concept for planning and management in coal mines of the future with greater overall correlation between integrated information systems on the one hand and the development of labour and effective use of engineering resources and machinery on the other, together with utilization of up-to-date data-collection techniques and new materials based on the experiences acquired by other branches of industry.

WORK PROGRAM: The following individual research projects will be carried: a) Projected measures for improving the utilization factor in mineworking activities. b) Establishing basic principles for information systems for the planning, control and monitoring of individual operating units and of the operational aspect as a whole. c) Possible application of new materials to coalmining in the light of experience with their use in other industries. d) Study of the technical functioning of monitoring systems for machinery and equipment in the light of newly developed procedures. e) Improved information systems for coalmining. f) Proposal on the planning and analysis of the range of engineering applications.

A study of methods of improving the utilization factor with coalmining machinery and equipment was completed and evaluated by specialist institutions. Requirements with information systems were analysed, and preparatory work was done for a sensitivity analysis on influence factors with the use of the computer. The basic concept of hierarchical data-processing system was produced.

ADDENDA: Subcontractor: Clausthal Technical College, Battelle Institute Messerschmidt-Bolkow-Blohm GmbH. Performing organization: Bergbau-forschung GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0473, COAL MINING OF THE FUTURE - EXTENSION OF MINING TECHNIQUES SUB-PROJECT 7 - CONVEYING TECHNIQUES

A. GUNTERMANN, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Indications of new solutions for the problem of conveyance in the face and gallery, and of the possibility of exploiting technological know-how in other branches of mining and other industrial sectors fo mining conveyance applications.

WORK PROGRAM: a) Research on new systems of face haulage: Analysis of requirements and model studies for the purpose of developing new face haulage systems as an integral part of the equipment package at the face. b) Research on possibility of a fully integrated system of underground haulage in coalmining: Ascertaining requirements with underground haulage systems and the units concerned. Survey of selected haulage and transport techniques with comparative analysis. Sensitivity analysis of planning parameters for an integrated conveying system with capability of rapid and flexible adjustment to changing transport requirements. c) Studies of basic principles governing the use of trackless haulage equipment at home and abroad. Inventory of minimum and optimum requirements in regard to haulage vehicles. Definition of technical and economic conditions providing logical motive for the use of trackless vehicles.

REFERENCE TO OTHER PROGRAMS: Sub-project to Project ET 2100 A.

ADDENDA: Subcontractors: Aachen College of Advanced Technology; Clausthal Technical College; Battelle Institute e.V. Performing organization: Bergbau-Forschung GmbH, and Saarbergwerke AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0474, EARLY DIAGNOSIS AND PREVENTION OF MINING DAMAGES

W. HELLWEG, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Adapting calculation methods use at present in to different conditions of deposits and working. Computer-controlled calculations of ground movement procedures in the Saar. Relationship between nature of ground movement elements and pipe conduit stress. Studies on reinforcement of extension plates by establishing the actual stresses.

WORK PROGRAM: a) Mathematical principles for pre-calculation of ground movement elements. b) Pre-calculation of stress behaviour of buried pipe conduits in areas subject to mining. c) Studies on behaviour of the building ground below buildings under the effect of mining operations.

Work on items a), b) and c) of the Program was initiated according to plan.

ADDENDA: Subcontractor: Leoben College of Mining Technology; Rhein, Braunkohlenwerke, Koln; Ing. - Bu.Meissner, Florsheim; Gewerksch. Auguste Victoria, Marl; Westf. Berggew.kasse, Bochum. Performing organization: Bergbau-Forschung GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0475, COAL MINING OF THE FUTURE - EXTENSION OF MINING TECHNIQUES SUB-PROJECT 5 - DRIFTING AND EXPANSION OF UNDERGROUND WORKINGS

I. HENNEKE, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Creation of concepts for economical methods of drifting and for the expansion and maintenance of underground workings.

FUTURE PROGRAM: a) Concepts for more efficient drifting methods in the light of new ways of rock crushing: Analysis of current drifting methods and definition of future requirements. Study of literature on new methods of rock crushing. Suggested design concepts for equipment units and overall concept for a more efficient method of drifting. b) Concepts for rationalized mechanization systems for maintenance activities: Analysis of current methods of heading maintenance. List of requirements based on selected instances of application in practice. Model studies for determining choice of appropriate concepts.

ADDENDA: Subcontractor: Berlin Technical College. Performing organization: Bergbau-Forschung GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0476, COAL MINING OF THE FUTURE - EXTENSION OF MINING TECHNIQUES SUB-PROJECT 4 ROCK MECHANICS.

O. JACOBI, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Verification of rock behaviour at great depths establishment of ground rules relation to the principles of rock mechanics for application to layout, driving and support techniques.

WORK PROGRAM: The following metrological studies and individual research projects will be carried out: a) Development of a system for determining the parameters to be used for calculating rock pressures in layout planning. b) Metrological studies of the effect of the sub-structure on underground excavation in the upper floors of carboniferous formations. c) Convergence measurements and model tests for verifying the relationship between depth rock pressure and behaviour supports. d) Metrological studies of geological influences and phenomena relating to rock mechanics at great depths. e) Applicability to mining of continuum and discontinuum mechanics in rock mechanics. g) Analysis of use of rock mechanics for measuring the state of stress in the rock mass, and suggestions on their applications for mining.

REFERENCE TO OTHER PROJECTS: Sub-project of Project ET 2100 A. Reference to project 'Support with precast concrete elements (panel support)', no. 591025.

Installation of measuring points to measure effect of the substructure. Conducting and analysis of statistical observations in headings. Studies of relationship between depth and terminal convergence down to a depth of 1,200 m. Model tests for assessing a concrete-section support system. Convergence measurements and core drilling in headings to determine influence of geological structure. Analysis of experience with tunnel construction for the purpose of formulating requirements imposed on support methods for withstanding heavy rock pressures.

ADDENDA: Subcontractor: Karlsruhe University. Performing organization: Bergbau-Forschung GmbH, Ruhrkolhe AG., and Gew. Auguste Victoria.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0477, DEVELOPMENT OF THE PRESSURE-OPERATED FLUIDIZED BED FIRING SYSTEM (TESTING PLANT)

JANSSEN, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECT: Coal conversion.

FIELD: Direct combustion.

OBJECTIVE: Development of a cheaper and safe firing system for power plants, causing less pollution, by application of the principle of the fluidized bed under pressure. In the proposed system, combustion and heat transfer take place synchronously to a register of tubes in the fluidized bed, while the dedusted hot gas is converted in a gas turbine. With regard to the emission of noxious matter (NOx, SO2), decisive advantages are achieved by the low temperature of combustion and the possibility of adding limestone. The conception will be developed to the stage of being capable of application on a large-technical scale, via intermediate stages. By the operation of a pressureless, small-scale plant, data will be obtained for the projecting of a pressure-operated testing plant with a throughput of 1.5 tons/h of coal. Investigations on this integrated overall plant will give the conditions for drawing up plans and programs for a 100 MW-plant.

WORK PROGRAM: Operation of a small-scale fluidized bed plant (pressureless) to clarify important questions for the actual pilot plant: Development of combustion, heat transfer, emission of dust and of noxious matter, recycling of dust, controllability. Analyses of the results and projecting of the pilot plant, utilizing the information available from well-known manufacturers of critical individual aggregates (hot gas separator, gas turbine, feed of coal). Drawing up program to realize the next phase of development.

STATUS: At present, item 1 of the work program is being carried out.

ADDENDA: Performing organization: Bergbau-Forschung GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0478, RESEARCH ON BASIC PRINCIPLES APPLYING TO PROCESS CONTROL OF COAL PREPARATION

D. LEININGER, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Establishing basic principles for the extended use of modern techniques of monitoring and control.

WORK PROGRAM: a) R & D and testing of high-speed measuring instruments. b) Mathematical construction of process phases, creation of a simulation model. c) Setting up a computer-controlled system for coal preparation.

STATUS: The sub-project 'Development and testing of high-speed measuring instruments' was completed according to plan. Work on ash content measurement has been temporarly suspended. Experiments under the sub-project 'Creation of regulation circuits' on the radiometric ash measuring instruments installed showed that there was an interference effect from the iron content. The measuring error is not however large enough to justify the amound of time and expenditure involved in the development of an appropriate compensation device. With the 'Isotope balance' subproject, no testing of the equipment has as yet been carried out in a preparation plant, as the permit required for the use of radioactive substances was still being awaited. The comprehensive mathematical construction of the stages of the prescreening process was checked through operational trials. The necessary research and evaluation work for the mathematical construction of separation stage procedures are continuing as planned. Problems arose over the acquisition of sufficient data for a mathematical statistical evaluation of wash-box data, but evaluation of the tests that have been completed will enable a decision to be taken on the future course and extent of the work. The work being done to produce a mathematical construction of the functinal link between the importance of the influence factor of the raw material and the results of fines dewatering, combined with the results obtained from several hundred pilot-plant tests to establish the functional connection between the operating conditions of a filter system and the dewatering reslts, will enable a comprehensive mathematical construction of this process phase to be produced in the near future. Work was continued on a mathematical construction of the distribution of material properties (e.g., size grading, compactness, ash content and so on). This particular construction is intended to serve as a basis for determining the appearance of any undesirable variations during the passage of the coal through the stages of preparation. (Text Abridged.)

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0479, COAL MINING OF THE FUTURE - EXTENSION OF MINING TECHNIQUES - SUB-PROJECT 3 - DEPOSITS

J. LEONHARDT, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Ascertaining arrangement and condition of all parts of deposits to be worked for the period up to 2025; forecast of explorational and geochemical aspects in regard to future workings; production of an isothermal chart.

WORK PROGRAM: a) Preparation of questionnaire forms as the basis for an inquiry among all the members of the Mining Companies Association. b) Acquiring and logging relevant data concerning the site and condition of deposits. c) Evaluation of the answers to the questionnaire and considered opinion. d) Study of available literature and inquiries regarding data suitable for processing on the subject of geomechanical characteristics. e) Data preparation for a computerised processing system. f) Tests with forecasting models. g) Determination of further explorational and geomechanical aspects by means of selective testing. h) Elaboration of computer programs for standardization of data. i) Correlation of characteristics with a view to standardization of basic data used in forecasting. j) Use of source material in model programming and application. k) Optimization of forecasting. m) Verifying that distribution density will effectively permit continued computation. n) Forecasting tests. o) Further data collection and processing as required. p) Presentation of results.

REFERENCE TO OTHER PROJECTS: Sub-project of Project No. ET 2100A.

STATUS: Examination of available literature and inquiry among 62 addresses completed. Start made on data preparation and logging of data. Calculation of strength data. Testing a data field containing information on locus-dependent influence factors. Modification of indexing of seams in the light of new experience. Matrix field of test conditions, etc., established.

ADDENDA: Subcontractors: Berlin Tech. Coll. Bonn. Univ., Bochum Univ., Land Government of Nordrhein-Westfalen, members of the Mining Companies Ass: Performing organization: Bergbau-Forschung GmbH, Essen.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0480, FURTHER DEVELOPMENT OF AUTOMATIC MEASURING EQUIPMENT FOR X-RAY MINERAL ANALYSIS BY COMPUTER

MACKOWSKY, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: It is intended to develop the available measuring equipment for diffraction patterns of carboniferous samples and/or rich in interferences.

WORK PROGRAM: a) Optimization of the geometry of the beam path in relation to intensity yield and resolution power. b) Optimization of peak/bottom intensity. c) Construction of a new sample changer. d) Perfecting of electronic measuring system. e) Writing computer subroutines for bent diffraction background and superimposed interference. f) Obtaining indications of and characterizing mineral concentrations likely to contain deposits. g) Trying out and verifying the system by routine tests.

STATUS: The optimum geometry of the beam path in relation to intensity yield and resolution power has been determined. Construction of a new sample changer has been started.

ADDENDA: Performing organization: Bergbau-Forschung GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0481, BUILDING AND INTEGRATION OF OPERATIONAL PLANNING MODELS FOR THE COAL-MINING INDUSTRY IN THE FEDERAL REPUBLIC OF GERMANY - SUBPROJECT 2

A.G. MEYER, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Construction or modification of models for important specific planning problems.

OBJECTIVE: Structuring of or modifications to existing computer programs and creation of data banks for important specific planning problems in the area of coal mining.

Optimization of overall results by integration of models dealing with the branch sectors concerned.

WORK PROGRAM: a) Preparing programs for: Logging and evaluation of coalstocks, seam information and quality computations. Operational planning of machinery deployment, costing underground operations at the coalface. Evaluation of operational studies. b) Expansion and integration of data banks for planning activities in coalmining. c) Building of linear programming (LP) models for the following fields: extraction, coking plant, power stations, coal preparation, sales. Integration with general model.

Systems analysis for establishing programming structure largely completed, production programs for logging and evaluation of coalstocks and work schedules already provided.

LP model for extraction field considerably expanded, preparatory work in course on building of coking plant model.

ADDENDA: Performing organization: Bergbau-Forschung GmbH; Ruhrkohle AG.

Part 1 of 3.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0482, BUILDING AND INTEGRATION OF OPERATIONAL PLANNING MODELS FOR THE COAL-MINING INDUSTRY IN THE FEDERAL REPUBLIC OF GERMANY - SUBPROJECT 3

A.G. MEYER, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Creation and testing of new concepts of coalmining planning in terms of possibilities offered by advanced computer applications.

OBJECTIVE: Construction of a computerized system for evaluating surveying and geological aspects of deposits.

Construction of a planning system to facilitate decisions over planning and evaluation and the choice of production options.

WORK PROGRAM: a) Creation of a data bank on deposits and apropriate communications system for accessing the bank.

Construction of a computer-controlled system for monitoring cracks. b) Systems analysis, data-acquisition and data processing, model building: introduction and testing at collieries.

The tectonics file of the data bank or deposits is now complete.

Systems analysis has begun on the other parts of the project.

Data preparation for the creation of planning systems, systems analysis.

ADDENDA: Performing organization: Bergbau Forschung GmbH; Ruhrkohle AG.

Part 2 of 3.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0483, BUILDING AND INTEGRATION OF OPERATIONAL PLANNING MODELS FOR THE COAL-MINING INDUSTRY IN THE FEDERAL REPUBLIC OF GERMANY - SUBPROJECT 1

A.G. MEYER, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Data-acquisition and data-processing system for planning and control of mining operations.

OBJECTIVE: Improved utilization factor for underground machinery and equipment in a group of pits with the use of a central computer.

WORK PROGRAM: a) Set-up of on-line data-processing system for a group of pits. b) Creation of data-processing programs and data preparation for planning applications. c) Elaboration of standard fault clearance procedures. d) Examination of data for serviceability in special planning applications.

All pits concerned are equipped with on-line computer terminals.

Set-up of data-processing facility for long and short production runs and start-up of operations, in real-time working as per programming.

ADDENDA: Performing organization: Bergbau-Forschung GmbH; Ruhrkohle AG.

Part 3 of 3.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0484, COAL MINING OF THE FUTURE - EXTENSION OF MINING TECHNIQUES SUB-PROJECT 8 - MINE CLIMATE

MUCKE, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: The limiting temperature for mining having been established, to study the extent to which mine climate is conditioned by depth and other important factors, together with the opportunites or improvement in mine climate through the use of mining engineering techniques and technical aids.

WORK PROGRAM: a) Implementation of a program of climatic calculations based on certain variable parameters taken from operating conditions, and study of the economic factors involved in air conditioning. b) Study of the effect of rock and seam formation on mine climate. c) Potentialities of borehole ventilation. d) Comparative analysis of the effect of descentional and ascentional ventilation on mine climate. e) Study of the interconnection between mine layout and form of ventilation. f) Effectiveness and potentialities of heat insulation and sealing of mineworkings as measures against moisture from the rock. g) Investigation of beneficial effects in regard to climatic conditions from the cooling action of stowing material. h) The effect on the climate of using electric motors, compressed-air or hydraulic mechanisms as drive units. i) Possibilities of using direct heat emission from drive units. j) Study of the technical and economic questions involved in the installation of central and individual cooling plant, and the problem of cold water closed-loop systems.

REFERENCE TO OTHER PROJECTS: Sub-project of Project ET 2100 A.

ADDENDA: Subcontractor: Aachen College for Advanced Technology, Institute of Mining. Performing organization: Bergbau-Forschung GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0485, PROSPECTING FOR NEW DEPOSITS BY MEANS OF SCOUTINGS FROM THE SURFACE

H. PALM, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Concentrated prospecting for unknown seams in areas of deposits of significance for coal mining industry in the Federal Republic by means of scouting from the surface.

WORK PROGRAM: a) Sinking 6 routine scoutings in the Ruhr coal field. b) Preparing a comparative study on drilling methods. c) Sinking 2 sample boreholes as prototypes. d) Establishing guidelines on standard exploration techniques with the use of scoutings in coal mining. e) Sinking 6 reference boreholes.

STATUS: Stages a), b) and d) have been concluded according to plan. There has been some delay over stage c), since the drilling rig was not available when required.

ADDENDA: Subcontractor: Anger's Sohne I tag Celle, Deutsche Schacht und Tiefbohrges, Thyssen Schachtbau, Saarberg Interplan, Gewerkschaft Walter, Dresser Europe S.A.,

Schlumberger, Prakla Seismos GmbH. Performing organization: Bergbau-Forschung GmbH; Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0486, STUDY OF CHARACTERIZATION AND QUANTITATIVE LOGGING OF FISSIBILITY OF COAL

PETERS, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: By collecting data on the spatial relationship of fissures in the coal to be in a better position to forecast eruptions of firedamp, to exercise practical dust control by long-term water infusion and to assess the yield of grades at the mineworking.

WORK PROGRAM: a) Detailed macropetrographical specification and enrollment of the seam at the coalface. b) Recording of all visible underground cracks, cleavages and major fissures. c) Appropriate sampling. d) Impregnating samples with colouring liquids to establish penetration depth and hence the spatial pattern of the structural fracture. e) Synthetic resin and silicone caoutchou imprints of selective cuts of coal a few mm apart. f) Endeavours to identify microfissures not identifiable by impregnation or surface slab impressions with the use of the selective step method (surface gridding).

STATUS: Impregnation tests were carried out on a number of coal samples. Synthetic resin and silicone caoutchou impressions of selected coal cuts were made and their analysis has begun.

ADDENDA: Performing organization: Bergbau-Forschung GMbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0487, REFLECTION PROCESS FOR REVEALING CARBONIFEROUS STRATA WITH THE PREVALENCE OF PERMIAN FORMATIONS, PARTICULARLY ROCKSALT (ABBREV)

K.H. RUELLER, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: To perform a reflection seismic technique which even in the presence of permian layers will give as accurate an image as possible of coal deposits.

WORK PROGRAM: a) Study of problem. b) Seismic measurement by blasting and percussive technique in the Rheinberg survey area. c) Uniplanar reflection seismic measurements in the Prosper survey area. d) Comparative analysis.

STATUS: Stages a) and b) have been completed; stage c) has been started.

ADDENDA: Subcontractor: Prakla Seismos GmbH, Hannover. Performing OrganizationS: Bergbau-Forschung GmbH and Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0488, DEVELOPING WAYS OF USING STRUCTURAL DATA FROM TECTONICS IN BITUMINOUS COAL MINING

K.H. RUELLER, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: To establish the stress pattern in specific areas, to discover more about the laws of tectonic deformation and stress conditions, to acquire advance information on tectonic faults in the area immediately in front of the face, to obtain data on fault conditions in unworked seams.

WORK PROGRAM: a) Preliminary study. b) Improvements in method of retrieving and compiling structural data. c) Processing by computer. d) Establishing correlations between structure and tectonic deformation principles in opened up workings. e) Application and testing of tectonic deformation principles in area immediately in front of the working with reference to structural diagrams. f) Investigation into possible use of drill-cores to obtain structural information from unworked fields. g) Comparative observations and production of reports.

STATUS: Stage a) has been completed, stages b) and c) have been started.

ADDENDA: Subcontractor: Professor Murawski, Frankfurt Univ., Professor Adler, Univ. of Kiel, Centre for Geo-photogrammetry of the College of Applied Geology. Performing organization: Bergbau-Forschung GmbH; Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0489, MANUFACTURE OF NON-POLLUTING BRIQUETTES (OPERATIONAL TESTS)

SCHINZEL, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECT: Coal conversion.

FIELD: Mechanical processing.

OBJECTIVE: Manufacture of hard coal briquettes producing only little smoke, complying with the requirements of the Federal Law for Protection against Emissions (Bundesimmissionsschutzgesetz). Development of a process on the operational scale and accompanying tests in the technical testing plants of Bergbau-Forschung GmbH.

WORK PROGRAM: Selection of suitable binders on a bitumen base and preliminary tests in the technical testing plant. Investigations on the availability of the selected binder. Modification of briquetting process for the use of bituminous binders instead of pitch binders. Trial operations and investigations of these briquettes in actual use by Bergbau-Forschung. Manufacture of larger quantities of briquettes. Tests serving the interests of the consumer, prior to changes in the production process for the briquettes.

REFERENCE TO OTHER PROJECTS: Operational tests for the conversion of the production process for the use of bitminous binders will be run at the same time in four briquetting plants. Preliminary selection of the binder and tests for their suitability will be run by Bergbau-Forschung GmbH (ET 96).

STATUS: At present, conversion of the equipment in briquetting plants is in progress.

ADDENDA: Performing organization Bergbau-Forschung GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0490, DEVELOPMENT OF PROCESSES FOR A CONVERSION OF COAL WITH NUCLEAR PROCESS HEAT (IMMERSION HEATER PROCESS)

K.H. VANHEEK, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Development of a process for the gasification of coal with steam in the fluidized bed with indirect heat supply via heating surfaces (binding of nuclear process heat).

WORK PROGRAM: a) Laboratory program to clarify principal questions of kinetics of coal gasification, heat transfer, selection of working material, process technology. b) Drawing up a concept of process for a semi-technical plant. c) Planning and construction of semi-technical plant (200 kg/h C). d) Start up of the semi-technical plant. e) Systematic operational tests and continuous tests. f) Simultaneously: Drawing up a project study to clarify economic and technical questions arising from the industrial utilization of the process.

RELATION TO OTHER PROJECTS: As an alternative or as a preliminary stage, Rheinbraun develops a process concerning the hydrogenating gasification of coal. By order of Bergbau-Forschung GmbH, Mannesmann develops working material with a view to the specific load conditions given in the reactor.

STATUS: The main points of the experiment on a laboratory scale were the measurements of the activity of various materials in a differential reactor and the examination of methods for their improvement. The experiments in the small technical plant (5 kg C/h; 10-70 bar) yielded data concerning steam decomposition, gas composition and the heat requirements of the gasification reactions as a function of various parameters, such as pressure, types of coal and amount of steam. This data could be extrapolated for the design of full-scale process using special calculation methods. Heat transfer coefficients of a heat exchanger wall in a

coal-steam-fluidization bed at 800 degrees C and 40 bar were determined for the first time. The results were applied to the construction of a Lange gasifier.

During the report year the semitechnical plant (200 kg C/h; 40 bar) was set up so that experimental operation can begin, presumably in the early part of 1976.

ADDENDA: Performing organization: Bergbau-forschung GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0491, WORKING MATERIAL FOR THE GASIFICATION OF COAL ACCORDING TO THE IMMERSION HEATER PROCESS (DEVELOPMENT)

K.H. VANHEEK, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Development of work materials for the load conditions (mechanical, chemical, thermal) given with an immersion heater process. Development of the methods of manufacture. Design of the gas generator such as to be ready for production series.

WORK PROGRAM: a) Feasibility study about the possibilities of a large-scale realization of the immersion heater concept according to the present state of the art. b) Development of work material for the specific conditions for loads and stresses. c) Testing of the developed special working material under actual stress conditions as given in the process, especially investigations into the creep depending on time. d) Planning and design from the previous development.

STATUS: In 1975, the first experimental stage for the development of work material for the immersion heater was completed. In this phase corrosion experiments in coal-steam fluidization beds on commercially available materials were most important. 39 different materials from different manufacturers were tested in 1000/h experiments and subsequently investigated metallographically. The results of the metallography investigations of all 39 materials are now available and can therefore be included in the considerations for a further development of alloys. For Incoloy 800 experimental results are available for 2000, 3000 and 5000 h tests in addition to the 1000 h test.

The smelting of model alloys has begun in the course of the actual development of work materials. Till today 50 such new work materials have been produced on a 50 kg scale, 4 heated to 1050 degrees C in pure water vapour for preliminary selection tests. 12 of the corrosion resistant materials are already now in the coal-steam fluidization bed for over 1000 h. 5 of the materials have exceeded 3000 h testing time (test temperature: fluidization bed 950 degrees C, gas 1000 degrees C.) For these materials, a test time of 5000 h is being striven for.

In addition to the corrosion experiments, an Incoloy 800 long time experiment in air and an Incoloy 802 preliminary experiment for pipe manufacturing and additional treatment were begun. The additional treatment refers to experiments in the extrusion press to investigate the hot malleability with 1 t-melts.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0492, PRODUCTION OF A SYNTHESIS GAS BY PRESSURE GASIFICATION OF COAL DUST WITH OXYGEN AND WATER ACCORDING TO THE TEXACO GASIFICATION PROCESS

KRUEGER, Soc. for Gasification of Coal, *Essen, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Production of synthesis gas from coal. Further development of the Texaco Gasification Process for the gasification of coal dust up to an application in practice.

WORK PROGRAM: a) Tests on a small-scale gasification apparatus of Messrs. Texaco in USA. b) Elaboration of the basis for the process. c) Carrying out the engineering work for the building of demonstration plant with a daily throughput of 6 tons of coal. d) Building a demonstration plant and taking it into operation. e) Trial operation with the following aims: testing and perfection of the selected progress, collecting experience for the planning and operation of the large-scale plants to be established later.

STATUS: The first two points of the work program have been completed. The engineering work for the demonstration plant has begun.

ADDENDA: Performing organization: Gesellschaft fuer Vergasung und Verfluessigung Von Steinkohle MBH (GVV).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0493, A 170 MW PROTOTYPE PLANT OPERATING WITH COAL PRESSURE GASIFICATION SYSTEM AND COMBINED GAS/STEAM TURBINE CYCLE PROCESS (ABBREV)

U. KRIEB, Steag AG, *Essen, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: a) Further development of a concept for the conversion of coal to electricity with low environmental impact. b) Increasing plant efficiency in the conversion of coal to electricity. c) Reduction of specific plant costs as compared with conventional coal-fired power plants.

WORK PROGRAM: a) Experimental determination of operating performance and load application limits by investigating -during start-up and shut-down procedures, -changes, - simulated operating conditions. b) Optimization by calculation and experiment of the complete system -control response of individual systems, -retroactions between individual systems, -individual units and the complete system on various parameters (e.g. coal spectrum, temperature profiles, pressure conditions, stoichiometric conditions). c) Improvements to the process and further development of components -stability of the evaporator system, - treatment system, -

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0494, PRELIMINARY DEGASIFICATION USING THE LR PROCESS (STUDY)

K.F. SCHLUPP, Steag AG, *Essen, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECT: Coal conversion.

FIELD: Low-temperature carbonization.

OBJECTIVE: The project study is intended to clarify technical, economic and environmental questions relating to the LR process. Factors to aid decision-making are supplied and particulars provided for establishing an optimum course of development. Investigations cover the linking of the LR process with, alternatively, a power station, a gasification system, and a coke briquetting plant, and take account of the methods of operation with maximum gas output and maximum tar output.

WORK PROGRAM: Stocktaking and evaluation of existing knowledge; Concept study for a large-scale plant, with determination of an optimum plant size; Investigations into operation of the plant in conjunction with the listed alternatives; Determination of the profitability of the process; Estimation of the market potential of the products; Planning of the complete project.

REFERENCE TO OTHER PROJECTS: Project: Prosper coke briquetting plant, as installation suitable for tailing the LR process (NT 366) -Low-temperature carbonization in a fluidized bed (ET 39) as a process alternative.

ADDENDA: Subcontractor: Lurgi Mineraloltechnik GmbH Bergbau-Forschung. Performing organization: STEAG AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0495, STUDY THE POSSIBILITY OF EXPORTING COAL CONVERSION TECHNOLOGY

B. OBERBACHER, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0496, RATIONAL ENERGY UTILIZATION IN COKE WORKS (SYSTEMS STUDY)

TREPTE, Dornier System Gmbh, *Friedrichshafen, Baden Wuertt., Federal Republic of Germany* 7990

DESCRIPTION OF PROJECT: OBJECTIVE: Outline of the possibilities for the rational energy application and utilization in coke plants. Elaboration of a project proposal with analysis of the technical measures, the time and cost expenditures as well as proof of economic feasibility.

WORK PROGRAM: a) Investigations of essential sources of energy work, b) Outline and analysis of energy flow in coke plants, c) Completion of measurements on coke ovens in order to compile system dependent influences, d) Investigations and evaluations of practiced or known procedures in order to improve energy utilization, e) Development of measures for the national energy applications and utilization (in-and outside of coke works), f) With details for the technical construction, the economical expenditures, and the attainable profit.

STATUS: Points a) - c) of the work have been completed.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0497, STUDY OF FLOW AND INTIMATE MIXING DURING GASIFICATION OF PULVERIZED COAL (PARALLEL STUDY TO THE VEW PROCESS)

JUNG, L. & C. Steinmuller, *Gummersbach, Nordrheim Westfa., Federal Republic of Germany* 527

MAIN OBJECT: Coal conversion.

FIELD: Low-temperature carbonization.

OBJECTIVE: Process engineering and technical development of plant components for 'coal gasification' and 'hot gas dust separation' according to the VEW coal conversion process.

WORK PROGRAM: Studies regarding the distribution of a concentrated pulverized coal column locally introduced into a gas stream over a large cross section. Study of intimate mixing of the preoxidized pulverized coal with the gaseous reactants in a cylindrical shaft of large cross section, the aim being to heat up the pulverized coal very quickly through convection or combustion. Testing of mechanical dust separators. Evaluation of the experimental results for the design and layout of plant components.

REFERENCE TO OTHER PROJECTS: The engineering and development of the system are needed for projecting the 15 t/h VEW coal conversion process unit ET 58. The investigations provide further information on the kinetic reaction conditions technically attainable (ET 61).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0498, VERIFYING POSSIBILITY OF USING COUNTERFLUSH PROCESS FOR UNDERGROUND RECONNAISSANCE OF THE AREA IMMEDIATELY IN FRONT OF THE FACE

U. DICKEL, Mining Company Westfalen, *Hamm 5, Nordrhein Westfalen, Federal Republic of Germany* 4700

DESCRIPTION OF PROJECT: OBJECTIVE: To sink vertical boreholes in Ruhrkohle AG pits to test out the potential of the counterflush process for obtaining information on tectonic conditions and coalfield deposits with the employment of vertical drillings.

WORK PROGRAM: a) Drilling in Monopol, Essen and Bochum formations. b) Drilling in two pits in the western district the Horst and Dorsten formations. c) Evaluation of results and production of reports.

STATUS: Stage a) due to start on 1 April 1976.

ADDENDA: Subcontractor: Thyssen-Schachtbau Mulheim-Ruhr. Performing organization: Bergbau AG Westfalen, Sachsenweg 6.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0499, RE-DEVELOPMENT OF THE STAPLE-SHAFT BORING TECHNIQUE FOR GREATER DEPTHS

I. HOPPE, Preussag, *Hannover, Niedersachsen, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: OBJECTIVE: Further development of existing staple-shaft boring machines to handle greater lengths, of up to 500 m, reduction of time required for hauling support material and machinery so that support work can follow on the work of the drilling machines without any holdup.

WORK PROGRAM: a) Operational planning and rock tests. b) Machine operation technical improvements in operating. c) Operational monitoring, operational analysis.

STATUS: Work on the project will start according to plan in 1976.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0500, THERMAL PRE-TREATMENT OF BAKING PIT COAL

HERMANN, Eschweiler Mining Union Co., *Herzogenrath-kohlscheid, Federal Republic of Germany* 5120

DESCRIPTION OF PROJECT: Objective: Decrease in the baking ability of baking hard coal by thermal treatment in a horizontal flight stream reactor. Here, immunizing in an non-oxidating manner by pure temperature influence is aspired at.

WORK PROGRAM: a) Projecting the pilot plant including all secondary plants (utilization of gas, refining of waste gas, heat utilization, disposal of sewage), b) Planning, construction and commencement of the pilot plant, c) Trial run, d) Chemical/physical analysis on the problem of temperature-shock immunization, e) Evaluation of the trial run with regard to the building of commercial plants, f) Consideration of the economy of the process.

STATUS: After granting the contract for the supply, assembly and the beginning of operation for the 'Thermal Coal Pre-Treatment Plant' to the firm Ca. Still, building plans were begun: The procedure schematics with descriptions of the plant divisions; Drawing up of the design plan; The foundations for the structural and constructive division; The survey drawings for the steel construction; The switch and locking plans for the electrical division of the plant; Detail drawings of equipment and different containers; Detailed assembly plans for the construction of the coal pre-treatment plant. This planning work was largely completed in 1975.

ADDENDA: Subcontractor: Still, Bergbau-Forschung, Essen. Performing organization: Eschweiler Bergwerksverein.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0501, PREPARATION OF FINES

NIESSEN, Eschweiler Mining Union Co., *Herzogenrath-kohlscheid, Federal Republic of Germany* 5120

MAIN OBJECT: Mining technology and coal preparation.

FIELD: Continued development of processing facilities and techniques.

OBJECTIVE: A project study is contemplated to investigate in detail the overall complex of process alternatives for treating the fines, their feasibility and their economic significance. This project study is intended to yield a recommendation for the development approach to be taken.

WORK PROGRAM: 1. Evaluation of all the facilities and new developments now on the market. 2. Development of alternate solutions. 3. Planning of a prototype system.

STATUS: Discussions and work to prepare the project study are now in progress.

ADDENDA: Subcontractor: Eschweiler Bergwerks-Verein.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0502, REDEVELOPMENT ON HIGH-PERFORMANCE SCREENING MACHINES FOR PRE-SCREENING

NIESSEN, Eschweiler Mining Union Co., *Herzogenrath-kohlscheid, Federal Republic of Germany* 5120

DESCRIPTION OF PROJECT: Objective: The types of screening machine hitherto in use are ideal from the point of view of throughput rates, but there is no quick method of adapting them for use with varying types of materials. There is therefore a requirement for redevelopment of sizing apparatus used in coal preparation plants with consecutive handling of different types of coal. Machines must be capable of immediate adaptation to varying types of materials. The system must permit immediate adaptation of the effective separating size as a function of the ash content of the end products oversize and screen underflow and even where there is a rapid change-over of effective separating sizes, the incidence of misplaced sizes must remain uniformly low. Finally, screening efficiency must remain high despite increase of water content in the material to be screened.

WORK PROGRAM: A) Fabrication of an experimental plant. b) Implementation of test program. c) Operating trials.

STATUS: Planning work on the construction of the experimental plant continued from January to September 1975. Owing to difficulties encountered over finding space for the screening machine, the construction plan required changing several times before completion of the final version. A start was made in mid-August on the manufacture of the mechanical and electrical installations, and on the necessary steel construction.

The experimental plant was taken into service on 14 October, 1975. Between then and the end of December, 100 test runs took place altogether. Despite the introduction of every imaginable modification (different screen cloth, for instance, changes in the tilt, or in the feed rate), results so far have been disappointing. The screening efficiency achieved with conventional screening machines is a distinct improvement on that so far attained with the use of the Mogensen sizer.

ADDENDA: Performing organization: Eschweiler Bergwerks-Verein.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0503, METHODS OF FINES PREPARATION TO COMPENSATE FOR THE INCREASED FINES CONTENT CAUSED BY MECHANIZED MINEWORKING

NIESSEN, Eschweiler Mining Union Co., *Herzogenrath-kohlscheid, Federal Republic of Germany* 5120

DESCRIPTION OF PROJECT: Objective: Operational experiments with flotation machines of different construction and with different flotation reagents. Examination of all available sedimentation accelerators and filtration aids. In the area of dewatering and washery-water clarification, the testing and modification of filter types, Dorr-type thickeners and Spitzkasten plant. The purpose of the tests is the provision of the necessary data for a fully automated system for the treatment of fines.

WORK PROGRAM: a) Planning and construction of the experimental plant. b) Trials.

STATUS: Anna Project: The prototype of a slurry deduction that was developed at end 1974 was installed at the beginning of 1975 in a Spitzkasten plant in the Anna mine. Continuous design improvements in the pilot plant led eventually to good operational results, which justify the work done on the project 'Redevelopment of Spitzkasten plant with maximum possible solids concentration and maximum clarification effect.' Emil Mayrisch project: The problem of the clarifying waste water tailing in Dorr-type thickeners to the standard of quality required of the thickener overflows passing into the disposal system proved to be a very difficult one. In particular, the suspended matter forming a high concentration in the overflow from the thickener could not be separated by the addition of flocculating agents. In the course of the tests, which were continued until August 1975, the range of flocculating agents supplied by nine national and foreign firms were tried out. With some of the makes there was a small temporary improvement, but very soon the quantities of suspended matter swung back towards the top of the scale. At the end of October 1975 an experimental coagulator was installed with both the thickeners. The results of a first series of tests over a period of eight weeks, involving reclarifying of the effluent, ranged from good to very good.

ADDENDA: Performing organization: Eschweiler Bergwerks-Verein.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0504, INTEGRATED COAL FACE SUPPORT EQUIPMENT FOR VERY THICK SEAMS

SIELAFF, Eschweiler Mining Union Co., *Herzogenrath-kohlscheid, Federal Republic of Germany* 5120

DESCRIPTION OF PROJECT: OBJECTIVE: Development of face equipment for use at coalfaces with a seam thickness of 3.5 to 4.5 m.

WORK PROGRAM: a) Design specification and ordering of machine units suitable for use in face areas with a seam thickness of 3.5 to 4.5 m. b) Fabrication and delivery of machine units and engineering support. c) Installation in the face area, trials and engineering support.

STATUS: With the two projects concerned with the development of integrated machines for coalface working, particularly in thick seams, the planning work for the joint project being undertaken by Ruhrkohle AG (RAG) and the Eschweiler Bergwerksverein (EBV), including planning the process technology to be used at the test face and in the T-junction, was completed by EBV. (Entailing the use of twin-drum shearer-loaders type EDW-300 L by Eickhoff for cutting, a special support method for the T-junction, pneumatic stowing with hydraulically advanceable elements with side delivery action). The part of the project being handled by EBV in a test face could only go forward after the roof and coalface had been artificially strengthened, when it was found that the internal stress on the face-working machinery was disproportionate to inrease in thickness of the seam.

Before the trials can be extended to thicknesses of up to 4.5 m, as has been indicated by the test results obtained so far, the coal-winning machinery and the face support equipment will require to be re-designed, and this has already been put in hand.

ADDENDA: Performing organization: Eschweiler Bergwerksverein, AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0505, DEVELOPMENT OF HIGH-PERFORMANCE, MOBILE COMPOSITE EQUIPMENT WITH LOW SPACE REQUIREMENTS (ABBREV)

BERG, Sophia Jacoba Trade Union, *Huckelhoven, Federal Republic of Germany* 5142

DESCRIPTION OF PROJECT: Objective: The development of high-performance, mobile combine machinery with low space requirements, with integrated support and anchor elements, for the T-junction and for arc-type roadways subject to heavy pressure, for working seam thicknesses of less than 1 m.

WORK PROGRAM: a) Development and trials of combine machinery for T-junction working. b) Development and trials of a composite, mobile backfilling and pressing machine with a minimum generation of dust, and including a dust-free feed mechanism. c) Development and trials of a hydraulically or mechanically operated shifting anchor and support unit to operate with the combine machinery.

STATUS: The strengthened advancing mechanism in the anchoring of the plough machine, and the same machine's rigid torque mounting for the driving mechanism, were tried out in the Sophia-Jacoba mine with good success. As an outcome of the tests it was found advisable to convert the chain linkage from flat links to wedge-type links. On the other hand, research and development work on higher performance drive units for the plough to replace the existing inadequate driving mechanism for a backfilling machine using a flexible worm mechanism having proved abortive, the prototype of an improved feed mechanism with fixed worm action was developed and manufactured.

ADDENDA: Performing organization: Gewerkschaft Sophia-Jacoba.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0506, DEVELOPMENT OF BRAKING DEVICES FOR DOWNWARD-CONVEYING BELT CONVEYORS AND THEIR INTEGRATION INTO A CONTROL SYSTEM SERVING A CONVEYOR LINE

BERG, Sophia Jacoba Trade Union, *Huckelhoven*, *Federal Republic of Germany* 5142

DESCRIPTION OF PROJECT: Objective: Optimum interaction between friction brakes and drive motors at start and shutdown of downward-conveying belt conveyors. Improvement of braking dependability.

WORK PROGRAM: a) Study of requirements in braking, control and monitoring systems for automatic belt conveyor line operation with load-sensitive braking. b) Testing of individual components for control and monitoring systems. c) Development of load-sensitive braking devices with associated control and monitoring systems.

STATUS: Testing is in course with seven conveyors on the stoppage of downwards-conveying conveyor units by means of friction brakes; ways of improving interaction between motor and brakes are also being systematically pursued.

It has been found that the use of a non-synchronous machine with short-circuited rotor with downwards-conveying belt conveyors leads to improved behaviour of the equipment with permanent operating.

The operation of the brakes with the non-synchronous machine needs to be very thoroughly researched. Work on this is at present in course at the suppliers' test station. Preliminary trials with the 55 kW non-synchronous machine used in mining for counterflush working indicate that it is basically suitable for the purpose in mind.

ADDENDA: Performing organization: Gewerkschaft Sophia-Jacoba.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0507, MANUFACTURE OF NON-POLLUTING BRIQUETTES (OPERATIONAL TESTS)

A. FUCHS, Sophia Jacoba Trade Union, *Huckelhoven*, *Federal Republic of Germany* 5142

MAIN OBJECT: Coal conversion.

FIELD: Mechanical processing.

OBJECTIVE: Manufacture of hard coal briquettes producing only little smoke, complying with the requirements of the Federal Law for Protection against Emissions (Bundesimmissionsschutzgesetz). Development of a process on the operational scale and accompanying tests in the technical testing plants of Bergbau-Forschung GmbH.

WORK PROGRAM: Selection of suitable binders on a bitumen base and preliminary tests in the technical testing plant. Investigations on the availability of the selected binder. Modification of briquetting process for the use of bituminous binders instead of pitch binders. Trial operations and investigations of these briquettes in actual use by Bergbau-Forschung. Manufacture of larger quantities of briquettes. Tests serving the interests of the consumer, prior to changes in the production process for the briquettes.

REFERENCE TO OTHER PROJECTS: Operational tests for the conversion of the production process for the use of bituminous binders will be run at the same time in four briquetting plants. Preliminary selection of the binder and tests for their suitability will be run by Bergbaum-Forschung GmbH.

STATUS: At present, conversion of the equipment in briquetting plants is in progress.

ADDENDA: Performing organization: Gewerkschaft Sophia-Jakoba.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0508, HORIZONTAL AND VERTICAL HYDRAULIC CONVEYANCE OF ABRASIVE SOLIDS FROM GREAT DEPTHS

HEIDERSDORF, Sophia Jacoba Trade Union, *Huckelhoven*, *Federal Republic of Germany* 5142

DESCRIPTION OF PROJECT: OBJECTIVE: Exploring the potentialities and limitations of the hydraulic conveyance of abrasive solids, in horizontal and vertical directions.

WORK PROGRAM: a) Preparatory work, storage and sedimentation tanks. b) Laying horizontal pipelines and lowering a rising main in the shaft. c) Assembly of a suction pump, an intermediate pump for delivery on the level and an underwater slusher unit, installation of mixers and a high pressure pump. d) Trials and process optimization. e) Abrasion measurement and evaluation.

Work on items a), b) and c) concluded, work on d) and e) in hand.

ADDENDA: Subcontractor: Halliburton. Performing organization: Gewerkschaft Sophia-Jacoba, Huckelhoven.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0509, DRILLING OF A BOREHOLE FOR VENTILATION 4.6 M IN DIAMETER THROUGH 350 M OF AQUIFEROUS OVERLYING ROCK AND 70 M OF CARBONIFEROUS STRATA (ABBREV)

KOHSE, Sophia Jacoba Trade Union, *Huckelhoven*, *Federal Republic of Germany* 5142

DESCRIPTION OF PROJECT: Objective: Construction of large diameter ventilation boreholes in a short construction period by means of the air-lift technique coupled with the use of newly developed drilling tools. Full use of the advantages conferred could facilitate the adoption of new types of layout, particularly in collieries with an extended area of working and with correspondingly high ventilation requirements.

WORK PROGRAM: a) Site preparation. b) Construction of the borehole. c) Floating in the support, sealing the support column in the carboniferous strata. d) Connecting up the ventilation borehole to the underground workings.

STATUS: Work on the project will start according to plan in 1976.

ADDENDA: Performing organization: Gewerkschaft Sophia-Jacoba.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0510, TRIALS WITH ROAD HEADING MACHINES UNDER DIFFICULT OPERATING CONDITIONS

HOPPE, Preussag Coal AG, *Ibbenburen*, *Federal Republic of Germany* 4530

DESCRIPTION OF PROJECT: Objective: Fully mechanized drifting with large cross-sections of between 16-24 square meters with a high proportion of wall rock of great strength. Conducting experiments to establish the capability of the machine to withstand the continual strain entailed in cutting through the wall rock and to determine the optimum operating method, for keeping the strain to the minimum, as well as establishing how operating efficiency could be improved by specific modifications of the machines and cutting tools.

WORK PROGRAM: a) Working out a concept for a suitable road heading machine, rock analysis. b) Operating trials. c) Further tests and modifications up to operational status.

STATUS: Item b) of the program was completed. There was a two months delay over the delivery and start-up of the machine (EVR 160). Difficulties were experienced in cutting through hard strata in the foot wall, from a friable roof, and from the problem of dust control.

ADDENDA: Subcontractor: Gebruder Eickhoff GmbH. Performing organization: Preussag Kohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0511, BIG CENTRIFUGE PLANT FOR SMALLS UNDER 6 MM WITH A HIGH CONTENT OF FINES
KRONER, Preussag Coal AG, *Ibbenburen, Federal Republic of Germany* 4530

DESCRIPTION OF PROJECT: Objective: Water accumulation in untreated coal means that fines of under 0.5 mm can no longer be separated by pneumatic sizing, but require to be passed with the small onto the grading apparatus and into the centrifuges beyond, which leads to loss of dewatering efficiency. The objective of the project is therefore to develop and test a big centrifuge for throughputs of over 300 tons/hour with input sizes ranging from 6 mm to 0 mm, and with retention of a water content of no more than 8% even with a 20% to 30% content of fines under 0.5 mm.

WORK PROGRAM: a) Preliminary research for system definition, plant design and calculation work, development and testing of critical components. b) Testing of centrifuge baskets of varying gap widths and at varying speeds. c) Specification and construction of big centrifuge plant. d) Operational trials.

STATUS: The necessary calculations and preliminary drawings were produced by the Siebtechnik GmbH Company, with particular attention to the slotted centrifuge baskets where correct gap widths are vital for the effective working of the centrifuge. The chief dimensions were determined. Tensile stress from centrifugal acceleration, vibrational stress and rigidity stress were calculated, the last by the finite element method.

ADDENDA: Siebtechnik GmbH, Mulheim (Ruhr). Performing organization: Preussag Kohle, AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0512, MANUFACTURE OF NON-POLLUTING BRIQUETTES (OPERATIONAL TESTS)
KRONER, Preussag Coal AG, *Ibbenburen, Federal Republic of Germany* 4530

MAIN OBJECT: Coal conversion.

FIELD: Mechanical processing.

OBJECTIVE: Manufacture of hard coal briquettes producing only little smoke, complying with the requirements of the Federal Law for Protection against Emissions (Bundesimmissionsschutzgesetz). Development of a process on the operational scale and accompanying tests in the technical testing plants of Bergbau-Forschung GmbH.

WORK PROGRAM: Selection of suitable binders on a bitumen base and preliminary tests in the technical testing plant. Investigations on the availability of the selected binder. Modification of briquetting process for the use of bituminous binders instead of pitch binders. Trial operations and investigations of these briquettes in actual use by Bergbau-Forschung. Manufacture of larger quantities of briquettes. Tests serving the interests of the consumer, prior to changes in the production process for the briquettes.

REFERENCE TO OTHER PROJECTS: Operational tests for the conversion of the production process for the use of bituminous binders will be run at the same time in four briquetting plants. Preliminary selection of the binder and tests for their suitability will be run by Bergbau-Forschung GmbH.

STATUS: At present, conversion of the equipment in briquetting plants is in progress.

ADDENDA: Performing organization: Preussag AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0513, REACTION KINETICS INVESTIGATION OF THE DEGASIFYING AND PARTIAL GASIFICATION OF PRE-OXIDIZED COAL LUMPS
K. HEDDEN, Univ. of Karlsruhe, Engler Bunte Institute, *Karlsruhe, Baden Wuerttemberg, Federal Republic of Germany* 7500

Reaction kinetics investigation of the degasifying and partial gasification of pre-oxidized coal lumps, particularly with a view to a possible widespread sulfur removal from residue coal.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0514, THE REACTION KINETICS OF CARBONIZATION AND PARTIAL GASIFICATION OF PREOXIDIZED COAL POWDERS (ABBREV)
K. HEDDEN, Univ. of Karlsruhe, Engler Bunte Institut, *Karlsruhe, Baden Wuerttemberg, Federal Republic of Germany*

DESCRIPTION OF PROJECT: Objective: Investigation into the reaction kinetics of carbonization and partial gasification of preoxidized coal powders, especially with regard to the possibility of an extensive desulphurization.

WORK PROGRAM: a) Laboratory measurements to optimize the reaction conditions of the desulphurization of preoxidized coal powders by carbonization and partial gasification. b) Determination of reactivity or rate of gasification of the char obtained by rapid carbonization at various temperatures and in different gas media. c) Examination of the composition of the gas obtained during the carbonization of preoxidized coal powders.

RELATION TO OTHER PROJECTS: The investigations will provide fundamental insight into the VEW coal conversion process (ET 1058, ET 1059).

The experimental work will be closely synchronized with project ET 1060.

STATUS: The rapid carbonization of pit coal was investigated in an electrically heated condensing reactor of 2 m length and 50 mm diameter. The experiments were carried out with preoxidized coal of grain size 0 to 200 mm with 1.2, 1.3 wt-% sulfur and 20, 30 wt.-% volatile ingredients respectively. The reaction conditions were varied with the following limits: carbonization temperature 750 carrier gas composition (hydrogen, nitrogen, and steam/hydrogen-mixture), time of direct contact of the coal 1 to 4 s.

The resulting gas and coke were analyzed. More volatile ingredients and therefore more sulfur were expelled due to the rapid heating of the coal particles than in the case of coke ovens. Under favourable reaction conditions at temperatures about 900 degrees C, the sulfur content in the remaining coke can be lowered to 0.8 wt.-%. Thereby 55 wt.-% of the sulfur produced in the coal, mainly as H2S, are transferred into the gas. Hydrogen as a carrier gas provides a somewhat better desulphuration than nitrogen. At adequate time of direct contact the remaining experimental parameters had no noteworthy influence on the degree of desulfurization. The reaction capability of the coals will be determined through gasification with carbon dioxide. Under the same experimental conditions, the gasification speed of the coals was almost as high as that of activated charcoal.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0515, BASIC STUDY OF CATALYSTS AND SELECTIVE LINKING IN FISCHER-TROPSCH SYNTHESIS
H. SCHULZ, Univ. of Karlsruhe, Engler Bunte Institute, *Karlsruhe, Baden Wuerttemberg, Federal Republic of Germany* 7500

DESCRIPTION OF PROJECT: OBJECTIVE: Acquisition of basic knowledge about the specific mode of operation of different types of catalysts. This knowledge should make possible a selective guidance of the Fischer-Tropsch synthesis for the production of low olefins and alcohols.

WORK PROGRAM: a) Design and construction of synthesis equipment. b) Development of optimal gas-chromatographic methods for the detailed investigation of the products. c) Production of catalysts and their physical characterization. d) Tests of catalyst activities and selectiveness. e) Systematic variation of synthesis conditions and exact investigation of the products. f) Carrying out of a 14-C-tracer test for the clarification of the reaction mechanisms.

STATUS: The first two points of the work program are in progress.

ADDENDA: Performing organization: Engler-Bunte-Inst. der Uni Karlsruhe.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0516, FURTHER DEVELOPMENT OF GAS COOLED HIGH TEMPERATURE REACTOR FOR USE IN COAL GASIFICATION
SAMECK, Hochtemperatur Reaktorbau Gmbh, *Mannheim, Baden Wuerttemberg, Federal Republic of Germany* 6800

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0517, IMPROVED PERFORMANCE, EASIER WORKING AND INCREASED SAFETY OF SUPPORT OPERATIONS IN DRIFTING
MEIER, Gewerkschaft Auguste Viktoria, *Marl, Federal Republic of Germany*

DESCRIPTION OF PROJECT: Objective: Gate and gate-end road cross-sections have to be made larger as the depth of drifting increases, when the pressurized strata are likely to cause creeping, so that there will always be sufficient space available in the cross-sections to accommodate the increasingly bulky high-performance mechanized units in use today. This of necessity means an increase in the profile weight of the steel arch support. For this reason simple mechanized support aids must be developed, making for easier working, increased safety and less time spend on support operations.

WORK PROGRAM: a) Procurement of a prototype mobile support and drill carriage preparation of a trials program. b) Trials in level gate-end roads. c) Trials in rising roadways. d) Further development with a view to multi-purpose application, securing of the heading face.

STATUS: Work on phase b) was continued, work was started on phases c) and d). The drill and support scaffolds of which eight were tried out altogether in different conditions of drivage, proved, on the whole, to be successful, the exception being that trials in conjunction with additional securing of the heading face proved to be unsatisfactory. So far the use of drill and support scaffolds has led to easier working and a corresponding increase in performance, apart from serving to improve operating safety.

ADDENDA: Subcontractor: Deilmann-Haniel Neuhaus.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0518, DEVELOPMENT AND TESTING OF A NEW SUPPORT SYSTEM WITH THE USE OF WATER-SETTING CEMENTING MATERIALS AND INTEGRATED IN THE DRIFTING CYCLE
MEISNER, Gewerkschaft Auguste Viktoria, *Marl, Federal Republic of Germany*

DESCRIPTION OF PROJECT: Objective: Tests of a compound of electrically separated ash and cement (EFA mortar) for backfilling the support and rock consolidation, tests with high-performance continuous conveying systems, increased performance by means of a manipulator of simple design for spray-nozzle control with multiple nozzles operating in parallel.

WORK PROGRAM: a) Procurement of transport units (tank wagons and liquid containers), preparing flow-chart for operating trials. b) Experiments with spraying and backfilling. c) Procurement of a continuous conveying unit and intermediate mixing station. d) Operating trials.

STATUS: Work was continued on phases b), c) and d). Successful trials were held with a modified liquid container, tank wagons and a newly developed endless screw steep seam box transporter. There were problems over keeping conveying and mixing units free of dust, correct metering of the mortar material and water, and the procurement of a continuous conveying unit and mixing station. These are all central to future development work.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0519, SHIELD-TYPE SUPPORTS FOR THICK SEAMS UNDER EXTREMELY POOR ROOF CONDITIONS
VOLKENBORN, Gewerkschaft Auguste Viktoria, *Marl, Federal Republic of Germany*

DESCRIPTION OF PROJECT: Objective: Large-area mining of the over 3 m thick Zollverein half-seam in the working panel of the Auguste Victoria pit. So far all attempts at mechanized extraction of the entire thickness of the seam have been thwarted by the exceptionally difficult roof formation. It is now proposed to achieve full mechanized extraction of the whole thickness of the seam with the use of a new type of shield support.

WORK PROGRAM: a) Practical tests on shields fabricated by the Becorit Company. b) Development of a so-called 'immersion cap.' c) Initial trials up to 15 degrees. d) Trials with other types of shield, and operating up to 30 degrees.

STATUS: Trials conducted in the Auguste Victoria pit with the Becorit type of shield support in a face area with shearer-loader working proved to be successful. This not only applied to extraction of the full thickness of the seam (after having first unworked the top-coal), the first time that this had been achieved in this 3 m thick seam with its exceptionally difficult roof conditions, but also to cutting through geological faults. On average, between July and December 1975, disposable output was 3,600 t/d, and in one particular month was as high as 4,700 t/d.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0520, PRELIMINARY STUDIES - EXTRA-HIGH-PRESSURE WATER JET COAL-WINNING MACHINE
K.H. SCHWARTING, Gutehoffnungshuette Sterkrade, *Oberhausen, Nordrhein Westfal., Federal Republic of Germany* 4200

DESCRIPTION OF PROJECT: OBJECTIVE: To work out different options for coal-winning with the use of extra-high-pressure water jets, and to establish the necessary basic principles by means of laboratory experiments.

WORK PROGRAM: a) Establishing the parameters to be used and drawing up a test program accordingly. b) Design and construction of test apparatus. c) Operational trials with the apparatus. d) Erection of substances to be cut. e) Holding of cutting trials. f) Report on trials. g) Results analysis. h) Definition of design data and elaboration of alternative options. i) Choice of optimum solution.

STATUS: The test apparatus was constructed and tried out. Cutting trials are in course on an artificial cement coalface.

ADDENDA: Subcontractor: IIT Research Institute, Chicago, USA.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0521, IMPROVEMENTS OF CONVENTIONAL POWERED SUPPORTS TO INCREASE THEIR OPERATING WIDTH
HAHN, Arbeits. Saarberwerke AG, *Saarbruecken, Saarland, Federal Republic of Germany* 6600

DESCRIPTION OF PROJECT: Objective: Adaptation of conventional powered supports to moderately inclined strata and working on the dip, improved stabilization of support elements and screening of the caving area.

WORK PROGRAM: Since trials are only due to start in 1976, a description of the separate target phases and the time schedule will be held over till later.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0522, INTEGRATION OF FACE EQUIPMENT, COMBINATION OF CAVING AND PNEUMATIC STOWING IN MECHANIZED COAL FACES
HAHN, Arbeits. Saarberwerke AG, *Saarbruecken, Saarland, Federal Republic of Germany* 6600

MAIN OBJECT: Mining technology and coal preparation.

FIELD: Mining under special conditions.

OBJECTIVE: Development of suitable equipment for powered supports which can meet the specific requirements of both caving and pneumatic stowing.

WORK PROGRAM: 1. New development of a supporting system for caving which allows conversion from pneumatic stowing to caving, or vice versa, while operations are in progress and while retaining the supporting system. (Short rear cantilever length of the cap, caving screen). 2. Conversion to pneumatic stowing.

STATUS: Item 1 of the work program has been completed, item 2 is still in progress.

ADDENDA: Performing organization: Saarbergwerke AG, Saarbrucken.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0523, IMPROVED POWERED SUPPORTS/SHIELD-TYPE SUPPORTS FOR THE CONDITIONS OF LIMNIC DEPOSITS

HAHN, Arbeits. Saarberwerke AG, *Saarbruecken*, *Saarland*, *Federal Republic of Germany* 6600

DESCRIPTION OF PROJECT: OBJECTIVE: Development and testing of a type of shield support suitable for use in the geological conditions peculiar in the limic coal basin of the Saar, i.e. very thick inclined seams with extreme tectonic deformations.

WORK PROGRAM: a) Development of a shield for up to 3 m thick seams on a dip up to 20 degrees and with fault levels up to 1.5.m. b) Continued development of the shield for seams up to 3.5 m thick on a dip of up to 30 degrees.

Application of design and technological experience acquired in the first phase of the program.

STATUS: The know-how acquired as a result of the experiments carried out in the ennsodorf pit was put to good use in the advanced development stage of the work done on the shield support system. In spring 1975 the shield support was put into operation in the Warndt pit in a 3.2 m thick seam on a 30 degree dip. Operating results were satisfactory, though one or two problems were brought out (for instance, over coordination of winning, haulage and support operations, repositioning of the face conveyor in top and bottom roads, and the behaviour of crack sealings), for the solution of which further experiments would appear to be called for.

ADDENDA: Performing organization: Saarbergwerke AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0524, IMPROVEMENT OF TECHNIQUES FOR ROCK COMPACTION AND FOR SECURING THE ROOF

KLINKNER, Arbeits. Saarberwerke AG, *Saarbruecken*, *Saarland*, *Federal Republic of Germany* 6600

DESCRIPTION OF PROJECT: Objective: Development of effective techniques for securing faulty and friable strata.

WORK PROGRAM: a) Laboratory tests: Strength tests on cementing agents, tests on adhesive bonds. Research on disturbance effects on strength of adhesive bonds. Improvement of early strength and adhesion of cementing agents. b) Operating trials: Redevelopment of the equipment. Improvement in process technology aspects. Resolving organizational and haulage problems. Statistical studies to evaluate consolidation result. Start-up of operation in the mine.

STATUS: Laboratory tests with magnesium oxichloride cements were carried out with successful results in the area of reducing the setting time, prevention of loss from running out (in large openings), and reduced crack formation. Additional research was undertaken on the workability of urea-formaldehyde resin as a hardening agent.

In operational trials underground magnesium oxichloride cements were successfully used in a number of face areas to consolidate steeply-sloping coal in thick seams and for securing coal on the roof, as well as for consolidating bottom layers. Good results were also registered with the use of magnesium oxichloride cements to consolidate friable strata in the T-junction and in areas of fault, and for water-tight stopping.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0525, DEVELOPMENT OF A SHEARER FOR SEAMS UNDER 1 M THICK

LESSMOLLMANN, Arbeits. Saarberwerke AG, *Saarbruecken*, *Saarland*, *Federal Republic of Germany* 6600

DESCRIPTION OF PROJECT: Objective: The development of a shearer-loader suitable for use on workable seams under 1 m thick.

WORK PROGRAM: The project is due to start in 1976. A detailed work program will be presented as soon as possible.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0526, SIG DRILL JUMBO WITH HYDRAULIC SUPPORT ERECTING AID AND MEUDON DRILL JUMBO WITH SUPPORT ERECTNG AID

LESSMOLLMANN, Arbeits. Saarberwerke AG, *Saarbruecken*, *Saarland*, *Federal Republic of Germany* 6600

MAIN OBJECT: Mining technology and coal preparation.

FIELD: New ground support systems.

OBJECTIVE: Improved economy and performance through the employment of cost and manpower-saving machinery in stone headings. Employment of a drill jumbo with a hydraulic work platform, mobile in all directions, minimum load capacity 280 kg for maximum boom extension, increased length of pull, envisaged minimum drivage rate of 11.2 m/day.

WORK PROGRAM: 1. Equipment acquisition, collaboration with suppliers on design, preparations for operation. 2. Test operation, operational studies.

ADDENDA: Subcontractor: SIG Company; MEUDON Company. Performing organization: Saarbergwerke AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0527, IMPROVEMENTS TO CONTROL TECHNIQUES AND AUTOMATION WITH BELT CONVEYORS

LESSMOLLMANN, Arbeits. Saarberwerke AG, *Saarbruecken*, *Saarland*, *Federal Republic of Germany* 6600

DESCRIPTION OF PROJECT: Objective: To find a dependable means of clearing coal from the face that is simple to monitor. To work out improvements in the control system with the use of vacuum contactors, electronic and pneumatic logical circuits.

WORK PROGRAM: a) Installation of bulk material conveyors. b) Installation of vacuum contactors and conveyor control devices for the belt conveyor system. c) Testing of new monitoring system.

STATUS: The transfer stations and special chutes have been installed, and installation is partially complete of the cleaning plant and bulk material conveyors. To enable tendency to cut-out at loading stations to be counteracted, a test apparatus for monitoring belt rips has been set up. Five belt conveyors in a conveyor line have been equipped with a control system and emergency signal facility. Revolving lights have been installed to give warning that conveyors are about to be started up. A scanning system for inclined belt running with ultrasonic devices and infra-red switches is being planned, and preliminary tests with light barriers in fibre glass have been carried out. Research is being undertaken on different methods of continuous temperature-monitoring of bearing (permeability change in magnets, thermo-elements, infra-red reflection.)

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0528, EICKHOFF EVA 160 ROAD HEADER WITH DUST SUPPRESSION SYSTEM AND SUPPORT ERECTING AID

LESSMOLLMANN, Arbeits. Saarberwerke AG, *Saarbruecken*, *Saarland*, *Federal Republic of Germany* 6600

MAIN OBJECT: Mining technology and coal preparation.

FIELD: Mechanized drivage systems.

OBJECTIVE: Experimental operation in horizontal and moderately inclined strata under different rock conditions, gentle treatment of the roof and inclinations up to 20 centesimal degrees. Improvement of the drivage rate to 10 to 15 m/day.

WORK PROGRAM: 1. Trial operations in seams with different types of associated rock strata. 2. Operation in moderately inclined strata.

STATUS: Preparatory work for experimental operation in accordance with item 1 of the work program has been completed.

ADDENDA: Subcontractor: Gebr. Eickhoff GmbH Company and Performing organization: Saarbergwerke AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0529, JIG FOR SIMULTANEOUS CLEANING OF TWO DIFFERENT TYPES OF COAL NEEDING TO BE KEPT APART

W. PADBERG, Arbeits. Saarberwerke AG, *Saarbruecken, Saarland, Federal Republic of Germany* 6600

DESCRIPTION OF PROJECT: Objective: Modification of a BATAG-Jig to facilitate simultaneous cleaning of two different types of coal. Variable compartmentalization facility to permit varying proportion of the two types of coal to be treated. This also entails variable feed and discharge facilities, and pre-screening of the product.

WORK PROGRAM: a) Planning and development work. b) Fabrication and installation of the system. c) Operational tests.

STATUS: The jig has been on test running since April 1975. The components for the cleaning of two different types of coal, as, for example: the inner partition, controls for air intake and water supply to both compartments and the feed-chute apparatus for metering out varying quantities of feed product, have all been manufactured and are currently undergoing modifications in accordance with the results of different research and measurement activities.

An old smalls-jig was re-fitted for reasons of security of operation for the cleaning of medium-size coal in high-volatile coal, and taken into service.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0530, PUSHER CENTRIFUGE FOR REPROCESSING OF FILTER CAKES

W. PADBERG, Arbeits. Saarberwerke AG, *Saarbruecken, Saarland, Federal Republic of Germany* 6600

DESCRIPTION OF PROJECT: Objective: Reduction of residual water content of froth fines by reprocessing of filter cakes in the centrifugal field of a pusher centrifuge. Reduction of terminal water content to 7% (absolute).

WORKING PROGRAM: a) Preparatory work and setting up of an experimental centrifuge. b) Research into the basic principles governing the use of the project method. c) Elaboration of concept for maximum dimension machinery units.

STATUS: A type SZ 50 B1 batch centrifuge (2-stage, throughput volume 4-5 t/h) was placed at the disposal of the Krauss-Maffei-Imperial Company of Munich (KMI) for semi-technical testing.

Experiments with manual feed led to a reduction in the water content of approx. 3.5% by weight. KMI had previously envisaged a reduction of approx. 7%. An extensive series of tests with the use of bucket centrifuge, the results of which could be compared with those obtained in similar test conditions with the use of a pusher centrifuge, had the identical outcome - water content reduction of only 3% by weight.

Tests using the KMI pusher centrifuge were thereupon discontinued, tests have since been initiated using a centrifuge made by the Siebtechnik Company of Mulheim/Ruhr, and the first results are available. It would appear that a reduction of water content of 6% by weight is attainable with the use of this particular machine.

ADDENDA: Subcontractor: Krauss-Maffei-Imperial, Munich; Siebtechnik GmbH, Mulheim. Performing organization: Saarbergwerke AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

1.0531, PRODUCTION OF SYNTHESIS GAS/SNG BY PRESSURIZED ENTRAINED GASIFICATION (RESEARCH CENTER)

ROSSBACH, Arbeits. Saarberwerke AG, *Saarbruecken, Saarland, Federal Republic of Germany* 6600

MAIN OBJECT: Coal conversion.

FIELD: Gasification.

OBJECTIVES: Development and testing of the optimum process of coal gasification according to the principle of pressurized entrained gasification. Technical proving of a process concept developed by Koppers-ICI for combined shift conversion/methanation.

WORK PROGRAM: Construction and operation of a pilot plant, consisting of an atmospheric Koppers-Totzek-gasifier, gas purifying section and gas compressor for shift conversion/methanation. This phase will be developed and technically approved for shift conversion/methanation at high temperatures. At the same time reconstruction of the original gasification train for technical approval of different kinds of pressurized gasifiers and their further development. Optimization of the whole coal-SNG system. Comparison of the tested gasifier types with respect to economic, technical and environmental aspects.

STATUS: At present, concept of item 1 of the work program.

ADDENDA: Subcontractor: Koppers, ICI, Linde. Performing organization: Saarbergwerke AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0532, TECHNOLOGY CENTER FOR PRESSURE GASIFICATION OF PULVERIZED COAL, DEVELOPMENT OF PROCESSES FOR THE GASIFICATION OF COAL UNDER PRESSURE

ROSSBACH, Arbeits. Saarberwerke AG, *Saarbruecken, Saarland, Federal Republic of Germany* 6600

DESCRIPTION OF PROJECT: OBJECTIVE: Construction of a technology center for the development and testing of processes for pressure gasification of pulverized coal. Further development of the 'Saarberg-Otto-Generator'.

WORK PROGRAM: a) Establishment of a suitable location for the technology center. b) Acquisition of a technical rough draft for the technology center. c) Carrying out the engineering work for the center. d) Constructive development of the Saarberg-Otto-Generator (coal throughput: 5-10 t/h; pressure: 25-30 bar). e) Erection and operation of the plant. f) Testing of the procedure and determination of the characteristic economical and technical data. g) Operation optimization, ascertaining power limits, further development of plant components, testing of newly developed components. h) Proof of the reliability of the gasifier through continual operation.

The first two points of the work program have been completed. Points c) and d) are in progress.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0533, EICKHOFF EVA 160 HEADING MACHINE WITH BUILT-IN DUST-SUPPRESSION EQUIPMENT AND SUPPORT-ERECTION DEVICE

SCHMID, Arbeits. Saarberwerke AG, *Saarbruecken, Saarland, Federal Republic of Germany* 6600

DESCRIPTION OF PROJECT: OBJECTIVE: Operating trials in level and moderately inclined strata under different rock conditions, with careful treatment of the roof, and at inclinations of up to 20 degrees. Improvement in drift advance of 10 to 15 m/d.

WORK PROGRAM: a) Operating trials in seams with differing wall-rock formations. b) Operating in moderately inclined strata.

STATUS: Work on item a) of the program was continued, but the completion date for work on item b) will have to be extended by approximately nine months because of so far unresolved problems and difficulties due to unfavourable operating

conditions in the level formation. A first partial result is that there was a marked improvement in drift advance as compared with the results from the use of conventional drivage systems.

ADDENDA: Subcontractor: Gebruder Eickhoff GmbH. Performing organization: Saarbergwerke AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0534, ENLARGEMENT OF THE RAW MATERIAL BASIS FOR REFINERIES BY INCLUSION OF HARD COAL (LABORATORY PHASE)

WURFEL, Arbeits. Saarberwerke AG, *Saarbruecken, Saarland, Federal Republic of Germany* 6600

DESCRIPTION OF PROJECT: Objective: Production of refinery products on base of hard coal by extraction and/or hydrogenation (laboratory phase).

WORK PROGRAM: a) Orienting preliminary tests and composition of detailed testing program, based on preliminary results of BASF and others. b) Equipment of a technical laboratory for hydrogenation, construction of the high pressure apparatus and function test. c) Autoclave tests. d) Construction of a continuously operating hydrogenation unit on a bench scale, and function test. e) Systematic operation of the continuous bench-scale unit. f) Processing of different kinds of coal.

RELATION TO OTHER PROJECTS: Simultaneously a study will be carried out to evaluate the test results and provide all necessary data for the construction of a pilot plant (ET 1050).

STATUS: Following the completion of the discontinuous autoclave experiments for the extraction of hard coal under different reaction conditions, the influence of extraction conditions on the filterability of the extract solutions was investigated.

In November 1975, according to plan, the first continually operating lab-plant section with a reaction volume of 10 l was completed. Varying from the work program, the 1-step sediment phase hydrogenation of the coal was tested with the subsequent separation of the distilled oils from the hydrogenation product. During the first run, the fundamental functioning of the plant was proven and produced preliminary results.

ADDENDA: Subcontractor: BASF, Several research institutions. Performing organization: Saarbergwerke AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0535, ENLARGEMENT OF THE RAW MATERIAL BASIS FOR REFINERIES BY INCLUSION OF HARD COAL (ACCOMPANIED STUDY TO THE LABORATORY PHASE)

WURFEL, Arbeits. Saarberwerke AG, *Saarbruecken, Saarland, Federal Republic of Germany* 6600

DESCRIPTION OF PROJECT: Objective: Production of refinery products on base of hard coal by extraction and/or hydrogenation (project study to the pilot plant).

WORK PROGRAM: a) Inventory and study of the available information. b) Development and description of a suitable process based on technical state of the art using the results from the laboratory phase. c) Accomplishment of the basic engineering for the pilot plant (about 3 t coal/d). d) Accomplishment of the detail engineering for the plant. e) Computations for the economic feasibility of the process. f) Calculation of the process economics. g) Market analysis until 1980.

STATUS: The first part of the project study has been completed. It contains the fundamentals of coal hydrogenation with special regard to the production of chemical raw materials. The different possibilities of hydrogenating coal - including recent developments -are presented.

ADDENDA: Performing organization: Saarbergwerke AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0536, EXTRACTION OF HYDROCARBONS FROM COAL USING ATOMIC HYDROGEN (BIBLIOGRAPHICAL STUDY)

H. SUHR, Univ. Tubingen, Inst. for Chemical Engin., *Tubingen, Federal Republic of Germany*

MAIN OBJECT: Coal conversion.

FIELD: Hydrogenation.

OBJECTIVE: This study has been initiated by a proposal to accomplish coal liquefaction by converting atomic hydrogen with coal to hydrocarbons. An initial prerequisite for experimental investigations in this direction is the development of a systematic conception of the chemical knowledge available in the field of atomic hydrogen.

WORK PROGRAM: Gathering material and information, sifting and evaluation; investigation into the profitability of coal liquefaction with atomic hydrogen; significance of atomic hydrogen for energy supply purposes; experimental problems involved in the use of atomic hydrogen.

STATUS: The study is near completion. Its evaluation will decide on the expediency of further investigations.

ADDENDA: Performing organization: Chemisches Institut der Universitat Tubingen.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0537, MANUFACTURE OF PETROCHEMICAL RAW MATERIALS FROM SYNTHETIC GAS (STUDY)

ELSTNER, Rheinische Braunkolen Kraftst., *Wesseling, Federal Republic of Germany* 5047

DESCRIPTION OF PROJECT: Objective: Manufacture of predominantly petrochemical raw materials via the Fischer-Tropsch synthesis or related processes, using brown coal as gasification feedstock (study).

WORK PROGRAM: a) Evaluation of the state of the art of synthesis processes, giving special consideration to results of commercial plants. b) Selection of recovery and refining processes. c) Economical comparison of the evaluated process-combinations. d) Determination of the most attractive avenue(s) for further development. e) Programming of the R & D work required to achieve the defined objectives.

RELATION TO OTHER PROJECTS: The work proceeds in parallel with 'Basic research on catalysts for carbon monoxide hydration' (ET 1131) and with the 'Development of catalysts for the Fischer-Tropsch synthesis' (ET 1035).

STATUS: The study has been completed yielding the following results: The Fischer-Tropsch synthesis is uneconomical at today's relationship between synthesis costs and net proceeds. This relationship has been clearly improved since 1970. There seems to be little prospect of selectively directing technically tested synthesis procedures for chemical raw material. New developments of the catalysts and the coal gasification processes can contribute to the improvement of the selectivity and economic feasibility of the Fischer-Tropsch synthesis. A vital decrease of synthesis costs and of the product finish-up costs, which were optimized within the framework of this study, is not to be expected.

ADDENDA: Subcontractor: SASOL, South Africa. C.F. Braun & Co., Alhambra, U.S.A. LURGI-Mineraloltechnik, Ffm. Friedrich Uhde GmbH, D'mund. Performing organization: Union Rheinische Braunkohlen Kraftstoff.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0538, DEVELOPMENT OF CATALYSTS FOR THE FISCHER-TROPSCH PROCESS

FROHNING, Ruhr Chemicals AG, *4200 Oberhausen, Federal Republic of Germany*

DESCRIPTION OF PROJECT: OBJECTIVE: Development of catalysts for the Fischer-Tropsch synthesis with improved selectivity for a product pattern corresponding to market requirements.

WORK PROGRAM: a) Comprehensive review covering the state of knowledge in connection with the evaluation of economic and technical prospects of the Fischer-Tropsch process and proposals for further research. The study is prepared by several well-known authors. b) Physico-chemical studies of thermodynamic equilibria, reaction kinetics and transport phenomena. c) Optimization of reaction conditions by means of a reaction model. d) Survey of patent literature, preparation and evaluation of suited catalysts. e) Development of catalysts with appropriate composition and by suitable methods of preparation

considering different types of reactors. f) Testing selectivity, thermal and mechanical resistance of catalysts by short-time and long-time test runs. g) Characterization of suitable catalysts by physical methods. h) Evaluation of suitable catalysts under optimum reaction conditions closely related to technical use.

STATUS: A study concerning Fischer-Tropsch catalysts has been prepared by experts from the various subject areas and at the moment it is being revised in coordination with the individual authors. A summary of the current stage of technical development is presented in the study, which should lead to the development of modified catalysts and processes. The content of this study has led to new ideas and considerations, which will influence the continuance of the development. The experimental research projects in liquid phase- and fixed bed-gas phase reactors of various sizes have shown that it is possible, by the suitable choice of formation and synthesis parameters of known catalysts, whose range of products is usually in the petrol region, to obtain markedly higher yields of gaseous olefins. It is also possible to obtain the short chain unsaturated hydrocarbons - ethylene, propylene and butylene - as the main products of the reaction by the use of recently developed selectively operating catalyst systems. These promising results, which were obtained in experiments of short duration and in small reactors, must be confirmed in tests of long duration and in large scale reactors and the products must be limited even further.

ADDENDA: Performing organization: Ruhrchemie AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0539, DISTRIBUTION OF SULFUR IN INTERMEDIATE AND RESIDUAL COKE (INVESTIGATIONS CONNECTED WITH THE VEW PROCESS)

KIRSCH, V G B, *4300 Essen, Nordrhein Westfal., Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Investigations on distribution of sulfur in intermediate and residual coke from coal with a view to desulfurization in gasification process. Determination of the dependence of degree of desulfurization of the coke on the nature of coal, conditions and operation of the process.

WORK PROGRAM: a) Identification of coal feedstock and physical and chemical methods of investigation regarding the nature of mineral matter, ash composition, melting point of ash, and structure and grain size. b) Identification of coal particles in the first stage of gasification, changes in surface contours, particle size, distribution of constituent elements, in particular on the surface, the hardness, and composition of volatiles. c) Identification of residual coke according to above methods. d) Identification of ignition and combustion characteristics of the residual coke.

STATUS: A number of preoxidized granulated coals (temperature 350 - 425 degrees centigrade definite amount of carrier air and definite time to direct contact in the experimental operation) were characterized by REM with respect to the surface in order to obtain firm and durable surfaces through optimal experimental conditions.

Further investigation by REM and microprobe dealt with preoxidized coal particles which has been coked in the experimental reactor of the Engler-Bunte-Institute (Section Gas, Oil, & Coal), Karlsruhe, at 1000 degrees centigrade in various carrier gases and their mixtures (N2, H2, H2O) for various periods of time. It proved that in the outer wall of the resulting highly porous coke particles (nearly hollow spheres) slag elements (e.g. Si, S, Ca, Fe) were enriched with regard to the inner wall. FeS, as a residue of the pyrite present in the coal, was not in the experimental series. On the other hand, partly crystalline microscopic particles had grown on the surface of the coke granules. These particles probably consisted of alkaline sulfates. The residual sulphur is very finely dispersed within the coke granules and probably is in the form of organically bound sulphur. Pyrite is consequently practically fully disintegrated. In all cases, S2, SO2, SO3, and the total amount of sulfur were determined. (Text Abridged.)

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0540, SEPARATION OF SULFUR IN HALFCOKE AND RESIDUE COKE

H. KIRSH, V G B, *4300 Essen, Nordrhein Westfal., Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0541, HIGH TEMPERATURE GAS-SOLID SUSPENSION COOLANT IN HEAT EXCHANGERS (ACCOMPANYING STUDY TO THE VEW PROCESS)

P.M. WIENSPACH, Univ. of Dortmund, *4600 Dortmund, Hombruch, Federal Republic of Germany*

MAIN OBJECT: Coal conversion.

FIELD: Low-temperature carbonization.

OBJECTIVE: Development of suitable heat exchangers for the cooling of flows of high-temperature gas-solid suspensions such as those involved in the VEW process of coal conversion. Acquisition of the basic parameters of interest to industrial process engineering.

WORK PROGRAM: Design and construction of a suitable experimental arrangement. Determination of the overall heat transfer coefficient from the flowing hot gas/steam-solid suspension to the gaseous cooling agent. Determination of the optimum type of construction and the best method of operation for this heat transfer process. Optimization of the apparatus geometry for a suitable type of construction. Study of the influence of the erosion caused by solid particles on the availability of the apparatus.

REFERENCE TO OTHER PROJECTS: The results are required for the conception and design of a unit of the VEW process of coal conversion. (15 t/h, ET 58).

ADDENDA: Performing organization: Universitat Dortmund.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0542, PRESSURIZED GASIFICATION OF COAL DUST (PROJECT STUDY)

J. HARJUNG, Veba Chemistry AG, *4660 Gelsenkirchen Buer, Federal Republic of Germany*

MAIN OBJECT: Coal conversion:

FIELD: Gasification:

OBJECTIVE: Development of a coal dust gasification process operating under pressure where the feedstock is charged as pumpable aqueous slurry. A project study will be prepared to show the technical and economic reasons for the development of this concept.

WORK PROGRAM: Literature and patent survey to show the state of the art and to establish the starting points for promising further developments. Informative tests to solve basic problems such as charging the slurry into the reactor, spray distribution in the reactor, suspension homogeneity, reaction stability, reaction progress. Comparison with other gasification principles from economic and technical viewpoints (investment costs, material and energy balances). Preparing the basic design for a pilot plant for 1 t/h coal throughout and an operating pressure of approx. 70 bar. Presentation of a program for the development of the concept to technical maturity.

REFERENCE TO OTHER PROJECTS: In this comparison, all processes involving pressurized gasification of coal dust will be considered (ET 79, ET 38, ET 53).

STATUS: The first three items of the program have been completed.

ADDENDA: Subcontractor: Lurgi-Mineraloltechnik. Performing organization: VEBA-Chemie AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0543, COAL DUST GASIFICATION IN COMBINED COMBUSTION CHAMBER/MELTING CYCLONE SYSTEM

H. BIERBACH, Lurgi Gmbh, *6000 Frankfurt 2, Federal Republic of Germany*

MAIN OBJECT: Coal conversion.

FIELD: Gasification.

OBJECTIVE: Development of high temperature gasification process with a high specific gasifier capacity using the combustion chamber/melting cyclone system for coal dust and coal fines.

WORK PROGRAM: Revamping a reactor with melting cyclone (Babcock System) installed at Sachtleben GmbH for the processing of coal dust (previously used for roasting sulfidic ores). Trial operation with systematic variation of the major parameters to obtain characteristic data (specific gasifier compacity, yield) and testing individual plant components (separation of liquid slag, slag discharge, burner). Anticipated coal throughput: 1 t/h. Establishing the basis for decisions regarding the further development of the concept (operation under pressure) by evaluating the results and comparing them with the data from other gasification systems. Provided the results are positive, planning a pilot reactor with 4-10 t/h coal throughput and elevated operating pressure. Preparing a development program.

REFERENCE OF OTHER PROJECTS: The evaluation of the results under technical and economic aspects will include a comparison with all systems working on the principle of coal dust gasification (ET 19, ET 38, ET 53).

ADDENDA: Performing organization: Lurgi Mineraloltechnik GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0544, DEVELOPMENT OF TECHNICAL PROCESSES FOR THE TREATMENT OF TAR FROM COAL CONVERSION

OTTO, Lurgi Gmbh, *6000 Frankfurt 2, Federal Republic of Germany*

MAIN OBJECT: Coal conversion.

FIELD: Hydrogenation.

OBJECTIVE: Development of processes for the treatment of tars and tar distillates from coal conversion/coal upgrading (gasification, in particular under pressure; devolatilization) to increase the yield of valuable products.

WORK PROGRAM: Studying literature to make use of known processes for tar treatment. Analyzing the market situation for saleable products. Development process routes for various final products under consideration of economic and technical aspects. This work includes the laboratory scale and pilot scale testing of the following process steps: Tar dedusting, distillative tar separation, phenol recovery and aromatics recovery. Proposals for the treatment of waste water. Proposing suitable analyzing methods. Establishing a program for further development to commercial scale.

REFERENCE TO OTHER PROJECTS: All projects of coal conversion/coal upgrading (gasification, in particular under pressure; devolatilization) where tar is an unavoidable byproduct.

ADDENDA: Subcontractor: For literature study: Metallgesellschaft AG Department TID, and Performing organization: Lurgi Mineralaltechnek GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0545, HIGH-PRESSURE DUST GASIFICATION IN COMBUSTION CHAMBERS WITH REVERSE FLOW VORTEX, COAL DUST FEEDING BY GAS INJECTOR PUMP

L.T. KAYSER, Technology Research Gmbh, *7000 Stuttgart, Baden Wuertt., Federal Republic of Germany*

MAIN OBJECT: Coal conversion.

FIELD: Gasification.

OBJECTIVE: Development of a continuously working dust feed device for feeding up to high end-pressures (20-100 bar) based on the principle of gas injector pumps. Feasability test of a reaction chamber with reverse flow vortex for high-pressure coal dust gasification. (project study, project design).

WORK PROGRAM: Coal dust feed system: Development of a technical concept for feeding up to high end-pressures (supercritical expansion of the transport gas - which is also the gasifying agent - to ambient pressure, feeding of the dust, compression waves, multistage array). Outline of technological and economical aspects of the process, especially under consideration of feeding up to high end-pressures. Development, design, construction and testing of a one-stage transport system for verification of the elementary working principle of the system. Systematic tests for optimization of the feed system under consideration of high pressure recovery. Optimum configuration of a system for the transportation up to high end-pressures.

Combustion chamber with reverse flow vortex: Outline of the technological and economic advantages of the combustion chamber with reverse flow vortex in comparison with well-tested processes. Development of suggestions and solutions for the technical handling of coal feeding and slag removal. Program definition for the next development steps.

STATUS: Item 3 of the program, verification of the basic working principle of the system, has been demonstrated with positive results.

ADDENDA: Subcontractor: DFVLR and Performing organization: Technologieforschung GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0546, NEWLY STYLED AND IMPROVED CATALYSTS FOR COAL HYDROGENATION

A. WEISS, Univ. of Munich, Inst. of Inorganic Chemistry, *8000 Munchen 22, Bayern, Federal Republic of Germany* 8000

DESCRIPTION OF PROJECT: OBJECTIVE: Development of a newly styled catalyst system for coal hydrogenation in the draining phase through the use of macro-molecular stratum structures of sulfides pi, v, Ta, Zr, Mo, and W with extremely large surfaces.

WORK PROGRAM: a) Production of stoichiometric and non-stoichiometric metal sulfide, b) Production of colloidular solutions which under a) named compositions with individual Mx2-strata, c) Investigation of the stability of the colloidal solutions, d) Production of Hybrid-Intercalation complexes, e) Use of under b) and d) produced catalysts, f) Carry out of tests with the object of producing directly from coal derivates with the character of Intercalation complexes, g) Tests Praess-Optimization with especially active catalyst systems.

RELATION TO OTHER PROJECTS: The basic research carried out will benefit all projects dealing with coal liquification.

STATUS: Granted on July 23, 1975. The first two points of the program are in preparation.

ADDENDA: Performing organization: Inst. fur Anorganische Chemie der Uni. Muenchen.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0547, COKE GRADE

UNKNOWN, Coal Fields Research Center, Experimental Station, *Marienau, France*

Goal: Study practical problems of mining, and iron and steel coking plants, in the laboratory and pilot plants.

Project orientation: The project deals with the composition of mixtures, the danger of pressure, problems of shrinking loads, and coke grade; it also deals with the production of iron and steel coke and smelting coke.

The studies deal in general with the difficulties of supplying coking coal. However, we will also continue to follow the results obtained in coking plants by three prototypes of the 10 kg furnace, enabling us to detect coals of pressurized mixtures before their use and to study a device for measuring lateral shrinking on our 400 kg furnace in order to carry out a systematic study of parameters affecting the load-shrinking phenomenon.

These studies on perfecting pressure and shrinking will be followed up during an examination of the practical problems involved.

SUPPORTED BY France - Ferrous Metallurgy Research Inst.- St. GermainLAYE

1.0548, CARLING - PREHEATED CHARGING
UNKNOWN, Coal Fields Research Center, Experimental Station, *Marienau, France*

Goal: Experiments using the Coaltek 250 degrees C preheated pulverization of coke blocks, followed by steam pneumatic transport charging which incorporates the advantages of preheating the block and smokeless charging.

Orientation of project: Our experiments have 2 goals: In the field of carbonization, determine the processes and performance with Lorraine coal, coke grade, and recovered by-products. In the field of pollution, control process efficiency.

We will use the coal deposits in the Lorraine region for the study.

Due to the delay in equipment delivery, the Carling Battery I 12 furnace preheating and charging plant was not ready until the end of 1974. We began to perfect the preheater and charging device technologically.

This study will involve charging the 12 furnaces with the mixture under study and examining coke produced by 3 or 4 of these furnaces.

SUPPORTED BY France - Ferrous Metallurgy Research Inst.- St. Germain-laye

1.0549, PREHEATED CHARGING GENERAL PROBLEMS
UNKNOWN, Coal Fields Research Center, Experimental Station, *Marienau, France*

Goal: Specify the extent of possible processes for preheated charging of loads by studies in our pilot plants.

Project orientation: The studies deal with: Expanding knowledge on the effects of preheating loads; improving the preheater- pulverizer. The study for increasing our knowledge of the effects of preheating loads is part of a group of German, British, and French studies financed by the CCE. During the preliminary studies and while installing some 10 Coaltek plants, we gathered numerous results, often unexpected, on the behavior of loads preheated and charged at 250 degrees C. during carbonization.

We will use a series of systematic tests in a 400 kg furnace to discover: the relationship between load density and core grade; pressure in relation to load density and nature of mixture, and compared to traditional charging; preheated formulas that can be substituted for crushed blocks; and various types of mixtures.

The goal of this study of preheated pulverization is to find ways of improving and increasing the equipment's productive capacity and to reduce its consumption of electricity. We will study the possibilities of using higher temperatures in the combustion chamber without harming coal grades, and the possibility of using the equipment for drying carbon at 120 degrees C. We will study decreasing the consumption of electricity by studying charge losses for reducing pressure at ventilator outlets.

SUPPORTED BY France - Ferrous Metallurgy Research Inst.- St. Germain-laye

1.0550, METHODS OF PREDICTING AND CONTROLLING COKE GRADE
UNKNOWN, Coal Fields Research Center, Experimental Station, *Marienau, France*

Goal: Better understand methods from different countries for determining coal grades, predicting coke grade, measuring mechanical resistance of cokes, and predicting mixture pressure, in order to inform operators of the value of these methods in comparison to those they usually use.

Project orientation: The project deals with: Following-up the perfection of a simple method enabling a coke user to quickly know whether the coal he has is oxidized or not: a paper synthesizing current results is being prepared. The study will continue following the decision of interested parties. Verifying Japanese theories on carbonization. The Japanese are publishing vast amounts of literature on perfecting an overall method of characterizing constituents and mixtures based on 2 basic parameters: Gieseler fluidity and the reflecting capacity of vitrinite on coke quality prediction. Examining measures taken for forming an opinion on methods of calculating the pressure of measures proposed by the 'Stein Kohlenberg Bauverein.' Following-up the study of different coke mechanical resistance tests -Irsid, Micum, Jis Japanese test. Our goal is to establish correlations between various coke quality indexes.

SUPPORTED BY France - Ferrous Metallurgy Research Inst.- St. Germain-laye

1.0551, COKE QUALITY - DRY DISTILLATION
UNKNOWN, Coal Fields Research Center, *Paris, France* 75007

OBJECTIVE: Determine whether the quality of dry distilled coke is not inferior to that of the same wet distilled coke.

We will use the 400 Kg furnaces of the Marienau experimental station and dry distillation equipment designed and fabricated for this purpose.

ADDENDA: Supporting agency: Institut de Recherche de la Siderurgie (IRSID). Performing organization: Centre d'Etudes et Recherches des Charbonnages de France (CERCHAR).

SUPPORTED BY France - Ministry of Industry & Research - Paris

1.0552, PHYSICAL-CHEMICAL VAPORIZATION OF COAL AND ITS DERIVATIVES
UNKNOWN, Coal Fields Research Center, Lab. Verneuil en Halatte, *60 Verneuil en Halatte, France*

Goal: Conduct physical-chemical studies useful for practical studies on using coal and its by-products within the limits of a joint project by the study committee of western European coal producers (Comite d'Etudes des Producteurs de Charbon de l'Europe Occidentale), financed partially by the CCE.

Orientations of the project: The project will continue to deal with: Characteristics of pitch whose results interest people who manufacture electrodes for industry. We shall attempt to establish a relationship less empirical than at present between measurements and laboratory tests - chemical composition, aromatic quality, softening point, viscosity, proportion and nature of different classes of resins, etc.(and the usage properties of this pitch). The porous texture of coals and cokes whose results are of special interest to metallurgists, rapid pyrolysis and ignition of dust whose results have a bearing on all studies involving coal combustion, powder explosions and fires.

SUPPORTED BY France - Ministry of Industry & Research - Paris

1.0553, CONSTRUCTION MATERIALS
UNKNOWN, Coal Fields Research Center, Lab. Verneuil en Halatte, *60 Verneuil en Halatte, France*

GOAL: Studying construction materials and manufacturing processes, more and more needed by construction industry and public works, based on sterile mine extracts and other natural materials.

MANUFACTURING LIGHT SANDS: We will continue to perfect methods of manufacturing silicon-aluminum grains smaller than 5mm with a loose density between 200 and 700 kg/m3.

MANUFACTURING PROCESSES: Direct heat expansion of Buddle schists, selected by pulverization, in the flame of an 800 hg/h pilot furnace which we shall construct and in which we shall study manufacturing parameters. Expansion of schist, clay, or fly ash slurry drops mixed with water and additives, pulverized, brutally heated in a liquefied layer, and consolidated by ceramic baking. We will study manufacturing parameters and the quality of obtained products, using a 100 kg/h pilot. Manufacture of 5 to 20 mm expanded granules by controlling the liberation of gas by working on the partial pressure of different gases in order to avoid recycling present manufacture processes in a series of revolving towers.

USING FLY ASH: We will continue to follow and oversee studies granted to outside laboratories by the mixed committee of fly ash producers (Comite Mixte des Producteurs de Cendres Volantes). The following subjects will be studied: Pozzolanic cements with high fly ash content corresponding to binding materi-

als envisaged by the new norm; drying of ash concrete and examination of intensive but short thermal processing; behavior of ash concrete in an aggressive environment; using fly ash for improving farmland.

SUPPORTED BY France - Ministry of Industry & Research - Paris

1.0554, NEW HYDRAULIC AND POZZOLANIC BINDING MATERIALS

UNKNOWN, Coal Fields Research Center, Lab. Verneuil en Halatte, *60 Verneuil en Halatte, France*

Goal: Autothermal manufacture of hydraulic and pozzolanic binding materials that can be used in road work and/or for obtaining calibrated construction blocks, by burning up calcareous mixtures and floating schists in liquefied strata, thus best using their latent heat.

Project orientation: We have studied binding material manufacture using the Marienau station's 50 kg/h liquefaction pilot; we examined different parameters: origin of schists processing temperature, excess of air, schist-lime ratio; samples of a few 100 kilograms of product have been prepared; we will examine whether they are worth using and continue research using the following methods: Replace introduction by pumping mixtures of schists and limestone containing 38% water, and by introducing mixtures containing 15% water through the screw in order to improve thermal yield. Achieve an industrial pilot unit with a 4t/h productive capacity and a 3m diameter liquefied layer burner. Based on an already completed technical notice, we will collaborate with Basin du Nord/Pas-de-Cacais in a numbered installation project and an economic story for constructing this pilot plant with one of the future users of its products.

SUPPORTED BY France - Ministry of Industry & Research - Paris

1.0555, APPLICATION POSSIBILITIES OF LIQUEFIED COAL

UNKNOWN, Dutch State Mines, Netherlands Res. & Pat. Dept., *Geleen, Netherlands*

This project concerns desk studies and some experimental work on bench scale about the application possibilities of liquefied coal extract as a raw material for chemical products.

SUPPORTED BY Netherlands - Dutch State Mines - Heerlen

1.0556, GASIFICATION OF COAL

UNKNOWN, Dutch State Mines, Netherlands Res. & Pat. Dept., *Geleen, Netherlands*

This project comprises at this time some desk studies concerning the technical and economical aspects of the several processes for the gasification of coal.

Addenda: Performing agency: Naamloze Vennootschap DSM.

SUPPORTED BY Netherlands - Dutch State Mines - Heerlen

1.0557, FORMED COKE PROJECT

VANLANGEN, Hoogovens Ijmuiden B.V., *Ijmuiden, Netherlands*

Scouting the possibilities of substitution of coke (from coke coals) by formed coke (from high volatile coal-types).

SUPPORTED BY Netherlands - Hoogovens Ijmuiden B.V.

1.0558, DEVELOPMENT OF TOTAL COAL TRANSPORT SYSTEMS FROM THE MINE THROUGH THE FURNACE IN POWER PLANT

P. CROOCKEWIT, Rijn Schelde Verolme N.V., *Rotterdam, Netherlands*

SUPPORTED BY Netherlands - Rijn Schelde Verolme N.V. - Rotterdam

1.0559, DEVELOPMENT OF REACTORS (AND INSTALLATIONS) TO CONVERT COAL INTO COMMERCIAL NON-POLLUTING GASEOUS OR LIQUID FUEL

P. CROOCKEWIT, Rijn Schelde Verolme N.V., *Rotterdam, Netherlands*

SUPPORTED BY Netherlands - Rijn Schelde Verolme N.V. - Rotterdam

1.0560, DEVELOPMENT OF A COMPLETE SYSTEM TO USE COAL IN FORM OF A PASTE FOR THERMAL ENERGY CONVERSION

O. SIWERSSON, Carbogel Company, *Helsingborg, Sweden*

OBJECTIVE: To develop methods and equipment for the production, transportation and combustion of coal in a fluid (pumpable) form: coal paste. Its combustion is to be studied both directly and by converting the paste into a combustible gas.

APPROACH: In stage 1 the remaining section of the project is planned in detail while experimental trials are conducted.

PROGRESS: During a future stage 2 research will concentrate on the development of suitable burning equipment and methods for the production of coal paste which can be used for direct combustion.

INTENDED USE OF RESULTS: To develop methods to make the handling of coal easy and to achieve a combustion which is not environmentally detrimental.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

1.0561, THE DEVELOPMENT OF A METHOD OF GASIFYING FINELY GROUND COAL IN A FAST FLUIDIZED BED TO HOT GAS FOR DIRECT COMBUSTION

B. KJELLSTROM, Nordic Fluidized Bed Gasificat, *Stockholm, Sweden*

OBJECTIVE: Nordisk Fluidbaddforgasning has passed on this assignment to the Institute of Thermal Energy Technology at KTH, Stockholm. The Director of Research is Niklas Berge.

The project is made to obtain basic data for the design and operation of a coal gasification plant which can be used in conjunction with conventional oil-fired boilers. Research work is to concentrate of the gasification of coal in a reactor with an ash-agglomerating fast fluidized bed for the production of a gas with a low heating value.

APPROACH: In a previous stage, studies of the flow in a gas generator have been carried out in a cold model in the laboratory.

PROGRESS: The following studies and experiments are carried out: The design, manufacture and adjustment of a hot gas generator with the same type of bed as in the cold model. Studies of the reaction kinetics of experiments conducted with the model. Possible examination of alternative design solutions. The possibility of pressurized beds and the use of the gas in gas turbine cycles are to be considered.

ADDENDA: Performing organization: Nordisk Fluidbaddsforgasning.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

1.0562, METHODS FOR THE TREATMENT OF LIQUID EFFLUENTS EMANATING FROM COAL CARBONIZATION PLANTS

R.L. COOPER, British Carbonization Research, *Chesterfield, England, United Kingdom*

1. Application of novel BCRA process to full-scale activated-sludge plants with the object of reducing size of plant, power and dilution water requirements, and/or to effect the removal of pyridine bases and enhance the nitrification of ammonia concurrently with carbonaceous oxidation. One full-scale application is in process at a well designed plant and has shown a saving in power requirement by using only 50% of the treatment plant capacity, hitherto unachievable. (2) To determine the conditions

necessary for effective mixing and aeration in activated-sludge tanks for different geometric arrangements and for existing plants and to improve separation of the sludge from treated liquors. A new large plant has been designed and another plant is operating more successfully, following advice given by BCRA. Study and development of alternative biological treatment methods to those using the activated-sludge process or packed towers.

SUPPORTED BY United Kingdom - United Kingdom Government - London

1C. PEAT, HYDROCARBONS AND NON FOSSIL ORGANIC SOURCES OF ENERGY

1.0563, HELIKIAN AND HADRYNIAN STRATIGRAPHY, EASTERN CORDILLERA AND INTERIOR PLATFORM
J.D. AITKEN, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To establish a coherent picture of Helikian and Hadrynian events in western and northwestern Canada and to emphasize study of those events that have created explorable mineral and/or hydrocarbon deposits.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0564, STRUCTURE AND STRATIGRAPHY, RINGNES ISLAND AND NEARBY SMALLER ISLANDS
H.R. BALKWILL, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: (1) To establish the nature, sequence and gross structure of bedrock in the central part of the Sverdrup Basin; (2) to elucidate the nature, kinematics and chronology of tectonism in the Eureka Sound Fold Belt and its relationship with other elements of the Innuitian Orogen; and (3) through the above, to determine the significance of structure and stratigraphy of the region on the genesis and accumulation of hydrocarbons and other minerals.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0565, STRUCTURE AND STRATIGRAPHY, WESTERN QUEEN ELIZABETH ISLANDS, DISTRICT OF FRANKLIN
H.R. BALKWILL, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To elucidate the nature, sequence, and structure of Mesozoic bedrock in the western part of Sverdrup Basin, Innuitian Province; to ascertain the style, kinematics, and chronology of Mesozoic and Cenozoic tectonism, and the relationships of tectonism to Sverdrup Basin evolution and sedimentation; to examine the relationships of the foregoing to the Arctic Coastal Plain and Arctic continental shelf, and to other pericratonic basins of the circum-Arctic region; and through the foregoing, to determine the significance of stratigraphy, structure and tectonism for assessment of hydrocarbon and other mineral deposits in the western part of the Sverdrup Basin.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0566, UPPER PALEOZOIC SUBSURFACE STRATIGRAPHY AND BASIN ANALYSIS, SVERDRUP BASIN, ARCTIC ARCHIPELAGO
G.R. DAVIES, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To provide a thorough understanding of the upper Paleozoic geological history of the Sverdrup Basin, stressing the interrelationships of tectonics, sedimentation, biostratigraphy, geochemistry and hydrocarbon distribution.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0567, MINERALOGY OF FINE GRAINED CLASTIC ROCKS IN CENTRAL SVERDRUP BASIN
A.E. FOSCOLOS, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: To identify and examine the distribution of clay mineral facies geographically and stratigraphically; to obtain parameters from the thorough study of the interstratified clay minerals which can help to evaluate the degree of diagenesis of shales; and to correlate the above mentioned parameters to evaluation of hydrocarbon and mineral potential of the Sverdrup Basin.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0568, DEVONIAN BIOSTRATIGRAPHY OF LAKE MANITOBA-LAKE WINNIPEGOSIS REGION
A.W. NORRIS, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: (a) More precise correlations of the Manitoba Devonian sequence with other areas; (b) delineation of reefs in the Winnipegosis Formation and assessment of hydrocarbon potential; (c) more precise determination of facies relationship between the Winnipegosis Formation and the, in part, laterally equivalent Prairie Evaporites which contains valuable deposits of potash; and (d) to show the extent of intermingling of faunal elements of the Appalachian and Cordilleran faunal provinces in Manitoba.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0569, OPERATION PORCUPINE
D.K. NORRIS, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: Critical evaluation of the structural geometry and stratigraphy of areas of northern Yukon Territory and western District of Mackenzie for documentation of the nature, origin, and mechanics of the deformation and its bearing on the hydrocarbon and mineral potential of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0570, STRUCTURAL GEOLOGY OF NORTHERN YUKON TERRITORY AND NORTHWESTERN DISTRICT OF MACKENZIE
D.K. NORRIS, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: Critical evaluation of the structural geometry of the Richardson, Barn and British Mountains, intervening plateaux, and adjacent coastal plain for documentation of the nature, origin and mechanics of the deformation and its bearing on the hydrocarbon potential of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0571, DEVONIAN BIOSTRATIGRAPHY, WESTERN AND NORTHERN CANADA
A.E. PEDDER, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: Establishment and refinement of Devonian faunal sequences to allow correlation of Devonian rocks of western and northern Canada. The project will provide time control that will aid greatly the search for Devonian stratigraphic traps and thus assist the exploration of the natural resources of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0572, MESOZOIC STRATIGRAPHY AND BASIN ANALYSIS OF THE WESTERN QUEEN ELIZABETH ISLANDS, ARCTIC ARCHIPELAGO
G.E. REINSON, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

Objective: To provide a detailed documentation of the lithostratigraphy and depositional and diagenetic history of the predominantly clastic Mesozoic sequence of the western Queen Elizabeth Islands. To utilize this documentation to understand basin history in terms of: 1) tectonism, 2) major transgressive and regressive depositional events, and 3) formation of reservoir rock and occurence and distribution of hydrocarbon within these reservoirs.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0573, CORNWALLIS AND ADJACENT SMALLER ISLANDS
R. THORSTEINSSON, Dept. Energy Mines & Resources, Inst. of Sed. & Petrol. Geol., *Calgary, Alberta T2L 2A7, Canada*

OBJECTIVE: (a) To improve the understanding of the age, structure, sequence, relationship, and thickness of bedrock formations with a view to helping assess the size, grade, mode of occurrence, origin, and potentialities of any fuel or mineral deposits that may occur; and (b) improve the knowledge and understanding of the morphology of the Silurian and Devonian ostracoderms of Cornwallis Island, thus aiding in the establishment of a more useful stratigraphic framework for the region, and contributing to objective (a).

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0574, GEOLOGICAL INTERPRETATION OF ALL PERTINENT GEOPHYSICAL DATA AS AN AID TO BASIN SYNTHESIS AND HYDROCARBON INVENTORY
A.G. GRANT, Dept. Energy Mines & Resources, Atlantic Geoscience Centre, *Dartmouth, Nova Scotia B2Y 4A2, Canada*

OBJECTIVE: The primary objective of the project is to reconstruct the geological conditions in the offshore regions sufficiently to: 1) obtain a reasonably accurate estimate of the potential hydrocarbon resources of the various basins and 2) to facilitate departmental management policies relating to the exploration and orderly exploitation of non-renewable resources. The scientific results of this project will be made available to the public through the medium of formal publications.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0575, STRATIGRAPHY AND SEDIMENTOLOGY OF THE SEDIMENTARY SEQUENCES, ATLANTIC OFFSHORE BASINS
I.A. HARDY, Dept. Energy Mines & Resources, Atlantic Geoscience Centre, *Dartmouth, Nova Scotia B2Y 4A2, Canada*

OBJECTIVE: To establish detailed stratigraphic framework of the Tertiary and Cretaceous sediments on the Atlantic Shelf; to demonstrate provenance, accumulated thickness and depositional environments, in order to further facilitate the basin analysis program of offshore Eastern Canada.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0576, HYDROCARBON INVENTORY OF THE SEDIMENTARY BASINS OF EASTERN CANADA
J.A. WADE, Dept. Energy Mines & Resources, Atlantic Geoscience Centre, *Dartmouth, Nova Scotia B2Y 4A2, Canada*

OBJECTIVE: To prepare an annual inventory of hydrocarbon resources for sedimentary basins on the Atlantic Continental Margin and assist in the preparation of similar inventories for Paleozoic basins of the St. Lawrence and Hudson platforms and the carboniferous basins of the Atlantic provinces and the Gulf of St. Lawrence.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0577, REGIONAL SUBSURFACE GEOLOGY OF MESOZOIC AND CENOZOIC ROCKS OF THE ATLANTIC CONTINENTAL SHELF
J.A. WADE, Dept. Energy Mines & Resources, Atlantic Geoscience Centre, *Dartmouth, Nova Scotia B2Y 4A2, Canada*

OBJECTIVE: To provide a regional subsurface geological interpretation of the Atlantic Continental Margin as a basis for 1) the Department Hydrocarbon Inventory, and 2) to establish a framework from which RMCB may carry out more detailed geological analysis of specific prospective areas.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0578, PEAT MOSS DEPOSITS IN ALBERTA - USE OF WASTE HEAT FROM POWER PLANTS
T. RACHUK, Alberta Research Council, *Edmonton, Alberta, Canada*

Program of research or study: Peat Moss program will be completed Dec. 75. Waste heat - continuing.

SUPPORTED BY Canada - University of Regina - Regina, Saskatchewan

1.0579, ORGANIC CARBON ANALYSIS OF MARINE SEDIMENT SAMPLES
UNKNOWN, Bridco Values Limited, *Halifax, Nova Scotia, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0580, GASIFICATION OF PEAT IN A SPOUTED BED REACTOR
R.I. GUTHRIE, McGill University, School of Engineering, *Montreal, Quebec, Canada* 101

Combustion Experiments have been carried out on the pilot scale reactor (5 feet high, 1 foot I.D.) operating in the spouted bed mode. It was found that burning rates of 3-4 lbs./minute were typical, using batch charges of 20 lbs. of one inch sized cubes of peat. Operating temperatures of 1200 degrees C were recorded during the later stages of these combustion tests, while CO2 : CO ratio as high as 1 : 1.4 were obtained. Since the results indicate significant by-passing of unreacted air through the central spouted core, the reactor has been modified to also act in the fixed bed mode. This, altogether with full pressure and temperature instrumentation and a continuous feeding system to allow runs of 20 minutes duration are to be used in future optimisation tests.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0581, GASIFICATION OF PEAT IN SPOUTED AND PACKED BED REACTORS
R.I. GUTHRIE, McGill University, *Montreal, Quebec, Canada* 101

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0582, ASSESSMENT OF CANADIAN PEAT AS AN ALTERNATIVE FUEL FOR POWER GENERATION
UNKNOWN, Montreal Engin. Company Ltd., *Montreal, Quebec, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0583, HYDROCARBON ANALYSIS FOR PILOT PLANT PERFORMANCE EVALUATION
R.G. DRAPER, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The control analyses for pilot-plant operation are done, as far as possible, by the pilot-plant staff. The analytical laboratory is required to make more complete assessments for material balances, and product quality evaluation, after the operating conditions have been stabilized.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0584, COOPERATIVE EXCHANGE ANALYSIS
R.G. DRAPER, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

As the oldest government laboratory engaged in hydrocarbon analysis, this laboratory has assisted in the setting up of the other Federal Government petroleum laboratories, and has encouraged the exchange of samples with industry and government agencies to maintain high standard of uniformity throughout Canada.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0585, STRATIGRAPHY AND CORRELATION OF LOWER PALEOZOIC SUBSURFACE SECTIONS, SOUTHERN AND CENTRAL ARCTIC ISLANDS
U. MAYR, Dept. Energy Mines & Resources, Regional & Econ. Geology Div., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: 1) Compare and connect different sets of stratigraphic nomenclature; 2) elucidate regional facies changes and paleogeography; 3) outline areas with hydrocarbon potential.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0586, HAZELTON MAP-AREA
T. RICHARDS, Dept. Energy Mines & Resources, Regional & Econ. Geology Div., *Ottawa, Ontario K1A OE8, Canada*

Objective: To determine the geological framework of Hazelton map-area as a basis for estimating the potential abundance and probable distribution of mineral and fuel resources and as an aid to future development of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0587, GEOLOGY & MINERAL DEPOSITS OF MCCONNELL CREEK MAP-AREA, B.C.
T.A. RICHARDS, Dept. Energy Mines & Resources, Regional & Econ. Geology Div., *Ottawa, Ontario K1A OE8, Canada*

Objective: To determine the geological framework of the map-area as a basis for estimating the potential abundance and probable distribution of mineral and fuel resources and as an aid to future development of the region.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0588, CHARACTERIZATION OF THE LOW MOLECULAR WEIGHT HYDROCARBONS IN ATHABASCA BITUMEN
H. SAWATYKY, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The objective is to secure information that will be helpful in evaluating the losses that occur in the hot water separation process and to secure organo-geochemical information useful for exploration.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0589, EVALUATION OF PEAT RESOURCES
T.E. TIBBETTS, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The objective is to systematically catalogue the occurrences, reserves and qualities of peat deposits in Canada.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0590, DEVELOPMENT AND STANDARDIZATION OF METHODS FOR EVALUATION OF PEAT RESOURCES
T.E. TIBBETTS, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The objective of this project is to improve the accuracy of present parameters and develop new ones for evaluating peat material in conformity with the criteria of utilization.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0591, METHODS OF EXPLOITATION OF PEAT DEPOSITS
T.E. TIBBETTS, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The objective is to improve and develop methods of recovery (mining) of peat material and methods of processing, including drying and packaging.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0592, PEAT FOR POWER
T.E. TIBBETTS, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To determine the quality of Canadian coal and peat resources, reserves and production capability on annual and demand bases committed to March 1981, for the National Coal Inventory and supply demand reference so as to stimulate regional economies, increase reliance on indigenous coal, reduce imports and support exports.

WORK: Contract to Montreal Engineering for the assessment of Canadian peat as an alternative fuel for power generation in the light of current resource data, harvesting technology, combustion technology and regional conditions.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0593, GEOLOGICAL AND GEOPHYSICAL STUDIES OF THE PACIFIC CONTINENTAL MARGIN
D.L. TIFFIN, Dept. Energy Mines & Resources, Regional & Econ. Geology Div., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To establish the geological framework of the Pacific Continental Margin; determine the hydrocarbon potential of its contained sedimentary basins; and to determine the tectonic development of the Pacific Continental Margin, especially its interaction with the Pacific ocean floor.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0594, RADIOCARBON DATING OF PEAT SAMPLES
J. TERASMAE, Brock University, *St. Catharines, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0595, PRELIMINARY INVESTIGATION OF THE FEASIBILITY OF ENERGY RECUPERATION FROM SOLID WASTES IN THE PROVINCE OF QUEBEC
UNKNOWN, Rochette Rochefort & Assoc., *St. Foy, Quebec, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

1.0596, ANALYSIS OF THE PRODUCTS OF RAPID DEVOLATILIZATION/HYDROGENATION OF HYDROCARBON FUELS
P.C. STANGEBY, Univ. of Toronto, Inst. for Aerospace Studies, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0597, COMBINED PYROLYSIS - GASIFICATION OF COAL AND WOOD WASTE
A.D. MCINTYRE, British Columbia Res. Council, *Vancouver, British Columbia, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

1.0598, CONTINUATION OF THE STUDY OF THE FEASIBILITY OF USING METHANE GAS PRODUCED FROM ANIMAL WASTE FOR ENERGY PURPOSES
H.M. LAPP, Univ. of Manitoba, *Winnipeg, Manitoba, Canada*

SUPPORTED BY Canada - Department of Agriculture - Ottawa, Ontario

1.0599, BIOGAS FROM ORGANIC WASTES, ESPECIALLY MANURE OF DOMESTIC ANIMALS
UNKNOWN, Danish Engineering Academy, Lab. of Industrial Chemistry, *Copenhagen, Denmark*

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0600, ALTERNATIVE MOTOR FUELS
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

The aim is to reduce the transportation sector's dependence on crude oil deliveries.

SUPPORTED BY Denmark - Danish Government - Copenhagen

1.0601, EXPERIMENTAL PLANT FOR PYROLYSIS OF FIRM AND PASTY WASTE WITH FLUID SLOG DRAINAGE
H. BAUMANN, Frankfurt City Sanitation Dept, *Frankfurt 14, Hessen, Federal Republic of Germany* 6000

DESCRIPTION OF PROJECT: OBJECTIVE: Construction and operation of a pilot plant in order to collect operational data and gain experiences with the Andco-Torray-System (high temperature pyrolysis).

Investigation of the overall process as well as the interaction of individual function units. Consideration of different waste materials (house and industrial waste and special waste products).

WORK PROGRAM: a) Study and evaluation of existing knowledge. b). Advancement of the technology on the basis of the already existing experimental plant, Buffalo, U.S.A. c) Development of final blue prints for an experimental plant with a capacity of 8 t/h. d) Extraction of criteria in order to judge the process in regard to the environment and economy. e) Construction and beginning of operation of the experimental plant. f) Experimental operation with differing waste materials. g) Investigation of economy and emission of pollutants. h) Follow-through of a standardized measurement program for all plants in order to study the thermal behaviour of waste materials.

STATUS: Program point a) has been completed. Points b) - d) are in progress.

ADDENDA: Performing organization: Stadtreinigungsamt der Stadt Frankfurt.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0602, DEVELOPMENT OF A TELEMETRY SYSTEM FOR SEISMIC DATA TRANSFER
D. RISTOW, Prakla Seismos Gmbh, *Hannover 1, Niedersachsen, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: OBJECTIVE: A telemetry system for seismic data transfer will be developed.

WORK PROGRAM: a) Basic reflections; checking of possibilities and limits of various solutions. b) Development of cable. c) Development of energy supply. d) Development of multiplexing mode. e) Development of amplifier. f) Construction and testing of a prototype.

STATUS: Considerations have shown that from many solution possibilities the cable telemetry offers most of the advantages in seismics. Research work in this respect was done in the United States and France in the last years. Two manufacturers will present prototypes at the beginning of 1976. The essential technical problems are found in: covering the dynamic range of 120 dB required in seismics with sufficient resolution (standard with digital field systems used today: or 4 bits gain code plus 15 bits amplitude). Small attenuation by cable at high data transfer rates of some M bits/s (at 2 ms sampling interval and about 200 seismic channels). Foolproof coding of channels which has to be changed from record to record with the generally used multiple coverage method. Smallest possible and light weight instruments because they have to be carried in the field. Least possible energy consumption.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0603, DIRECT RECOGNITION OF HYDROCARBONS, AND RECONNAISSANCE OF LITHOLOGY USING SEISMIC PROCEDURES
D. RISTOW, Prakla Seismos Gmbh, *Hannover 1, Niedersachsen, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: OBJECTIVE: Methods shall be developed permitting the utilization of physical, hitherto suppressed or adulterated parameters which are contained in seismograms. The parameters may serve as indicators for rock parameters, for the identification of rocks, for the determination of their pores, and for the determination of their pore-filling.

WORK PROGRAM: a) Preparatory studies, Theoretical studies, Pre-reflections on digital procedures. b) Implementation of procedures, Programming and testing of procedures for the extraction of physical parameters from seismic surveys, Extractions of parameters from seismic surveys in the vicinity of deep wells, and correlation with parameters known from deep wells. c) Development of geological interpretation methods for the interpretation of physiaal parameters and application to hydrocarbons in exploration.

STATUS: In conformity with the working plan considerations, basic investigations and literature studies have been made. Special attention was given to the development of display modes for the physical parameters extracted from seismic surveys. The following review of the studies is subdivided according to these parameters: Studies of the amplitude in dependence of the transmitter/receiver-distance according to different processes and at different transmitter energy. Development of a procedure ('scanning') which enables any selection of amplitudes and their frequency true reproduction. 'Ambient-noise'-studies with onshore and offshore surveys. Polarity recognition by colour displays of seismic sections. Frequency analyses, referred to the horizon, and automatic determination, as well as continuous display of their characteristics.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0604, NEW AND FURTHER DEVELOPMENT OF METHODS OF ORGANIC CHEMISTRY AND ISOTOPIC

GEOPHYSICS FOR APPLICATION TO THE EXPLORATION OF HYDROCARBONS
W. STAHL, Geosciences & Mineral Inst., *Hannover 23, Niedersachsen, Federal Republic of Germany* 3000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0605, RESEARCH UPON DIFFERENT POSSIBILITIES OF PRODUCING ENERGY FROM STRAW
H. SCHULZ, Technical Univ. of Munich, *Munich 2, Bayern, Federal Republic of Germany* 8000

DESCRIPTION OF PROJECT: OBJECTIVE: Experiment tests of plants for producing energy from straw; further development of these plants; construction of hot-air generators for drying plants by utilizing the combustion of the straw; carbonization of the straw in order to separate important elements and for the winning of straw coal.

WORK PROGRAM: a) Determination of the calorific value of different sorts of straw according to their varying moisture contents. b) Measurements at existing straw furnaces (heating capacity and efficiency). c) Improvements of the furnaces considering physical points of view and the efficiency of their work. d) Construction of a plant for burning huge bales (500 kg/bale). e) Development of simple plants for decomposing huge bales. f) Construction of hot-air generators for drying purposes (1. Combined plants for heating homes with boiler and interchange of heat. 2. Steel plant for interchange of heat without water circulation including the direct heating by selective connecting. 3. High-capacity combustion of huge bales.) g) Carbonization of straw: use and improvement of a plant developed by Dipl.-Ing. Linneborn.

RELATION TO OTHER WORKS: The work is based on existing Passat straw furnaces and plants designed by Dipl.-Ing. Linneborn; moreover, collaboration is held with the Institut fur Landmaschineenforschung of the Agricultural Research Centre in Braunschweig-Volkenrode where the basic studies of combustion of straw are made.

STATUS: Determination of the calorific value of different sorts of straw was made with the aid of a calorimeter.

Fundamental analysis of straw and ashes are in hand. Heating capacity and efficiency of 1 Passat furnace and 3 Linneborn furnaces are in hand. 2 movable hot-air generators for drying plants are ready, 1 transport vehicle for huge bales was constructed. Experiments with supporting fires began in order to reduce the smoke emission when lighting the fire.

ADDENDA: Performing organization: Bayerische Landesanstalt fuer Landtechnik, TU Muenchen.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0606, GASIFICATION OF MUNICIPAL AND INDUSTRIAL WASTE
HUCK, Saarberg Fernwaerme Gmbh, *Saarbruecken, Saarland, Federal Republic of Germany*

DESCRIPTION OF PROJECT: Objective: A process for conversion of municipal and industrial waste into a heating gas with a high BTU value without increase of pollution will be developed to the commercial stage. The waste material will be gasified by means of partial oxidation. The resulting gas is purified of harmful components after removal of heavier fractions by means of condensation.

WORK PROGRAM: a) Defining basic concepts, planning and construction of a pilot plant at a capacity of 1 t/h. b) Start-up of unit. c) Systematic variation of parameters to establish correlations of physical and chemical variables. d) Optimization of operating conditions. e) Determining mass and energy balance. f) Check on suitability of materials. g) Evaluation of test results for design, construction, and operation of commercial unit.

STATUS: The pilot plant is in the planning stage. Small-scale experiments were carried out.

ADDENDA: Performing organization: Saarberg-Fernwarme GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0607, POWER STATIONS USING FOSSIL FUELS
G. BAUERSFELD, Univ. of Stuttgart, *Stuttgart, Baden Wuerttemberg, Federal Republic of Germany* D7000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0608, METHANE AND METHANOL AS MEANS FOR ENERGY SUPPLY (COMPARATIVE PROFITABILITY STUDY)
H. HAFERKAMP, Salzgitter AG, *3320 Salzgitter, Federal Republic of Germany*

MAIN OBJECT: Conversion, transport and storage of energy.

FIELD: System analysis studies.

OBJECTIVE: Elaboration of the economic and technical ways and means for the supply of LNG and methanol to industrial centers, with natural gas from the Iranian area as raw material basis.

WORK PROGRAM: Clarification and examination of the given possibilities of preparation, transportation and storage of potential means of energy supply. Elaboration of overall solution proposals. Cost estimates of economic ways of solution. Comparative examination of these proposals under economic and technical aspects. Representation of the optimum solution for the energy supply in Germany on a basis of natural gas from the Iranian area. List of open questions.

STATUS: A substantial part of the project has already been realized. The termination of the project will be on schedule.

ADDENDA: Performing organization: Salzgitter AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

1.0609, CONVERSION OF PEAT TO OIL
R. IKANM, Hebrew University of Jerusalem, Center of Energy, *Jerusalem, Israel*

Peat from Huleh is being converted to oil by thermocatalytic process in presence of reducing gases. The crude oil obtained can be used as fuel oil or refined by chromatography and distillation.

SUPPORTED BY Israel - Ministry of Commerce & Industry - Jerusalem

1.0610, UTILIZATION OF HEAT GENERATED BY COMBUSTION OF WASTE
B.G. KREITER, Waste Disposal Foundation, *Amersfoort, Netherlands*

This project concerns the research on the utilization of the heat generated by incineration of waste: a) supply of heat (warm water and steam); b) generation of electricity; c) combination of a) and b).

SUPPORTED BY Netherlands - Institute for Waste Diposal - Amersfoort

1.0611, PYROLYSIS OF WASTE
B.G. KREITER, Waste Disposal Foundation, *Amersfoort, Netherlands*

The objective of this project is to define the possibilities of the technology of pyrolizing waste (municipal and extraordinary types of refuse, such as old tires).

SUPPORTED BY Netherlands - Institute for Waste Diposal - Amersfoort

1.0612, UTILIZATION OF CELLULOSE FROM AGRICULTURAL WASTE AS A RESOURCE FOR FOOD SYNTHESIS AND ENERGY GENERATION
A.H. STOUTHAMER, Free University of Amsterdam, *Amsterdam, Netherlands*

1. ORGANIC SOURCES OF ENERGY

Cellulose (from agricultural refuse) is a substantial resource for the synthesis of food and for energy production. Cellulose might be converted either to 'single cell protein', or to ethyl alcohol or to methane by microbiological processes. Micro-organisms that are able to perform such processes in an efficient way are not known yet.

A disadvantage of the conversion of waste cellulose is the contamination with other polymers, e.g., lignine. This affects the rate of conversion.

The program therefore includes: a) Study of the deterioration of cellulose/lignine mixtures by mixed cultures of micro-organisms. These are raised by the continuous breeding of samples from natural environments. b) Study of the control of cellulose synthesis in pure and in mixed cultures. Already much research has been performed elsewhere regarding the subjects a) and b).

The intention is to apply new techniques, developed by the research team for other objectives, in this field, e.g., the technique of continuous breeding and the use of mixed cultures.

SUPPORTED BY Netherlands - Free University at Amsterdam

1.0613, PRODUCTION OF HYDROGEN BY MEANS OF BIOLOGICAL PROCESSES

A.H. STOUTHAMER, Free University of Amsterdam, *Amsterdam, Netherlands*

The objective is to study the possibilities of decomposing water using a hydrogenase system (comparable to the reduction-system in algae), combined with solar radiation.

There are gaps in the knowledge regarding the hydrogenase-system in algae. The program therefore includes the separation and purification of hydrogenases out of biological material, and the determination of their properties. A substantial disadvantage of hydrogenase enzymes in algae is their sensitiveness to oxygen.

Therefore this property will be investigated for hydrogenases from different origins. One of the systems to study is the hydrogenase enzyme of the oxyhydrogen bacteria (These organisms generate energy by catalyzing the reaction: 2H2 plus O2 yields 2H2O). This hydrogenase system is probably not poisoned by oxygen.

SUPPORTED BY Netherlands - Free University at Amsterdam

1.0614, SEPARATION OF DOMESTIC WASTE

F.J. COLON, Central Org. Adv. Appl. Res., Central Technical Inst., *Apeldoorn, Netherlands*

Domestic waste contains 25-30 percent of waste paper. If separation of this paper and recycling into a usable quality would be possible, it would mean a welcome supply to the material stock of the Dutch paper industry. Two years ago TNO started the development of a process concerning dry separation of domestic waste in various components. The results so far have proven that a usable product at an acceptable price can be obtained. A pilot plant handling 1 ton/hr of domestic waste has been tested, and up-scaling to a 10 ton/hr plant is underway.

Addenda: Supporting agency: Nijverheidsorganisatie TNO. Performing organization: Centraal Technisch Instituut TNO.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

1.0615, COMBUSTION OF WASTE

A. KIERS, Central Org. Adv. Appl. Res., Central Technical Inst., *Apeldoorn, Netherlands*

Investigation into the possibilities to burn gas, liquid, or solid wastes, making use of the heat generated.

Special aspects taken into account: afterburning; combustion of sludge; combustion of silt; fluidized bed combustion.

Addenda: Supporting agency: Nijverheidsorganisatie TNO. Performing organization: Centraal Technisch Instituut TNO.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

1.0616, WOOD WASTE AS AN ENERGY SOURCE FOR WOOD PROCESSING INDUSTRIES

B.M. ROEM, Central Org. Adv. Appl. Res., Forest Products Research Inst., *Delft, Netherlands*

The objective is to study the possibilities of utilizing wood waste (e.g. sawdust) as a fuel to substitute for fossil fuels for boilers and for engines.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

1.0617, METHANATION OF CARBON OXIDES

E.W. DEBRUIJN, Delft Univ. of Technology, *Delft, Netherlands*

The following aspects of methanation of carbon oxides are being studied: 1. Kinetics of the methanation of carbon oxides, under conditions used for the purification of hydrogen and ammonia synthesis gas, as well as under conditions applied in the manufacture of SNG. A computer-controlled microreactor unit is now under construction for use in this study. 2. The methanation of small amounts of carbon oxides in hydrogen is being used to study the dynamic behaviour and the static stability of fixed-bed, catalytic reactors. 3. The application of non-conventional, fixed-bed reactors for the manufacture of SNG is examined, with emphasis on temperature control.

SUPPORTED BY Netherlands - Delft University of Technology

1.0618, ANAEROBIC FERMENTATION OF INDUSTRIAL AND MUNICIPAL EFFLUENT AS A MEANS FOR PURIFICATION OF WATER AND METHANE PRODUCTION

P.M. HEERTJES, Delft Univ. of Technology, *Delft, Netherlands*

Compared with aerobic treatment, anaerobic treatment of waste waters has the advantages that methane is produced, no energy is needed to supply oxygen, and less surplus sludge of a better quality is produced. At present, disadvantages of the anaerobic treatment are the unreliability of the process and the problems involved in separating the gas from the microbial mass. These aspects are studied.

The research is carried out in collaboration with the Agricultural University at Wageningen (Professor Dr. P.G. Fohr, Dr.ir. G. Lettinga), where more concentrated wastes are studied.

SUPPORTED BY Netherlands - Delft University of Technology

1.0619, APPARATUS FOR FERMENTATION OF ORGANIC MATERIAL TO PRODUCE METHANE FOR DEVELOPING COUNTRIES

S.P. BERTRAM, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

SUPPORTED BY Netherlands - Foundation Tool - Eindhoven

1.0620, ANAEROBIC FERMENTATION OF ORGANIC MATERIAL

K.J. HUTTEMAN, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

OBJECTIVE: Development and design of anaerobic fermentation reactors for the quick conversion of wet vegetable wastes to methane (fuel) gas. The anaerobic fermentation process consists of several successive stages. It can be expected that, when the sub-processes are controlled individually, the rate of the overall process will be substantially increased with respect to the recently applied installations. The necessity of pre- and intermediate treatments of the substrate has to be studied also.

APPLICATION: The treatment of substantial amounts of sludge (from waste waters), manure of pigs, cows, etc., municipal waste and industrial refuse. The nitrogen compounds are not destroyed during the process, in contrast to the incineration of vegetable and animal waste.

REMARKS: This type of process offers the opportunity to generate part of our energy need in a way acceptable from the environmental point of view as well as utilizing a recuperative source as long as the sun emits light. Further, we are released from enormous amounts of stinking waste. This process may be of interest for the elimination of waste from population concentrations and regions where pigs and cattle are bred intensively. The applications of the fermentation process on an industrial scale are rare, because the methane price is compared with the conventional fuel gas prices. The latter are favourable at the moment. Although the anaerobic fermentation of organic waste may be a minor source of energy as a refuse treatment for stinking substances, this method surpasses all the other possibilities.

ADDENDA: Supporting agency and performing organization: Technische Hogeschool Eindhoven.

SUPPORTED BY Netherlands - Eindhoven University of Technology

1.0621, FUEL GAS GENERATORS

K.J. HUTTEMAN, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

Objective: Gasification of combustible solid waste, with a high percentage of water, together with combustible liquids to fuel gas.

Application: Municipal and industrial waste treatment of fuel gas and ashes. The latter can be utilized as a compound for artificial fertilizers. The fuel gas has to be purified from environmentally undesirable compounds.

Experimental: A simple convertor has successfully produced fuel gas for several hours. The gas was ignited at the exhaust of the converter. It burned with a sootless flame.

This preliminary investigation has proved that combustible solid waste with a high percentage of water mixed with combustible liquids, such as used lubricating oil, can be gasified to a fuel gas with a heat of combustion of 1000-1500 kcal/cubic meter (STP).

The thermal efficiency of this gasification method is particularly favourable. During the test runs, the bunker for the waste supply caused difficulties. It has been decided to construct a bigger bunker. Pending the construction of this design, the experiments have been postponed.

Addenda: Supporting agency and performing organization: Technische Hogeschool Eindhoven.

SUPPORTED BY Netherlands - Eindhoven University of Technology

1.0622, AGRICULTURAL WASTE AND REFUSE AS AN ENERGY SOURCE FOR DEVELOPING COUNTRIES

W.P. VANSWAAIJ, Twente Univ. of Technology, *Enschede, Netherlands*

Based on an evaluation of reports and of results from experiments to be performed with a bench scale reactor, some gasification and pyrolysis processes are being planned for the conversion of organic waste to fuel. These processes must be suitable for application in developing countries.

SUPPORTED BY Netherlands - Twente University of Technology - Enschede

1.0623, ALTERNATIVE ENERGY SOURCES

UNKNOWN, Dutch State Mines, Netherlands Res. & Pat. Dept., *Geleen, Netherlands*

This project concerns studies of production and use of hydrogen and methanol as alternative energy carriers.

SUPPORTED BY Netherlands - Dutch State Mines - Heerlen

1.0624, COMBINED CYCLE INSTALLATION

UNKNOWN, Stork Boilers & Power Systems, *Hengelo, Netherlands*

There is an increased interest in the possible application of a combined cycle with fuel gasification. The process is based on the partial oxidation of fuels at elevated pressure, whereby the fuel is converted into raw fuel gas. The gas, after removal of contaminants such as ash and sulphur, is subsequently burned in a combustor and expanded in a gas turbine. Electricity is partly produced in gas turbogenerators and partly in steam turbogenerators. Steam is produced in the wasteheat-boiler of the partial combustion cycle and in the gas combustor. As a consequence of this increased interest, Stork Boilers Power Systems is studying the design of a supercharged boiler and will possibly undertake the development of other components.

SUPPORTED BY Netherlands - Stork Boilers & Power Systems - Hengelo

1.0625, PRODUCTION OF METHANOL

HOEKSTRA, Hoogovens Ijmuiden B.V., *Ijmuiden, Netherlands*

Technological and economical assessment of the synthesis of methanol from carbon monoxide-containing exhaust gases from oxysteel works.

SUPPORTED BY Netherlands - Hoogovens Ijmuiden B.V.

1.0626, FERMENTATION OF ORGANIC MATTER TO METHANE

G.D. VOGELS, Microbiology Laboratory, *Nijmegen, Netherlands*

Historical: The methane-forming bacteria and their metabolism have hardly been studied before, because of their excessive sensitiveness to oxygen. These micro-organisms play a part in the anaerobic conversion of organic matter in nature. Besides, the bacteria are able to synthesize poisonous methyl-metal compounds. New methods have been developed for breeding methane-forming bacteria on a laboratory scale.

Current situation: In cooperation with Prof. Wolfe (University of Illinois), the Laboratory for Microbiology investigates: a) the optimum conditions with respect to the formation of methane and the co-factors concerned; b) the mechanism of the fermentation caused by methane-forming bacteria. The performance of the project is impeded by shortage of scientists.

SUPPORTED BY Netherlands - Catholic University of Nijmegen

1.0627, FUEL GAS PRODUCTION

W. TAKENS, V E G Gas Institute N.V., *Rijswijk 2100, Netherlands*

A literature research will be executed on several fuel gas-production processes: a. coal gasification, b. crude oil, c. hydrogen production by water electrolysis.

Addenda: Supporting agency & performing organization: VEG Gasinstituut N.V.

SUPPORTED BY Netherlands - V E G Gas Institute N.V. - Rijswijk

1.0628, FUEL GAS TREATMENT

W. TAKENS, V E G Gas Institute N.V., *Rijswijk 2100, Netherlands*

To keep constant burner properties, it is necessary to find some fuel gas parameters which are applicable to this problem.

As a solution, air and/or hydrogen can be mixed with gas.

The purpose is to investigate the technological consequences of this mixing.

The influence of changes in gas quality on odorisation is a part of the investigation.

Addenda: Supporting agency and performing organization: VEG Gasinstituut N.V.

SUPPORTED BY Netherlands - V E G Gas Institute N.V. - Rijswijk

1.0629, DEVELOPMENT OF INCINERATION PLANTS WITH ENERGY AND MATERIAL RECOVERY AND TRANSFORMATION IN COMMERCIAL FORM

P. CROOCKEWIT, Rijn Schelde Verolme N.V., *Rotterdam, Netherlands*

SUPPORTED BY Netherlands - Rijn Schelde Verolme N.V. - Rotterdam

1.0630, ANAEROBIC FERMENTATION FOR THE PURIFICATON OF CONCENTRATED INDUSTRIAL EFFLUENT WATER AND FOR METHANE PRODUCTION

G. LETTINGS, Wageningen Ctr. of Agric. Sci., *Wageningen, Netherlands*

The anaerobic treatment of industrial effluent has the advantage (above other methods), in that the fuel gas methane is produced by the conversion of the organic matter present in the waste water.

Further, the amount of sludge produced is substantially smaller than that formed during the application of other methods, whereas the subsequent treatment of the sludge (separation of water) is easier; moreover, higher organic loads can be applied.

THE OBJECTIVES OF THE RESEARCH ARE: 1) To study the chemical aspects and reaction kinetics of the anaerobic conversion of specific compounds (fatty acids, methanol, carbon hydrates, etc.) and reaction factors (e.g. temperature, pH, toxic and inhibiting compounds, sludge concentration, surplus sludge, and methane output); 2) To apply the anaerobic treatment for the purification of different types of industrial effluents (potato flour-, dairy-, sugar- and vegetable-canning industries; 3) The development of an anaerobic reactor (anaerobic filter/upflow reactor) and two- and three-stage purification processes; 4) Study of the possibilities of promoting the adaption of the sludge to a certain type of waste water; 5) Possibilities of storing sludge unfed.

SUPPORTED BY Netherlands - Ministry of Agriculture - The Hague

1.0631, PRODUCTION OF METHANE BY FERMENTATION OF PIG MANURE

J. DEWAART, Central Org. Adv. Appl. Res., Central Inst. for Nutrition, *Zeist, Netherlands*

For as long as five months, experiments have been performed with continuous pilot plant (volume: 0.5 cubic meter; temperature: 30-35 degrees C; feed: diluted pig manure, 6 percent solids). One kilo of dry organic substance generated about 0.5 cubic meter of methane.

Other types of organic substrates can be used to produce methane.

The program also includes studying: a) the costs of transporting manure (or waste) to the converter; b) the costs of treating the sludge (e.g. fermentation, filtering, transport of the stabilized sludge); c) the assessment of the value of the stabilized sludge; d) the costs of purification of the percolation water.

SUPPORTED BY Netherlands - Organization for Nutrition & Food - The Hague

1.0632, PEAT FOR DOMESTIC HEATING AT GISLAVED, SWEDEN

S. ENGSTROM, Gislaveds Kommun, *Gislaved, Sweden*

OBJECTIVE: To study the conditions and the practical methods of utilizing peat as a primary and/or secondary fuel in a small district heating plant (max 70 MW). It is assumed that the plant is situated in the vicinity of easily accessible peat bogs.

APPROACH: In stage 1 preparatory investigations to determine technical, economical and environment-technical conditions are carried out. The design of future stage is studied.

PROGRESS: In future stages the following are to be studied: The handling and processing of peat into fuel; The thermal energy conversion; The effect on the environment.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

1.0633, ENERGY RECOVERY FROM MANURE

O. OHMARK, Jarvso Verken Ab, *Jarvso, Sweden*

The aim of the project is to find out whether it is economically justified to recover energy from manure, both for the operation of the electric equipment of a farm, and for satisfying the heat requirements of dwelling-houses and other buildings belonging to it.

The environmental advantages of such a procedure (no air pollution) as well as its importance in times of emergency make it an issue which must not be neglected.

The properties of fully digested manure, like less odour, faster nitrogen effect, and easier pumping, may result in less demand for commercial manure, which would have a favourable effect on economy. Distribution may be done in a more sensible way than before, which may prevent water pollution.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

1.0634, RELATIONSHIP BETWEEN CELL-MASS PRODUCTION AND PRODUCT FORMATION IN ANAEROBIC SYSTEMS

N. MOLIN, Univ. of Lund, Chemical Center, *Lund 7, Sweden*

The object of the project is to define the relationship between product formation and cell-mass production in anaerobic systems. The production of metabolites is dependent on the amount of cell mass available and its physiological condition.

In a first phase, work will aim at defining cultivation conditions which give optimal cell growth. Thus, the importance of the following parameters will be studied: 1) graft material, 2) spore formation, 3) the redox potential, 4) medium composition, 5) the composition of the gaseous phase. Moreover, alternative methods for cell-mass production and product formation are to be tested out.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

1.0635, UTILIZATION OF THE WHOLE TREE (ENERGY PRODUCTION)

P. ALSEFELT, All Tree Utilization Project, *Stockholm, Sweden*

OBJECTIVE: The project aims at providing a basis of and developing methods for technical utilization of that assortment of wood raw material which, with present conventional felling methods, is left in the forests or separated within industry, regarded as waste. By such marginal raw material assortment are meant tops, branches, stumps and roots as well as smallwood which remain after cleaning and thinning a forest.

APPROACH: The project work is to be assigned to four project groups or subject sectors: forest, logging, pulp, and fibreboard/ particle board.

PROGRESS: The project is in progress and a final report is to be expected at the end of 1977.

INTENDED USE OF RESULTS: Better utilization of wood raw material.

ADDENDA: Performing organization: Projekt Heltradsutnyttjande.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

1.0636, BARK PRESSING

I. SANDQVIST, Forest Products Research Lab, *Stockholm, Sweden*

Swedish forest industry handles large bark quantities, roughly 2 million tons of dry weight/year. The major part of this bark is burnt. The energy yield highly depends on its dry matter content. A 5% increase of dry matter content at a 40% dry matter content will enhance heat yield by 8-12%, which, in Sweden, would mean saving 100,000 cubic meters of fuel oil/year.

The least expensive way to remove water from wet bark is pressing, a method which yields today roughly 40% dry matter content.

This investigation is expected to lead to a development of better bark pressing equipment, which a) is of great economic importance to forest industry; b) would contribute to the general energy supply; c) would help to find a good solution of environmental problems connected with bark pressing; d) would provide a basis for manufacturing and export of Swedish engineering products.

PROJECT PLAN: 1) Literature studies and tests centered on the moisture sorption capacity of bark. 2) Evaluation of what bark assortment should be the subject of continued investigation.

3) Determination of the proportion of water in bark, which is bound, free, and 'on the outside'. 4) Pressing tests in a laboratory press. 5) Possible fields tests, and 6) Possible tests of surveying character, with other solutions, for example hydroextraction.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

1.0637, MICROBIOLOGICAL GASEOUS PHASE CATALYSIS WITH GEL IMMOBILIZED CELLS

C.G. HEDEN, Karolinska Institutet, *Stockholm, Sweden*

Experiments concerning enzymatic methanol syntheses have been carried out, the results indicating the need of systematic screening work. However, owing to the slow growth of the relevant bacterial isolates this work will necessarily extend over a long period of time. Consequently, between the different series of tests, there will be periods of waiting that may well be utilized for carrying out other experiments in the aspects of microbiological gaseous phase catalysis with gel immobilized cells. Such experiments could be carried out in two more aspects: Biochemical nitrogen fixation and elimination of odours.

The project program also involves preparations for another project phase more related with basic research. This part of the program, however, has to be preceded by the tests mentioned above, before a suitable model system can be chosen. After that it should be possible to plan in detail mass conversion tests to elucidate the kinetics of microbiological gaseous phase catalysis in bead polymerized gel systems.

Successful results of the nitrogen fixing system could lead to a microbial production of ammonia, which might prove useful in the process development of decentralized production of fertilizers.

Results of experiments on elimination of smell could be used in the development of biological filters for the elimination of odours.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

1.0638, IMPROVED TECHNIQUE IN USING A COMBINATION OF LIQUOR AND OIL OR BARK (AND OTHER WASTE PRODUCTS) AND OIL FOR HEATING PURPOSES

T. WAHLBERG, Research Found. for Heat Engin, *Stockholm, Sweden*

Auxiliary heating with oil is frequently applied when liquor and bark (including other waste products) are used as fuels. Such heating combinations are associated with a large number of difficulties in terms of ventilation, corrosion, slag deposits and slag separation as well as deposits in the form of dust and solid particles on fire tubes and in economizers, etc.

The object of the project is to create conditions for higher efficiencies and reduce the number of operational disturbances when a combination of fuels are used for heating purposes.

The first project phase involves a survey of operational observations made at different boiler plants within the pulp and paper industry.

The investigation will indicate fields of activities on which to centre experimental efforts in a second phase. Such fields of activities are for instance a study of corrosion-accelerating tracer elements in fuel oil and development of methods for the elimination of dust and other deposits on boiler tubes and in economizers.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

1.0639, EXPERIMENTS AND STUDIES CONCERNING THE CULTIVATION OF FAST-GROWING CLONES SUCH AS POPLAR AND SALLOW SUITABLE FOR ENERGY PRODUCTION

G. SIREN, Royal College of Forestry, *Stockholm, Sweden*

OBJECTIVE: Experiments and studies will be made concerning the intensive cultivation of fast-growing types of trees which, after a certain initial period, will produce 2-4 kg dry trunk wood per m2 during one growth cycle. The heat content of the wood is approximately equivalent to 1-2 kg oil. The rate of growth is also to be studied where the soil is heated by waste heat from nuclear power stations.

The current phase of the project is stage 2.

APPROACH: In stage 1 of the project (research project No. 53 3065 011) the programme of experiments was structured and a plant research station at Studsvik, Sweden has been laid out.

PROGRESS: In stage 2 of the project (the current phase) the cultivation experiments are carried out; samples for analysis are taken and the growth and production are studied. If the results come up to the expectations preparations are to be made for the construction of a computer system, and an expansion of experiments on mineralogenic and organogenic substrata plus studies of the soil heating experiments.

The results are to be presented by 1977-01-15 at the latest.

The research work may possibly be extended by a third stage during 1977-1982.

A part of the project is planned to be internationalized within the framework of the IEA collaboration.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

1.0640, EXECUTION OF THE ANALYSIS, PLANNING AND MANAGEMENT OF THE WORK FOR METHANOL PRODUCTION

D. VENDIL, Svensk Metanolutveckling Ab, *Stockholm, Sweden*

OBJECTIVE: Investigation of conditions required to produce methanol.

The current phase of the project is stage 1.

APPROACH: Stage 1 is to carry out a long-range evaluation, produce an investment plan for the Board for Energy Source Development's methanol sector and carry out the duties of managing the methanol programme. Programme management duties consist of secretariat and lecture assignments, the preparation of basic data for project decisions, supervising the project and reporting the result of both the project and the whole programme.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

1.0641, TECHNO-ECONOMICAL STUDIES OF THE METHANOL INSTALLATION PROJECTS AND THE METHANOL MARKET

D. VENDIL, Svensk Metanolutveckling Ab, *Stockholm, Sweden*

OBJECTIVES: An elucidation of the technology and economy of large-scale methanol production. Both the production of methanol alone and the production of methanol with high alcohols is to be studied. It is assumed that in both cases the raw material is residual oil or natural gas.

The current phase of the project is stage 1.

APPROACH: In stage 1 the work is carried out by British and American companies in the branch. The results of an ongoing multi-client study on the future use of methanol are to be purchased.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

1.0642, PRODUCING OIL FROM WET PEAT BY HIGH PRESSURE TREATMENT USING HYDROGEN GAS AND/OR CARBON MONOXIDE

P. BJORNBOM, Royal Institute of Technology, *Stockholm 70, Sweden*

OBJECTIVE: To study different systems of high pressure treatment of wet peat for the production of oil using hydrogen gas and/or carbon monoxide. These methods are supposed to dry peat without energy being consumed.

The current phase of the project is stage 2.

APPROACH: In stage 1 of the project (research project No. 53 3062 021) a study of the literature in the carbonhydration sector and estimates of the energy balance and economy was carried out. Computers have been used to analyse approximately 30 cases with variations in the parameters; moisture content and temperature conditions.

PROGRESS: The results were presented in a report dated 1976-03-29.

1. ORGANIC SOURCES OF ENERGY

In stage 2 (the current phase of the project) a coordinated research with Canadian researchers working with Prof. Chornet at the University of Sherbrooke, Quebec, Canada, is carried out.

Further stages will continue with experiments on a larger scale.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

1.0643, STUDIES OF FLUIDIZED BEDS USED FOR HEATING FURNACES, ETC. IN METALLURGY

R. COLLIN, Royal Institute of Technology, *Stockholm 70, Sweden*

OBJECTIVE: Theoretical studies of fluidizing, gasification and combustion. A gas generator for producing energy principally in metallurgical processes, the burning of waste, etc., will be developed.

APPROACH: An existing reactor will be supplied with a fluidized bed. A series of tests using the converted reactor is to be carried out. Studies of mathematical models are included in the work.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

1.0644, COLLOCATION OF PEAT DEWATERING METHODS AND STUDIES OF THE POSSIBILITIES OF DEVELOPING THE METHODS

O. LINDSTROM, Royal Institute of Technology, *Stockholm 70, Sweden*

OBJECTIVE: To identify the methods of peat dewatering which are available and investigate the possibilities of further development of these methods.

APPROACH: The existing methods for peat dewatering is examined and the reasons why these have not been successful are surveyed. The mining, drying, transportation of peat and the possibilities of utilizing waste heat for thermal drying are studied.

PROGRESS: More extensive studies of the most profitable and suitable methods are planned for a next stage of the project.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

1.0645, STUDIES AND EXPERIMENTS CONCERNING THE GASIFICATION OF PEAT USING PYROLYSIS

O. LINDSTROM, Royal Institute of Technology, *Stockholm 70, Sweden*

OBJECTIVE: To conduct studies and experiments to obtain data on pyrolysis system suitable for specifically Swedish conditions such as the gasification of peat, wood chips and waste.

The current phase of the projects is stage 2.

APPROACH: A pyrolysis project has been run by the Institute of Chemical Technology.

PROGRESS: Stage 1 of the project (research project No. 53 3066 011) consists of: The elucidation of existing gasification processes for solid fuels. A study of pyrolysis and gasification process literature. Studies of pyrolysis and gasification in laboratory reactor. Introductory experiments in a flash pyrolysis reactor.

In stage 2 (the current phase) of the project a continuation and expansion of studies and experiments is carried out.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

1.0646, ENERGY RECOVERY FROM BIOLOGICAL WASTE

H. LJUNGGREN, Agricultural College of Sweden, Inst. of Microbiology, *Uppsala 7, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

1.0647, INVESTIGATION CONCERNING PRODUCTION OF METHANE GAS OUT OF MANURE AND OTHER WASTE PRODUCTS

O. NOREN, Agricultural Engineering Inst, *Uppsala 7, Sweden*

Before initiating an extensive development project concerning the production of methane gas out of manure and other waste products, a preliminary investigation will be made. This investigation will result in a project plan for a Swedish methane-gas project.

Since process time and gas yield are important factors as regards economy, the aim is to find out how much is known, in different parts of the world, about the microbiology of methane gas reaction, within the field concerned. Furthermore, the most suitable application of the gas will be studied, i.e., application for heating purposes, production of electric power or internal combustion-engine drive. The storage problem will also be investigated. A draft design for inexpensive storage of gas, and possibly also a screening test, should be inclued in this part of the investigation.

The investigations mentioned above will serve as the basis for a draft design for a methane reactor. An estimate of investment requirements as well as costs of methane gas production will then be made.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

1.0648, DIESEL MOTOR COMBINED HEAT AND POWER PLANT AT SKULTUNA

G. KERS, Vasteras Stads Kraftvarmeverk, *Vasteras, Sweden*

A Diesel motor combined heat and power plant has been built and tested. Total power is 30 MW. It has been in operation since the end of 1975.

A detailed report presenting the design, operational experiences and evaluation of future utilization of the technique will appear soon.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

2. THERMONUCLEAR ENERGY & PLASMA PHYSICS

2.0001, ELECTRON EMISSION FROM SOLIDS UNDER HYDROGEN AND DEUTERIUM ION IMPACT

R.A. BARAGIOLA, Bariloche Atomic Center, *San Carlos de Bariloche, R.N., Argentina* 8400

Reliable data on electron emission from surfaces under light ion impact is very scarce. This is due to the fact that in most experiments on this subject, the surface conditions were not well known. In particular, and since light ion beams are very inefficient in sputtering surface contaminants, clean conditions were seldom met.

Under this research project, clean surfaces will be created by vacuum deposition of a film on a suitable substrate, under ultra-high vacuum (UHV) conditions, Refractory metals will be degassed at high temperature to remove adsorbed gas layers. Electron emission coefficients will be measured for H ion and D ion impact at energies from a few KeV to 60 KeV under UHV conditions.

Controlled amounts of gases will be introduced in the target chamber to measure effects of adsorbed gases.

The variation of electron emission coefficient on ion dose will be measured for thin oxide layers to examine the role of 'chemical sputtering'.

The final objective will be to get reliable data of importance to fusion research.

ADDENDA: Performing organization: Centro Atomico Bariloche.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

2.0002, FUNDAMENTAL AND APPLIED RESEARCH IN PLASMAS

P.R. SMY, Univ. of Alberta, *Edmonton, Alberta, Canada*

Laser Heating of Plasmas - using CO2 lasers with magnetic confinement in 100 kg fields. Combustion studies. Electrical measurements in flames and internal combustion engines. Effect of field/air mixture variation.

SUPPORTED BY No Formal Support Reported

2.0003, DEVELOPMENT AND ASSESSMENT OF SURFACE ANALYSIS TECHNIQUES FOR FUSION MATERIALS RESEARCH

J.E. ROBINSON, McMaster University, *Hamilton, Ontario, Canada*

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

2.0004, STUDY OF FUSION OF THERMONUCLEAR CONTROL

G. PAQUETTE, Univ. of Montreal, *Montreal, Quebec, Canada*

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

2.0005, PLASMA PHYSICS (WAVES AND TURBULENT HEATING)

H.M. SKARSGARD, Univ. of Saskatchewan, *Saskatoon, Saskatchewan, Canada*

The work of the group is concentrated in the area of plasma waves and turbulent heating of plasmas. The generation and propagation of various kinds of waves in plasmas (ion waves, lower hybrid waves, electron waves) are studied experimentally and theoretically. Turbulent heating due to large-amplitude, current-driven, electrostatic waves is of particular concern. This is one of the possible methods by which it is hoped to ignite the plasma fuel in an eventual fusion reactor.

Turbulent heating is investigated in two toroidal experiments. In the first, the plasma current results from a uniform electric field (approximately greater than 10 to the 2nd power V/cm) induced parallel to the toroidal, confining magnetic field. High-frequency (omega pi greater than omega greater than omega pe) waves grow first (within approximately to the minus 7th power sec), enhancing the resistance to current flow and heating up the electronS to keV energies. Ion acoustic waves (omega approximately greater than omega pi) are subsequently observed (after approximately 10 to the minus 6th power sec) together with rapid heating of the plasma ions (up to approximately 0.5 keV in helium plasmas). An improved version of this experiment (higher containment field; improved diagnostics) is under construction. In the second experiment, a nonuniform electric field (approximately 1 V/cm) is appplied, such that the plasma current density changes direction near the axis. The influence of this velocity shear is not yet understood, but surprisingly effective heating is observed despite the low value of the electric field.

Ion wave damping is investigated in a spherical plasma. Fluid dynamic damping (mainly due to the ambipolar flow velocity of the plasma) has recently been elucidated. Lower hybrid wave propagation is studied in a cylindrical plasma. Beam-plasma interactions due to two counterstreaming electron beams are also investigated. Theoretical investigations are carried out on the following problems: the diffusion tensor in turbulence theory, ion wave refraction in a thermal gradient, effects of loss-cone and temperature anisotropy on current-driven lower-hybrid instabilities, high-frequency flute instability with loss-cone distribution function, and functional calculus in strong plasma turbulence.

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

2.0006, DEVELOPMENT OF AN INTENSE, 14 MEV NEUTRON SOURCE

J.H. DELEEUW, Univ. of Toronto, Inst. for Aerospace Studies, *Toronto, Ontario, Canada*

While the virtue of the gas target generator concept is its great simplicity (compared with typical fusion devices), a number of experimental questions require resolution before it would be warranted to construct a full facility. Questions of aerodynamic stability and plasma formation have been resolved in large part by electron beam experiments undertaken by our group over the last two years. Gas scattering of an ion beam in the approach region to the gas target remains unresolved. Altogether, it is clear that, before proceeding to the fabrication of a full irradiation facility, it will be essential to undertake a simulation of the full scale operation of a gas target. To this end, our group is preparing a Negotiated Development Grant Application to the National Research Council to construct a high voltage, high current ion beam facility (greater than 300 kv, greater than 100 mA pulsed operation) which, in conjunction with the large gas pumping facilities at the Institute for Aerospace Studies, will make possible the full testing of the gas target concept. The ion source will be built and tested at low voltages (40 kv) using an available power supply. Other gas target studies of the group will also be continued.

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

2.0007, PLASMA PHYSICS RESEARCH (PART II)

R. NODWELL, Univ. of British Columbia, *Vancouver, British Columbia, Canada*

Research project summary: Line shifts in plasmas: 1. The shifts of some lines can be used to measure the electron temperature in plasma. Computations indicate possible lines, but the shifts have to be checked experimentally. 2. Stark effect of ion lines: The Stark shifts of lines from ionized atoms in static electric fields will be measured and compared with computed values to check atomic structure calculations. 3. Imploding, detonation expansion laser IDEL I: Based on extensive flow and gain measurements with IDEL I, a reconstruction of the nozzle is underway, and a newly designed IDEL II with more gain length and a different ignition system is being built, aiming to achieve laser action in both machines. 4. Schlieren diagnostics: We are building a quantitative diagnostic method with analog readout for the index of refraction in an object (such as a shock wave) passing through the field of view of a schlieren system. 5. Diffusion generator: A program has started to investigate the electromotive forces generated by the diffusion of electrons across a standing shock front. 6. Iodine laser: A CF3I photo-dissociation laser has been built with the intention to switch the laser beam by the application of an electric field to the active medium. A second experiment is in progress, in which the iodine laser is excited by an electrical current pulse, using no pump light at all. 7. Supercompression by an accelerated heat wave: The new laser fusion scheme requires the compression of matter by deflagration wave (heat wave) driving a series of shocks. There is no experimental evidence that such a scheme is possible at all. Experiments are underway to simulate the experimental conditions and study multi-shock-compression in an electro-thermal shock tube.

Part 2 of 3.

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

2.0008, PLASMA PHYSICS RESEARCH (PART III)

R. NODWELL, Univ. of British Columbia, *Vancouver, British Columbia, Canada*

Research project summary: Non-linear wave mixing: 1. Waves of accurately specified geometry are excited in fluids in order to examine non-linear mixing phenomena which are of interest in plasmas, particularly heating and stabilizing problems. 2. Laser interferometry in pulsed plasmas: Electron-density distributions in axisymmetric plasmas are being measured with a laser-

excited interferometer which records electron density directly, with high spatial and temporal resolution. Highly reproducible, quiescent plasma sources are also being developed for Thompson scattering experiments (anomalous scattered spectra). 3. Non-linear interactions: The non-linear interaction of charged particles trapped in the potential well of a monochromatic electrostatic wave in Vlasov plasmas is studied analytically and the stability of such a wave is investigated. 4. Thompson scattering from quiescent plasmas: A Z-pinch current is being developed for scattering experiments. The scattering will be performed when the discharge amount is zero and the plasma is at rest, in an effort to study anomalous scattering resulting from micro-instabilities induced in the quiescent plasma. 5. Heating mechanisms in convergent axisymmetric shocks: Pressure measurements are being performed on convergent axisymmetric shocks to ascertain the mechanism responsible for the observed preheating of stationary gas into which the shocks propagate. 6. Optical micrometer: A prototype device is being constructed for McMillan-Bloedell Company to measure the thickness of pressed wood coming out of the press without making physical contact with the boards. 7. Faraday resonant rotation spectroscopy: This method of measuring line shapes, developed in this laboratory, is being used to measure the van der Waals' broadening as a function of pressure.

Part 3 of 3.

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

2.0009, PLASMA PHYSICS RESEARCH (PART I)

R.A. NODWELL, Univ. of British Columbia, *Vancouver, British Columbia, Canada*

Research project summary: 1. Non-Linear Optical Mixing in a Plasma: Two dye laser beams, with frequency difference near the plasma frequency, are mixed to induce longitudinal oscillations. These enhanced oscillations are detected by ruby laser light. 2. Scattering of Laser Light from a Plasma Jet: Light from a Neodymium glass laser will be frequency-doubled and scattered from a plasma jet. Results will be compared with scattering of ruby laser light to determine the k-dependence of the scattering cross section. 3. High Intensity Plasma Light Source: A high current, vortex stabilized arc will be developed to produce a high temperature (approximately 6,000 degrees K), high efficacy (approximately 80 lumens/watt), high power (say 200 kw) lamp. A special PRAI grant has been received for the commercial development of this lamp. 4. Electron Trapping in a Standing E.M. Wave: Two beams of ruby laser light, travelling in opposite directions to form a standing wave, should trap plasma electrons in the potential trough. We will attempt to detect these trapped electrons by means of laser scattering. 5. Dense Plasma Focus: A plasma focus device has been built to provide an extremely hot high density plasma. The dynamics of the plasma are investigated by time resolved X-ray photography with a pinhole-image, converter-image intensifier-camera, developed in this laboratory. 6. Light Scattering from a Magnetically Stabilized Arc: A stable plasma of n sub e equals 10 to the 16th power cm minus 3 and T equals 150,000 degrees K is obtained in a magnetically stabilized arc. The plasma density fluctuations are investigated by laser light scattering. 7. Broadening of Ionized Lithium Lines: The width of ionized lithium lines in dense plasma are measured. The data are required to extend the theory of line broadening to the spectra of highly ionized, hydrogen-like atoms. 8. Shapes of Helium Lines in Plasmas: The shapes of He-I lines in plasmas are computed for astrophysical applications. Measurements of these lines are also planned.

Part 1 of 3.

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

2.0010, FUSION RESEARCH

UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

Fusion research was begun at RISO in 1958 when it became apparent that fusion energy was a realistic possibility for solving the energy problem. After a brief introductory explanatory phase, direct research problems were hastily begun, essentially those involving basic research. Since 1973 the group has been associated with the European fusion research program at EURATOM.

Besides participating in the EURATOM research work the fusion research group must also provide expert information to the authorities and provide instruction in the field of plasma physics.

SUPPORTED BY Denmark - Danish Government - Copenhagen

2.0011, BASIC PROGRAM FOR PLASMA TECHNOLOGY - SUPPLEMENTARY INVESTIGATIONS

BURHORN, Siemens AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

DESCRIPTION OF PROJECT: OBJECTIVE: To develop high-capacity circuit-breakers with an emphasis on reliability and economy. To develop suitable diagnostic procedures.

WORK PROGRAM: Interferometry on arcs subjected to SF6 jets. Effect of catcher electrodes on arcs drawn in an SF6 double nozzle arrangement. Investigation of behaviour of arcs drawn in a vacuum, i.e. in the presence of metal vapour.

STATUS: Interferometry on arcs subjected to SF6 jets. A real-time set-up has been constructed combined with a Bartels high-speed camera. With this arrangement it is possible to obtain 50 interferograms of one discharge. Depending on the rotating mirror frequency the time resolution extends into the microsecond range.

Effect of catcher electrodes on arcs subjected to SF6. Measurements of the cold gas jets have been completed. The chambers for the final quenching tests have been tested for their dielectric strength and can be stressed at up to 120 kV. Theoretical studies of the magnetic instability of the arcs have also been carried out.

Investigation of metal-vapour behaviour of arcs drawn in a vacuum. Emphasis was placed on investigating thermodynamic equilibrium, determining electron densities and investigating plasma behaviour near the cathode.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

2.0012, PLASMA TECHNOLOGY BASIS PROGRAM

GOENTHER, Siemens AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

2.0013, NUCLEAR FUSION REACTOR BEHAVIOR UNDER HYPOTHETICAL FAILURES CONSIDERING FAST MELTDOWN, THE BOILING & THE SOLIDIFICATION OF THE MELT

F. MAYINGER, Technical Univ. of Hannover, Inst. for Nuc. Technology, *Hannover, Niedersachsen, Federal Republic of Germany* 3000

ADDENDA: Performing organization: Inst. fuer Verfahrenstechnik der TU Hannover.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

2.0014, RELATIVISTIC PLASMAS

C. ANDELFINGER, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Under this contract, the work on the development of an electron ring accelerator is collected together.

Description of work planned: With the electron ring accelerator 'Schuko I', which contains a 30 cm long accelerating chamber, with little preparation, rings have been successfully accelerated. For a needed improvement in the electron ring, an additional azimuthal stabilizing field is being built, an arrangement for the correction of the radial magnetic field, and appropriate conducting sidewalls for the compressor are being built. The results of the investigation eventually make necessary other important things on the experiment. An additional aspect is being investigated--the trapping due to the inflection of the electron beam, especially in the presence of an azimuthal stabilizing field.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0015, LASER FUSION AND WAVE HEATING, LASER AND MICROWAVE DIAGNOSTICS
H. DERFLER, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Coherent scattering of infrared laser light and millimeter radiation off plasma waves, whether thermal- or turbulence-related density fluctuations, as a perturbation-free diagnostic of dispersion, relaxation, and parametric decay of ion waves. The scattering spectrum should be correlated with the stimulated transport (anomolous transport due to the HF or particle injection). Coefficients for the shock-free heating processes first will be investigated in LIWEREX, and later will be monitored in Tokamaks and stellarators.

Description of work planned: 1. Homodyne mixing of scattered light and spurious light, by small angle scattering with a single-mode CO2 laser consisting of a longitudinal strip, low-pressure discharge in series with a transverse excited discharge in the same optical resonator. Development of the electronic data acquisition systems, with the aid of the scattering spectra from LIWEREX. 2. Heterodyne mixing of scattered HCN laser light (337 microns) with the seventh harmonic of a 2.5 mm klystron, or else the fundamental of a second HCN laser (311 microns). The necessary superheterodyne equipment is being developed in regard to application in dense (n greater than 10 to the 13th power), hot (T greater than 3 keV) plasmas, where CO2 small angle scattering is unfeasible. 3. Development of homodyne and heterodyne sets for 2 mm scattered radiation for the investigation of longwave turbulence.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0016, LASER FUSION AND WAVE HEATING, LIWEREX MEANS LINEAR WAVE RELAXATION EXPERIMENT
H. DERFLER, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: High-frequency heating and lower hybrid deposition in a plasma column, which constitutes the inner conductor of a coaxial cable. The plasma column is produced by microwaves (2.45 GHz, 5 kW pulse) in an Iofee bar stabilized mirror arrangement (Bmin is 7 kG, mirror ratio 1:1.5). The penetration and the conversion of the electromagnetic waves into electrostatic waves, as well as the relaxation of the latter through shock-free absorption processes, are to be studied with the goal of shaping the groundwork for similar heating processes in toroidal plasmas.

Description of work planned: 1. Measure the heating mechanism and efficiency in the region of the lower hybrid frequency at 100 M Htz. 2. Diagnostics of relaxation processes through CO2 laser small-angle scattering and neutral particle analysis. 3. Development of a coupling system with waveguides for 800 MHz and 1 MW impulses with regard to applications in toroidal structures (TOWEREX). Locate and solve the breakdown problem.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0017, TOKAMAKS, JET - JOINT EUROPEAN TORUS
D. ECKHARTT, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: 1. Collaboration in drawing up a project for a joint European Tokamak (JET) in Culham. 2. Treatment a Garching of special problems framed by the JET team. According to JET agreement, the IPP is obliged to spend up to 2.5% of its budget for the JET preparation.

Description of the work planned: Stage 1. Only the personnel costs and associated expenses of the selected collaborators fall due. Stage 2. Here appear expenses from other expenditures for revised orders and calculated expenses.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0018, HIGH BETA PLASMAS, HBSII - WALL STABILIZED HIGH BETA STELLARATOR
M. KAUFMANN, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Building an installation for the study of HBS-equilibrium with weak compression ratio.

Description of the work planned: Upon the final approval of the project, the construction of the installation will begin: Final construction of the magnetic field capacitor bank; certain heavy components (condensers, containers, etc), begin on-the-spot construction. Furthermore, the accompanying theoretical program will thereupon be set aside, so that final optimized form of the windings can be determined.

The HBS-reactor concept will be further developed.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0019, TOKAMAKS, TOKAMAK ASDEX
M. KEILHACKER, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: ASDEX is a Tokamak experiment with magnetic limiter and an axisymmetric divertor. The principal problems to be investigated are: how much the influx of impurities can be reduced by an axisymmetric divertor, and how the plasma behaves under the changing boundary conditions. The experiment is planned such that ion temperatures in the kev range can be expected.

Data for the experiment: Major radius 1.54 m; plasma minor radius 0.4 m; magnetic field 3.0 T; plasma current 500 kA (for q equals 3).

Description of the work planned: Calculation and construction of the most important components (major field coils, ohmic heating pulse, multipole and vertical field coils, vacuum vessel, vacuum system, frame feedback system, and control); pre-evaluation of the technical concept; completion of the prototype coils; finishing of the components; preparing the diagnostics.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0020, TOKAMAKS, PULSATOR ML
O. KLUBER, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Revised version of Pulsator I: A multipole configuration produces a separatrix in the inside of the discharge container which works as a magnetic limiter. The major goal is the investigation of equilibrium and stability behavior in a Tokamak plasma in the stated field configuration. Of further importance are the comparison with 'classic' Tokamak discharges and the study of ignition condition.

Description of the work planned: Rebuilding of Pulsator I.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0021, TOKAMAKS, PULSATOR I
O. KLUBER, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Pulsator I is a Tokamak device which distinguishes itself through extreme axial symmetry, helical windings, and the possibility of good pre-ionization.

Description of work planned: 1. Measurement of the current density profile; 2. special investigation of the plasma-wall interaction (in collaboration with the realm of surface physics); 3. completion of the investigation of stability and containment; 4. continue the study of HF pre-ionization and heating; provide for the rebuilding in PML.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0022, TECHNOLOGY, FUSION REACTOR ELECTRICAL ENGINEERING
A. KNOBLOCH, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Technology of the electrical system for plasma trapping and heating.

Description of work planned: 1. Investigation of the SC (superconducting) prototype coil and completion of this coil as a sector coil unit; measurements on the SC-NC-triplet; 2. coupling out the energy from large SC coil units; 3. testing of the cooling with super-critical helium on the SC prototype coils; 4. low temperature neutron bombardment of superconducting and insulating materials; 5. planning SC prototype torus of shaped coils; 6. power supply for a pulsed NC magnet; 7. energy transmission for the ohmic heating.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0023, HIGH BETA PLASMAS, ISAR II

W. KOPPENDORFER, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Linear theta-pinch compression at low densities and with a modified magnetic field impulse, so that a weakly-compressed, warm plasma results. With this, a prerequisite for the toroidal HBS project will be satisfied (Contract 1Y).

Description of the work planned: The work on the shockwave compression with a weak compression ratio, as a pre-experiment to HBS II, will expire in 1975 with the investigation of the diffusion in the current sheet and of the plasma in the external regions. Released personnel and equipment will be re-directed toward the entire project of the wall-stabilized high-beta stellarator (1Y).

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0024, LOW BETA STELLARATORS, 1.5 GJ SHOCK CURRENT GENERATOR

M. KOTTMAIR, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Flywheel converter with 1.45 GJ useable energy and 100 MW flat-topped output with a 15 s pulse duration, to supply the W VII, including supply and return conductors for the electrical power.

Description of the work planned: The generator will be completed.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0025, HIGH BETA PLASMAS, BELT PINCH II

H. KRAUSE, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Smaller flexible injection experiment for Belt pinch II.

Description of the work planned: Probing various HF heating methods in belt pinch geometry.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0026, INFORMATION PROCESSING, DATA ACQUISITION

R. LATHE, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Keyword description and long range goals: Digital acquisition of measured values, computer controlled apparatus, primarily in CAMAC mode. Setting up a complete data acquisition software system as well as testing and servicing programs.

Description of work planned: Especially, set up the common data acquisition installation for microbeam probes and field electron energy distributions (FEED) experiment, and the data acquisition system for W VII.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0027, TOKAMAKS, MICROWAVES

G. LISITANO, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Accompany all experiments on Pulsator I. In particular, all with microwave and HF heating and pre-ionization are to be combined (microwave interferometer under 3P).

Description of work planned: 1. Continue the microwave-pre-ionization for Pulsator I; 2. HF heating experiments on Pulsator I with high efficiency, on Dinnammar and on other machines at IPP; 3. Development of: a) plasma filling system for large machines; b) plasma source for fast neutral infection; c) HF coupling system for plasma heating.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0028, RELATIVISTIC PLASMAS, THEORY

P. MERKEL, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: In the theory group, questions of the equilibrium and stability of relativistic plasmas are being investigated.

Description of the work planned: The equilibrium and the stability of the ion-loaded electron ring will be investigated, primarily in the acceleration phase. At the same time, these questions should be answered for the case with the superimposed azimuthal magnetic field also. Theoretical problems are solved analytically and numerically in support of the experimental work.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0029, LOW BETA STELLARATORS, STELLARATOR W IIA

G. MULLER, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: RF spectroscopy in the investigation of certain frequencies for the heating of hydrogen plasmas. Pre-experiment for RF high-efficiency heating in large stellarators (Vega, W VII).

Description of the work planned: Continuation of the RF absorption experiment with higher efficiency and hotter plasmas. By means of broad-band antennas, the RF absorption range should be determined, which will make possible an effective heating of the plasma with a minimal influence on the confinement behavior of the plasma. Of special importance in this are related questions of the coupling and propagation of the RF field, especially when operated together with ohmic heating.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0030, HIGH BETA PLASMAS, ISAR TL

J. NEUHAUSER, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Investigation of high beta stellarator equilibria with a large compression ratio. Eventually equilibrium without rotational transform of the Shafranov-Lortz type is also to be investigated.

Account of the work planned: Equilibrium with gross helical deformation is to be investigated. This investigation will be begun about the end of 1974 and will be closed out at the end of 1975.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0031, THEORY AND SURFACE PHYSICS, PURE THEORY

D. PFIRSCH, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Theoretical foundations, application of theoretical results to experiment, including also numerical calculations.

Description of the work planned: Equilibrium, stability, diffusion, turbulence, plasma currents, transport.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0032, THEORY AND SURFACE PHYSICS, NUMERICAL PLASMA DYNAMICS

D. PFIRSCH, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Development of numerical plasma models.

Description of work planned: Multi-fluid codes, axisymmetric equilibria, stability calculations, 1-, 2-, and 3-dimensional

plasma simulation, streaming and rotation in a torus, laser-plasma interaction.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0033, THEORY, AND SURFACE PHYSICS, DEVELOPMENT OF NUMERICAL METHODS
D. PFIRSCH, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Mathematical investigation of numerical methods, development of general programs.

Description of the work planned: Difference methods, eigenvalues, non-linear iteration methods, interpolation, program library, support of numerical plasma dynamics.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0034, TECHNOLOGY, SYSTEM STUDIES
J. RAEDER, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: 1. Construction of computer models for various types of fusion reactor systems; 2. Analysis of attainable reactor- and detail-design, as well as system studies from the viewpoint of application of results of the computer models in section 1; 3. Carrying out detailed investigations if they are necessary for 1., but cannot be obtained through 2; 4. Optimizing of complete systems from various viewpoints, e.g., from energy costs, environmental burden, etc.

Description of work planned: 1. Gathering, sifting, and analyzing of published works of reactor models, system components, and system studies; 2. Setting up a simple computer model for a reactor concept; 3. Familiarization with the mathematics and numbers of optimization problems.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0035, TECHNOLOGY, SYSTEM STUDIES - APPLIED SYSTEM ANALYSIS AGF
J. RAEDER, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Collaboration in the AGF program 'Applied System Analysis' in the framework of the agreement between the member institutions of the AGF.

Description of work planned: Collaboration of the study project 'Man-Energy-Environment' of the AGF. In particular, in the study E1-2 (Nuclear Primary Energy Sources), the section 'Nuclear Fusion' will be compiled by IPP.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0036, LOW BETA STELLARATORS, STELLARATOR W II B
H. RENNER, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Stellarator with L equal 2, M equal 5 helical windings; toroidal plasma confinement in the low beta regime; plasma production through laser pellet interaction; ohmic heating; development of diagnostics; electronic data processing.

Description of the work planned: For the stellator W II B, plasma production through the laser scattering from a hydrogen pellet is being prepared. The use of this method is being prepared for filling the stellarators VEGA and W VII at a later time.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0037, TECHNOLOGY, LASER PELLET SOURCE
M. SALVAT, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Production of free targets from condensed hydrogen isotopes: 1. for the production of the starting plasmas in stellarators by means of laser scattering; 2. for the production of dense plasmas in laser fusion experiments; 3. for the fuel supply in fusion reactors.

Description of the work planned: 1. Work on a stamp-out source for single particles and for loading and controlling the pellets; 2. Development of a continuously operating pellet source and thermodynamics of the pellets; 3. Preparation of experiments for W IIB; 4. Optimization of lasers for the production of plasmas for stellarators; 5. Expansion of laser-produced plasmas in magnetic fields; 6. Theory of the thermodynamics of the pellets and plasma dynamics.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0038, RELATIVISTIC PLASMAS, NEUTRAL GAS INJECTION
B. SCHILLING, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Development of pulsed gas injection apparatus to load the electron ring with ions.

Description of work planned: Construction and investigation of a gas injection apparatus for loading the electron ring with various ions and removing the gases not trapped in the electron ring, and development and testing of related diagnostics. Information and parts of the apparatus can be taken over from the GfK, Karlsruhe.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0039, THEORY AND SURFACE PHYSICS, SURFACE DIAGNOSTICS IN PLASMA MACHINES (QWASS)
P. STAIB, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Investigation of the plasma-wall interaction in a running plasma experiment (Pulsator). An experiment is being installed in the machine. Alterations of its surface composition will be analyzed using AES and SIMS.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0040, HIGH BETA PLASMAS, SHOCK WAVE HEATING
K. STEUER, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: 250 kV Belt pinch: Belt pinch with strong shock wave heating (ion temperature of 2-3 keV with densities of 10 to the 14th power/cm3). Data about the belt pinch windings: Height 120 cm, inner diameter 40 cm, outer diameter 90 cm. Input pulse doubling with Blumlein conductors (circuit charging voltage 250 kV, maximum magnetic field 5 kG, crowbar decay time 50 microseconds).

Description of work planned: After the investigation of the implosion phase, and especially of the development of a strong compression wave in a belt-pinch geometry, the experiment will be prepared for crowbarred operation. Then it will be possible to observe the shockwave-heated high-beta plasma for a long time while it is decaying away. Above all, it is possible to investigate the scaling of the sheath thickness without disturbing influences, the establishment of a toroidal equilibrium with a low compression ratio, and the influence of a nearly conducting wall on the plasma stability. The emphasis in the plasma diagnostics lies in time-and space-varying laser light scattering.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0041, HIGH BETA PLASMAS, BELT-PINCH ISAR II
UNKNOWN, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: 15 kJ Experiment: Experiment on the fast compression in metal-walled chambers; 90 kJ Experiment: Investigation of the stability and of the toroidal equilibrium of a belt-pinch with dominant toroidal current.

Description of the work planned: Continue the research with metal vessels in belt-pinch geometry.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0042, THEORY AND SURFACE PHYSICS, BOMBARDON, PHARAOH, 2.5 MEV ACCELERATOR
H. VERNICKEL, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long-range goals: Sputtering measurements in metals, alloys, and compounds with light ions in the energy range up to 20 keV; back scattering, and charge distribution measurements; blistering of metal surfaces due to hydrogen and helium ions; thickness measurements and surface profiles in thin sheets.

Description of work planned: 1. Sputtering measurements on alloys, oxides, and carbides with H ion, D ion, and He ion (up to 20 keV) through sheet thickness measurements by means of Rutherford back-scattering or Auger electron spectroscopy; 2. back-scattering of H ion, D ion, He ion from polycrystalline and monocrystalline material, and measurement of charge, angle, and energy distributions; 3. measurement of blistering from light ions by help of Rutherford back-scattering; 4. surface diagnostics through RIBS, AES, and IIX.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0043, THEORY AND SURFACE PHYSICS, SORBAS
H. VERNICKEL, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long-range goals: In the framework of these experiments, the ion dispersion and ion desorption are investigated under UHV conditions between 50 eV and 2,000 eV. These processes are measured in dependence upon energy, angle, and mass. Finally, a good definition of the surface being investigated is possible through slow electron deflection and Auger spectroscopy.

Description of the work planned: On well-defined surfaces, the desorption due to ion bombardment is being investigated. Moreover, methods of getting information from low-energy neutral particles are being tested. For this, more equipment is necessary (differential pumped hydrogen ion source.)

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0044, THEORY AND SURFACE PHYSICS, WALL EROSION AND VACUUM TECHNOLOGY
H. VERNICKEL, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Investigation of wall erosion; process of sputtering and blister-formation on reactor-relevant materials; 'recycling' studies of wall and getter materials.

Description of work planned: Use of the source for neutral particle injection in W7 with mass analyzed beam; measurement of the erosion of metals by means of weighing and back-scattering; measurements of sputtering yield for 14 MeV neutrons in collaboration with the Technical University of Munich and an institute with a strong neutron source; collaboration on the vacuum system of W VII and ASDEX; investigation of the gas absorption and re-emission in wall and getter materials using the W VIIb's experimental vacuum system and the neutral particle source.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0045, LOW BETA STELLARATORS, VEGA
J. WEGROWE, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Construction and installation of a stellarator for the investigation of the high-efficiency RF plasma heating methods; continuation of the experiment in Grenoble (France); European collaboration (IPP, CEA, ERM Brussels).

Description of the work planned: To improve the magnetic field configuration in experimental operation, a correction coil is to be built, and the current is to be regulated. Further diagnostic improvements and an improved pumping system are being provided for.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0046, HIGH BETA PLASMAS, BELT PINCH II
R. WILHELM, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Investigation of the stability conditions and the diffusion process in belt pinch geometry in the msec range; studies of different heating methods (fast magnetic compression-ohmic heating, HF heating).

Description of the work planned: Beginning work on the prepulse capacitor bank (160 kV/ 2 microsecs) for a fast magnetic compression; survey the plasma parameters; stability studies.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0047, LOW-BETA STELLARATORS, STELLARATOR W VII
G. WOLF, Max Planck Society, Inst. for Plasma Physics, *Munich, Federal Republic of Germany*

Key word description and long range goals: Plasma containment in the toroidal l equals 2 and l equals 4 stellarator (beta much less than one); production and heating of plasmas through ohmic heating; maintaining plasma temperature and density through particle injection and RF heating; filling with laser-produced plasmas.

Description of work planned: Completion of the technical construction of the first construction stages (small vacuum vessel W VIIa); beginning work on the entire installation and begin the experiment.

SUPPORTED BY Germany - Max Planck Society - Munchen

2.0048, PART OF A COORDINATED PROGRAMME ON ENERGETIC PARTICLE INTERACTIONS WITH MATERIALS OF IMPORTANCE TO FUSION REACTORS (ABBREV)
D. BERENYI, Hungarian Academy of Sciences, Inst. of Nuclear Research, *Debrecen, Hungary*

It is planned to determine the electron impact L-shell ionization cross section for several metallic targets (e.g. Pb, Au, Yb, etc.), the K gamma/K beta X-ray intensity ratio for several elements (e.g. Cr, Cu, Y, Ag, In, etc.) in the bombarding energy region from 25 keV to 600 keV using a Cockroft-Walton accelerator and Si/Li/ X-ray detector.

We also try to measure the M-shell ionization by electron impact at the above accelerator and the heavy ion (N, O, C, A) impact ionization cross section for some elements (Cr, Cu, etc.) in the Van de Graaff accelerator.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

2.0049, COORDINATED PROGRAMME ON ENERGETIC PARTICLE INTERACTIONS WITH MATERIALS OF IMPORTANCE TO FUSION REACTORS
M. NARAGHI, Atomic Energy Organization, Nuclear Research Center, *Tehran, Iran*

The current research program consists of two main activities. One includes a theta pinch program for studying the end loss problems, and the other covers the construction of diagnostics of a small tokamak. The theta pinch is in modular form with a capacitor bank energy of 400 joules; rise time of magnetic field, 3.5 microseconds; maximum compression field in 10 centimeters diameter, 7 tesla. The construction of capacitor bank will be completed by March 1977. The capacitor bank is constructed in such a way that one meter module will include the basic components, i.e. capacitors, spark gaps, crowbar components, etc. Some of diagnostics already developed on a smaller theta pinch than ALVAND 1 include probe techniques, fast photography, luminosity, Thomson scattering, and neutron detection. The tokamak has a larger radius of 30 cm, a non-circular cross section with dimensions of 2a equals 20 cm and 2b equals 30 cm. The toroidal field is planned to be 10 kG and the plasma current to be 30 KA. Some of diagnostics planned include microwave interferometer, Thomson scattering, soft x-ray spectra and charge exchange neutrals.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

2.0050, HIGH BETA PLASMA COLUMN IN TOROIDAL CONFIGURATIONS

UNKNOWN, Univ. of Padua, Inst. of Electrotech. Elec., *35100 Padua, Italy*

The main feature consists of the use of a very flexible axisymmetric toroidal device, with a programmable combination of poloidal and toroidal currents, in order to study several topics in a wide range of plasma parameters. Emphasis is placed on the early stages of the discharge. Diagnostic tools include laser scattering and automatic data handling.

The experimental apparatus is presently used for the production of a diffused plasma pinch in the reversed field configuration. Its good high beta stability properties are of interest for thermonuclear reactors applications.

The main results have been communicated at the I.A.E.A. 5th Conference on Plasma Physics and Controlled Nuclear Fusion Research (Tokyo, Nov. 1975).

The next five-year program includes the construction and the use of a new toroidal device with a metal discharge vessel.

Addenda: Supporting agency: Consiglio Nazionale Delle Ricerche, Universita' Di Padova. Performing organization: Instituto di Elettrotecnica e di Elettronica dell'Universita di Padova.

SUPPORTED BY Italy - National Research Council - Rome

2.0051, LINEAR SUPERSONIC TURBULENCE OF GASES

J. KISTEMAKER, Fund. Res. on Matter Found., Inst. for Atomic & Mol. Phys., *Amsterdam Wgm, Netherlands*

Historical: Since 1955, researchers of the FOM-Institute have been working on gas dynamics and magnetohydrodynamics (ultra-centrifuge, turbulent (rotating) plasmas).

Current situation: The research team on magnetohydrodynamics consists of 8 university graduates and 8 technicians. The gas dynamic part of the project has been finished this year. So there is capacity to accept a new project, based on the large know-how of this Institute.

Interests: a) Formation of an artificial wall of dense gas (confinement of thermonuclear plasmas in fusion reactors); b) separation of light and heavy isotopes: 1) Enrichment of nuclear fuel (e.g. U235 F6 and U238 F6); 2) radioactive waste management (e.g. two important problems in the fuel cycle: Kr85, half-life 10 years, and Cs137, half-life 30 years); 3) precipitation of dust in industrial processes; c) research on supersonic aerodynamics; d) focussing divergent relativistic electron-beams, in order to activate the fusion of thermonuclear plasmas; e) inverse gas core fission reactor, an interesting alternative of the NASA gas core reactor.

SUPPORTED BY Netherlands - Fundamental Research on Matter Found - Utrecht

2.0052, BEAM-PLASMA INTERACTION

J. KISTEMAKER, Fund. Res. on Matter Found., Inst. for Atomic & Mol. Phys., *Amsterdam Wgm, Netherlands*

Historical: The FOM-Institution has managed a research team on beam interaction with plasmas since 1964 in the framework of the Euratom-FOM programmes to study the instabilities of very hot thermonuclear plasmas.

Current situation: There are three projects: a) Electron-beam experiments in plasmas: The research has been revised. The objective is to study the effects of relativistic electron beams; b) Ion beams: The investigation is in a transitional stage: 1) Turning to lower energy beams (less than keV); 2) Terminate the experiments. Although the project is of great importance, the capacity of the Institution tends to reach its limits. c) Photo-beams: The research on the changes in the electron-distribution function, caused by the influx of micro waves in Q-plasmas, will be stopped at about the end of this year.

Interests: a) Assessments of the energy transfer by ion beams to plasmas: This type of transfer is important concerning the heating of plasmas to such a level that the fusion process is realized; b) Relativistic electron beams (REB) are media posessing the highest known capacity to transport power (10 to the 12th power Watt). Studies concerning the focussing of REB's could be of importance for pulsed fusion reactors. D/T pellets could be compressed by means of REB's. This is analogous to laser compressed fusion.

SUPPORTED BY Netherlands - Fundamental Research on Matter Found - Utrecht

2.0053, WELDING OF INCONEL AS CONSTRUCTION MATERIAL OF THE TORUS FOR FUSION PLASMA CONFINEMENT (JOINT EUROPEAN TOKAMAK PROJECT)

D.V. TORRE, Central Org. Adv. Appl. Res., Metal Research Institute, *Apeldoorn, Netherlands*

This project concerns the development of welding methods for three types of Inconel steel. These may be utilized as construction materials for the construction of a torus confinement of fusion plasmas in the framework of the European Fusion Research (Joint European Tokamak Project).

The investigation is executed in cooperation with: a) Rotterdamse Droogdok Maatschappij (shipbuilding and repairing corporation), Rotterdam, the Netherlands. b) Stichting Fundamenteel Onderzoek der Materie (Foundation for Fundamental Research on Matter), Jutphaas, the Netherlands.

SUPPORTED BY Netherlands - Fundamental Research on Matter Found - Utrecht

2.0054, RADIATIONAL DAMAGE OF METAL LATTICES (FUSION REACTOR CONDITIONS)

H. VANDAM, Delft Univ. of Technology, Reactor Instituut, *Delft, Netherlands*

Basic research is performed regarding the radiational damage of metal lattices, caused by fast moving particles (ions and/ or neutrons), under conditions as may be expected during the fusion process. The principal metals concerned are molybdenum tungsten, vanadium, niobium, tantalum.

The theoretical part of the investigation focusses on computer simulations of processes such as the formation and diffusion of lattice defects (interstitials, vacancies and clusters thereof) and diffusion of helium through metal lattices. The experimental part of the investigation is directed to: a) Effecting damages of a metal lattice by means of a beam of fast moving ions and/or neutrons; b) studying the nature of the damage caused by a specific beam of fast moving particles, by means of gas tracer techniques (desorption in supervacuum).

SUPPORTED BY Netherlands - Delft University of Technology

2.0055, HIGH POWER LASERS FOR INDUCING NUCLEAR FUSION REACTIONS

W.J. WITTEMAN, Twente Univ. of Technology, *Enschede, Netherlands*

The objectives are to design and develop laser-systems with which high power pulses can be generated.

The program consists of a number of subprojects: a) Active media, able to strongly amplify readiation pulses; b) apparatus for the optical control of such short pulses; c) techniques for generating more energy in a smaller period of time ('compressing' the pulse-period).

The relevance of this investigation is the possibility to generate temperatures of 1 to 10 billion degrees Kelvin in fusion-plasmas by means of these laser systems. The realization of these high temperatures is of extreme importance for the thermonuclear research.

Information is exchanged with American research institutes such as the Los Alamos Scientific Laboratories.

SUPPORTED BY Netherlands - Fundamental Research on Matter Found - Utrecht

2.0056, TURBULENT HEATING OF PLASMA

H. DEKLUIVER, Central Org. Adv. Appl. Res., Inst. for Plasma Physics, *Jutphaas, Netherlands*

The study of turbulent heating by currents near the ion-acoustic threshold will be continued in a toroidal and in a linear device. The toroidal device TORTURE is in operation. We intend to study electron and ion heating as well as plasma containment during turbulence and in the afterglow. Of particular importance is the study of the skin current and the radial diffusion processes as functions of time. A higher toroidal magnetic field is requested for stable confinement of hotter plasma than possible with the present field.

A study will be made of the possibility of a linear gas blanket thermonuclear reactor with longitudinal confinement by a magnetic multiple mirror system. A laboratory scale experiment necessary in testing one or more of the essential features of a linear concept might be designed.

Addenda: Performing organization: FOM-Instituut voor Plasmafysica.

SUPPORTED BY Netherlands - Fundamental Research on Matter Found - Utrecht

2.0057, PLASMA-WALL INTERACTION THROUGH GAS BLANKET

L.T. ORNSTEIN, Central Org. Adv. Appl. Res., Inst. for Plasma Physics, *Jutphaas, Netherlands*

The experiment RINGBOOG aims at the study of the region-including partly ionized transition layer and a neutral gas blanket - between the fully ionized central core of an inductive arc in a toroidal magnetic field and the quartz wall. Ringboog resembles a high density (approximately 10 to the 15th power cm to the minus 3rd power), low temperature (approximately 20 eV) Tokamak.

The influence of the gas blanket on heat and particle transport and on the equilibrium and the stability of the plasma column is investigated as well as the influence of the plasma on core (2 x 0.6 Vs). This should allow us to reach a quasi-steady state in which the density profile and the poloidal diamagnetic current, as determined by the Nernst effect in the toroidal B-field, approach their equilibrium values. A pulse time of about 7 ms will be appropriate.

A computational model applicable to the gas-blanket experiment, yielding numerical profiles, will be further developed.

Computational work is done to bring the Verboom-Rem reactor model closer to reality. The influence of toroidal geometry will be investigated and the computations will be extended to lower temperatures.

Both the experimental and the numerical programme will extend well beyond 1975.

Addenda: Performing organization: FOM-Instituut voor Plasmafysica.

SUPPORTED BY Netherlands - Fundamental Research on Matter Found - Utrecht

2.0058, PLASMA THEORY

J. REM, Central Org. Adv. Appl. Res., Inst. for Plasma Physics, *Jutphaas, Netherlands*

The MHD-stability of a belt-pinch plasma with a surrounding force-free field will be investigated. The work on damping of MHD-waves in an inhomogeneous plasma slab and in a plasma cylinder will be extended to the belt-pinch geometry.

The influence of the assumption of quasi-stationarity in the classical treatment of diffusion of a toroidal plasma is analyzed by investigating the time-dependent diffusion process in a belt-pinch configuration.

An expansion technique which avoids secularities and squares of delta functions yields the distribution function up to second order in the wave amplitude expressed in terms of Van Kampen modes. The formation is being extended to include ion motion and wave-wave coupling.

A quantum-mechanical formalism is being developed for the description of the nonlinear interactions between excitations in plasmas.

A reactor model for a cylindrical thermonuclear plasma has been investigated. In this model, the fuel diffuses radially inward and the reaction products diffuse radially outward. It will be investigated whether it is possible to extend the model to a belt-pinch configuration.

The developed method, a stability, for analyzing the stability of straight diffuse pinch will be extended to toroidal systems.

Impurities in toroidal systems can give rise to new modes which are of a macroscopic nature. Apart from their effect on energy losses, it is investigated whether they cause the impurities to diffuse further inward or have a favourable influence.

SUPPORTED BY Netherlands - Fundamental Research on Matter Found - Utrecht

2.0059, SCREW PINCH CONFINEMENT

P.C. VANDERLAAN, Central Org. Adv. Appl. Res., Inst. for Plasma Physics, *Jutphaas, Netherlands*

In the screw pinch, both components of the helical magnetic field are applied simultaneously. The results in our largest machine SPICA are encouraging: a lifetime of at least 40 microns and a decay time of the z-current in the plasma of about 200 microns. This indicates that the force-free currents in the outside region persist much longer than in the older experiments. The programme for SPICA will concentrate on high temperature plasmas by operating the machine at maximum bank voltage and low filling pressure. The effect of changes in q, in the magnitude of the bias field and small variations in the timing of z- and 0-banks will be investigated. More drastic changes in the field programming are necessary if reversed field pinches or other pinch configurations are to be studied.

Addenda: Performing organization: FOM-Instituut voor Plasmafysica.

SUPPORTED BY Netherlands - Fundamental Research on Matter Found - Utrecht

2.0060, DEVELOPMENT AND CONSTRUCTION OF FUSION REACTOR PARTS

P. CROOCKEWIT, Rijn Schelde Verolme N.V., *Rotterdam, Netherlands*

Calculation and construction of torus rings; construction of current conductor for mounting around torus rings.

SUPPORTED BY Netherlands - Rijn Schelde Verolme N.V. - Rotterdam

2.0061, SYSTEM STUDIES OF HIGH-BETA FUSION REACTORS

M. BUSTRAAN, Reactor Center, *The Hague, Netherlands*

A system study group has been formed in early 1975, together with members of the FOM Plasmaphysics Institute at Jutphaas and Kema Arnhem, to study several types of high-Beta plasma configurations for fusion reactors in order to determine the development potential. A further object of study is to identify technological problems concerning the development of high-Beta fusion reactors and to present recommendations as to research to be undertaken in the technological field.

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

2.0062, SPECIAL FOREIGN CURRENCY AWARD FOR BOILING OF LIQUID METALS IN STRONG MAGNETIC FIELDS

B. STANISZEWSKI, Technical Univ. of Warsaw, *Warsaw, Poland*

The award is for support of research concerned with the effect of strong magnetic field, parallel to the surface, on nucleated boiling in liquid metals. Among specific objectives are the determination of (a) the feasibility of bubble generation and growth, (b) the heat transfer rate, (c) the stability of the boiling mode.

The problem is of particular interest in feasibility studies of certain types of controlled thermonuclear reactors, where boiling coolant may offer a convenient means of energy transfer. These reactors, for which abundant fuel could be drawn from sea water, would present an energy source with relatively very low radiation hazards and pollution potential.

Experimental work will be conducted at the Institute of Thermal Technology of the Technical University of Warsaw in cooperation with a group at the University of Delaware, headed by Professor J. Moszinski. Related theoretical studies will be carried out partly at the Technical University of Warsaw and partly at the University of Delaware with close consultations between the two groups.

SUPPORTED BY U.S. Natl. Science Foundation, Div. of International Programs

2.0063, STUDY OF SURFACE EFFECTS INDUCED BY LIGHT IONS IN THERMONUCLEAR REACTORS

B. NAVINSEK, Univ. of Ljubljana, J. Stefan Institute, *Ljubljana*, *Soc. Fed. Rep. of Yugoslavia* 61001

Radiation blistering and light ion erosion of fusion first walls are important engineering problems of future fusion reactors.

This research contract (for the second year) includes investigations of surface changes induced by He ions on stainless steels and nickel-rich alloys including Hastelloy and Inconel, as the materials of special interest to the JET programme.

Surface changes under the following conditions are studied: ion energies 3 - 15 keV, ion doses 10 to the 16th power - 10 to the 19th power ions/cm2 and target temperatures 20 - 650 degrees C.

Repeated bombardments at various temperatures to simulate fusion reactor conditions are also included in the programme.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

2.0064, LASER-PRODUCED PLASMAS IN SUPER-HIGH PRESSURE GASES

A.A. DOUGAL, Univ. of Texas, School of Engineering, *Austin*, *Texas* 78712

DESCRIPTION: Through the U.S. Government's participation in the North Atlantic Treaty Organization with other European governments, a program of exchange research fellowships offers engineers, scientists, and other academicians opportunies for exchanging experiences and knowledge through exchange visits. Formerly an Assistant in the Institut fur Experimental Physik II at the new Ruhr Universitat Bochum, Dr. Gunter Schurger was awarded the NATO Research Fellowship 430/402/603/6. His award is for participation in the Department of Electrical Engineering and the Electronics Research Center's research on the subject of 'Laser-Produced Plasmas in Super-High Pressure Gases.' As a research specialist Dr. Schurger is contributing to the ongoing research which has the objective to provide future plentiful, economical electric power through laser-induced fusion of light nuclei.

SUPPORTED BY North Atlantic Treaty Organization - Brussels, Belgium

3. FISSION SOURCES & ENERGY PRODUCTION

3A. REACTOR FUELS

3.0001, COMPUTER CODES FOR IN-CORE FUEL MANAGEMENT OF POWER REACTORS

M. SCHNEEBERGER, Kernkraftwerk Planungsge. Mbh, *Vienna*, *Austria* 1030

The objective of this contract is to prepare a document on 'Computer codes for In-Core Fuel Management of Power Reactors', which will provide an essential source of information for countries starting nuclear power projects in their efforts to learn about in-core fuel management codes and to perform the fuel management of their reactors.

This document will give a survey of the presently tested and used computer codes applicable to the fuel management of light and heavy water reactor and available to IAEA-members.

Each computer code of the document shall be described such that the nature of the physical problem solved and the basic mathematical or calculational approach are evident. In addition, further information regarding computer requirements, up to date applications and experiences are available. Helpful remarks concerning implementation, staff requirements, etc. is provided.

The program procurement conditions, possible program implementation assistance and, if applicable, conditions are listed in order to permit the Agency to request each code and the necessary associated documentation, if desired.

A summary chapter shall be included which concisely reviews the relative merits of each code system and provides some guidance on an approach to building up the required staff and computational capability for in-core fuel management.

ADDENDA: Performing organization: Kernkraftwerk Planungsgesellschaft mbH.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0002, PHYSICAL STANDARD FOR GAMMA SPECTROMETRIC DETERMINATION OF THE U-235 CONTENT OF MTR FUEL

C.M. FLECK, Nuclear Institute, *Vienna*, *Austria*

In non-destructive measurements of U-235 content of MTR fuel, gamma spectrometric measurement of characteristic U-235 radiation is the favored method and it is necessary to evaluate the various factors affecting the determination. Special problems include: 1) Establishment of a well-characterized calibration standard; 2) Effect of different fuel element geometries and U-235 loadings on the measurements; 3) Demonstration of the ability to detect substitution of genuine fuel plates by dummies; 4) Effect of differing instrument sensitivities on the measurement.

ADDENDA: Perforrning organization: Atominstitut der Osterreichischen Universitaten.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0003, STUDY OF IMPROVED METHODS OF PROCESSING URANIUM ORE USING LIQUID-ION EXCHANGERS AND RESIN-IN-PULP TECHNIQUES

M.A. AWWAL, Bangladesh Atomic Energy Ctr., Chemistry Division, *Ramna*, *Dacca*, *Bangladesh*

The increasing need for nuclear power has increased the demand for uranium all over the world. Uranium requirement by the year 2000 A.D. will be more than the total production capacity of uranium existing at present. Therefore it necessitates to process the lower grade uranium ores by improved methods which at present is not economic for commercial production. In the present studies solvent extraction of uranium with liquid ion-exchangers LA-1, LA-2 and D2EHPA in kerosene diluent have been investigated as a function of different extraction parameters such as pH of aqueous sulphate solutions, concentration of the solvents and uranium. Similar studies of uranium distribution on solid ion-exchange resins Diacidite FF and Deacidite G have been carried out. Interference of impurity ions on the extraction and distribution of uranium is also to be investigated. After obtaining optimum conditions from these basic studies processing of low grade uranium ores will be carried out at laboratory and pilot plant scale.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0004, DETERMINATION OF TRACE ELEMENTS IN URANIUM AND THORIUM BY MEASURING THE CAPTURE GAMMA RAYS OF THERMAL NEUTRONS IN A REACTOR INTERNAL GEOMETRY

A.A. SUAREZ, Atomic Energy Institute, *Sao Paulo*, *Sao Paulo*, *Brazil* 05508

The main objective of this project is to determine concentrations of various impurities or burnable poisons in reactor fuel materials and their equivalent boron concentration by measuring the capture gamma rays of thermal neutrons in a reactor internal geometry.

The sensitivity of this method is some orders of magnitude higher than the external geometry utilized by Dr. R.C. Greenwood (IITRI-578PII-54(TID-4500)) and has the advantage of being selective and sensitive when analyses are performed for energies higher than the neutron binding energy of uranium and thorium.

Some elements which cannot be detected by conventional activation analysis can be easily determined in the level of a fraction of a ppm by use of this technique.

The calibration of this method is realised by utilizing samples composed of a matrix of UO2 or ThO2 contaminated by controlled amounts of impurities of the type boron, cadmium,

gadolinium, samarium, dysprosium, hafnium, etc. Those samples are positioned close to the reactor core in the interior of a through tube in a region which has a average neutron flux of 3 x 10 to the 12th power n/cm2/sec.

The thermal neutron capture gamma rays emitted by the samples are measured by a Ge(Li) spectrometer situated in a distance of about 10 m from the sample and the collimating system is so arranged that it does not permit the Ge(Li) spectrometer to see the walls of the through tube.

Th analysis of the spectra obtained are made using the computer program GAUSS V of Dr. R.G. Helmer which is already working in our computer center.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0005, TO DEVELOP AND TEST SAFEGUARD, SURVEILLANCE, AND CONTAINMENT EQUIPMENT IN CANDU REACTORS

UNKNOWN, Atomic Energy Control Board, *Ottawa, Ontario, Canada*

Design and fabricate 5 high quality surveillance cameras triggered by motion, gamma field, and internal periodic timers, and test these devices in operating Candu power reactors. Buy and test fibre optic seals developed by Harry Diamond Labs U.S.A. Buy one spent fuel bundle counter from Sandia Corporation, U.S.A., and test in operating Candu reactor.

Continue development and test of track etch safeguards devices. Design test installations and supervise tests of above equipment.

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

3.0006, DEVELOPMENT OF TECHNIQUES FOR SAFEGUARDING IRRADIATED FUEL STORED IN CONCRETE CANISTERS

R.M. SMITH, Atomic Energy of Canada Ltd., *Ottawa, Ontario, Canada*

A program to demonstrate the dry storage of spent irradiated CANDU fuel has been undertaken. The objectives of this project are (1) establish the basic criteria for safeguarding the stored fuel and the flow of spent fuel prior to storage, and (2) to demonstrate techniques for applying such safeguards.

Under the WNRE Dry Storage Demonstration Program two concrete canisters have been loaded with spent fuel. One contains natural uranium spent fuel and the other slightly enriched (gamma 2%) spent fuel. During these two campaigns the basic safegaurds criteria were established and some techniques demonstrated.

A long range program is now beginning for the storage of slightly enriched spent fuel from the WR-1 reactor. Planned work is: 1. to study methods of reducing the amount of time spent by the IAEA inspector on-site: 2. to investigate methods of surveillance of the spent fuel which present a reduced risk to the IAEA inspector: 3. to investigate methods whereby greater assurance may be given that a bundle is irradiated fuel.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0007, IMPLEMENTATION OF A PROTOTYPE SAFEGUARDS INSTRUMENTATION SYSTEM AT THE DOUGLAS POINT GENERATING STATION

UNKNOWN, Dilworth Secord Meagher Assoc., *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

3.0008, IMPLEMENTATION OF A PROTOTYPE SAFEGUARDS INSTRUMENTATION SYSTEM AT THE DOUGLAS POINT GENERATING STATION - PHASE II

UNKNOWN, Dilworth Secord Meagher Assoc., *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

3.0009, APPLICATION OF GAMMA AND ISOTOPIC CORRELATION TECHNIQUES FOR SAFEGUARDS IDENTIFICATION AND VERIFICATION PURPOSES

J. VALOVIC, Atomic Power Plant, *Bohunice, Czechoslovakia*

Assay of spent fuel is a continuing effort at various centres in order to obtain practical experience on the wide variety of problems presented by routine field measurements and to establish the value of NDT techniques for safeguards.

For that we perform: 1) Measurements on spent fuel assemblies, rods, and solutions with GeLi detectors. 2) Analysis of recorded spectra in order to establish from it some operational data, e.g. irradiation history, cooling time, PU-build up etc. 3) Dissolve and perform radiochemical and mass spectrometric analysis of chosen samples. 4) Correlate exposure history and cooling time of fuel with its gamma spectra and neutron measurements. 5) Evaluate NDT techniques and examine accuracy obtainable under field conditions. 6) Postirradiation measurements of neutron fluence along the fuel assembly by the activation of Al-Co wire and by on-line determination of flux and burn up in space and time by selfpowered detectors. 7) Measurements with Agency's portable equipment for safeguards and verification purposes.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0010, FUEL ELEMENTS, PROJECTED DEVELOPMENT

UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

The work on the development, manufacture, and study of fuel elements is essentially concentrated on UO2Zr rod elements for water-cooled power reactors, especially since developments in the past few years have not altered the earlier assumption that such reactors will be the first ones in Denmark. These tasks all have the purpose of assuring that AEC will obtain a basic knowledge of the fuel element design (mechanical, thermohydraulic, reactor physics), manufacture, and performance during operation, with respect to the evaluation of reactor safety. The thus acquired knowledge will be of further importance for the Danish electric power plants in connection with the procurement and operation of fuel elements, since experience abroad has shown that special assistance is needed, both in working out the procurement specifications and in connection with reactor operation, where optimization requires a thorough knowledge of fuel element properties in order to reduce the number of breakdowns. The experience gained at RISO will be of further importance in the explanation of fuel element breakdowns, where various types have already been studied in RISO's hot cells, in part from some of RISO's own research and part from foreign customers. Eventually, the fuel element program will provide sufficient information on the manufacture and operational characteristics of fuel elements, so that a Danish manufacture of fuel elements can be established.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0011, PROVISION OF ENRICHED URANIUM IN ACCORDANCE WITH THE TREATY OF NOV. 8, 1974 AS PART OF THE 1973-75 GERMAN-AMERICAN FUNDING AGREEMENT

E. STRECKER, Konsortium Uranerzbergbau U.A., *Bonn, Nordrhein Westfalen, Federal Republic of Germany* 5300

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0012, STATIONARY DNB - MEASUREMENTS OF FUEL RODS WITH COMPLEX SHAPES IN WATER AND AIR

H. MAERKL, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

ADDENDA: Performing organization: Bereich Reaktortechnik der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0013, LIGHT WATER PLUTONIUM FUELS USING THE PRESSURIZED AND BOILING WATER CONCEPT
H. MAERKL, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

ADDENDA: Performing organization: Bereich Reaktortechnik der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0014, LOAD INTERCHANGE BEHAVIOR OF PWR AND SWR FUEL RODS WITH POSITIVE OPERATING RAMP
H. SCHWEIKERT, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

ADDENDA: Performing Organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0015, FURTHER DEVELOPMENT AND RADIATION TESTING OF THE FUEL ELEMENTS OF THE PRESSURIZED WATER REACTORS
H. SCHWEIKERT, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0016, PRESSURE EQUALIZATION SYSTEMS IN PWR FUEL RODS - OUT-OF-PILE EXPERIMENTS
H. SCHWEIKERT, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0017, DETERMINING THE CONFINEMENT BEHAVIOR AND HELIUM ABSORBING POWER OF URANIUM OXIDE USING RADIATION TESTS IN THE HBWR AND THE PETTEN HFR
H. SCHWEIKERT, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0018, FOLLOW-UP INVESTIGATION OF PRESSURIZED WATER REACTOR FUEL RODS IN KWO AND KKS
H. SCHWEIKERT, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0019, TECHNOLOGY OF NUCLEAR FUELS - FUEL ELEMENT DEVELOPMENT - UO2 CERAMICS
H. SCHWEIKERT, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0020, THE BEHAVIOR AND ABSORPTION CAPACITY OF URANIUM DIOXIDE AFTER SINTERING - IRRADIATION STUDIES IN THE HBWR AND HFR
H. SCHWEIKERT, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

ADDENDA: Performing Organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0021, REEXAMINATION OF PRESSURIZED WATER REACTOR FUEL RODS OF KWO AND KKS
H. SCHWEIKERT, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

ADDENDA: Performing organization: Bereich Reaktortechnik der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0022, PROJECT PILLARSHAFT - DEVELOPMENT OF LIGHT WATER REACTOR FUEL ELEMENTS
UNKNOWN, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0023, PLUTONIUM RECYCLING IN THERMAL REACTORS
UNKNOWN, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

ADDENDA: Performing organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0024, FUEL ELEMENT DEVELOPMENT - PROPERTIES OF ZIRCALLOY ENCASING TUBES MANUFACTURED BY DIFFERENT METHODS
POETZSCHKE, Metallgesellschaft AG, *Frankfurt 1, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0025, EXTRACTION OF URANIUM FROM PHOSPHATES IN THE FEDERAL REPUBLIC OF GERMANY
WIRTH, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0026, FUEL ELEMENT STATISTICS
H. SCHUMANN, Kraftwerk Union AG, *Frankfurt 70, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0027, DEVELOPMENT PROGRAM FOR THE IRRADIATION OF PU/TH FUEL
L. SCHUMANN, Kraftwerk Union AG, *Frankfurt 70, Hessen, Federal Republic of Germany* 6000

3. FISSION SOURCES & ENERGY PRODUCTION

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0028, FUEL ELEMENT DEVELOPMENT - NONSTANDARD BUNDLES 72/I
U. SCHUMANN, Kraftwerk Union AG, *Frankfurt 70, Hessen, Federal Republic of Germany* 6000
ADDENDA: Performing Organization: Bereich Kernreaktoren Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0029, 8X8 SPECIAL BUNDLES FOR THE FIRST LOADING OF THE WURGASSEN NUCLEAR POWER PLANT
U. SCHUMANN, Kraftwerk Union AG, *Frankfurt 70, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0030, BWR FUEL ROD DESIGN
U. SCHUMANN, Kraftwerk Union AG, *Frankfurt 70, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0031, FUEL ELEMENT DEVELOPMENT - KRB/KWL RAMPS 72
U. SCHUMANN, Kraftwerk Union AG, *Frankfurt 70, Hessen, Federal Republic of Germany* 6000
ADDENDA: Performing organization: Bereich Kernreaktoren Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0032, ADDITIONAL COST OF THE GERMAN PART OF THE TRILATERAL URANIUM ENRICHMENT DEVELOPMENT PROGRAMS
H. MOHRHAUER, Uranit Gmbh, *Friedrichshafen, Baden Wuertt., Federal Republic of Germany* 7990

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0033, DEVELOPMENT OF LWR FUEL ELEMENTS (ROD DESIGN)
FRANKE, Soc. for Use of Nuclear Energy, *Geesthacht, Schleswig Holstein, Federal Republic of Germany* 2054
ADDENDA: Performing organization: Gesellschaft Fuer Kernenergieverwertung in schiffbau und schiffahrt MBH (GKSS).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0034, STATIONARY DNB - MEASUREMENTS OF FUEL RODS WITH COMPLEX SHAPES IN WATER AND AIR, PART II
KATSAOUNIS, Soc. for Use of Nuclear Energy, *Geesthacht, Schleswig Holstein, Federal Republic of Germany* 2054
ADDENDA: Performing organization: Gesellschaft fuer Kernenergieverwertung in Schiffbau und Schiffahrt MBH (GKSS).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0035, DEVELOPING PLUTONIUM FUEL ELEMENT FOR REFUELING THE KWO - 75
K. ENNERST, Alkem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0036, PLANNING A PLUTONIUM INSTALLATION (PHASE II)
W. STOLL, Alkem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0037, PLUTONIUM RECYCLING IN THERMAL REACTORS
W. STOLL, Alkem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0038, RESEARCH AND DEVELOPMENT IN PLUTONIUM TECHNOLOGY
W. STOLL, Alkem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0039, FUEL ELEMENTS FOR THE HTR-1160, ADAPTATION OF MANUFACTURING PROCESSES
HUSCHKA, Hobeg Hochtemp. Brennel. Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0040, PROCEDURAL MODELS OF NUCLEAR FUEL MANUFACTURE, SCRAP METAL PREPARATION, IMPROVEMENTS IN METALLURGY, AND QUALITY CONTROL METHODS
L. AUMUELLER, Nukem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0041, REPROCESSED URANIUM - YIELD, USE, STORAGE, AND DISPOSAL
L. AUMUELLER, Nukem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0042, AGREEMENT BETWEEN NUKEM, FAST BREEDER NUCLEAR POWER PLANT CO. MBH & BMFT FOR SUPPLYING PLUTONIUM FOR THE FIRST CORE OF THE SNR-300
KEESE, Nukem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0043, FUEL ELEMENT DEVELOPMENT IN THE FRAMEWORK OF THE HHT PROGRAM
D.N. KRAEMER, Nukem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0044, R&D WORK TO IMPROVE AND FURTHER DEVELOP FUEL ELEMENTS FOR RESEARCH AND MATERIAL-TESTING REACTORS
N. MUELLER, Nukem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0045, PILOT PROPOSAL TO BUILD A COLD PROTOTYPE SITE TO SERVE AS THE HEAD END FOR HTR FUEL ELEMENT REPROCESSING
U. TILLESSEN, Nukem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0046, PILOT SITE FOR RECYCLING HTR FUEL ELEMENTS WITHIN WAK'S TRACT OF LAND
U. TILLESSEN, Nukem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0047, SUPPLYING OF FUEL AND DISPOSING OF HIGHLY RADIOACTIVE WASTES FOR NUCLEAR POWER STATION
H. WITTE, Nukem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0048, PROCEDURES FOR THE ACCOUNTING AND CONTROL OF NUCLEAR MATERIALS IN LARGE RESEARCH CENTRES, AS RELATED TO THE NEED FOR INTERNATIONAL SAFEGUARDS
U. KOTTE, Arbeitsgruppe Spaltsofflubk., *Juelich, Federal Republic of Germany*

The project is concerned with the application of safeguards to a large research center. The object of investigation is the German nuclear research center Kernforschungsanlage Julich GmbH (KFA). The research programmes of the KFA, material flow and physical inventory taking are to be regarded. Existing procedures for the accounting and control of nuclear materials in the facility will be analyzed. An overview will be given concerning records, reports and regulations. Particular attention is paid to the different use and the relatively small amount of nuclear material in a number of separate research institutes. The necessary modifications to facilitate safeguards will be discussed. The adaptation depends on the division of the research center into meaningful material balance areas and key measurement points. It is intended to get a model showing the influence of various parameters. Based on this model some concepts of a practical safeguards system for research centers are to be presented. The advantages and disadvantages of the various proposed solutions will be discussed. The most efficient means for applying safeguards in the KFA are to be explained in more detail.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0049, DEVELOPMENT OF N D A-TECHNIQUE FOR URANIUM/THORIUM FUEL CYCLE
R. HECKER, Reactor Development Institute, *Juelich, Federal Republic of Germany*

The developed NDA techniques for LWR fuel materials are probably not applicable to HTR fuel materials without modifications, especially for those containing fuel mixtures of Th/U. Therefore investigations are performed on unirradiated as well as on spent fuel of this type (sperical fuel elements). Especially the quantitative measurement of unirradiated U-235 and irradiated U-233 and U-235 fuel mixtures has to be checked. So far as possible, methods established in other fuel cycles are used. Emphasis is given to NDA methods to be used by the inspector. The following items are investigated. 1. Unirradiated feed, product and recoverable scrap: Develop methods using IAEA instrumentation, or equivalent, for the quantitative determination of various parameters, such as U, U-235, Th, U plus Th content, uranium enrichment, U,(U plus Th) ratio, U, Th, U plus Th fraction, etc. 2. For irradiated fuel pebbles: (a) Collection of high resolution gamma spectra data of irradiated HTR fuel and a study of its use for qualitative and/or quantitative safeguards measurements. (b) Study of the potential application of methods developed in (1) to irradiated fuel.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0050, COMPLETION OF THE PROJECT PILLARSHAFT WITH THE DEVELOPMENT OF HIGH TEMPERATURE REACTOR FUEL ELEMENTS AND MATERIALS
BALTHESEN, Juelich Nuclear Res. Ctr., *Juelich 1, Nordrhein Westfalen, Federal Republic of Germany* 5170

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0051, IRRADIATION OF TEST FUEL ELEMENTS IN THE PILE REACTOR AND DEVELOPMENT OF THE COMPUTER-RUN REACTOR CONTROL AND SUPERVISION SYSTEM
UNKNOWN, Juelich Nuclear Res. Ctr., *Juelich 1, Nordrhein Westfalen, Federal Republic of Germany* 5170

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0052, PILOT PLANT COMPLETION UNDER THE ALMELO AGREEMENT - PUTTING IT INTO OPERATION
C. ALLDAY, Uranit Gmbh, *Juelich, Nordrhein Westfalen, Federal Republic of Germany* 5170

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0053, THE URANIUM INDUSTRY - DEVELOPMENTS IN URANIUM ENRICHMENT
H. MOHRHAUER, Uranit Gmbh, *Juelich, Nordrhein Westfalen, Federal Republic of Germany* 5170

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0054, URANIUM ENRICHMENT - CONSTRUCTING A SEPARATION CHAMBER AND A WORKING AREA TO REPLACE BUILDINGS 4 AND 7
TITZE, Uranit Gmbh, *Juelich, Nordrhein Westfalen, Federal Republic of Germany* 5170

ADDENDA: Performing organization: Staatschochbaumt fuer die Kernforschungsanlage Julich GmbH (KFA).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0055, MANAGEMENT OF URANITE AND DEVELOPMENT IN THE FIELD OF URANIUM ENRICHMENT
UNKNOWN, Uranit Gmbh, *Juelich, Nordrhein Westfalen, Federal Republic of Germany* 5170

Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0056, PARTICIPATION IN THE CONSTRUCTION OF THE URENCO 2000-TON CAPACITY URANIUM ENRICHMENT PLANT
UNKNOWN, Uranit Gmbh, *Juelich, Nordrhein Westfalen, Federal Republic of Germany* 5170

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0057, COST SHARING THE URENCO, 2000 TON/YEAR URANIUM ENRICHMENT PLANT
UNKNOWN, Uranit Gmbh, *Juelich, Nordrhein Westfalen, Federal Republic of Germany* 5170

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0058, IRRADIATION STUDIES IN THE HALDEN REACTOR TO DETERMINE THE HAZARDS OF LWR FUEL RODS
WIGGER, Kernkraftwerk Philippsburg, *Philippsburg, Baden Wuerttem., Federal Republic of Germany* 7522

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0059, REPROCESSING THORIUM-RICH NUCLEAR FUEL
R. THOMAS, Gelsenberg AG, *4300 Essen 1, Nordrhein Westf., Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0060, A FAST CORE (KNK II) AS A SECOND CORE FOR THE COMPACT SODIUM-COOLED NUCLEAR REACTOR INSTALLATION (ABBREV)
UNKNOWN, Interatom Gmbh, *5060 Bensberg, Nordrhein West., Federal Republic of Germany*
Addenda: Supporting agency: Gesellschaft Fuer Kernforschung MBH (GFK).

SUPPORTED BY Germany - Nuclear Research Society - Frankfurt

3.0061, R&D FOR REFABRICATION OF FUEL ELEMENTS
U. TILLESSEN, Hobeg Gmbh, *6450 Hanau, Hessen, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0062, THE NUCLEAR FUEL CYCLE
MAYER, Nuclear Engineer. Service Gmbh, *6450 Hanau, Hessen, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0063, LOCATION SURVEY INFRASTRUCTURE FOR THE LARGE REPROCESSING INSTALLATION
UNKNOWN, Soc. for Nuc. Fuel Reproc., *7501 Leopoldshafen, Baden Wue., Federal Republic of Germany*

Addenda: Performing organization: Kernbrennstaff Wiederaufarbeitungs Gesellschaft.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0064, DEMONSTRATION OF THE PHENIX SYSTEM FUEL CYCLE, ADVANCING FUNDS
BAILLY, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0065, 1200 MWE HIGH CAPACITY POWER PLANTS - PROJECT, FUEL MANUFACTURE
BAILLY, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0066, PROVIDING 5PI KILOGRAMS OF PLUTONIUM FOR MASURCA IN THE FORM OF OXIDE FOIL
BARRE, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commisariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0067, DRAFT - SUPER-PHENIX CORE AND FUEL ROD ASSEMBLY
ESTAVOYER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0068, CORE AND FUEL ROD ASSEMBLY
ESTAVOYER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0069, DEVELOPING FUEL SLUGS FOR SUPERBEC
FERRY, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0070, DEVELOPING FUEL SLUGS - PARTICIPATION IN OPERATION
FERRY, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0071, IRRADIATING 'CARAMEL' FUEL IN PAT
FERRY, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0072, COMMON PROBLEMS OF REACTORS - FUELS, EXPERIMENTAL STUDY
LANCONY, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0073, DEMONSTRATION OF THE PHENIX SYSTEM - OPERATION, FOLLOW-UP OF FUEL ELEMENTS
OLLIER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0074, DEMONSTRATION OF THE RAPSODIE SYSTEM - OPERATION, FUEL ELEMENTS
OLLIER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0075, COMMON PROBLEMS OF REACTORS - FUELS, PRELIMINARY TESTS
OLLIER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0076, COMMON PROBLEMS OF THE TUBULAR FUELS REACTOR (EXAMINATION)
OLLIER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0077, COMMON PROBLEMS OF THE AME GRAPHITE FUELS REACTOR (EXAMINATION)
OLLIER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0078, COMMON PROBLEMS OF THE AME GRAPHITE FUELS REACTOR, FOLLOW-UP OF MANUFACTURE
OLLIER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0079, COMMON PROBLEMS OF THE AME GRAPHITE FUELS REACTOR (IMPROVEMENT)
OLLIER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0080, COMMON PROBLEMS OF THE ANNULAR FUELS REACTOR - EXAMINATION
OLLIER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0081, COMMON PROBLEMS OF THE ANNULAR FUELS REACTOR - FOLLOW-UP OF MANUFACTURE
OLLIER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0082, COMMON PROBLEMS OF THE ANNULAR FUELS REACTOR - IMPROVEMENT
OLLIER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0083, FUEL ELEMENTS, CYCLE B CONTROL
UNKNOWN, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0084, VALORIZATION
UNKNOWN, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0085, 1200 MWE HIGH CAPACITY POWER PLANTS - PROJECT, FUEL-ROD ASSEMBLY
VALANCONY, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0086, COMMON PROBLEMS OF REACTORS - FUELS, IMPROVING ELEMENTS
VALANCONY, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0087, COMMON PROBLEMS OF REACTORS - FUELS, EXAMINING AND TESTING SHEATHING
WALLET, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0088, COMMON PROBLEMS OF REACTORS - FUELS, TESTS FOLLOWING IRRADIATION
WALLET, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0089, FAST NEUTRON REACTORS - CORES
UNKNOWN, Electricite de France, *Paris, France* 76008

'Core' studies of the fast neutron reactor deal with its concepts and operation as an indivisible whole core-blankets protection apparatus.

It is important that EDF follow the development of technical and economic data so as to be able to judge and orient solutions. Our studies will cover the following areas: a. Physics of the core (study of neutrons, thermohydraulics, protection); b. Behavior of the fuel (mechanical and physical-chemical studies under irradiation); c. Mechanical concept of fuel rod assembles and core structures, blankets, and protection apparatus. This is especially useful in calculating regeneration yield and the amounts of plutonium produced.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0090, NUCLEAR FUELS - PERFORMANCE, MANUFACTURE, TRANSPORT, AND TREATMENT
UNKNOWN, Electricite de France, *Paris, France* 76008

In order to discover the performance of nuclear fuels, existing information will be studied, experimental results will be taken into account, and the further development of mathematical models and different computation codes will be followed. This general program has been adapted to the French work on the different reactors considered: high-temperature, light water, fast neutron.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0091, THE FUEL CYCLE IN FAST NEUTRON REACTORS
UNKNOWN, Electricite de France, *Paris, France* 76008

Calculating the cost of the fuel cycle inside and outside the reactor and implications on the cost of the KWH produced, including interdependent operations undergone by the fuel: production, irradiation, cooling, transport, and treatment. These operations involve physical and economic parameters.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0092, PLUTONIUM RECYCLING IN LIGHT WATER REACTORS
UNKNOWN, Electricite de France, *Paris, France* 76008

Since Pu will eventually be used in thermal neutron reactors, studies of the light water cycle must be adapted to this type of fuel. Therefore, we are: a. studying the development of neutron properties of Pu under irradiation, thermal and neutron study on the development of Pu-containing cores; b. perfecting methods of using Pu: relative quantity and distribution of Pu in the core and core renewal policy; c. studying plutonium fuels: experimental irradiation of fuel, fabrication cost overruns, reprocessing. Different economic aspects of Pu recycling.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0093, PROSPECTIVE STUDY OF WAYS OF FUELING DIFFERENT REACTORS
UNKNOWN, Electricite de France, *Paris, France* 76008

Our objective is to determine how much fissile and enriched material and how many separation units will be required for a nuclear reactor park whose constituent elements can vary. We will take into account the sequence in which these elements will be constructed in the course of time and the technological progress that may be expected of different reactors.

We will study sensitivity as a function of the main technical aspects, particularly the profitable effect of breeding, available fissile materials, time required for fabrication, transportation, and reprocessing in order to provide a framework for available nuclear choices.

ADDENDA: Performing organization: Electricite de France

SUPPORTED BY France - Electricite de France - Paris

3.0094, RECYCLING IN LIGHT WATER REACTORS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

To make the best possible use of fissile Plutonium, we must use it in thermal neutron reactors. This means that studies of the light cycle must be modified for this type of fuel. Such modification requires a number of specific studies: (1) Select and develop a set of codes (cell and reactor codes) modified for Plutonium fuels in order to make physical studies of the core possible. (2) Plutonium cores: neutron and thermal studies now being developed. (3) Develop techniques of using plutonium: relative quantity and apportioning, restocking and treatment policy. (4) Follow up experimental work on irradiating plutonium fuel. (5) Study the economic aspects of using plutonium: additional cost of fabrication, cost of plutonium. (6) Specific aspects of safety in light water reactors which are caused by using plutonium fuel.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0095, NUCLEAR FUELS FOR FAST REACTORS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

We need to understand how nuclear fuels perform before we can make physical studies of the core, of optimization, and of fuel cycles. We also need to estimate limited performance before we can study safety and develop protective measures. We should, therefore, keep informed about the experimental results (following the behavior of irradiated fuel elements in Phoenix, Fortissimo, and Scarabee experiments); we should also help develop mathematical models that simulate fuel element performance.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0096, CHAMPLAIN, DMECN PILOT PROJECT, PARTICIPATION IN STUDIES OF FUEL
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0097, CLASSIFYING FUEL, GASCON LOOP
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0098, CHAMPLAIN 2-3, FUEL
BERGOUGNOUX, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0099, REPROCESSING FUELS, HIGH TEMPERATURE REACTORS
BOURGEOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0100, ANALYSING IRRADIATED FUEL ELEMENTS OF THE LIGHT WATER REACTOR
BOYER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0101, STUDYING THE CORE - PROTECTION AND THE STUDY OF NEUTRONS - DRAFT
BRISBOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0102, STUDYING THE CORE, CEA PROGRAM
BRISBOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0103, STUDYING THE CORE (IN COLLABORATION WITH KFA-DRAGON)
BRISBOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaire de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0104, ANALYZING THE BEHAVIOR OF FUELS
DELAPLACE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0105, DISTORTION IN URANIUM ALLOYS
DELAPLACE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0106, MONITORING THE PHENIX FUEL ELEMENT
DUPOUY, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0107, COMPILING A DATA FILE ON REFERENCE MATERIAL
DUPOUY, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0108, LIGHT WATER REACTORS - APPARATUS FOR FUEL ROD NEUTROGRAPHY
GENTHON, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0109, IRRADIATING FIVE FUEL ROD ASSEMBLIES (TYPE 17 17)
LESTIBOUDOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0110, URANIUM OXIDE DENSIFICATION IN WATER REACTORS
LESTIBOUDOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0111, STATISTICAL TESTS OF OUR FUEL CLASSIFICATION IN REACTORS
LESTIBOUDOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0112, EXTRA-REACTOR STUDIES AND FEASIBILITY TESTS OF OUR FUEL ELEMENTS
LESTIBOUDOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0113, FUEL FOR THE BOILING WATER REACTOR
LESTIBOUDOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0114, FUEL POISONED BY GADOLINIUM
LESTIBOUDOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0115, REALIZING FOUR FUEL ROD ASSEMBLIES, PRECURSORS OF FESSENHEIM
LESTIBOUDOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0116, PARTICIPATION IN THE CEA-GGA FUEL PROGRAMS
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0117, FAST GAS REACTORS - CORES
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0118, LATERAL STRUCTURES OF THE CORE
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0119, CORE SUPPORT POSTS
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0120, CORE (EARTHQUAKES)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0121, CORE DISCHARGE (MIXTURE AND MEASURE OF TEMPERATURE)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
No summary has beeen provided to the Smithsonian Science Information Exchange.
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Perfoming organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0122, CORE THERMOCOUPLES (OSIRIS IRRADIATION)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0123, CORE (BALL TESTS, CARMEN II)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division D'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0124, NUCLEI OF FUEL ELEMENTS - DYNAMICS OF TRITIUM REMOVAL
RAPPENEAU, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0125, CHAMPLAIN, INNOVATION 2, CARAMEL FUEL
N. REUSS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0126, ADVANCED FUEL ELEMENTS - DIRECTLY COOLED ELEMENTS
RINGOT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0127, PREPARING FUEL ELEMENTS FOR THE 1160 MWE REACTOR
RINGOT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0128, ANNULAR FUEL ELEMENTS
RINGOT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0129, PLUTONIUM RECYCLING IN THE LIGHT WATER REACTOR
SERMA, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0130, JOINT CEA/GA PROGRAM - FUEL
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0131, SODIUM-MELTED FUEL INTERACTION
AMBLARD, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble*, *France* 38000
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Department de Transfert et Conversion d'Energie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0132, FUEL ELEMENTS FOR FAST GAS-COOLED REACTORS
LORIERS, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble*, *France* 38000
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0133, DEVELOPING THERMAL SIMULATORS OF FUEL RODS
TEYTU, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble*, *France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Department de Transfert et Conversion d'Energie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0134, DEVELOPING THERMAL SIMULATORS OF FUEL ELEMENTS FOR EXPERIMENTS
TEYTU, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Department de Transfert et Conversion d'Energie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0135, GADOLINIUM FUELS, PRODUCTION AND IRRADIATION EXPERIMENTS
UNKNOWN, Atomic Energy Commission, Div. of Metall. Stu. Nuc. Fuel, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0136, FUEL PRODUCTION
UNKNOWN, Atomic Energy Commission, Div. of Metall. Stu. Nuc. Fuel, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0137, FUEL ELEMENTS DERIVED FROM THE BB5 PROCESS
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0138, MANUFACTURING AND CONTROL PROCESSES
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0139, FUEL RODS - LETTING UP FISSION GASES
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0140, TECHNICAL ASSISTANCE FOR MANUFACTURERS - FUEL PRODUCTION
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting Agency: Commissariat A L'Energie Atomique. Performing Organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0141, REPROCESSING FAST NEUTRON REACTOR FUELS BY VOLATILIZATION
BOURGEOIS, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0142, PERFECTING METHODS OF ANALYSIS
DELARUE, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat a l'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0143, PROVISIONAL ESTIMATE FOR A REPROCESSING PLANT
J. DUBOZ, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0144, PERFECTING FUEL ANALYSIS METHODS
GUICHARD, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0145, EVALUATING THE POSSIBILITIES OF PROCESSING FUELS
MICHEL, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0146, PROCESSING IRRADIATED FUELS FOR THE NEW REACTORS
MIQUEL, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0147, ANALYZING IRRADIATED FUELS OF THE LIGHT WATER REACTOR
ROBIN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0148, ANALYZING TELEDIAL IRRADIATED FUELS
ROBIN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0149, APPRAISAL OF PHENIX FUEL
SEAMA, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0150, EXAMINING PHENIX FUEL ROD ASSEMBLY
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0151, EXAMINING FORTISSIMO FUEL ROD ASSEMBLY
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0152, FUEL ELEMENTS
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0153, IRRADIATION RELATING TO THE STUDY OF FUEL ELEMENTS
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires Fontenay-aux-Roses, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0154, PHYSICAL AND THERMODYNAMIC PROPERTIES OF OXIDE FUELS
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires deFontenay-aux-Roses, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0155, OXIDE FUEL BEHAVIOR UNDER IRRADIATION AND THERMAL PERFORMANCE
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires deFontenay-aux-Roses, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0156, RAPSODIE, FORTISSIMO, AND PHENIX FUEL
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0157, FUEL BURN-UP DETERMINATION BY SOLID STATE TRACK DETECTORS
J. CSIKAI, Lajos Kossuth University, Inst. of Experimental Physics, *Debrecen, Hungary*

The nondestructive assay of fuel elements is important from the point of view of nuclear reactor operation control. The determination of the transplutonium elements in irradiated fuels is of great interest. However, the spent fuel interrogation even at low burn-up is difficult because of the high gamma activity from fission fragments. The spontaneous fission neutron activity of the spent fuels may be a measure of the gross amount of the generated transplutonium elements even if the contribution of the isotopes to neutron activity is very different and changes with burn-up. The neutrons can be counted by means of solid state nuclear track detectors with converter foils B10, Li6, and U235, even in high gamma background.

Conditions for the applicability of solid state nuclear track detectors to spontaneous fission neutron counting, its precision and sensitivity together with the limitations will be investigated. Different solid state nuclear track detectors and fissionable materials for coating must be tested for optimalisation. The arrangement of fuel cassettes for ideal counting also have to be examined (e.g. fast neutron detection or light water bath for thermalization of neutrons). A jumping spark counter for the fission fragment counting will also be constructed.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0158, TESTING AND DEMONSTRATION OF AUTOMATION OF THE NUCLEAR MATERIALS ACCOUNTABILITY CONTROLS AT IRRADIATED FUEL REPROCESSING FACILITIES
P. FRANCO, Atomic Energy Commission, *Rome, Italy* 00198

The work will be done at the EUREX reprocessing plant, Saluggia (Italy). It will concern a system which will permit nuclear material (Pu) control through concentration measurements to be made by an X-ray absorptiometer (MAX-I) or by a gross-alpha and container volume measurement by the TDR. The development of a technique for residual nuclear material in the hulls for accountability purposes is further considered. Particularly, the objectives are: 1) Installation, testing and demonstration of the MAX-I measuring system for Pu continuous determination. 2) Construction and installation of TDR measuring probes on some Eurex plant tanks. Testing and demonstration of the TDR technique for safeguards accountability purposes. 3) Installation, testing and demonstration of a new gross-alpha measuring head for Pu determination in waste streams. 4) Adaption of scale near the mechanical chopping cell for the determination of residual nuclear materials in the hulls. Testing and demonstration of the system. 5) In addition to the measuring system, instruments will be installed to determine continuously the temperature, the level (by dip tubes) and other parameters in order to allow comparison of the various experimental devices against known and reliable materials.

ADDENDA: Performing organization; Comitato Nazionale per l'Energia Nucleare (CNEN).

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0159, COLLECTION OF GAMMA SPECTRA DATA & CORRELATED ISOTOPIC DATA OF IRRADIATED MIXED OXIDE FUEL (ABBREV)

H. NATSUME, Atomic Energy Research Inst., Division of Chemistry, *Tokai Mura, Ibaraki Ken, Japan*

In order to study a number of isotopic correlations which are valid for determining important parameters of spent fuels, both non-destructive gamma-ray spectrometric measurements for fission-products activities and precise chemical analysis for the actinides and some fission products are carried out on the ten selected points of an irradiated UO2-PuO2 fuel pin of Halden IFA-159. The gamma-ray spectra data are correlated with the chemical analysis data. Feasibility of isotopic correlation techniques for plutonium content verification, burn-up determination and estimation of other parameters is studied.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0160, DEMONSTRATION OF INSTRUMENTAL TECHNIQUE IN THE MEASUREMENT OF SOLUTION WEIGHT IN THE ACCOUNTABILITY VESSELS OF A FUEL REPROCESSING PLANT

K. NAKAJIMA, Power Reactor Nucl. Fuel Corp., *Tokyo, Japan*

As commercial nuclear reprocessors and safeguards authorities seek to improve accountability, new and improved methods for measuring the amounts of fissionable material will be required.

Weighing of the amount of material in the input accountability vessel appears to be the most direct and accurate system; however, the performance of such a system under actual plant operating conditions has never been demonstrated.

Then, we demonstrate the weighing system using load cell.

Scientific scope of our project is as follows: 1. Vessel calibration of the three vessels such as input and Pu product accountability vessels and one Pu storage vessel, by load cell systems using room temperature water. 2. Vessel calibration of the three vessels using actual density solution (uranium nitrate solution) by dip tube system and manometers. 3. Comparison of the results obtained from the two systems over entire range of vessels. 4. Comparison of the precision and accuracy of the two measurements at the normal full and normal heel levels. 5. Evaluation of the tamper-indicating features of the two systems.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0161, USE OF LOW-COST HEAT SOURCES TO IMPROVE THE EFFICIENCY OF HEAP LEACHING OF URANIUM ORES

S. AJURIAGARZA, Atomic Energy Institute, *Mexico City 18, Distrito Fed., Mexico*

Heap leaching offers important economic advantages over conventional leaching processes where finely ground ore is treated in agitated vessels. Heap leaching, however, has a lower yield than conventional methods (10 to 20% less) and recovers a smaller net amount of uranium. Leaching efficiency can be improved by heating leach or wash solutions but the cost of heating a large heap using conventional heat sources would be prohibitive. A study is being made of a) the use of heated solutions in selected parts of the heap leaching process and b) the design, construction and operation of simple solar heaters to be used in conjunction with heap leaching.

Studies are in progress on the effect of heating the solutions used in initial and late leaching and washing stages with various temperature increments. Several solar collectors have been constructed using inexpensive and readily available materials such as flat glass panes, flat mirrors and glass or metal tubing. If it is technically and economically feasible to use heated solutions to improve the efficiency of heap leaching the total amount of recoverable uranium from a given ore body could be substantially increased.

Addenda: performing organization: Instituto Nacional de Energia Nuclear.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0162, ULTRA-CENTRIFUGES FOR URANIUM ENRICHMENT

UNKNOWN, Physics Dynamic Research, *Amsterdam, Netherlands*

Development and testing of components for ultra-centrifuges.

Development of production techniques.

Engineering.

SUPPORTED BY Netherlands - Ultracentrifuge Netherlands - The Hague

3.0163, DETERMINATION OF EFFECTIVE CROSS-SECTIONAL AREA OF ATOMS AND MOLECULES, IN CONNECTION WITH LASER SEPARATION OF ISOTOPES

J. LOS, Fund. Res. on Matter Found., Inst. for Atomic & Mol. Phys., *Amsterdam Wgm, Netherlands*

Historical: Since 1963 a research team of the FOM Institute is working in the field of intersecting atomic and molecular beams. The energy of the particles is 1-25 eV. The group consists of about 10 scientists and 8 technicians.

Current situation: Five beam experiments are in progress. The research team is unique, because of the applied technologies and the energy range used (1-25 eV). Most of the experiments are automatized and computerized.

Interests: Determination of the effective cross-sectional area regarding the transfer of electrons as a function of the (internal) state of excitation of molecules (e.g. SF6, UF6) during the collision with alkaline atoms is of importance for the separation of isotopes by means of laser-beams.

SUPPORTED BY Netherlands - Fundamental Research on Matter Found - Utrecht

3.0164, 'SOL-GEL' PROCESSES FOR NUCLEAR FUEL FABRICATION

J.B. KANIJ, N.V. K E M A, *Arnhem, Netherlands*

Sol-gel processes for the preparation of nuclear fuels in the form of spherical particles have been studied for more than 10 years.

Several U.S. patents have been granted as a result of this work. Noteworthy among these is a process for the preparation of

UO2 or UO2-PuO2 spheres straight from solutions of the nitrates. A pilotrplant for this process with a capacity of several kg/hr is being build.

Fundamental and development work is continued.

Fuel elements with vibrocompacted UO2, made according to this process, are performing well in Halden heavy water reactor and Dodewaard boiling water reactor.

SUPPORTED BY Netherlands - N.V. Kema - Arnhem

3.0165, DEVELOPMENT OF COMPONENTS TO PRODUCE FISSION REACTOR FUELS
P. CROOCKEWIT, Rijn Schelde Verolme N.V., *Rotterdam, Netherlands*

SUPPORTED BY Netherlands - Rijn Schelde Verolme N.V. - Rotterdam

3.0166, DEVELOPMENT OF MANUFACTURING METHODS TO PRODUCE FUEL ELEMENTS
P. CROOCKEWIT, Rijn Schelde Verolme N.V., *Rotterdam, Netherlands*

SUPPORTED BY Netherlands - Rijn Schelde Verolme N.V. - Rotterdam

3.0167, ULTRA-CENTRIFUGE PROJECT
A.H. DEHASSI'ANDORSSE, B.V. Neratoom, *The Hague, Netherlands*

Neratoom co-operates in the Ultra-Centrifuge Project.

SUPPORTED BY Netherlands - B.V. Neratom - The Hague

3.0168, RESEARCH ON BURN-OUT AND MIXING PHENOMENA IN FUEL ROD BUNDLES OF NUCLEAR REACTORS
J.A. HEIL, Reactor Center, *The Hague, Netherlands*

In order to study the phenomena of burn-out and mixing in fuel rod bundles of nuclear reactors, research is being carried out using a high pressure-high temperature loop, fitted with an electrically heated nine-rod bundle, and two low temperature loops with a test section with one rod and a test section with 36 rods respectively.

The aims of the programme are: to determine the influence of grids of different designs on burn-out parameters; to determine the influence of grids of different designs on mixing paramenters; and to study fundamental aspects of boiling and burn-out phenomena that occur in fuel rod bundles.

Addenda: Performing organization: Reactor Centrum Nederland.

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

3.0169, FUEL PIN PERFORMANCE STUDIES
H. KWAST, Reactor Center, *The Hague, Netherlands*

A fast reactor fuel pin performance programme is being carried out to study the behaviour of fuel pins under transient loss of cooling and overpower conditions. The study consists of a series of experiments on single SNR type fuel pins which are irradiated in the poolside facility of the High Flux Reactor at Petten in specifically designed fuel capsules filled with sodium. Initial irradiation conditions are a linear power of 560 W.cm-1, and a sodium temperature of 550 degrees C.

For the transient experiments emphasis up till now has been in the loss of cooling conditions leading to sodium boiling and fuel melting. The loss of coolant flow conditions are simulated in two different ways: 1. by maintaining a stationary high sodium temperature. This represents a condition of insufficient cooling (SHOT experiments); and 2. by introducing a sudden interruption of the heat flow from the fuel pin and the surrounding sodium to the outer capsule construction (LOC experiments).

SHOT experiments are performed with canning temperatures of about 1000 degrees C and internal pin pressures of 0-75 bar. So far 13 of the planned 20 SHOT experiments have been performed. Following experiments will be performed with pre-irradiated pins. Of the planned 17 LOC experiments so far 12 have been performed. In 3 cases the fuel pins were pre-pressurized and two were pre-irradiated.

At present a programme is being prepared for the simulation of slow overpower experiments (TOP). The experiments will follow after the planned SHOT and LOC tests. A first series of in total 18 capsules are foreseen to be irradiated in the period 1977-1980.

Addenda: Performing organization: Reactor Centrum Nederland.

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

3.0170, DEVELOPMENT OF FUEL ELEMENTS FOR NUCLEAR REACTORS
P.F. SENS, Reactor Center, *The Hague, Netherlands*

On the basis of previous work by RCN and KEMA the development of fuel rods for nuclear power reactors, containing vibrocompacted fuel particles, which have been prepared by the sol-gel method, is being undertaken by Interfuel B.V. in close cooperation with RCN and KEMA. The effort includes the following projects: 1. Fabrication of uranium-oxide sol-gel particles in pilot plant scale; 2. Fabrication of mixed-oxide sol-gel particles, containing plutonium, on laboratory scale; 3. Development of vibro-compacting equipment on pilot-plant scale; 4. Performance of irradiation experiments and post-irradiation examination with vibrocompacted fuel rods; 5. Development of design and fabrication method for fuel rods for power reactors. Cooperation with: Interfuel B.V. - management of project; Kema - Arnhem - preparation of sol-gel fuel particles.

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

3.0171, ENRICHMENT OF URANIUM BASED ON CENTRIFUGE TECHNOLOGY
M. BOGAARDT, Ultra Centrifuge Nederland NV, *The Hague, Netherlands*

The project started as a Z.W.O. research project in 1954 at Prof. Dr. J. Kistemaker's laboratory. After proving of viability in 1962 the project was handed over to an institution supported by industries: Reactor Centrum Nederland. Evaluation studies during 1968 showed the industrial applicability of enrichment of uranium with centrifuges. A special firm with the Dutch Government as majority shareholder, Ultra-Centrifuge Nederland N.V. was founded in 1969. R & D has since then turned from basics towards improvement of performance, producibility, engineering of plants, operation, and other cost-affecting factors. The program for the years to come cover these aspects. Specification of programs and funds involved can not be disclosed because of security regulation.

Addenda: Supporting agency: Urenco/Centec on behalf of the U.K., West Germany.

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

3.0172, COMPUTER CODES FOR FUEL MANAGEMENT OPTIMIZATION, BURN-UP CALCULATIONS AND EXPERIMENTS FOR THERMAL REACTORS (ABBREV)
R. ZELAZNY, Nuclear Research Institute, *Swierk, Poland*

The research project is a continuation of the IAEA Research Project 1100/RB. The aim of the project is the development of a system of computer programmes for fuel management optimization of the 1000 MWe hexagonal lattice PWR. Preliminary computer programmes available from NEA and ANL libraries will be used for that purpose, with alterations needed for the CYBER-72 computer and the above mentioned type of reactors.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0173, DEVELOPMENT OF A PROCESS FOR CONTINUOUS EXTRACTION OF URANIUM FROM SEAWATER

C. YUN, Science & Technology Institute, Fuel & Combustion Laboratory, *Seoul, Republic of Korea*

The Korean energy plan to rely primarily on the nuclear power by 1985 is handicapped by the lack of guaranteed supply of the fuel. The ultimate aim of this project is to achieve a commercial scale production of seawater uranium that can be bartered for the processed fuel from advanced countries. It seems possible that we will eventually be able to exploit the tidal potential along the Korean west coast and the large amount of seawater to be pumped into the nuclear stations. During the first year of the project, we will be doing three things: First, evaluate existing extraction techniques by conducting literature survey and analytical experiments. Secondly, develop a system of adsorbents which are abundant domestically or can be regenerated cheaply. Thirdly, design and run at least one bench-scale continuous process for the extraction. During the next two years, we hope that a few different systems can be developed, the best process selected, and the basic data for a pilot testing collected.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0174, OPTIMIZATION THEORY AND FUEL AND ABSORBER MANAGEMENT PROBLEMS OF LIGHT-WATER REACTORS

N.B. URLI, Rudjer Boskovic Institute, *Zagreb, Soc. Fed. Rep. of Yugoslavia* 41001

Research on fuel and absorber management schemes which are not based on trial and error methods. Development of an effective physical model which will represent properly the status of a PWR chemical-shim reactor. The infinite multiplication factor k will be used as a single variable to describe the fuel distribution over the core at any stage of its life. Formalisms of general optimization theory and computer techniques based on variational methods and dynamic and linear programming will be used in order to find the optimum fuel cycle length, the number of assemblies required for refuelling, the optimum fuel enrichment, and refuelling and discharge patterns which minimize the overall energy cost.

ADDENDA: Performing organization: Institut Ruder Boskovic.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0175, EVALUATION OF NON-DESTRUCTIVE TECHNIQUES FOR MEASUREMENT OF ENRICHMENT AND URANIUM CONTENT OF VARIOUS MATERIALS (ABBREV)

V.M. SINCLAIR, Atomic Energy Authority, *Dounreay, Scotland, United Kingdom*

The evaluation of non-destructive assay techniques based on the use of portable equipment under plant conditions will be carried out. The techniques will comprise gamma spectrometry using both sodium iodide and lithium drifted germanium detectors, active neutron interrogation by a Random Driver system and total uranium analysis by neutron transmission. The Results of these measurements will be compared to measurements by in-plant equipment such as whole plate counters and will be backed by wet chemical analysis and mass spectrometric enrichment measurements.

The results of these measurements will be used to develop suitable procedures for the measurement of different types of special nuclear materials in the fuel cycle of highly enriched uranium fuel.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0176, BANK OF CORRELATED ISOTOPIC DATA

D.E. CHRISTENSEN, Battelle Memorial Institute, *Richland, Washington* 99352

For the development of isotopic correlations techniques (ICT) for safeguards, there is a practical need to store in a computerized data bank at the International Atomic Energy Agency all relevant isotopic and other data which might be useful for the application of the techniques. In particular, research and development are required in selecting what kinds of data, and in what format they are to be collected and stored in the data bank. Research on the choice of the most important correlations for different reactor fuel cycles as well as development of necessary software for processing and evaluation of collected data are some of the tasks that need to be carried out.

The ultimate purpose of the bank would be to make it available for application of ICT for safeguards verification, e.g., verificaton of plutonium content at the input of a reprocessing plant. Checking of consistency of reported data could also be achieved by these techniques, especially when historical data on similar reactor fuel cycles become available. Other benefits of ICT are helpful to fuel managements for checking burnup and reactor physics predictions.

The research agreement is the means to formally recognize the continuous work of participants from several institutes on isotopic correlation techniques with special emphasis on the Agency data bank.

The goals of the programme, as foreseen now, can be stated as: 1) Completion and demonstration of the Agency data bank software with exchange of test data supplied by participants in the project, and 2) Identification of correlation procedures and tests to be used with the data bank software.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3B. REACTOR MATERIALS

3.0177, DEVELOPMENT OF AN EXPRESS ACTIVE NDA TECHNIQUE (USING ISOTOPIC SOURCES) FOR THE CONCENTRATION MEASUREMENTS OF NUCLEAR MATERIALS

J. KARAMANOVA, Nuclear Research & Eng. Inst., *Sofia, Bulgaria*

The work treats an express active nondestructive technique for the concentration measurements of nuclear materials, based on electron interrogation and spectrometric detection and analysis of excited radiation-KX-rays. Combination of beta- and gamma-sources is necessary for the interrogation. There are two variants for spectrometric detection of excited radiation: 1) Using Ge semi-conductor spectrometers with high resolving power when other heavy elements are present in the measured samples; 2) Using scintillation spectrometers with low resolving power but high counting rate possibilities for routine concentration measurements of samples with one heavy element present (UO2, UF6, UF4, PuO2, and so on).

This technique is very precise. The precision for five minutes measurement time was in the range of 0 to 1%. The sensivity of the method, in the range of U concentration 84-88%, is 0 to 5% change of counting rate per 1% change in the concentration.

The technique is very simple to use. Measurements are relative. Only a few reference samples are necessary in order to calibrate the instrument.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0178, COORDINATED RESEARCH PROGRAM ON IRRADIATION EMBRITTLEMENT OF PRESSURE VESSEL STEELS

L.E. STEELE, U.S. Navy, Thermostructural Materials Br., *Washington, District of Columbia* 20375

A large amount of data on steel embrittlement by nuclear radiation has been developed by the Naval Research Laboratory. Some of this has been on A533-B steel heats similar to the A533-B plate used as the basic reference material for the IAEA cooperative program. Accordingly, it is proposed that: (a) NRL irradiation data be summarized for comparison with that of the IAEA irradiation program; (b) NRL irradiate selected heats of A533 and A508 steel for direct comparison of fracture toughness; (c) instrumented fracture toughness values be obtained for both

unirradiated and irradiated conditions with particular attention to the relationship to ASME Code requirements as described in ASME Code Section III; (d) NRL data analysis emphasize the question of postirradiation shelf toughness and the possibilities for restoring toughness by postirradiation annealing; and (e) the implications of composition effects, first recognized at NRL, be extended to this study for comparisons of composition and radiation sensitivity to help evolve specifications that will minimize radiation embrittlement sensitivity in future (new) steels. If the cooperative program is extended in the future to improved (or typical) European and Japanese steels, NRL will consider adding certain of these steels to its program.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0179, CRACK-CAUSED TRANSPORT IN GRAPHITE

E. HOINKIS, Hahn Meitner Inst. Nuc. Res., *Berlin 39, Berlin, Federal Republic of Germany* 1000

Addenda: Performing organization: Hahn Meitner Inst. Fuer Kernforschung GMBH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0180, FISSION PRODUCT TRANSPORTATION GRAPHITE

E. HOINKIS, Hahn Meitner Inst. Nuc. Res., *Berlin 39, Berlin, Federal Republic of Germany* 1000

ADDENDA: Performing organization: Hahn-Meitner-Inst. fuer Kernforschung Berlin GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0181, REDUCING PRIMARY CYCLE CONTAMINATION BY ELECTROMAGNETIC FILTERING

K.H. NEEB, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

ADDENDA: Performing Organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0182, NEUTRON IRRADIATION EFFECTS ON THE RESISTANCE AND RELAXATION OF AUSTENITIC STEEL AND NICKEL ALLOYS IN LWR POWER STATION STRUCTURES

ROESLER, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0183, SELECTIVE CORROSIVE BEHAVIOR OF MATERIALS USED IN LWR'S - EXAMINING LITERATURE AND EXPERIMENTAL PROGRAM

UNKNOWN, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

ADDENDA: Performing organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0184, INVESTIGATION OF THE PROPERTIES OF ZIRCALLOY CLADDING TUBES OF VARIOUS PRODUCTION TECHNIQUES

W.N. POETLSCHKE, Metallgesellschaft AG, *Frankfurt 1, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0185, HOLOGRAPHIC INTERFEROMETRIC INVESTIGATIONS FOR MATERIAL AND CONSTRUCTION PART-TESTING OF REACTOR COMPONENTS

GRUENEWALD, Dornier System Gmbh, *Friedrichshafen, Baden Wuertt., Federal Republic of Germany* 7990

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0186, RESEARCH WITHIN THE COORDINATED PROGRAMME ON IRRADIATION EMBRITTLEMENT OF PRESSURE VESSEL STEELS

J. AHLF, Soc. for Nuc. Energy Navig., *Geesthacht Tesperhude, Federal Republic of Germany* 2054

Samples of the pressure vessel steel ASTM A533 B will be irradiated and different materials tests are carried out. 192 specimens Charpy-V-notch and 48 tensile tests specimens will be irradiated in several capsules in the Material Test Reactor Geesthacht. The irradiation temperature is 100 degrees C and 290 degrees C respectively. The neutron dose will be 5x10 to the 18th power, 2x10 to the 19th power and 10 to the 20th power n/cm2 (En greater than 1MeV).

10 WOL-IX-specimns and 16 Pellini-P2-specimens will be irradiated at 29 degrees C to neutron doses of 2x10 to the 19th power and 10 to the 20th power n/cm2 (En greater than 1MeV).

The fluence is measured with neutron monitors of Co, Co plus Cd, Ag, Nb, Np, In, Ni, Ti, Fe and Al.

After the irradiation, the following tests will be done in the hot cell facilities: Impact test at the whole transition region and determination of the NDT-Temperature; Tensile test (tensile strength, yield strength, elongation reduction of area); Hardness test; Determination of fracture toughness; Drop weight test and determination of the NDT-Temperature.

Similar tests will be performed in several countries and the results will be compared and discussed.

Addenda: Performing organization: Gesellschaft fur Kernenergieverwertung in Schiffbau und Schiffahrt mbH.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0187, BURNABLE POISONS IN THE LIGHT WATER REACTOR DESIGN, MICROBURN-UP EXPERIMENTS AND CALCULATIONS

K. PENNDORF, Soc. for Nuc. Energy Navig., Inst. for Physics, *Geesthacht Tesperhude, Federal Republic of Germany* 2054

Solid burnable poisons are needed in present PWR designs for the reduction of the boron acid concentration in order to prevent positive coefficients of reactivity. The special operational conditions of a ship reactor lead to another reason for the application of this kind of poison, namely to use them for compensation of almost all burn-up reactivity. This strengthens the necessity of a very accurate dimensioning because an appropriate binding of reactivity has to be kept over the whole cycle time.

Therefore, several burn-up experiments have been run in the 15 MW material test reactor FRG-II. The following device have been irradiated: poison pins within and without PWR fuel pin lattice segments and fuel pins containing lumped poison in the center. Measurements of reactivity, fluence, fission product concentrations and radial profiles of poison concentration have been performed. Methods applied were gamma-scanning and neutron pulse, radiography, and transmission techniques.

Evaluation of the experiments was done by one- and two-dimensional SN-transport burn-up calculations. In parallel a collision probability transport burn-up code for current PWR design work is being developed, the main feature of which is economy in manpower and computer time.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0188, DEVELOPMENT PROGRAM FOR REACTOR GRAPHITE
E. PFITZER, Univ. of Karlsruhe, Inst. for Chemical Technology, *Karlsruhe, Baden Wuerttemberg, Federal Republic of Germany* 7500

ADDENDA: Performing organization: Inst. fuer Chemische Technik der Uni Karlsruhe.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0189, BASIC STUDIES FOR THE REACTOR GRAPHITE DEVELOPMENT PROGRAM
UNKNOWN, Univ. of Karlsruhe, Inst. for Chemical Technology, *Karlsruhe, Baden Wuerttemberg, Federal Republic of Germany* 7500

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0190, TENSION AND FRACTURES IN SELECTED GRAPHITE SAMPLES BEFORE AND AFTER IRRADIATION
LUCAS, Hochtemperatur Reaktorbau Gmbh, *Mannheim, Baden Wuerttemberg, Federal Republic of Germany* 6800

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0191, REACTOR MATERIALS - WELDING PROCESSES AND PROPERTIES OF STEEL 22, NIMOCR 37 AND 20 MN-MONI 55
LOHRMANN, Gutehoffnungshuette Sterkrade, *Oberhausen, Nordrhein Westfal., Federal Republic of Germany* 4200

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0192, DEVELOPMENT PROGRAM FOR REACTOR GRAPHITE
VOHLER, Sigri Elektrographit Gmbh, *8901 Meitin Gen, Bayern, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0193, CHAMPLAIN 8-1, MOTION OF CORROSION PRODUCTS
FRICONNEAU, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0194, DAMAGE TO MATERIALS OF THE FAST NEUTRON REACTOR
LOTT, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0195, JOINT STUDIES OF MATERIALS
LOTT, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0196, 1200 MWE HIGH CAPACITY POWER PLANTS PROJECT - EXPERIMENTAL IRRADIATION
OLLIER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0197, SODIUM-COOLED FAST NEUTRON REACTOR - STUDYING EXCHANGER MATERIALS
UNKNOWN, Electricite de France, *Paris, France* 76008

Steam generators: studying materials and their welding (mechanical and metallurgical behavior of Incoloy 800).

Studying mass transfer capable of affecting secondary circuit materials, and its effects.

Caustic corrosion of steam generator materials and the effects of sodium contamination.

Water side corrosion of 'once through' steam generators.

This project and its predecessor are being carried out in collaboration with CEA and industry because of decisions taken about the reactor setting-up program.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0198, SODIUM-COOLED FAST NEUTRON REACTOR - STUDYING VESSEL MATERIALS
UNKNOWN, Electricite de France, *Paris, France* 76008

This study deals with: a. steel for the super-Phenix vessel: studying the steel for the Phenix vessel and other suitable steels (temperature resistance, dimensional stability, behavior under cyclical load); b. the susceptibility of different types of steel to welding and the welding of vessels (manual and atomic welding); and c. the reactor block, and internal structures (welding, bolting, behavior of materials in sodium and in combination with blanket gas).

Addenda: Supporting agency and Performing Organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0199, EXPERIMENTAL STUDY OF CORROSION AND CHEMISTRY OF THE PWR REACTOR'S PRIMARY AREA
UNKNOWN, Electricite de France, *Paris, France* 76008

Studying corrosion products falling-off in the primary area, related to safety problems (interference with steam generators).

Studying the corrosion of PWR reactors' primary circuit materials in a Boron- and Lithium-containing environment.

This project deals with putting the loop into operation and performing tests.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0200, TESTING MATERIALS IN SODIUM - ANALYZING SODIUM AND ARGON
UNKNOWN, Electricite de France, *Paris*, *France* 76008

This project deals primarily with developing and managing important test methods for the testing programs planned by the Department of 'Materials Studies'.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0201, PWR REACTORS - STEAM GENERATOR MATERIALS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Studying corrosion in Inconel 600 tubes in the primary and secondary areas of PWR reactors: Tests of samples and models have been carried out in order to show the effects of manufacturing, operation, and utilization conditions of tubes (chemical composition, pressure level, etc.). Studying other similar materials (stainless Incoloy 800, inconel 690). Some tests will be carried out in the dynamic corrosion loop. Some of the questions dealt with in this project are part of the subject of the EDF-CEA-Westinghouse study.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0202, VERIFYING CONDITIONS OF USE FOR GRAPHITE-GAS MATERIALS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

End of tests since 1969 on metallic materials' corrosion in CO2 in order to define graphite-gas reactor operating conditions which allow us to maintain corrosion within acceptable limits (EDF-CEA work group).

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0203, MATERIALS FOR VESSELS, PIPES, AND STRUCTURES OF LIGHT WATER REACTORS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Establishing qualifications and conditions for use of manganese-molybdenum type steel for water reactor vessels. Comparing methods of studying welding the basic metal's resistance to the spread of cracks. Studying the effects of weathering in operation and collaboration with CEA for radiation effects.

New manufacturing processes for BWR reactor primary pipes (metal characteristics, welding, etc.). Evaluating performance of materials used in small chambers or components while in operation. Conserving the pre-stressing of the containment cell.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0204, CORROSION OF CELL MATERIALS IN LIGHT WATER POWER STATIONS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Determining the amount of hydrogen produced when a boric acid solution and soda are sprinkled within the containment cell of a pressurized water boiler following a primary pipe rupture.

This project will provide data on the corrosion of metals of light water reactor cells by sprinkling solutions. This information can be used for safety studies.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0205, SPECIAL PROBLEMS OF USING SODIUM
UNKNOWN, Electricite de France, *Paris*, *France* 76008

The main problems of using sodium are: friction, corrosion, evaporation, and behavior of aerosols.

We will also cover maintenance problems, (welding, etc.) of fast reactor structures.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0206, FAST NEUTRON, SODIUM-COOLED REACTORS - VESSEL MATERIALS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

The objective of this project is to study the operation and resistance of vessel materials. The results will yield facts to be used in making decisions about the plan to construct a reactor and about the reliability and safety of fast neutron, sodium-cooled reactor vessels. (1) Steel for the vessel in Phoenix and Superphoenix and other types of steel with suitable properties resistant to aging under heat, problems of dimensional stability, and behavior under cyclical stress. (2) The weldability of different types of steel and vessel manual and automatic welding. (3) Reactor block and internal structures: bed and flooring (welding, bolting), behavior of materials in sodium and at interfaces with surface gas.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0207, METHODS OF ANALYZING SODIUM AND COVERING GAS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

By developing methods of analyzing sodium impurities, such as H2, O2, and C which have an effect on materials resistance, we will be in better position to understand the chemical reactions that occur in sodium when it is contaminated by water, air, oil, etc. This, in turn, will enable us to understand the stress on materials. It will also provide users with simple analysis methods that will help ascertain the purity of the sodium and understand the dangers of such occurrences as carbon transfer.

We will examine these types of methods: (1) analyzing samples, which can be done with laboratory testing equipment (corrosion tests), with test loops (ICARE, COCAU, CGVS, etc.) or with the Phoenix. This method will enable us to determine the forms that impurities can take and to modify equipment continuously or semi-continuously: (2) semi-continuous analysis based on distribution between sodium and an adequate amount of the impurity to be analyzed. For oxygen, we will use vanadium wire, for carbon, ferrous manganese (20%) and ferrous nickel (8%). (3) continuous analysis: we will test devices such as the oxygen meter or the hydrogen meter and compare them to other methods. We will also examine the possibility of contructing a carbon meter and will study the operation of damping indicators.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0208, COLLABORATING IN TESTING MATERIALS IN SODIUM AND IN DEVELOPING METHODS OF ANALYZING SODIUM
UNKNOWN, Electricite de France, *Paris*, *France* 76008

This project will develop and use test methods that will lead to new methods of analyzing sodium and argon that can easily be used in a power station and will accumulate as much information as possible on the behavior of the different materials used or to be used in constructing sodium-cooled reactors, particularly steam generators.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0209, BEHAVIOR OF NUCLEAR REACTOR MATERIALS UNDER FLOW
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Structures located where flows are heavy or materials that absorb liquids that flow create significant risks of vibration. This is because of the decrease in mechanical frequencies (effect of size) and the increase in dynamic pressure. These phenomena

should be analyzed when conventional and nuclear power station materials are designed, fabricated, and used.

This project consists of basic research and will apply its results to pipe systems, air coolants, and cluster exchangers (water heaters and steam generators in PWRs) by analyzing flow conditions and the vibratory behavior of these devices under flow.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0210, CONDENSER MATERIALS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

To prove the reliability of coastal conventional or nuclear power stations, we intend to: study the impact of sea water by observing the resistance of titanium tubes at high speeds (up to 3m/s) and the expansion of titanium tubes with tests that use a model of a condenser with tubular plaques provided by Direction de l'Equipement.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0211, MATERIALS FOR STEAM TURBINES
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Study materials for wheels and blades using lightly alloyed (1, 2 1/2, and 3% nickel) ferritic steel for making the large wheels for the BP blades of turbines in pressurized 900 MW water reactors; determine their resistance to rupture and the effect of various corrosive environments.

Because of the significant number of blade ruptures in large turbines, manufacturers have proposed new grades with 13% chromium. We will use the mechanics of rupture to examine the principal grades under the following aspects: (1) for turbine wheels: resistance to rupture and relationship to mechanical characteristics that exist when materials arrive at the factory; corrosion under stress in actual environments and effect of certain local concentrations; (2) for blades: fatigue resistance in different environments that can exist; effects of surface states.

Materials for nuts and bolts at high temperatures. Due to the high cost of replacing nuts and bolts and of using such nuts and bolts for fast neutron reactors, we will study the effects of chemical composition and the thermal treatment on the resistance of bolts to fatigue and relaxation.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0212, DISTORTION - CAVITY FORMATION BY NEUTRON IRRADIATION
ADDA, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgies et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0213, CHAMPLAIN, DCH PILOT PROJECT, EFFICIENT FILTERS (USING LOOPS)
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0214, CHAMPLAIN, SERMA PILOT PROJECT, CORROSION PRODUCTS (USING LOOPS)
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0215, ASSISTANCE FOR OPERATORS IN DIFFERENT AREAS (CORROSION OF REACTOR MATERIALS)
BASTIEN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0216, STRUCTURAL MATERIALS OF UMGG REACTORS
BASTIEN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0217, PARTICIPATION IN THE SSL-1 IRRADIATION IN SPITFIRE (OSIRIS)
BRISBOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0218, DIAMOND IRRADIATION
BRISBOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0219, STRUCTURAL DEVELOPMENT OF AUSTENITIC STEEL UNDER IRRADIATION
DELAPLACE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0220, QUICK STUDY OF THE EFFECTS OF IRRADIATION (DISTORTION) BY BOMBARDING
DELAPLACE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0221, LIMITING THE USE OF SOLUBLE BORON
DOLLE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0222, CHAMPLAIN 7-1 AND 7-3, RESISTANCE OF STEEL VESSELS UNDER IRRADIATION
GUIONNET, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0223, IMPROVING VESSEL STEEL - RADIATION RESISTANCE
GUIONNET, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0224, DAMAGE TO CARBON MATERIALS (OWN PROGRAM)
LEDIEUDEVILL, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0225, FABRICATION AND CHARACTERISTICS OF DIEZO-ELECTRIC MATERIALS
LEGALELMALEH, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0226, CONTROL ROD AND SHIELDING MATERIALS (CONSUMABLE POISON)
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0227, CEA-GGA PROGRAM FOR CPL-2 IRRADIATION (SET OF 3 IRRADIATIONS)
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0228, SC 1 IRRADIATION
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0229, GULF-CEA PROGRAM ON GRAPHITE CORROSION
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0230, DRAGON, IRRADIATION - TELEDIAL AND MET U1 EXPERIMENTS
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0231, CLASSIFYING GRAPHITES
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0232, MANUFACTURING COMPACTS - IMPROVING INJECTION PROCEDURE
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0233, IRRADIATING SG2 GRAPHITE
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0234, SSL2 IRRADIATION
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0235, CHARACTERISTICS OF COMPACTS AFTER IRRADIATION
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0236, IRRADIATION OF GRAPHITES IN THE DRAGON REACTOR - CORROSION PREVENTION
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0237, CPL 3-0 IRRADIATION
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0238, GRAPHITE FLOW - CEA/KFA COLLABORATION
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0239, TROUBLESOME MATERIALS - SILICON NITRIDE
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0240, CHAMPLAIN, INNOVATION 8-1, TRANSPORT OF CORROSION PRODUCTS IN REACTOR LOOPS
MICAUX, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0241, CEA-INDUSTRY ROUND-TABLE PARTICIPATION - ELECTRON WELDING
NIFENECKER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0242, PRE-STRESSED CONCRETE - TECHNICAL ASSISTANCE FOR THE DEDR
NIFENECKER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0243, IMPROVING PRESENT REACTOR VESSEL STEEL - BIBLIOGRAPHIC STUDY - ASSISTANCE
NIFENECKER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0244, TESTING A GULF-TYPE HOT CONDUIT WITH TEMPERATURE CYCLES
NIFENECKER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0245, INSULATING MATERIALS
NIFENECKER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0246, DEVELOPING STARISOL INSULATION
NIFENECKER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0247, SHIELD WITH HOT WALLS - HOT CONCRETE
NIFENECKER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0248, ELECTRON BEAM WELDING AND ULTRASONIC CONTAMINATION STOPPERS
NIFENECKER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0249, CHAMPLAIN, INNOVATION 12, LIMITING THE USE OF SOLUBLE BORON
NIGON, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0250, MATERIALS - CLASSIFICATION (GRAPHITE INSULATOR)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0251, INSULATING MATERIALS (RELAXATION)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0252, CERAMIC INSULATORS (CONDUCTIVITY)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpementdes Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0253, NEW EXCHANGER MATERIALS - FERRITES IN CHROMIUM
PETREQUIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0254, IMPROVING THE STEEL IN TODAY'S VESSELS - WELDING PROBLEMS - ASSISTANCE
PETREQUIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0255, THE SEARCH FOR METALLURGIC CORRECTIVE MEASURES FOR EARLY SHEATHING RUPTURE
PETREQUIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nuclearires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0256, IMPROVING SHEATHING QUALITY (VALLOUREC TUNING AND UGINE STEELS)
PETREQUIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0257, DETERMINATION AND IMPROVEMENT OF THE DUCTILITY OF ZIRCALLOY SHEATHING
PETREQUIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0258, ZIRCONIUM ALLOY SHEATHING - CREEP RESISTANCE
PETREQUIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0259, EXAMINATION WHILE IN OPERATION - MECHANICAL STUDY OF RUPTURE
PETREQUIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Surrporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0260, NEW STEEL FOR REACTOR VESSELS
PETREQUIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0261, SUPER-PHENIX, AUTOMATIC SAMPLING OF VESSELS, CHOOSING THE GRADE OF INCOLOY
PETREQUIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0262, STRUCTURAL MATERIALS ANALYSIS AND DATA FOR CONSTRUCTION CODES
PETREQUIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0263, STRUCTURAL MATERIALS THAT MAY BE USED UP TO 800-850 DEGREES C
PETREQUIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

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3.0264, BB5 MATERIAL
RAPPENEAU, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0265, EXAMINING GRAPHITE SAMPLES AFTER IRRADIATION
RAPPENEAU, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0266, CHARACTERISTICS OF GRAPHITE WHEN NOT UNDER IRRADIATION
RAPPENEAU, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0267, CONTROL ROD MATERIALS IN FAST NEUTRON CARBIDE REACTORS
RAPPENEAU, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0268, TYPES OF CONCRETE
RAPPENEAU, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

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3.0269, CEA-GGA PROGRAM FOR SSL-1 IRRADIATION
RINGOT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0270, TRANSPORT OF CORROSION PRODUCTS
ROZENBERG, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

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3.0271, ANALYTIC CONTROL OF STRUCTURAL MATERIALS BY ACTIVATION
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0272, REACTOR MATERIALS - PRACTICAL PROBLEMS OF CORROSION
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0273, CORROSION OF MATERIALS UNDER IRRADIATION - STAINLESS STEEL 18/10
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0274, RADIOLYTIC CORROSION OF GRAPHITE AND INHIBITION BY METHANE
UNKNOWN, Atomic Energy Commission, Div. of Metall. Stu. Nuc. Fuel, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

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3.0275, PARTICLES WITH NUCLEI DILUTED IN CARBON
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles.

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3.0276, JOINT CEA-GGA PROGRAM ON GRAPHITE CORROSION
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0277, JOINT CEA-GGA PROGRAM FOR GF 1,2,3 IRRADIATION
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles.

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3.0278, JOINT CEA-GGA PROGRAM FOR FU AND FQ IRRADIATION
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0279, LOW DISTORTION ALLOYS
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0280, MECHANICAL PROPERTIES OF COMMERCIAL STEELS WHEN HEATED
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles.

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3.0281, TRANSPORT OF FISSION PRODUCTS IN STEELS AND GRAPHITE
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0282, REACTOR MATERIALS - PRACTICAL PROBLEMS OF CORROSION
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0283, CORROSION OF MATERIALS IN HELIUM
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Chimie.

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3.0284, MATERIALS - DAMAGE AND DISTORTION
FICHE, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0285, CORROSION OF MATERIALS AT HIGH TEMPERATURES IN HTR REACTORS
SECE, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0286, METALLURGICAL AND ELECTROCHEMICAL ASPECTS OF CORROSION PHENOMENA
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay.aux-Roses, Division de Chimie.

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3.0287, VARIOUS COMMON FACTORS OF THE PROBLEM OF CORROSION BY LIQUEFIED METALS
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0288, CORROSION PROBLEMS OF THE STEAM GENERATOR
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

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3.0289, BEHAVIOR OF MATERIALS IN SODIUM AND ASSOCIATED PROBLEMS
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

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3.0290, CORROSION OF STEAM GENERATOR MATERIALS, PROPORTION OF STEAM
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0291, CORROSION OF MATERIALS IN THE HELIUM COOLANT
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0292, SHIELDS - CORROSION OF METALLIC INSULATING SHEETS
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0293, CORROSION OF STAINLESS AUSTENO-FERRIC STEEL
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

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3.0294, CORROSION IN REACTOR CIRCUITS AND STEAM GENERATORS
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

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3.0295, REACTOR MATERIALS - PRACTICAL PROBLEMS OF CORROSION
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

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3.0296, SHEATHING MATERIALS
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0297, THE CARBIDE ELEMENT
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0298, STUDY OF SPUTTERING AND BLISTERING PROCESSES OF REFRACTORY METALS BY 15 KEV TO 3 MEV HYDROGEN IONS
M.K. MEHTA, Bhabha Atomic Research Centre, Nuclear Physics Division, *Bombay, Maharashtra, India*

The programme of work is to carry out sputtering and blistering studies on Ta, Mo, Nb and Ni using a clean vacuum system and back scattering techniques. The work during 1977-'78 would include: (1) setting up a clean irradiation system with good vacuum. (2) Sputtering: a) Sputtering the metals Ta, Mo, Nb and Ni using H plus and He plus ions of energy in the range 15 keV-1.5 MeV and collecting the sputtered atoms on an aluminium backing, b) studying the yield and angular distribution of sputtered particles by back-scattering technique using MeV He plus ions, c) examination of sputtered surface using a scanning electron microscope. (3) Blistering: a) bombardment of the metals by He plus and He ions of energy in range of 15 keV-3 MeV, b) ex-

amination of irradiated samples using scanning electron microscopy of different stages of annealing.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0299, FRACTURE ANALYSIS RESEARCH ON NOZZLE INTERSECTIONS (BROS) PROJECT NO. - 061.681B

M.J. BROEKHOVEN, Delft Univ. of Technology, Lab. for Thermal Power Engin., *Delft, Netherlands*

The main aim of this Dutch cooperative research program 'BROS' is to contribute to the existing knowledge and its practical applicability regarding the crack extension behaviour in heavy section nuclear steel pressure vessels, with particular reference to cracks occurring in areas of complicated geometry and stress distribution, notably nozzle corner regions.

The main activities are: A. theoretical research directed towards development of efficient computation methods to calculate the crack extension behaviour for complicated configurations, such as nozzle corner cracks, using advances analytical and finite element techniques; B. experimental investigations of crack extension behaviour in uniaxially and biaxially loaded cracked nozzle-on-flat-plate models, manufactures from nuclear grade pressure vessel steel (ASTM A508 C1.2) and from model materials; C. determination of fatigue and fracture (elastic and elastic-plastic) related material parameters for A508 and model materials; D. research on the applicability of Acoustic Emission techniques to detect, localize and characterize crack extension in the materials of concern.

In the first instance the investigations are based on the application of Linear Elastic Fracture Mechanics concepts, in order to obtain an optimal connection with present ASME code (Section III, Appendix G) requirements.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

3.0300, ELASTIC-PLASTIC FRACTURE MECHANICS INVESTIGATIONS ON NOZZLE CORNER CRACKS (EPOSS)

M.J. BROEKHOVEN, Delft Univ. of Technology, Lab. for Thermal Power Engin., *Delft, Netherlands*

Partly overlapping, partly as a follow up of the BROS program described under Project no. 061-681b, this program aims at obtaining information about the elastic-plastic fracture behaviour of nozzle-to-cylinder junctions with cracks at the inside nozzle corner; it should lead to efficient computation procedures to describe this behaviour, verified by experimental model testing. For this purpose advanced elastic-plastic fracture mechanics concepts will be applied, with emphasize on the J-integral concept.

The main activities are: Theoretical investigations; the finite element technique will be used to obtain accurate solutions, while more economical approximation procedures, the results of which have to be checked with the finite element results, will be developed; experimental investigations on carefully designed flat-plate simulation models, manufactured from a suitably chosen model material (aluminium alloy); determination of elastic-plastic fracture related material parameters for the model material, to support the model tests.

In view of the complexity of the problem, the theoretical and experimental investigations will start with simple models, i.e. through-thickness cracks emanating from a hole in a strip; subsequently quarter circular cracks in the same type of models will be studied while finally the problem of quarter cracks in nozzle-junction models will be treated.

SUPPORTED BY Netherlands - Ministry of Social Affairs - The Hague

3.0301, SODIUM TECHNOLOGY DEVELOPMENT PROGRAM

A.H. DEHASSVANDORSSE, B.V. Neratoom, *The Hague, Netherlands*

The sodium technology development program is a part of one of the projects which has the target to assure the long term energy production by means of nuclear energy.

The project is carried out in close co-operation with Belgian and German institutions and industries. The effort of the Dutch industry is mainly directed towards the development of the components of heat transport systems using liquid sodium. These components are: sodium-sodium heat exchangers, sodium pumps and sodium heated steam generators.

In order to establish a disciplined basis of technology in the areas pertinent to the design, construction and operation of this type of component, it has been decided to build and test full size prototypes of each component. For this purpose a 50 MWth test installation has been constructed.

Addenda: Performing organization: B.V. Neratoom.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

3.0302, GRAPHITE RESEARCH

R. BLACKSTONE, Reactor Center, *The Hague, Netherlands*

In cooperation with the OECD Dragon project and KFA Julich irradiations are performed on various types of graphite at temperatures between 400-900 degrees C and 900-1400 degrees C. Furthermore an in-pile creep capsule has been developed, which will be used for radiation-induced creep experiments of graphite at about 900 degrees C. Secondly irradiations are being performed on dummy coated particles and compacts of dummy coated particles in graphite matrices. In 1975 a long-lasting irradiation experiment will be started on fuel-containing coated particles. The post irradiation investigation is concentrated on the determination of irradiation-induced changes in the density of pyrolytic graphite and silicon carbide coatings. The research on UO2-coated particles concerns a selection of advanced coated particles for the thorium cycles, possibly with oxygen getters in the fuel.

Addenda: Performing organization: Reactor Centrum Nederland.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

3.0303, DEVELOPMENT OF SAFEGUARDS TECHNIQUES FOR NUCLEAR MATERIALS

R.J. HARRY, Reactor Center, *The Hague, Netherlands*

The development of safeguarding techniques is being carried out within the framework of the so-called ESARDA-agreement between six of the nine countries of the European Community, and the European Commission. Also studies are performed on behalf of the Netherlands Government especially concerning the safeguarding of the enrichment plants in Almelo.

Development work at RCN covers the following projects: development of nondestructive measurements of nuclear materials using gamma spectrometry; development of chemical analytical techniques for nuclear materials; development of statistical techniques and studies concerning error propagation in accounting of nuclear materials.

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

3.0304, BEHAVIOUR OF CONSTRUCTION MATERIAL AFTER IRRADIATION

B.V. SCHAAF, Reactor Center, *The Hague, Netherlands*

The long term creep properties and low cycle fatigue behaviour of the austenitic steel 1.4948, in conditions representative for the operation of the sodium-cooled fast reactor SNR-300 have to be measured for the safety analysis. Thus a series of about 800 steel samples will be irradiated in the high Flux Reactor at Petten in the period 1975-1976. Irradiation conditions are 450-500 degrees C and fast fluences up to 5 x 10 to the twenty-fourth power n/square meter, En greater than 0.1 MeV. For the creep experiments a special lead-shielded facility has been built, equipped with ten 3-ton creep machines. For the low-cycle fatigue testing an Instron 1251 testing machine is available in one of the hot cells at RCN. The experiments are performed in close cooperation with TNO and GfK, Karlsruhe.

Addenda: Performing organization: Reactor Centrum Nederland.

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

3C. REACTOR COMPONENTS

3.0305, STUDY OF BEHAVIOUR OF CONCRETE CONTAINMENT UNDER OVERPRESSURE CONDITIONS
D. MURRAY, Univ. of Alberta, *Edmonton, Alberta, Canada*

The objective is to investigate the behaviour of containment structures of the Gentilly-1 type (pre-stressed concrete) at pressures exceeding the design pressure up to the point of gross structural failure; to predict the location and modes of failure; and to develop general methodology applicable to other structures of similar shape.

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

3.0306, FLAW SENSITIVITY OF PIPE-TO-PIPE INTERSECTIONS
D.J. BURNS, Univ. of Waterloo, *Waterloo, Ontario, Canada*

The objective of this project is an experimental and theoretical investigation of flow tolerance and stress fields in ASME Section III, Class I, stainless steel pipe ties subjected to cycling internal pressure and in-plane bending. Indications so far are that such components have a high tolerance for large defects.

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

3.0307, STRUCTURAL INVESTIGATIONS OF COMPRESSED-AIR CONTAINER COMPONENTS IN PRESTRESSED CONCRETE
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

The project is a joint Scandinavian project that was organized by Swedish initiative with the aim of developing a pressure vessel in prestressed concrete as an alternative to the reactor steel tank used in present light-water reactors. The concrete tank concept, which is based on an extrapolation of known technology from gas-cooled reactors, is distinguished by a high safety standard and has, by comparison with the steel tank, fewer restraints with respect to unit size and supplier options, shorter erection time and higher operational flexibility.

The development work is carried out in stages. The third and last stage is now being carried out.

It is the purpose of the project to develop, through theoretical and experimental research, methods of predicting quantitatively the structural behavior, in critical parts of the design in the area between operational loading and failure loading. The investigation includes conditions in the tank's cover design and bottom plate, where complex stress conditions arise which cannot be computed with available methods. The work is thus a means toward collective researching of the safety characteristics of the tank concept and serves as a contribution to the general knowledge of the behavior of concrete structures under triaxis stress conditions.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0308, STRUCTURAL ANALYSIS OF THE PRESSURE VESSELS AND OTHER SUPPORTING STRUCTURES IN NUCLEAR POWER PLANTS
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

Structural analyses are an essential part of the safety evaluation of nuclear plants and assumes the access to and experience in the use of advanced computer methods.

The project is being put into active status with a view toward increasing the department's competence in this area, and a view toward assisting the authorities in connection with the evaluation of future Danish nuclear pojects.

The aims of the project, which includes a number of partial activities, are: 1) to investigate the reliabilty of available programming systems and their applicability to structural analyses for various parts of plants and loading situations; 2) to verify computing models experimentally to the extent possible; 3) to transfer suitable programs to domestic computers; 4) to undertake independent development of special programs.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0309, DEVELOPMENT OF NONDESTRUCTIVE TEST PROCEDURES AND POSSIBLE ASSOCIATED APPARATUSES FOR DETECTING FLAWS IN THICK-WALLED CONTAINERS
GUTHMANN, Unknown Inst. or Indiv. Grant, *Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0310, STRESSED CONCRETE REACTOR PRESSURE VESSELS
N. BUNKE, German Bureau of Standards, *Berlin 15, Berlin, Federal Republic of Germany* 1000

E.V. (DIN) and Deutscher Ausschuss fuer Stahlbeton.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0311, PROGRAM OF R&D FOR PRESTRESSED CONCRETE REACTOR PRESSURE VESSELS (SBB PROGRAM)
G.W. BECKER, Materials Testing Institute, *Berlin 45, Berlin, Federal Republic of Germany* 1000

Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0312, LIGHT WATER REACTORS - ANALYSIS OF THE EXPERIMENTAL RESULTS OF MULTI-AXIS STRESS STUDIES OF CONCRETE
G. SCHICKERT, Materials Testing Institute, *Berlin 45, Berlin, Federal Republic of Germany* 1000

ADDENDA: Performing organization: Bundesanstalt fuer Materialpruefung.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0313, IMPROVING MANUFACTURE TECHNOLOGY FOR NON-INTERCHANGEABLE GRAPHITE REFLECTORS THROUGH TECHNICAL ANALYSIS
WIEMER, Ringsdorff Werke Gmbh, *Bonn Bad Godesberg 10, Nord. W, Federal Republic of Germany* 5300

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0314, INVESTIGATION OF WELDING AS IN WELDED JOINTS OF THICK-WALLED REACTOR STRUCTURAL PARTS
K. SEIFERT, Fraunhofer Society, Inst. for Applied Mater. Res., *Bremen 77, Bremen, Federal Republic of Germany* 2820

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0315, SAMPLE-MODERATED TREATMENT OF OSCILLATIONS IN NUCLEAR FITTINGS IN LIGHT WATER REACTORS
KLAPP, Technical Univ. of Clausthal, Inst. for Apparatus Constr., *Clausthal Zellerfeld, Nieder., Federal Republic of Germany* 3392

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0316, CONTINUING THE INTENDED RESEARCH ON SAMPLE-MODERATED TREATMENT OF OSCILLATIONS OF NUCLEAR FITTINGS IN LIGHT WATER REACTORS
KLAPP, Univ. of Erlangen at Nuremberg, Inst. for Apparatus Technology, *Erlangen*, *Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0317, REACTOR COMPONENTS - DEVELOPMENT OF AN EASILY-REPAIRED STEAM GENERATOR
BUDNICK, Kraftwerk Union AG, *Erlangen 2*, *Bayern*, *Federal Republic of Germany* 8520
ADDENDA: Performing organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0318, EXPERIMENTAL INVESTIGATION OF THE BRITTLE-FRACTURE BEHAVIOR OF THICK-WALLED CYLINDRICAL CONSTRUCTION COMPONENTS
H. DORNER, Kraftwerk Union AG, *Erlangen 2*, *Bayern*, *Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0319, INVESTIGATION PROGRAM TO TEST A BURST PREVENTER FOR REACTOR COMPONENTS
H. DORNER, Kraftwerk Union AG, *Erlangen 2*, *Bayern*, *Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0320, BURST RESISTANCE FOR THE PRIMARY CIRCULATION IN PRESSURIZED WATER REACTORS
H. DORNER, Kraftwerk Union AG, *Erlangen 2*, *Bayern*, *Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0321, DEVELOPMENT OF NONDESTRUCTIVE TEST PROCEDURES AND THE POSSIBLE ASSOCIATED APPARATUS FOR FINDING FLAWS IN THICK-WALLED CONTAINERS
ENGEL, Kraftwerk Union AG, *Erlangen 2*, *Bayern*, *Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0322, INVESTIGATION OF TRANSIENTS CAUSED BY THE FAILURE OF THE FAST DISCONNECTION SYSTEM (ATWAS STUDY)
D.N. MAERKL, Kraftwerk Union AG, *Erlangen 2*, *Bayern*, *Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0323, REACTOR COMPONENTS - QUALITY CONTROL SYSTEM - PREPARING THE FIRST STAGE
ROESLER, Kraftwerk Union AG, *Erlangen 2*, *Bayern*, *Federal Republic of Germany* 8520
ADDENDA: Performing organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0324, BEHAVIOR OF ZIRCALLOY (ZRY) CLADDING TUBES UNDER THE SUDDEN STRAINS CAUSED BY THE DISTURBANCE DUE TO THE COOLANT
H. SCHWEIKERT, Kraftwerk Union AG, *Erlangen 2*, *Bayern*, *Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0325, CONSTRUCTIONAL AND CALCULATIONAL DEVELOPMENT WORK IN PRESSURE VESSELS BUILT OF STEEL
JORDE, Fried Krupp Gmbh, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0326, DEVELOPMENT OF NONDESTRUCTIVE TEST PROCEDURES AND THE THUS-POSSIBILE APPARATUS FOR FINDING FLAWS IN THICK-WALLED CONTAINERS
H. WEESTENBERG, Fried Krupp Gmbh, *Essen 1*, *Nordrhein Westfalen*, *Federal Republic of Germany* 4300

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0327, WELD TESTS OF THE PLATES OF REACTOR PRESSURE VESSELS
K.H. GRAEBNER, Kraftwerk Union AG, *Frankfurt 70*, *Hessen*, *Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0328, DETERMINATION OF FRACTURE PROCESS SAFETY CRITERIA FOR ELASTIC-PLASTIC MATERIAL BEHAVIOR
K.H. GRAEBNER, Kraftwerk Union AG, *Frankfurt 70*, *Hessen*, *Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0329, NONDESTRUCTIVE REPEATED TESTS OF REACTOR PRESSURE VESSELS BY MEANS OF EDDY CURRENT TECHNIQUES
K.H. GRAEBNER, Kraftwerk Union AG, *Frankfurt 70*, *Hessen*, *Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0330, DEVELOPMENT OF NONDESTRUCTIVE TEST PROCEDURES AND THE POSSIBLYASSOCIATED APPARATUSES FOR FINDING FLAWS IN THICK-WALLED CONTAINERS
SCHUELER, Kraftwerk Union AG, *Frankfurt 70*, *Hessen*, *Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0331, CURRENT STATE OF NOISE EMISSION ANALYSIS, ITS LIMITS AND FEASIBILITY IN THE FIELD OF REACTOR SAFETY
J. EISENBLAETTER, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0332, PUMP STUDIES
KATSAOUNIS, Soc. for Use of Nuclear Energy, *Geesthacht, Schleswig Holstein, Federal Republic of Germany* 2054

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0333, DEVELOPMENT OF HIGH PERFORMANCE BLOCK ELEMENTS FOR HIGH TEMPERATURE REACTORS
M. HROVAT, Nukem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0334, HEAVY DUTY BLOCK ELEMENTS FOR HIGH TEMPERATURE REACTORS
M. HROVAT, Nukem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0335, INVESTIGATION OF BREAK DETECTION IN LOAD-BEARING REACTOR CONSTRUCTION PARTS WITH HELP OF OPTICAL HOLOGRAPHY THROUGH SURFACE-WAVE ANALYSIS
F. MAYINGER, Technical Univ. of Hannover, Inst. for Reaction Technology, *Hannover, Niedersachsen, Federal Republic of Germany* 3000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0336, R&D FOR PRESTRESSED CONCRETE REACTOR PRESSURE VESSELS (SUBPROJECT) - THE INFLUENCE OF TEMPERATURE VARIATION ON CONDITION OF REACTOR CONCRETE
UNKNOWN, Univ. of Karlsruhe, Inst. for Concrete, *Karlsruhe, Baden Wuerttemberg, Federal Republic of Germany* 7500

Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0337, PRESTRESSED CASING IN THE PRESSURE VESSEL FOR BOILING WATER REACTORS
BEINE, Siempelkamp Giesserei Kg, *Krefeld 1, Nordrhein Westfalen, Federal Republic of Germany* 4150

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0338, SUPPLEMENTING AND COMPLETING THE INVESTIGATIONS FOR CALCULATING THE CONCEIVABLE LOAD LIMITS FOR A BURST RESTRAINER
HOFMAN, S D K Gmbh, *Loerrach, Baden Wuerttemberg, Federal Republic of Germany* 7850

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0339, LWRS - STRESSED CONCRETE REACTOR PRESSURE VESSELS - THICK WALLED CYLINDRICAL STRESSED CONCRETE REQUIRING INTERNAL STRESSING
GRASSER, Technical Univ. of Munich, Inst. for Massive Construction, *Munich 2, Bayern, Federal Republic of Germany* 8000

ADDENDA: Performing organization: Technische Univ. Munchen.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0340, R&D FOR PRESTRESSED CONCRETE REACTOR PRESSURE VESSELS (ABBREV)
UNKNOWN, Technical Univ. of Munich, Inst. for Heavy Construction, *Munich 2, Bayern, Federal Republic of Germany* 8000

R&D for prestressed concrete reactor pressure vessels. Subproject - influence of different construction plans and methods on the three-eighths tensile strength and distortion resistance of concrete.

Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0341, REACTOR COMPONENTS - DEVELOPING SPINDLE PACKING FOR PIPE FITTINGS
ZILLING, Klein Schanzlin & Becker AG, *Nuremberg, Bayern, Federal Republic of Germany* 8500

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0342, REACTOR COMPONENTS - DEVELOPMENT WORK ON FITTINGS TO IMPROVE SERVICEABILITY
ZILLING, Klein Schanzlin & Becker AG, *Nuremberg, Bayern, Federal Republic of Germany* 8500

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0343, NONDESTRUCTIVE TESTS OF METALS IN REACTOR COMPONENTS BY USING HOLOGRAPHIC INTERFEROMETRY
W. JUEPTNER, Fraunhofer Society, Inst. for Non Dest. Test Proc., *Saarbruecken 11, Saarland, Federal Republic of Germany* 6600

Foerderung der Angewandten Forschung E.V. (FHG), Inst. fuer Angewandte Materialforschung der FHG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0344, REACTOR COMPONENTS - PRESSURE VESSELS AND TUBING - INSTRUMENTATION PART II
ISSLER, Univ. of Stuttgart, State Materials Testing Dept., *Stuttgart, Baden Wuerttemberg, Federal Republic of Germany* 7000

ADDENDA: Performing organization: Staatliche Materialpruefungsanstalt Universitat Stuttgart.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0345, REACTOR COMPONENTS - PRESSURE VESSELS AND TUBING - INSTRUMENTS FOR STRESS ANALYSIS WHILE TESTING LOAD IN THE GROSSWELZHEIM HDR
ISSLER, Univ. of Stuttgart, State Materials Testing Dept., *Stuttgart, Baden Wuerttemberg, Federal Republic of Germany* 7000
ADDENDA: Performing organization: State Materials Testing Dept.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0346, RESEARCH PROGRAM REACTOR PRESSURE VESSELS--PRIORITY SCHEDULE PROGRAM 22 NIMOCR 37
KUSSMAUL, Univ. of Stuttgart, *Stuttgart, Baden Wuerttemberg, Federal Republic of Germany* D7000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0347, LWRS - STRESSED CONCRETE REACTOR PRESSURE VESSELS
G. REHM, Univ. of Stuttgart, *Stuttgart, Baden Wuerttemberg, Federal Republic of Germany* D7000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0348, R&D FOR PRESTRESSED CONCRETE REACTOR PRESSURE VESSELS
UNKNOWN, Univ. of Stuttgart, Inst. for Stat. & Dynamic Air, *Stuttgart, Baden Wuerttemberg, Federal Republic of Germany* D7000
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0349, LWRS - STRESS CONCRETE REACTOR PRESSURE VESSLES - CONVERTING SBB COMPUTATION PROGRAMS
WILLAM, Univ. of Stuttgart, Inst. for Stat. & Dynamic Air, *Stuttgart, Baden Wuerttemberg, Federal Republic of Germany* D7000
ADDENDA: Performing organization: Inst. fuer Statik und Dynamik der Luft und Raumfahrtkonstruktionen der Universitat Stuttgart.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0350, PRESTRESSED CONCRETE REACTOR PRESSURE VESSELS, DISTORTION IN LINERS DUE TO NON-LINEAR MATERIALS PROPERTIES & ANCHOR BEHAVIOR (ABBREV)
UNKNOWN, Steinmueller Gmbh, *5270 Gummerbach 1, Nord. West., Federal Republic of Germany*
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0351, BEHAVIOR OF MATERIALS AND STRUCTURAL PARTS OF REACTOR BUILDINGS DUE TO IMPACTS OF FRAGMENTS AND PARTICLES OF DIFFERENT MASSES AND VELOCITIES
HOFFMANN, Fraunhofer Society, Inst. for Shockwave Research, *7800 Freiburg, Baden Wuerttem., Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0352, REFRACTION OF PRESSURE WAVES IN REACTOR BUILDINGS
HOFFMANN, Fraunhofer Society, Inst. for Shockwave Research, *7800 Freiburg, Baden Wuerttem., Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0353, INVESTIGATION OF THE BREAK BEHAVIOR OF PIECEMEAL-TRANSMITTED BREAKS IN BUILDING COMPONENTS AND CONSTRUCTION ELEMENT
E. SOMMER, Fraunhofer Society, Inst. for Rigid Body Mechanics, *7800 Freiburg, Baden Wuerttem., Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0354, INVESTIGATION OF UNSTABLE CRACKS AND OF THE RUPTURE ARREST FROM THE BREAK-MECHANISM VIEWPOINT
G. SPERL, Fraunhofer Society, Inst. for Rigid Body Mechanics, *7800 Freiburg, Baden Wuerttem., Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0355, DEVELOPMENT OF NONDESTRUCTIVE TEST PROCEDURES AND THE THUS-POSSIBLE APPARATUS FOR FINDING FLAWS IN THICK-WALLED CONTAINERS
J. LINDNER, Maschinenfabrik Augs. Nur. AG, *8500 Nuremberg, Bayern, Federal Republic of Germany*
Addenda: Performing organization: Maschinenfabrik Augsburg Nuernberg AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0356, DIRECTION - DIAGNOSIS OF CORE DEFECTS
DELAPPARENT, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0357, APPARATUS
LYONS, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0358, COMPUTING AND OPTIMIZING BLOCS
OCERAIES, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0359, SHEATHING RUPTURE
PAGES, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0360, CHAMPLAIN 10, EXCHANGER TUBES
POEYDEMANGE, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0361, COMPONENTS WITHOUT STEAM GENERATORS
SAUVAGE, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0362, APPARATUS FOR THE DRNR
SCHMITT, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0363, MEASUREMENTS OF THE PWR
UNKNOWN, Electricite de France, *Paris, France* 76008

Preparing Essais Department intervention in 3 distinct circumstances: 1. during a study of reactor apparatus, in collaboration with the equipment; 2. when it is put into operation during provisions for the manufacturer or for the equipment; 3. during normal operation of the installation in case of accidents or difficulties.

Our goal is to establish intervention methods in the reactor apparatus and its primary circuit.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0364, MONITORING PRESSURIZED CELLS
UNKNOWN, Electricite de France, *Paris, France* 76008

Finding the methods best suited to controlling and monitoring pressurized cells and especially reactor vessels.

The first method to examine consists of detecting and treating surface waves emitted by defects developing in the material when it is under pressure.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0365, MONITORING AND DIAGNOSING INTERNAL STRUCTURES OF REACTORS
UNKNOWN, Electricite de France, *Paris, France* 76008

We shall auscultate the internal structures of light water reactors in order to detect certain defects as they appear, follow their development, and avoid unfortunate difficulties; for example: a. by analyzing signals, ionization chambers (neutron noise), fluctuating pressure acceleration displacement receivers; b. by acoustic methods and comparisons with computation code results.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0366, CONTROLLING THE AIRTIGHTNESS OF CONTAINMENT CELLS
UNKNOWN, Electricite de France, *Paris, France* 76008

We shall develop methods of controlling the airtightness of containment cells in PWR compartments. These methods will be put into operation when reception has been tested and we will determine the leakage rate during periodic tests, eventually even in continuous operation.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0367, STUDIES AND TESTS OF CIRCUIT COMPONENT EQUIPMENT IN LIGHT WATER POWER STATIONS (ABBREV)
UNKNOWN, Electricite de France, *Paris, France* 76008

Test methods using light water and hot pressurized carbonic gas enable us to test the equipment used in light water reactors and in graphite-gas power stations while in operation, in realistic surroundings and under thermal shock conditions.

Light water power stations: We are now studying the resistance of HP and BP water heaters' tubular plate assemblies.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0368, STUDYING AND TESTING REVOLVING MODERATORS (MECHANICAL FITTINGS)
UNKNOWN, Electricite de France, *Paris, France* 76008

Perfecting the mechanical fittings of moderator shafts. Because of the Chatou bed, we can conduct full-scale tests of feed pumps during normal and temporary operation (shut-down, start-up, etc.). Tests under unusual conditions are also planned (vibrations, thermal barrier shut-down).

The pumps of the light water power stations being attempted at Genneuilliers also have mechanical moderating fittings whose behavior must be studied in tests.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0369, COMPUTATIONS ON RAPID REACTOR BLOCK STRUCTURES, THEORETICAL ANALYSIS OF THEIR BEHAVIOR UNDER PLANNED OPERATING CONDITIONS
UNKNOWN, Electricite de France, *Paris, France* 76008

Perfecting computation codes for vessels in elastic and viscoelastic areas, taking into account the special load conditions of rapid reactors (especially in discussing major distortion) using the analysis of the response of the primary containment to an explosive type accident. Verification calculations concern the 1975 Super-phenix project.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0370, EXPERIMENTAL STUDY OF MECHANISMS AND STRUCTURES INVOLVED IN RAPID REACTOR CONSTRUCTION
UNKNOWN, Electricite de France, *Paris*, *France* 76008

General problems involving sodium: friction, corrosion, evaporation, surface state, hardness, etc., perfecting simple mechanisms capable of operating on sodium or dry or sodium-vapor-charged argon; maintenance problems (welding, etc.) of barrels contaminated by sodium.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0371, TESTING AND PERFECTING VALVES AND FITTINGS OPERATING ON SODIUM
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Perfecting and developing isolating and regulating valves for sodium circuits: A prototype of a 900 mm diameter valve will be tested in water and sodium. The tests will also involve valve parts (frozen joints), air valves, joints, and couplings.

Addenda: Supporting agency and Performing organization - Electricite de France, Direction des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0372, TESTING AND PERFECTING GAUGES CAPABLE OF OPERATING IN SODIUM AT HIGH TEMPERATURES
UNKNOWN, Electricite de France, *Paris*, *France* 76008

We will mainly test the measuring device available on the market and eventually adapt it for use in liquid sodium at high temperatures (550 degrees C). The instruments involved are pressure gauges, vibration, displacement pressure, and level gauges, etc.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0373, CONTROLLING SPEED IN NEW TURBO-ALTERNATOR GROUPS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Redefining methods of controlling new turbo-alternator groups (700 MW level and nuclear compartments) including the development of new control apparatus.

Testing regulators (verifying performance); assistance for operators.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0374, TURBINE REGULATION
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Studying a means of regulating the steam turbine by modulating loads variations in order to facilitate start-up, recharging after relief, and rapid loading in revolving reserve, taking into consideration the pressures endured by the turbine.

Applying this to turbines now in use (Rateau, CEM-250 MW) and extending it to 700 MW level turbines and nuclear power stations.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0375, CORES OF SODIUM COOLED FAST REACTORS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

By studying the cores of sodium-cooled, fast neutron reactors, we will contribute to studies of: the Phoenix, high power reactors, optimization, reactor operation, fuel cycles, reactor safety, and reactor economy (the object of other projects).

This will cover the following areas: neutronics, thermohydraulics, shielding, fuel behavior. We will use the CEA code for the neutronics section in order to develop a series of codes, to modify it for the Phoenix and finally perfect it so that it can meet the special requirements of the equipment and of heat production.

This project also includes general research on the reactor, such as heterogenous cores for the increased regeneration yield which will enable us to evaluate the technical and economic possibilities related to the amount of plutonium produced, which in turn, will help us estimate the cost of the fuel cycle.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0376, LIGHTLY ALLOYED CONTAINMENT VESSELS FOR BOILERS IN LIGHT WATER REACTORS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Determine the conditions under which manganese-molybdenum vessels can be constructed and used in water reactor vessels (welding, boring, buckling). Compare different methods of studying how resistant basic metals and welded surfaces are to fissurization. Effects of radiation. Take part in an experimental study of the cast base of the Creusot-Loire steam generator.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0377, LIGHT WATER REACTORS - TUBES AND VESSELS OF AUSTENITIC ALLOYS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

The problem of corrosion in steam generator tubes is a primary cause of shut-down in the pressurized water reactor. This project will study tubes in PWR steam generators including metallurgy, decrease in residual pressure levels (granulation, thermal analysis, etc.) and test corrosion; tubes in heaters and high-temperature heaters: including study of metallurgy, decrease in pressure; bolting and internal structures including test bolting in core containment vessel in the CHOOZ reactor; and primary pipes.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0378, EXAMINING THE REACTOR VESSELS OF WATER REACTORS WHILE IN OPERATION
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0379, STUDYING AND TESTING APPARATUS IN WATER
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0380, FRAMATOME - INTERNAL STRUCTURAL VIBRATIONS (SAFRAN)
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0381, SPECIAL STUDY OF INDUSTRY (FRAMATOME) - PIPE RUPTURE
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0382, BASIC STUDIES OF VIBRATIONS IN WATER REACTORS
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0383, PRESSURIZED CELLS - WORKING OUT STRESS CODES
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0384, DEVELOPING IMPACT ABSORBING DEVICES
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0385, PRESSURIZED REACTORS WITH PRE-STRESSED CONCRETE REACTOR VESSELS
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0386, CONCRETE CONTAINMENT SPHERE
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0387, REACTOR VESSELS OF COMPOSITE MATERIALS
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0388, CHAMPLAIN, MONITORING REACTOR VESSELS
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0389, GENERAL STUDIES AND PROSPECTS OF PRE-STRESSED CONCRETE SHIELDS
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0390, APPLYING METHODS OF STRUCTURAL ANALYSIS TO VESSEL RUPTURE
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Divivion d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0391, DRAFT - BOILING WATER REACTOR WITH PRE-STRESSED CONCRETE CONTAINMENT SPHERE
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0392, PERFORATION OF CONCRETE WALLS BY PROJECTILES
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0393, COMPONENTS - TRANSPORT AND DEPOSIT OF FISSION PRODUCTS IN THE PRIMARY CIRCUIT
BRISBOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0394, LOCALIZING SHEATHING RUPTURES BY RARE TRACER GASES
COURVOISIER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0395, TIGHTNESS PROBLEMS IN THE CONSTRUCTION OF FAST REACTORS
DELAPLACE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0396, CHARACTERISTICS OF RAPSODIE AND PHENIX HEXAGONAL TUBES - DETECTORS
DELAPLACE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0397, STUDY OF NEUTRON DETECTORS AND APPARATUS FOR REACTORS
DUCHENNE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0398, HEXAGONAL TUBES - REFERENCE SOLUTION AND SUBSTITUTION SOLUTIONS
DUPOUY, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0399, DEVELOPING MOLYBDENUM TUBES FOR THE EXCHANGER, EXTREMELY HIGH TEMPERATURE REACTOR
DUPOUY, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0400, THERMAL PROBLEMS RELATING TO COMPONENTS
GEFFROY, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0401, LOCALIZING SHEATHING RUPTURES, PRODUCING RARE TRACER GASES
JANIEL, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0402, THEORETICAL STUDY OF DISTORTION
LANORE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0403, MANUFACTURING COMPACTS - GAI TECHNICAL ASSIMILATION (IRRADIATION)
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0404, INTEGRAL BLOC, INDUSTRIAL MANUFACTURE OF BLOCS
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0405, NEW METHODS OF MANUFACTURING GAI-TYPE IRRADIATION COMPACTS
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0406, IRRADIATING INTEGRAL BLOCS IN DRAGON
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0407, CONTAINMENT SPHERE AROUND THE VESSEL - INTERIOR WALL - TECHNICAL ASSISTANCE
NIFENECKER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0408, EXAMINING EXCHANGERS IN OPERATION
NIFENECKER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0409, CONTINUOUS MONITORING OF THE CAP VESSEL (1974), CHAIN FOR OTHER REACTORS
NIFENECKER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0410, STANDARD COMPONENTS AND VARIOUS STUDIES
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0411, COMPONENTS - BASIC DEVELOPMENT
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0412, INSULATING PANELS (RELAXATION AND ACCIDENTS)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0413, FIXING INSULATING PANELS (FRICTION)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0414, SHIELD SKIN (CHARRING)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0415, SHIELD (MODEL 1/10)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0416, SEALING INTERSTICES OF THE SHIELD
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0417, CHARACTERISTICS OF PRE-STRESSED FRAMES FOR CONCRETE SHIELDS
PETREQUIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0418, INCLUDING SHEATHING ANISOTROPY IN STRESS CODES
PETREQUIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0419, PERFECTING A FLOW INSTRUMENT TO CONTINUOUSLY REGISTER DISTORTION
PETREQUIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0420, INTEGRAL BLOC, FULL-SCALE MECHANICAL TESTS
RINGOT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0421, TESTING GRAPHITE RUPTURE BY THE WIGNER EFFECT - RWG 1
RINGOT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0422, INTEGRAL BLOC - BIP 01 IRRADIATION
RINGOT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0423, RULES AND STANDARDS OF THE ART OF NUCLEAR EQUIPMENT
ROCHE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0424, PART 2 OF THE HTR BOILER PROGRAM - CEA/GA
UNKNOWN, Atomic Energy Commission, Div. for Stu. & Dev. Reactors, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0425, ASSISTANCE TO INDUSTRY - CONCRETE SHEATHING AND PROCESSING
NIFENECKER, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0426, EXPERIMENTS FOR ESTABLISHING DATA TO OBTAIN STRESS CODES
UNKNOWN, Atomic Energy Commission, Div. of Metall. Stu. Nuc. Fuel, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0427, CALOGENE REACTORS - THE EXCHANGER
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting Agency: Commissariat A L'Energie Atomique. Performing Organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0428, STUDYING THE CONDITION OF A RUPTURE BY ANALYZING THE FALLING-OFF OF GASEOUS FISSION PRODUCTS
DEBEAUCOURT, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0429, EROS PROGRAM, RUPTURES AND THEIR EFFECTS
UNKNOWN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires Fontenay-aux-Roses, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0430, ACOUSTIC EMISSION LOCALIZATION AS A METHOD FOR TRACING DEVELOPING CRACKS IN PRESSURE VESSELS (E.G. AS A PART OF NUCLEAR FISSION REACTORS)
B.M. BOORSTOEL, Central Org. Adv. Appl. Res., Metal Research Institute, *Apeldoorn, Netherlands*

Although the project is not focussed primarily on the field of energy generating, the results are of importance for the safety of nuclear reactor pressure vessels.

The growth of microscopic cracks in construction materials (under stress) is accompanied by the emission of acoustic signals. This phenomenon can be possibly applied to localize the developing crack and to determine the velocity of crack growth.

This means that continuous safe guarding of installations is a possibility. The investigation concerns especially the development of measuring techniques.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

3.0431, SODIUM TECHNOLOGY RESEARCH AND DEVELOPMENT
UNKNOWN, Central Org. Adv. Appl. Res., Metal Research Institute, *Apeldoorn, Netherlands*

Most of the work related to industrial development efforts of LMFBR.

Main subjects: heat transfer and fluid flow in sodium systems; corrosion, deposition and associated problems in sodium; bearings, shafts and seals for sodium pumps; high temperature properties of structural materials for sodium systems; development of process equipment for sodium systems; development of calculational methods (i.e. creep, plasticity and crack propagation complicated parts of components like tube sheets etc.); development of nondestructive testing methods; operation of 50 MW Sodium Component Test Facility for developmental testing of; heat transfer components like steam generators and intermediate heat exchangers.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

3.0432, CRACK GROWTH SUSCEPTIBILITY IN WELDING NOZZLES (FISSION) REACTOR PRESSURE VESSELS
H.C. VANELST, Central Org. Adv. Appl. Res., Metal Research Institute, *Apeldoorn, Netherlands*

Regarding the safeguarding of pressure vessels of nuclear fission reactors, research is carried out in the field of crack-growth susceptibility in welding nozzles. The more important parameters, the directional dependence and the influence of the thickness are being studied.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

3.0433, RESEARCH ON THE PROBLEM OF 'CLADDING' OF STEEL PRESSURE VESSELS
H.C. VANELST, Central Org. Adv. Appl. Res., Metal Research Institute, *Apeldoorn, Netherlands*

The project regards as primary the construction of pressure vessels of water cooled nuclear fission reactors. The investigation is in the framework of safeguarding nuclear installations. The investigation focusses on tracing the causes, development of prevention regulations, detection and susceptibility for extending of micro-cracks induced by 'reheat cracking', during the 'cladding' treatment of pressure vessels (welding up an austenitic layer). Representative specimens are tested applying mechanical and thermal stress-cycles, analogous with the operational conditions.

SUPPORTED BY European Community - Brussels, Belgium

3.0434, CONCRETE PRESSURE VESSELS FOR HIGH TEMPERATURE REACTORS
UNKNOWN, Netherlands Government, *Apeldoorn, Netherlands*

Development of fabricational techniques and materials for pre stressed concrete pressure vessel for gas cooled high temperature reactors.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

3.0435, FRACTURE MECHANICS AND FRACTURE INVESTIGATION
UNKNOWN, N.V. K E M A, *Arnhem, Netherlands*

Objective: Arriving at an option about the danger of the propagation of cracks detected in existing plant components, especially pressure vessels.

The effort comprises the development of computer programmes and the determination of the relevant parameters of the materials.

A programme on fissures in A 508, clad with stainless steel 347 has just been finished.

Study of fractures with the aid of optical microscopy and the electron microscope.

SUPPORTED BY Netherlands - N.V. Kema - Arnhem

3.0436, TEAR EXTENSION IN POWER GENERATING AND PROCESS TECHNICAL APPARATUS
M.J. BROEKHOVEN, Delft Univ. of Technology, Lab. for Thermal Power Engin., *Delft, Netherlands*

The objective is to develop and verify calculation methods regarding the mechanism of tear extension behaviour in power generating and process technical apparatus.

The research focusses on the tear extending phenomena in LWR-pressure vessel branches. In this field the research team participates in the NIL-AEA-Group on acoustic emission analysis applied to tracing and the subsequent process of tear extension.

An adequate knowledge of tear extension processes is becoming more and more important for an accurate design (regarding security and operating efficiency) of power, generating and process technical apparatus: a) On the one hand there are trends promoting tear extension: upsealing, external process conditions, such as very low or very high temperatures, corrosive media extensive neutron radiation, more economical designs by lowering the safety margins, use of high-quality (but often tear sensitive) materials, and b) on the other hand there is an increasing risk to the environment of leakage or rupture in this apparatus. An effective detection method is indispensable in this field.

Addenda: Supporting agency and performing organization: Technische Hogeschool Delft.

SUPPORTED BY Netherlands - Delft University of Technology

3.0437, DESIGN AND STRESS ANALYSIS OF STRUCTURAL COMPONENTS OF PROCESS AND POWER GENERATING EQUIPMENT
H.A. SPAAS, Delft Univ. of Technology, Lab. for Thermal Power Engin., *Delft, Netherlands*

Activities of concern are: a) Development of computational methods for the determination of stress and strain distribution in vital parts of (nuclear fission) pressure vessel and piping systems. b) Development of design methods for these parts and in particular the development of reliable (mathematical and economical) analysis methods to create a safe design. These analysis methods concern stresses and deformations caused by mechanical and thermal loadings and thermal shock phenomena, during the manufacturing process and under process operating conditions. c) Research on the manufacturing processes for these components (e.g. welding).

Addenda: Supporting agency and performing organization: Technische Hogeschool Delft.

SUPPORTED BY Netherlands - Delft University of Technology

3.0438, TESTING CIRCUIT OF SODIUM-COOLED NUCLEAR FISSION REACTORS
C.C. SMIT, Central Org. Adv. Appl. Res., Central Technical Inst., *Hengelo, Netherlands*

The objectives are: a) Testing (on an industrial scale) of parts regarding the heat transfer, of sodium cooled nuclear fission reactors; b) Acquiring industrial experience and developing methods to handle sodium-circuits and apparatus containing liquid sodium.

Addenda: Performing organization: Centraal Technisch Instituut TNO.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

3.0439, FISSION REACTOR DEVELOPMENTS OF COMPONENTS (GENERAL)
P. CROOCKEWIT, Rijn Schelde Verolme N.V., *Rotterdam, Netherlands*

Heat exchanger; sodium-sodium; steam generator; sodium-water; components for sodium circuits; components for pressurized water reactors; components for boiling water reactors.

SUPPORTED BY Netherlands - Rijn Schelde Verolme N.V. - Rotterdam

3D. REACTOR THERMODYNAMICS, THERMOHYDRAULICS AND MECHANICS

3.0440, STATISTICAL HEAT ENGINEERING (DETAILED ANALYSIS)
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

The project is intended to be a means of developing detailed computer models for the hydrodynamic and thermal behavior in a water-cooled reactor. This includes detailed descriptions of subchannels, filmflow and burnout mechanisms. The work is based on integral foreign measurements and detailed studies of the physical phenomena in the new water loop at RISO. The models are to be used in the evaluation of the operation and safety of nuclear power plants, but the work can also be utilized for the description of other hydrodynamic conditions.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0441, THE CONSTRUCTION OF HELIUM TURBINES RELATIVE TO THE DEVELOPMENT OF A HIGH TEMPERATURE REACTOR WITH A HELIUM TURBINE (ABBREV)
UNKNOWN, Technical Univ. of Aachen, Inst. for Steam & Gas Turbines, *Aachen, Nordrhein Westfalen, Federal Republic of Germany* 5100
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0442, DEVELOPMENT OF MEASURING PROCEDURES TO DETERMINE TRANSIENT MASS FLOWS (STEAM/WATER) THROUGH SIGNAL CORRELATION
U. WESSER, Technical Univ. of Berlin, Inst. for Nuc. Technology, *Berlin 10, Federal Republic of Germany* 1000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0443, DEVELOPMENT PROGRAM FOR HIGH TEMPERATURE REACTORS WITH A HELIUM TURBINE IN THE DIRECT CIRCULATION (HHT PROGRAM)
KRAMER, Hochtemperatur Reaktorbau Gmbh, *Cologne 1, Nordrhein Westfalen, Federal Republic of Germany*
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0444, THE BEHAVIOR OF FLOWS IN BWR PRESSURE VESSELS
BUDNICK, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520
ADDENDA: Performing organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0445, DEVELOPING A MODEL FOR VIBRATION IN THE REACTOR PRIMARY CYCLE
PROBST, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520
ADDENDA: Performing organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0446, SMALL SIZED DETECTORS FOR MEASURING NUCLEAR FLOW IN LIGHT WATER REACTOR (BWR AND PWR)
SCHUMANN, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520
ADDENDA: Performing Organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0447, INVESTIGATION OF THE EFFECTS OF STEAM AND STEAM-WATER MIXTURES STREAMING FROM PIPE LEAKS
H. SCHWEIKERT, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0448, DEVELOPMENT OF A MASS TRANSPORT MEASUREMENT METHOD FOR TRANSIENT TWO-PHASE STREAM STATES BY MEANS OF NUCLEAR SPIN RESONANCE (ABBREV)
H. SCHWEIKERT, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0449, REACTIONS DURING THE INJECTION OF STEAM AND STEAM-AIR MIXTURES IN A WATER RECEIVER
H. VOIGT, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520
Investigation of the Interactions of a Boiling Water Reactor Pressure Destruct System During a Loss of Coolant Accident.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0450, HYDRODYNAMIC BEARINGS FOR HIGH TEMPERATURES IN BWR CIRCULATING PUMPS
KLEIN, Klein Schanzlin & Becker AG, *Frankenthal, Rheinland Pfalz, Federal Republic of Germany* 6710

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0451, PWR - PART I - TESTING CIRCULATING PUMPS
KLEIN, Klein Schanzlin & Becker AG, *Frankenthal, Rheinland Pfalz, Federal Republic of Germany* 6710

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0452, PWR - PART II - TESTING CIRCULATING PUMPS
KLEIN, Klein Schanzlin & Becker AG, *Frankenthal, Rheinland Pfalz, Federal Republic of Germany* 6710

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0453, WAVE EMISSION MEASUREMENTS OF MECHANICAL RUPTURES PROBED BY INGENIOUS DETECTORS (FATIGUE CRACKS)
J. EISENBLAETTER, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0454, STATIONARY AND DYNAMIC CRITICAL HEAT FLUX LOADING IN MULTI-ROD BUNDLES OF PWR AND BWR REACTORS WITH FREON AS THE FLUIDITY MODEL
KATSAOUNIS, Soc. for Use of Nuclear Energy, *Geesthacht, Schleswig Holstein, Federal Republic of Germany* 2054

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0455, DEVELOPMENT PROGRAM FOR HELIUM TURBINE DIRECT CYCLE GAS COOLED HTR'S
D.N. KRAEMER, Nukem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0456, INVESTIGATION OF THE THERMOHYDRAULIC PROCESSES AS WELL AS HEAT AND MATTER EXCHANGE IN THE CORE MELT
F. MAYINGER, Technical Univ. of Hannover, Inst. for Reaction Technology, *Hannover, Niedersachsen, Federal Republic of Germany* 3000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0457, EXPERIMENTAL AND THEORETICAL ANALYSIS OF THE THERMOHYDRAULIC BEHAVIOR OF THE CORE DURING THE INITIAL BLOWDOWN PHASE
F. MAYINGER, Technical Univ. of Hannover, Inst. for Nuc. Technology, *Hannover, Niedersachsen, Federal Republic of Germany* 3000
ADDENDA: Performing organization: Inst. fuer Verfahrenstechnik der TU Hannover.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0458, DEVELOPMENT PROGRAM FOR HIGH TEMPERATURE REACTORS WITH A HELIUM TURBINE IN THE DIRECT CIRCULATION
UNKNOWN, Technical Univ. of Hannover, Inst. of Mechanics, *Hannover, Niedersachsen, Federal Republic of Germany* 3000
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0459, GENERAL TEST-STAND FOR TESTING AND CALIBRATING VARIOUS TWO-PHASE MASS FLOW PROCESSES
FISCHER, Soc. for Nuc. Research, Inst. for Reactor Const. Elem., *Karlsruhe 1, Baden Wuerttem., Federal Republic of Germany* 7500
Addenda: Performing organization: Gesellschaft fuer Kernforschung MBH, Inst fuer Reaktorbauelemente.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0460, DEVELOPMENT PROGRAM FOR HELIUM TURBINE DIRECT CYCLE GAS COOLED HTR'S
D.N. KRAEMER, Brown Boveri & Cie Company, *Mannheim 1, Baden Wuerttemberg, Federal Republic of Germany* 6800

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0461, DEVELOPMENT PROGRAM FOR HIGH TEMPERATURE REACTORS WITH A HELIUM TURBINE IN THE DIRECT CIRCULATION
UNKNOWN, Brown Boveri & Cie Company, *Mannheim 1, Baden Wuerttemberg, Federal Republic of Germany* 6800
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0462, DEVELOPMENT PROGRAM FOR HELIUM TURBINE DIRECT CYCLE GAS COOLED HTR'S
D.N. KRAEMER, Hochtemperatur Reaktorbau Gmbh, *Mannheim, Baden Wuerttemberg, Federal Republic of Germany* 6800

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0463, THE BEHAVIOR OF INSULATED COOLING SYSTEMS OF A CONTAINMENT DEVICE FOR REACTOR PRESSURE VESSELS UNDER TRANSIENT LOADS
B. NEUNERT, Dyckerhoff & Widmann Company, *Munich 40, Bayern, Federal Republic of Germany* 8000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0464, DEVELOPMENT PROGRAM FOR HIGH TEMPERATURE REACTORS WITH A HELIUM TURBINE IN THE DIRECT CIRCULATION (HHT PROGRAM)
UNKNOWN, Oberhausen Energy Supply AG, *4200 Oberhausen, Nordr. Westf., Federal Republic of Germany*
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0465, PHYSICAL-CHEMICAL PHENOMENA IN SODIUM CIRCUITS
CHAMPEIX, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0466, CHAMPLAIN 2, STEAM DRYER AND SEPARATOR
GAOUDITZ, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0467, DRAFT - PROTOTYPE PUMP, SUPER-PHENIX
GOLLION, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0468, SODIUM AND ARGON - BASIC STUDIES
GOLLION, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reactors.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0469, STEAM GENERATORS
ROBIN, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0470, DRAFT - SUPER-PHENIX BOILER
SAUVAGE, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0471, MECHANICAL AND HYDRAULIC RESISTANCE OF FILTRATION AND ABSORPTION AGENTS
UNKNOWN, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0472, WET AIR COOLANTS
UNKNOWN, Electricite de France, *Paris, France* 76008

At Septen's request, a program of tests has been undertaken, including: a. Tests of coolants in use (Gardanne anti-flow, Emile Huchet's crossed currents), b. tests on one of the coolants in section and 5, Bugey, c. acquiring thermal stress codes of air coolants and their retiming according to the test results, d. the eventual use of a dispersion testing circuit.

We will pay special attention to the influence of weather conditions on reactor operation.

These studies on naturally circulating coolants are partially applicable to forced circulation coolants.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0473, HTR REACTORS - STEAM GENERATORS
UNKNOWN, Electricite de France, *Paris, France* 76008

The development of helium-cooled high temperature reactors in the USA has become a reality because of many power station controls. The EDF must become competent enough to be able to analyze commercial projects or proposals (notably GHTR and GBRA). Experimental work, limited to steam generators involves 2 aspects: a. Studying the development of small leaks in HTR steam generators; b. Studying the effects of gas/wall temperature differences on the gas exchange coefficient (doctor-engineer thesis).

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0474, FAST NEUTRON REACTORS - INTERNAL HYDRAULICS
UNKNOWN, Electricite de France, *Paris, France* 76008

This project assembles a certain number of studies dealing with flows in fast neutron reactors and their components. Phenix reactor: comparing measurements to computation results and improving computation codes.

Super-phenix reactor: Various studies on the reactor block (flows in collectors, detecting sheathing rupture, thermal shock, vessel vibration, coolant circuits, etc.).

Stratification in secondary circuit conduits. Studies relating to the stein steam generator (supplying, argon carrying, loss of charge, H2 detection, and vibration of tube clusters).

Fast neutron reactor: Thermohydraulics compared to different reactor block projects.

Relative studies of intermediate exchangers loss of charge, calculating flow).

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0475, INTERNAL HYDRAULICS OF PRESSURIZED LIGHT WATER REACTORS
UNKNOWN, Electricite de France, *Paris, France* 76008

Vessel: Mixed study of asymmetrical operation of loops.

Depressurization wave: Studying the propagation of the wave and the attempts to implement a primary canalization in the vessel after rupture (experiments and computation code).

Interaction with a falling body: Studying the effects of a body falling into the fuel element storage pool.

ADDENDA: Supporting agency and Performing organization -Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0476, FLOW IN LIGHT WATER REACTOR STEAM GENERATORS
UNKNOWN, Electricite de France, *Paris, France* 76008

This project will define the internal geometry of a Westinghouse 1350 MW steam generator pre-heater in order to avoid dead water zones where mud deposits and corrosion usually occur. We shall examine the problem of mechanical resistance of the tubes under the effect of the flow.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0477, BEHAVIOR OF BWR CIRCUITS AND INTERNAL STRUCTURES UNDER FLOW
UNKNOWN, Electricite de France, *Paris, France* 76008

This study consists of tests on models, or test beds: 1. In order to predict the development of flows for different circuit configurations or different operating cases by visualization; 2. To estimate loads carried by various elements.

The mechanisms involved are: 1. Safety valves of the nuclear boiler and corresponding exchange tubes; 2. Recirculation circuits; 3. Internal structures at the bottom of the reactor (guide tubes, control rods, etc.).

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0478, 900 MW PRESSURIZED LIGHT WATER REACTORS - BEHAVIOR OF INTERNAL STRUCTURES OF STEAM GENERATORS UNDER FLOW
UNKNOWN, Electricite de France, *Paris, France* 76008

This study: a. analyzes flow conditions by using a model to visualize the circulation of secondary water in the steam generator ensemble and at the base of the tube cluster near the tubular plate as well as that of primary water in the water chamber; b. estimates the damage to secondary cluster tubes and pins caused by flow; and c. controls the vibratory characteristics of tubes by determining the frequency of the pins themselves.

Addenda: Supporting agency and Performing organization - Electricite DE France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0479, THERMAL TRANSFER IN 2 PHASE FLOW
UNKNOWN, Electricite de France, *Paris, France* 76008

An important point is the study of exchange coefficients after critical flux has appeared. An understanding of what happens during and beyond the critical flux is useful for determining the operational margin of steam generator cores and for safety studies.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0480, DIMENSIONS AND OPERATION OF STEAM GENERATORS AND INTERMEDIATE EXCHANGERS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Our goal is to help define and choose steam generators for equipping fast neutron power stations, especially the Creys-Malville Power Station.

The project: a. defines, prepares, draws up and assembles tests on models of the CGUS loop and the 1.5 MW sodium-water loop; b. establishes and develops computation codes for operation at a fixed level of performance, dynamics, and high amplitude transition; c. transposes results to commercial steam generators.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0481, SEPARATING THE LIQUID PHASE INSIDE STEAM TURBINES
UNKNOWN, Electricite de France, *Paris*, *France* 76008

The operation and efficiency of the devices used to eliminate the liquid phase in the wet levels of a steam turbine are not well known. This study, in collaboration with manufacturers, provides us with a better understanding of what happens and improves present devices: drainage belts on the edges, suction (or blowing) vents on fixed vanes.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0482, LOOP TESTS OF PRIMARY OR RECIRCULATION PUMPS AND OF LIGHT WATER POWER STATION COMPONENTS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Objectives: 1. Studying and constructing the loop to be used for testing the primary and recirculation pumps, the first of a series in light water power stations, in their true size and under nominal conditions, in order to improve reliability and optimize operation. Modifying the loop to adapt it to each new pump; 2. Choosing and perfecting measuring devices; 3. Carrying out tests and interpreting results, tests of endurance, hydraulic characteristics, mechanical resistance of components, etc.), and training operating and maintenance personnel.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0483, 900 MW PRESSURIZED LIGHT WATER POWER STATIONS - BEHAVIOR OF STEAM SEPARATORS IN STEAM GENERATORS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

The goal of this project is to obtain experimental results confirming and improving technical data on stress in instruments. This can be achieved by: a. Studying a small-scale model; b. Scale tests of a 150t/h unit. In the latter case, we must equip a test loop beside a thermal compartment in operation.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0484, 900 MW PRESSURIZED LIGHT WATER POWER STATIONS - THERMAL AND MECHANICAL BEHAVIOR OF STEAM GENERATORS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

This project is basically experimental - it consists of 2 main parts: 1. controlling the thermal and mechanical behavior of steam generators during hydraulic tests by measuring and analyzing distortion of the tubular plate, primary foundation, and secondary envelope; 2. controlling the secondary water circulation conditions at the beginning and base of the secondary cluster in a Bugey steam generator in situ while in operation by measuring and analyzing temperature distribution, speed and pressure by visualization.

ADDENDA: Supporting agency and Performing organization -Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0485, THERMAL AND MECHANICAL BEHAVIOR OF MATERIALS AND THE CONFIGURATION OF THERMAL AND NUCLEAR COMPARTMENTS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Thermal and mechanical behavior of thermal and nuclear compartment equipment now in use: a. studying the entire compartment: analyzing increased thermal performance in 700 MW and PWR nuclear compartments; perfecting mathematical models for improving ordinary compartments' start-up conditions; b. studying a specific piece of equipment: analyzing mechanical and thermal behavior of boilers and behavior of residual energy removal circuits in operation.

Addenda: Supporting agency and Performing organization - Electricite de France, Direction des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0486, SEPARATING THE LIQUID PHASE OUTSIDE TURBINES
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Comparative study of the performance of various types of separators available on the market. Analysis of operating conditions and areas of utilization. Influence of main parameters (steam speed, content, granulometry, geometry, arrangement) on performance. The final goal of the study, carried out in collaboration with manufacturers, is to decrease the number of superheater dryers in light water power stations.

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0487, DEVELOPING AND TESTING A SODIUM PIPE SYSTEM
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Develop isolating and control blades for sodium circuits. We will test a 900 mm diameter prototype in water and then in sodium.

Other qualification tests will cover: blades of small diameters (less than or equal to 300 mm) for preselecting minor equipment, Superphoenix blades and joints.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0488, TESTING LEADING PUMP GROUPS OF LIGHT WATER REACTOR AUXILIARY CIRCUITS UNDER NORMAL AND UNUSUAL CONDITIONS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

We will use a special loop for testing the pumps of auxiliary circuits under possible conditions of unusual operation and in case of nuclear accident. Study and construct special test banks for simulating the thermal shock and unusual operation that can have an effect on pumps. Test and analyze results for the aspersion and ISBP pumps in the PWR 900; simulate the thermal shocks and unusual operation (water quality, over production); test component resistance (butees, paliers, couplings); verify characteristics.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0489, USE A WATER LOOP TO TEST GROUPS OF PRIMARY AND SECONDARY PUMPS IN FAST REACTORS UNDER NORMAL OPERATING CONDITIONS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

The objective of the tests is to ensure that the different electrical and mechanical components of motor-pump groups have great operational safety, as a result of using sodium as coolant and of integrating the circuits in the reactor.

Our primary objective is to develop a test loop that uses water either originally or based on a leading prototype, fast reactor primary and secondary pumps (endurance, hydraulic characteristics, etc.).

While awaiting decisions about the fast reactor, our limited objective is to complete the already begun initial steps of constructing a water test loop for Superphoenix pumps, which will enable us to test prototype 900 mm blade.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0490, USING A LOOP TO TEST THE ENDURANCE OF GROUPS OF PROTOTYPE PRIMARY PUMPS IN LIGHT WATER REACTORS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

We will use a water loop to test groups of prototype primary motor-pumps under nominal operating conditions (test endurance, hydraulic characteristics, mechanical behavior of components, etc.), interpret results obtained, modify the loop to make it suitable for each new pump and develop measurement methods and equipment.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0491, FAST SODIUM COOLED REACTORS - EXCHANGER MATERIALS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Our objective is to examine exchanger materials for their operational and resitant qualities. This project will accumulate data needed to make decisions about the reactor as well as information on its reliability and the safety of the steam generators of sodium cooled fast reactors.

Steam generators: Industry or Fives-Cail-Babcock for Superphoenix and for the reactor; study materials and welding. Study mass transfer that can have an effect on materials to be used in secondary circuits. Study corrosion by water in once-through steam generators.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0492, PROBLEMS OF DIPHASE FLOW IN NUCLEAR REACTORS - PRESSURIZED WATER REACTOR
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Plot curves characterizing primary pumps based on mechnical and thermodynamic conditions that characterize their operation. Study diphase flow in pipes, characterize critical output.

Experimental study of flow in control valves using supersonic methods. Flashing valves, defining the corresponding diaphragm. Study occasional flows in hydraulic circuits by creating limited vaccuum areas and by introducing gas; study water pressure.

GENERAL OPERATION OF FAST REACTORS: 1. Phoenix: To make sure that present codes are valid, we intend to do a unit by unit comparison of Phoenix test results and computation results. Such comparison will yield a modified Phoenix code that meets the needs of the user; the corrected results of such comparison will be used to study the Superphoenix. CEA will collaborate in this study.2. Superphoenix: Current work on the general operation of the Superphoenix has so far dealt with the behavior of the boiler during symmetrical operation. The code to be developed will include representations of the turbine and water station.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0493, THERMAL AND MECHANICAL BEHAVIOR OF THERMAL AND NUCLEAR CONVERSION DEVICES
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Thermal and mechanical study of the actual behavior of materials and nuclear conversion devices, especially during occasional operation. Specifically, study an entire system, analyze data on the thermal behavior of 700 MW thermal systems or 900 MW nuclear reactors, analyze various systems under which reactors can be operated, study a predetermined material, analyze the mechanical and thermal behavior of boilers and analyze the way different circuits behave in operation (PWR back-up systems).

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0494, DEVELOPING AND TESTING CAPTORS THAT CAN WORK IN SODIUM AT HIGH TEMPERATURE
UNKNOWN, Electricite de France, *Paris*, *France* 76008

We will test equipment currently on the market and modify it for liquid sodium at high temperatures. The equipment involved consists of pressure gauges and vibration, displacement, pressure, and level measuring devices.

We will study only the aspects relating to sodium and temperature. In order to qualify these materials, Equipment Management must define specifications.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0495, INTERNAL HYDRAULICS OF NUCLEAR REACTORS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

This project will accumulate all work done by the National Hydraulics Laboratory concerning flows in nuclear reactors. Its results will effect the design of reactor block components and hydrodynamic research on the components (including vibration under flow).

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0496, ISOLATING THE LIQUID PHASE INSIDE STEAM TURBINES
UNKNOWN, Electricite de France, *Paris*, *France* 76008

We do not fully understand the operation or efficiency of the devices used to eliminate the liquid phase in the wet stages of the steam turbine. Work done in collaboration with manufacturers was designed primarily to learn more about the phenomena that occur and to improve present equipment, i.e., peripheral drainage belts and breathing (or Blow) vents on fixed rotors.

We will use the experimental turbine at Gennevilliers for most of the experimental part of this project because it is much better than a production turbine for analyzing phenomena and for testing extraction equipment.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0497, ISOLATING THE LIQUID PHASE OUTSIDE TURBINES
UNKNOWN, Electricite de France, *Paris*, *France* 76008

We will compare the performance of different types of separators on the market, analyze operational conditions and area of use, and the effect of operational conditions on performance, i.e., stem, speed, size, granulometry, geometry, lay out. We will study erosion and corrosion in high temperature dryers; effect of flow characteristics and materials quality. Manufacturers will collaborate closely in these studies. Their objective is to improve mechanical resistance and decrease the size of high temperature dryers in light water reactors.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0498, THERMAL AND MECHANICAL BEHAVIOR OF REACTOR HEATERS AND WATER STATIONS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Experimental study of the operational behavior of water heater elements. (1) Analyze the thermal and mechanical behavior of tubular plaques in heaters by using test models or doing tests on site (Bugey and Cordemais 2 reactors). (2) Study heat transfer in heaters that blow off. (3) Study flow conditions in water heaters. (4) Analyze the behavior of water stations under temporary operating conditions at power stations and compare with currently accepted mathematical models.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0499, THERMODYNAMIC CYCLES FOR WATER REACTORS
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0500, STUDYING THE CORE - THERMAL MECHANICS - DRAFT
BRISBOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0501, PERFECTING METHODS OF ANALYZING OUGO-ELEMENTS IN SODIUM
ENGELMANN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency· Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0502, SUPER PHENIX - MECHANICAL PROBLEMS
GEFFROY, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0503, MECHANICAL RESISTANCE OF STRUCTURES
GEFFROY, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0504, EXAMINING BOILING WATER REACTORS WHILE IN OPERATION
NIFENECKER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0505, USING HYDRAULIC TESTS OF THE REACTOR VESSEL FOR STUDYING EMISSION
NIFENECKER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

ADDENDA: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0506, STEAM GENERATORS (GAS MIXTURE)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0507, STEAM GENERATORS (VIBRATION AND ACOUSTICS)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0508, HOT CONDUIT (CARMEN II EQUIPMENT)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0509, STEAM GENERATORS (CARMEN II EQUIPMENT)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0510, HOT CONDUITS (NEW DESIGN)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0511, PART X OF THE HTR BOILER PROGRAM - CEA/GA
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0512, DEVELOPING METHODS OF CALCULATIONS OF THE THERMOHYDRAULICS OF REACTORS
PLAS, Atomic Energy Commission, Div. for Stu. & Dev. Reactors, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0513, PURIFYING HELIUM - ANALYZING THE GAS
RAPPENEAU, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0514, SIMULATING THE PRIMARY LOOP OF A PRESSURIZED REACTOR
ROZENBERG, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0515, THERMOHYDRAULIC NEUTRON COUPLING
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0516, SUPER-PHENIX - THERMAL AND THERMOHYDRAULIC PROBLEMS
UNKNOWN, Atomic Energy Commission, Div. for Stu. & Dev. Reactors, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0517, CHAMPLAIN 14 - EXCHANGERS
VERDEAU, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0518, BOILING SODIUM
COSTA, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble*, *France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Department de Transfert et Conversion d'Energie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0519, THERMAL PROBLEMS RELATED TO REMOVING RESIDUAL POWER
COSTA, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble*, *France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Department de Transfert et Conversion d'Energie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0520, THERMOHYDRAULICS OF THE FUEL ROD CLUSTERS OF THE WATER REACTOR
COURTAUD, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble*, *France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Department de Transfert et Conversion d'Energie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0521, INTERVESSEL THERMOHYDRAULICS
MARTIN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble*, *France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Department de Transfert et Conversion d'Energie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0522, CONTROL APPARATUS FOR TWO-PHASE FLOW
RICQUE, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble*, *France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Department de Transfert et Conversion d'Energie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0523, EXAMPLE OF RESEARCH ON EXTERNAL COOLING WATER CIRCUIT - EXTENSION BORSSELE POWER PLANT (WESTERN-SHELDT, THE NETHERLANDS)
H. LIGTERINGEN, Delft Hydraulics Laboratory, *Delft*, *Netherlands*

Situation: Tidal estuary.

Design concept: Selection to be made between open outlet channel with selective withdrawal at the intake, or mixing by means of a diffusor.

Method of investigation: Hydraulic model on scale 1:75 of the near field region; computation of increase in background temperature (far field) by means of a two-dimensional mathematical model. For the latter, the diffusion characteristics of the ambient water will be derived from field measurements.

SUPPORTED BY Netherlands - Provincial Zeeuwsee Energy Mij - Middleburg

3.0524, SECURITY AND CONTROL STUDIES REGARDING HEAT EXCHANGING SYSTEMS OF NUCLEAR (FISSION) POWER STATIONS
N.W. BRUENS, Delft Univ. of Technology, Lab. for Thermal Power Engin., *Delft*, *Netherlands*

The objective is to develop computer simulation models, describing the dynamic behaviour of heat transport systems and of parts of two types of nuclear power stations: LMFBR and PWR. These models, suited for usual as well as unusual operational conditions, are applied to: a) optimalization of the design; b) Risk analysis for the entire system and the composing parts; c) Developing an optimal control system. Co-operation: a) Since 1972 there has been co-operation with Interatom G.m.b.h., Bensberg, Western Germany, information exchange on supply of and know-how regarding the LMFBR and PWR (ship propulsion). b) Since 1974 there has been an exchange of information about risk analysis of PWR power stations with the Dutch Ministry of Social Affairs (Committee on Reactor Risks), The Hague, The Netherlands. c) TNO (Organization for Applied Scientific Research), The Hague, The Netherlands co-operates concerning the comparison of experimental data with computer-calculated data.

Addenda: Supporting agency and performing organization: Technische Hogeschool Delft.

SUPPORTED BY Netherlands - Delft University of Technology

3.0525, DELFT MOLTEN SALT PROJECT (DMSP)
B. VRIESEMA, Delft Univ. of Technology, Lab. for Thermal Power Engin., *Delft, Netherlands*

Developing a technology (including measuring apparatus and controllers) to apply salts as a coolant in high temperature processes (500-700 degrees C).

Subprojects are: a) Molten salt technology. b) Bayonet type steam Boiler.

The current trend of applied chemical and physical processes (concerning power generation) is towards high temperatures. The development is impeded by the scarcity of useful coolants. Merely liquid metals (e.g. sodium) and molten salts (e.g. alkali fluorides) satisfy the conditions concerning vapour pressure, chemical stability and heat transfer. Elsewhere in The Netherlands research institutions are developing liquid sodium technology, therefore this investigation focusses on the technology of molten fluorides.

These salts are not inflammable and do not react explosively with water. The compounds are a possible alternative for sodium. The bayonet type steam boiler is one of the possible designs that can satisfy the extreme qualifications, required for sodium cooled fast breeder reactors. The application as a molten salt cooled reactor is doubtful, because of the temporization of the molten salt cooled breeder in the United States.

SUPPORTED BY Netherlands - Delft University of Technology

3.0526, STEAM/WATER SEPARATION TECHNOLOGY FOR THE BOILING WATER REACTOR SYSTEM
R. WISMAN, Delft Univ. of Technology, Lab. for Thermal Power Engin., *Delft, Netherlands*

The objective is to develop a new type of steam/water separator for Boiling Water Reactors. This separator is of the axial centrifugal type, resembling a venturi-system, which explains the name Venturi-separator. The development of calculation models for two-phase flows is a part of the project.

The seale of nuclear power stations is still increasing. Consequently there will be a demand for new steam/water separators with increasing capacity. In this field the Venturi separator will offer possibilities.

This project likewise offers the opportunity to prove that a mathematical description of two-phase flows is possible.

Further it may be expected that the investigation will enlarge the fundamental knowledge about two-phase flows.

The Research Team exchanges information with the Laboratory for Aero- and Hydrodynamics and the subdepartment of Mathematics (Delft University of Technology).

SUPPORTED BY Netherlands - Delft University of Technology

3.0527, SODIUM TECHNOLOGY FOR FAST BREEDER NUCLEAR REACTOR
UNKNOWN, Stork Boilers & Power Systems, *Hengelo, Netherlands*

Stork Boilers and Power Systems has participated for several years in the development of the sodium pump and the sodium steam generator in co-operation with TNO.

The main part of the development of these two components has been concluded. As is well-known, a demonstration nuclear power plant will be built in Kalkar (German Federal Republic).

Stork Boilers and Power Systems obtained orders for the above mentioned items which at this moment are manufactured in their workshop. When the demonstration plant will be ready for operation, specialists of Stork will assist in the putting-into-operation and testing, and thus participate in the final development-work in order to prove the reliability of these two important components.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

3.0528, SODIUM BOILING EXPERIMENTS
R.A. LAKEN, Reactor Center, *The Hague, Netherlands*

Sodium boiling experiments are carried out in a 500 kW sodium heat transfer loop at RCN. The experiments are performed with simulated fuel bundle, assembled from electrically heated rods. Previous experience has been obtained through experiments with single pins and with 4, 7 and 12 rod bundles. The 12 rod bundle has been used to study sodium expulsion when gross boiling occurs due to a.o. a reduction in sodium flow. At present the programme is focussed on the study of local boiling behind blockages. These experiments will be performed with a 60 degrees sector of an SNR fuel element, consisting of 28 heated fuel rods, of which more than half will be blocked. The object of the experiments is to study boiling phenomena behind such a local blockage and to test detection instruments. Although theoretical work indicates that such boiling conditions do not lead to fast fuel failure propagation, it is considered necessary to verify this by experiments. This is a joint experiment of GFK-Karlsruhe and RCN-Petten. Work is well underway and the measurements are expected to start October 1975. Meanwhile in a smaller 75 kW sodium loop gas detection measurements have been started to deterimine degassing procedures and to study the influence of the free gas bubbles on the sodium superheat.

Addenda: Performing organization: Reactor Centrum Nederland.

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

3.0529, PRESSURE PULSATIONS IN BOILING
M. TOMSIC, Jozef Stefan Nuclear Inst., *Ljubljana, Soc. Fed. Rep. of Yugoslavia* 61001

The proposed study should provide new quantitative information on the conditions under which important acoustic oscillations exist in a boiling channel, on the nature of such oscillations and in what way does the presence of the acoustic field influence the boiling process. The boiling bubble dynamics in being studied theoretically, as the growth and collapse of boiling bubbles is the principal mechanism of sound generation in boiling. Theory shall be confronted with the measurements of boiling sound in pool boiling. Further, in a specially designed test section the flow boiling situation shall be investigated with particular emphasis on the nature of the acoustic oscillations in view of the possibility of the diagnosis of the boiling process by acoustic detection. The effect of the selfgenerated pressure oscillations on the boiling process shall also be considered.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3E. REACTOR SAFETY AND CONTROL

3.0530, CONSULTANT & ADVISORY SERVICES TO THE ATOMIC ENERGY CONTROL BOARD'S REACTOR SAFETY ADVISORY COMMITTEE FOR ONTARIO, QUEBEC & NEW BRUNSWICK
W. PASKIEVICI, Unknown Inst. or Indiv. Grant, *Canada*

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

3.0531, OPTIMAL CONTROL OF NUCLEAR REACTORS AND ESTIMATION OF NONLINEAR SYSTEMS
G.S. CHRISTENSEN, Univ. of Alberta, School of Graduate Stu. & Res., *Edmonton, Alberta, Canada*

CURRENT RESEARCH AND OBJECTIVES: (1) Optimal control of nuclear reactors. This research project is specifically aimed at the Xenon oscillation problem. (2) Estimation of nonlinear systems by a specific method developed here. The convergence of this method is currently being investigated. Using the same method parameter estimation is being attempted. Estimation of distributed systems is also being carried out.

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

3.0532, DEVELOPMENT OF DYNAMIC CODES FOR ANALYSIS OF REACTOR SECURITY
UNKNOWN, Univ. of Montreal, Polytechnic School, *Laval, Quebec, Canada*

ADDENDA: Performing organization: Centre Developpement Technologique de 1, Ecole Polytechnique de Montreal.

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

3.0533, DEVELOPMENT OF DYNAMIC CODES FOR THE ANALYSIS OF REACTOR SAFETY
W. PASKIEVICI, Univ. of Montreal, *Montreal, Quebec, Canada*

This project began as a numerical analysis of space-time reactor kinetics equations with two objectives in mind: (1) to reduce the cost of numerical calculations; (2) to improve the precision of theoretical calculations dealing with the behaviour of the reactor under accident conditions.

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

3.0534, A REVIEW OF THE AMENDMENT PROPOSED TO THE EARTHQUAKE DESIGN BASIS FOR CANADIAN NUCLEAR PLANTS
UNKNOWN, Spectrum Engin. Corp. Limited, *Peterborough, Ontario, Canada*

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

3.0535, RISK ASSESSMENT STUDY
I. BURTON, Univ. of Toronto, *Toronto, Ontario, Canada*

Carry out a study of the process of risk assessment in policy decisions on nuclear power generation at the national, provincial and local levels. The work was originally begun under the auspices of the Ford Foundation.

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

3.0536, A SYSTEMS ANALYSIS APPROACH FOR ESTABLISHMENT OF RISK CRITERIA FOR NUCLEAR POWER GENERATION
C.R. PHILLIPS, Univ. of Toronto, *Toronto, Ontario, Canada*

The objective of this study is to place safety and environmental risks associated with the nuclear industry in Canada in perspective with other risks the Canadian public is exposed to, and thereby establish a more sound basis for selection of regulatory risk criteria.

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

3.0537, EXPERIMENTAL DIRECT DIGITAL CONTROL OF THE POWER PLANT A 1 REACTOR BASED ON A MODERN CONTROL THEORY APPROACH
C. KARPETA, Power Research Institute, *Prague 7, Czechoslovakia*

The research project represents an application of the modern control theory to a heavy-water gas-cooled nuclear power reactor. A computerized control system is to be developed to control the coolant output temperature at the nominal power level. The design procedure will be based on the solution of the so-called linear-quadratic gaussian problem.

Scheduled topics for the current year are as follows: (a) linearization of the model of the process, (b) sensitivity analysis of the linearized model with respect to the process parameters variation, (c) design of an optimum digital estimator and controller, (d) simulation studies of the closed control loop on a hybrid computer.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0538, RELIABILITY ENGINEERING
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

Among the tasks of the RISO station is that of aiding the management of nuclear plants and electric power stations by appraising the safety of the nuclear power plants and the safety of their operations.

In view of this, an attempt is being made through this project to increase the knowledge and to develop methods within the area of reliability engineering, including also the development of computer programs for planning and safety analyses.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0539, PROBABILISTIC MECHANICS OF FAILURE
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

Probabilistic mechanics of failure is an attempt to predict the operational reliability of a structure (such as a pressure vessel) on the basis of detailed analysis of design, methods of manufacture, and quality insurance regulations in force. The method is expected to gain use as a supplementary means of appraising existing plant safety.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0540, HEAT CYCLE RESEARCH
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

The project includes experimental investigations of the cooling conditions in thermal reactors, with a view toward establishing an understanding of the physical processes that occur during operation, burnout, and emergency cooling. The research on the 1/2-megawatt water cycle at RISO involves, among other things, the measuring of water film flow and thickness, void, steam quality, etc.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0541, EMERGENCY OPERATIONS, BLOWDOWN AND EMERGENCY COOLING
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

The project is a part of the Scandinavian joint project, NORHAV, that deals with reactor safety.

The purpose of the project is to describe and compute the sequence of events during a large accident at an atomic power plant. When the breakdown occurs the primary cooling system ruptures, and the coolant is lost in the case of a blowdown. The reactor fuel is heated up by the residual heat, but an emergency cooling is supposed to prevent damage. The computer simulations for this are large three dimensional transient descriptions of the hydrodynamic and thermal processes.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0542, SAFETY AND RELIABILITY ANALYSIS OF NUCLEAR TECHNOLOGY INSTALLATIONS UNDER THE PARTICULAR CONDITIONS OF HIGH TEMPERATURE REACTOR SYSTEMS
W. BUCK, Unknown Inst. or Indiv. Grant, *Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0543, PARTICIPATION IN THE ELABORATION OF THE RASMUSSEN STUDY (WASH 1400) OF NUCLEAR POWER STATIONS IN THE FEDERAL REPUBLIC OF GERMANY
G. MEMMERT, Technical Univ. of Berlin, Inst. for Nuc. Technology, *Berlin 10, Federal Republic of Germany* 1000

ADDENDA: Performing organization: Inst. Fuer Kerntechnik Der Tu Berlin.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0544, PARTICIPATION IN THE AEROJET NUCLEAR COMPANY'S RESEARCH ON SAFETY PROCEDURES DURING EMERGENCY COOLING IN WATER-COOLED REACTORS
FARBER, Reactor Safety Institute, *Cologne, Nordrhein Westfalen, Federal Republic of Germany* 5000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0545, APPRAISAL OF THE HHT FROM THE POINT OF VIEW OF SAFETY
MOKROS, Reactor Safety Institute, *Cologne, Nordrhein Westfalen, Federal Republic of Germany* 5000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0546, REACTOR SAFETY - COMBUSTIBLE POISONS
BUDNICK, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520
ADDENDA: Performing organization: Bereich Reaktortechnik der Kraftwerk Union AG.

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3.0547, REACTOR SAFETY - SEPARATION OF RADIOACTIVE SUBSTANCES FROM THE PRIMARY COOLANT
BUDNICK, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520
ADDENDA: Performing organization: Bereich Reaktortechnik der Kraftwerk Union, AG.

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3.0548, BWR BEHAVIOR DURING AN EARTHQUAKE
BURKE, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520
ADDENDA: Performing organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0549, INVESTIGATION OF THE RELIABILITY OF PRESSURE AND PRESSURE DIFFERENCE TRANSDUCERS UNDER LOCAL CONDITIONS
D.V. HAEBLER, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0550, RECIPROCAL EFFECTS BETWEEN NUCLEAR MELTDOWN AND REACTOR CONCRETE
G. HILDENBRAND, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0551, NUCLEAR MELTDOWN YIELDING ZIRCONIUM
G. HILDENBRAND, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0552, REACTOR SAFETY - FUNCTIONAL STUDY OF VIBRATION INDUCED MALFUNCTIONS (2ND STUDY)
HINTERGRAEBER, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520
ADDENDA: Performing organization: Bereich Vertrieb der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0553, INVESTIGATION OF THE BEHAVIOR OF THE MAIN COOLANT PUMPS IN A LOSS OF COOLANT ACCIDENT
W. KELLER, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0554, EXPANSION & BURST OF CLOSELY SITUATED ENCASING TUBES DUE TO MECHANICAL AND THERMAL EFFECTS OF REACTOR COOLANT LEAKAGE
D. KNOEDLER, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520
ADDENDA: Performing organization: Bereich Reaktortechnik der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0555, PRELIMINARY EMPIRICAL DESCRIPTION OF THE BEHAVIOR OF FUEL RODS IF COOLANT LEAKAGE OCCURS
D. KNOEDLER, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520
ADDENDA: Performing organization: Bereich Reaktortechnik der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0556, EMERGENCY COOLING - MODIFYING A 3-D TRANSITIONAL PROGRAM FOR THE BWR
D.N. MAERKL, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520
ADDENDA: Performing Organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0557, REACTOR SAFETY - CORROSION PRODUCTS DEPOSITION
SCHUMANN, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520
ADDENDA: Performing Organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0558, THE HYDRAULICS OF FLOODING AND NEW FOUND EFFECTS IN REWETTING FOR EMERGENCY COOLING
H. SCHWEIKERT, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

1. Low-Pressure Test; 2. Refill Test with Consideration about the Primary Circulation.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0559, EXPERIMENT TO PRODUCE A THEORY OF RESPRINKLING OF HIGHLY HEATED FUEL RODS USING PIPE TESTS
H. SCHWEIKERT, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0560, EMERGENCY COOLING - CONTINUED EFFORT TO DEVELOP A MEANS OF MEASURING MASS OUTPUT USING NUCLEAR SPIN RESONANCE
H. SCHWEIKERT, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

ADDENDA: Performing organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0561, STEAM CONDENSATION IN A WATER RECEIVER - CONDENSATION IV, PART II
H. SCHWEIKERT, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

Testing the actual peak and form of peak pressure under the conditions and effects that are found in an BWR nuclear power station when coolant leakage occurs.

ADDENDA: Performing organization: Bereich Reaktortechnik der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0562, NUCLEAR MELTDOWN - ENERGY BALANCES FOLLOWING POSSIBLE RDB FAILURE
UNKNOWN, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

ADDENDA: Performing organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0563, THEORETICAL FORMULATION OF ENERGY BALANCES - EVALUATING THE RASMUSSEN REPORT FROM THE GERMAN POINT OF VIEW
UNKNOWN, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

ADDENDA: Performing organization: Bereich Reaktortechnik der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0564, EMERGENCY COOLING PROGRAM
H. WINKLER, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

Performing Theoretical Work, Evaluating the Test of Flooding the In-pipes and Rodbundles.

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3.0565, NUCLEAR MELTDOWN - SUBPROJECT - THEORETICAL FORMULATION OF THE ENERGY BALANCE
H. WINKLER, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

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3.0566, EMERGENCY COOLING PROGRAM--LOW PRESSURE BOILING WATER REACTOR--DOUBLE BUNDLES
H. WINKLER, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

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3.0567, EMERGENCY REACTOR COOLING - CRACKS CAUSED BY FLOWING WATER
KLEIN, Klein Schanzlin & Becker AG, *Frankenthal, Rheinland Pfalz, Federal Republic of Germany* 6710

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0568, REACTOR SAFETY - MAXIMUM LOAD-CARRYING CAPACITY OF STEEL AND CONCRETE SHEETS UNDER HIGH SPEED IMPACT SUCH AS AIRPLANE CRASH
W. JONAS, Hochtief Company, *Frankfurt 1, Hessen, Federal Republic of Germany* 6000

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3.0569, NUCLEAR MELTDOWN - THEORETICAL INVESTIGATION OF THE MELTDOWN PHASE
SOBOTTKA, Kraftwerk Union AG, *Frankfurt 70, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0570, NUCLEAR MELTDOWN
SOBOTTKA, Kraftwerk Union AG, *Frankfurt 70, Hessen, Federal Republic of Germany* 6000

Investigation of the metallurgical interactions between the melt and the reactor pressure vessel wall.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0571, NUCLEAR MELTDOWN--THEORETICAL FORMULATION OF THE ENERGY BALANCE
UNKNOWN, Kraftwerk Union AG, *Frankfurt 70, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0572, UTILIZATION OF WAVE EMISSION ANALYSIS TO DETECT LEAKS IN THE KKW
J. EISENBLAETTER, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0573, ENHANCEMENT OF THE PROBABILITY OF DETECTING DEFECTS BY IMPROVING THE RELATIONSHIP BETWEEN SIGNAL AND NOISE IN ULTRASONIC TESTS
R. KLOT, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

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3.0574, INVESTIGATION OF THE PROCESSES IN A MANY-FOLD SUBDIVIDED CONTAINER DURING A BREAK IN THE COOLANT PIPES OF WATER-COOLED REACTORS
B. RUEDIGER, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0575, LOSS OF PRESSURE IN WATERCOOLED REACTORS - MODEL TESTS WITH AN 11.2M HIGH STEEL CONTAINER WITH FITTINGS
B. RUEDIGER, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

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3.0576, HDR SAFETY PROGRAM; EARTHQUAKE RESEARCH AND TECHNOLOGY TRANSFER
F. SCHAEPERMEIER, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0577, RADIOACTIVE MATERIAL CLASSIFICATIONS FOR HDR SAFETY PROGRAM BLOW DOWN STUDY FOR THE HDR IN GROSSWELZHEIM
I. SPITZER, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

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3.0578, OPERATING CONDITIONS OF REACTOR PERSONNEL SEALING OFF SYSTEMS DURING REACTOR ACCIDENTS & THE EFFECT OF STEAM CONTAINING AIR ON PERSONNEL
K. VONHANFFSTENGEL, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

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3.0579, SAFETY EXPERIMENTS IN THE MARVIKEN/SWEDEN NUCLEAR POWER STATIONS CONTAINMENT SPHERE
FRANKE, Soc. for Use of Nuclear Energy, *Geesthacht, Schleswig Holstein, Federal Republic of Germany* 2054

ADDENDA: Performing organization: Gesellschaft Fuer Kernenergieverwertung in schiffbau und Schiffahrt MBH (GKSS).

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3.0580, PREPARATION, CARRY-THROUGH, AND CONCLUSION OF SAFETY EXPERIMENTS IN CONTAINMENT OF THE MAVRICK NUCLEAR POWER PLANT IN SWEDEN
TRAUKE, Soc. for Use of Nuclear Energy, *Hamberg 11, Hamberg, Federal Republic of Germany* 2000

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3.0581, DECONTAMINATION AND TRANSPORT PROBLEMS INVOLVED IN DISPOSING OF ACCIDENTAL WASTE PRODUCTS OF NUCLEAR POWER STATIONS
H. PIRK, Nukem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

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3.0582, CRITERIA FOR SELECTING SEISMICALLY STABLE SITES FOR NUCLEAR INSTALLATION IN THE FEDERAL REPUBLIC OF GERMANY
H.P. HARJES, Geosciences & Mineral Inst., *Hannover 23, Niedersachsen, Federal Republic of Germany* 3000

ADDENDA: Performing organization: Bundesanstalt fuer Geowissenschaften und Rohstoffe (BGR).

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3.0583, INVESTIGATION OF MODEL LAWS FOR TRANSIENT HEAT TRANSFER CONDITIONS IN WATER-COOLED REACTORS USING EMERGENCY COOLING (ABBREV)
F. MAYINGER, Technical Univ. of Hannover, Inst. for Process Techniques, *Hannover, Niedersachsen, Federal Republic of Germany* 3000

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3.0584, CONCLUSION OF PARTICIPATION IN THE ORGANIZATIONAL MANAGEMENT OF THE LOFT PROGRAM
F. MAYINGER, Technical Univ. of Hannover, Inst. for Process Techniques, *Hannover, Niedersachsen, Federal Republic of Germany* 3000

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3.0585, APPLYING STATISTICAL ANALYSIS PROCEDURES IN POWER REACTORS WITH THE SAFETY-TECHNOLOGY GOAL OF EARLY DETECTION OF FLAWS
W. SEIFRITZ, Technical Univ. of Hannover, Inst. for Nuc. Technology, *Hannover, Niedersachsen, Federal Republic of Germany* 3000

Addenda: Performing organization: Inst. Fuer Ierntecnik Der Hannover,

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3.0586, STATISTIC ANALYSIS METHODS IN POWER REACTORS FOR THE EARLY DETECTION OF DANGER
D. STEGEMANN, Technical Univ. of Hannover, Inst. for Nuc. Technology, *Hannover, Niedersachsen, Federal Republic of Germany* 3000

ADDENDA: Performing organization: Inst. fuer Kerntechnik der TU Hannover.

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3.0587, DEVELOPMENT OF A RADIONUCLIDE MEASURING PROCESS FOR THE TWO-PHASE COMPOSITION DURING A LOSS OF COOLANT ACCIDENT
R. LOEFFEL, Soc. for Nuc. Research, Chemistry Reaction Tech. Div., *Karlsruhe 1, Baden Wuerttem., Federal Republic of Germany* 7500

Addenda: Performing organization: Gesellschaft Fuer Kernforschung Fachbereich Chemie Verfahrenstechnik.

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3.0588, DICE THROW - PRELIMINARY STUDY - REACTOR PROTECTION FROM EXTERNAL EFFECTS
H. HOFMANN, S D K Gmbh, *Loerrach, Baden Wuerttemberg, Federal Republic of Germany* 7850

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3.0589, CONTAINMENT - STUDY OF REACTIONS IN NUCLEAR INSTALLATIONS
H. HOFMANN, S D K Gmbh, *Loerrach, Baden Wuerttemberg, Federal Republic of Germany* 7850

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3.0590, CONTRIBUTION TO SPECIFYING A SAFETY RESEARCH PROGRAM FOR HIGH TEMPERATURE REACTORS (HTR)
KUJATH, Hochtemperatur Reaktorbau Gmbh, *Mannheim, Baden Wuerttemberg, Federal Republic of Germany* 6800

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3.0591, SAFETY ANALYSIS OF UNDERGROUND REPROCESSING PLANTS AND THE EFFECTS ON COSTS AND METHODS OF OPERATION
E. ROTH, Fichtner Consult. Eng. Gmbh, *Stuttgart 30, Baden Wuerttem., Federal Republic of Germany* 7000

ADDENDA: Performing organization: Fichtner - Beratende Ingenieure GmbH & CO KG.

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3.0592, ROUGH SPECIFICATION OF PHASE I AND DETAILED SPECIFICATION OF THE FIRST YEAR OF THE RESEARCH PROGRAM ON COMPONENT SAFETY
KUSSMAUL, Univ. of Stuttgart, State Materials Testing Dept., *Stuttgart, Baden Wuerttemberg, Federal Republic of Germany* 7000

ADDENDA: Performing organization: Staatliche Materialpruefungsanstalt Uni Stuttgart.

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3.0593, HYPOTHETICAL NUCLEAR MELTDOWN - INVESTIGATION OF THE INFLUENCE OF A PARAMETER THROUGH VARIATION
H. UNGER, Univ. of Stuttgart, Inst. for Nuc. Energy, *Stuttgart, Baden Wuerttemberg, Federal Republic of Germany* D7000

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3.0594, PROGRAM DEVELOPMENT OF MULTIDIMENSIONAL CONTINUUM MECHANICS
L. JEGOROFF, Interatom Gmbh, *5060 Bensberg, Nordrhein West., Federal Republic of Germany*

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3.0595, ACCIDENT ANALYSIS OF SODIUM-WATER REACTIONS IN THE STEAM GENERATOR UNDER CONSIDERATION OF THE PICTURE OF 2 PHASE-2 COMPONENT MIXING
L. JEGOROFF, Interatom Gmbh, *5060 Bensberg, Nordrhein West., Federal Republic of Germany*

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3.0596, SPECIFICATION OF SAFETY RESEARCH PROGRAM FOR FAST BREEDER REACTORS FROM VARIOUS UNIQUE VIEWPOINTS (MAINLY 20 THEMES)
UNKNOWN, Interatom Gmbh, *5060 Bensberg, Nordrhein West., Federal Republic of Germany*

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3.0597, INVESTIGATION OF THE LOAD-BEARING CAPACITY OF CONCRETE STRUCTURES TO AIRPLANE CRASHES
UNKNOWN, Board for Arms Technology, *5400 Koblenz 1, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0598, ANALYSIS AND REPAIR OF SEVERE MALFUNCTIONS DURING NUCLEAR POWER STATION SHUT-DOWN
AULER, Nuclear Engineer. Service Gmbh, *6000 Frankfurt 71, Federal Republic of Germany*

ADDENDA: Performing organization: Abt. Reaktoranlagen der Nuklear-Indenieur-Service GMBH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0599, SPECIFYING A SAFETY TECHNOLOGY INVESTIGATION PROGRAM FOR THE GROSSWELZHEIM HOT STEAM REACTOR (HSR)
MUELLERDIETZSCH, Soc. for Nuc. Research, *6000 Frankfurt, Hessen, Federal Republic of Germany*

Addenda: Performing organization: Gesellschaft Fuer Kernforschung.

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3.0600, BREAK GROWTH FOR THE ESTIMATION OF THE BREAK DANGER OF BUILDING PARTS
H. BLAUEL, Fraunhofer Society, Inst. for Rigid Body Mechanics, *7800 Freiburg, Baden Wuerttem., Federal Republic of Germany*

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3.0601, ORIGIN OF CHEMICAL EXPLOSIONS AND THEIR EFFECTS ON THE SAFETY TECHNOLOGY OF IMPORTANT REACTOR COMPONENTS
H. PFOERTNER, Fraunhofer Society, Inst. for Shockwave Research, *7800 Freiburg, Baden Wuerttem., Federal Republic of Germany*

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3.0602, LARGE SODIUM FIRES (SATAN PROGRAM)
CERCY, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Department de Surete Nucleaire.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0603, EMISSION, TRANSPORT, AND DEPOSIT OF FISSION PRODUCTS IN PEGASUS LOOPS
DADILLON, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Department de Surete Nucleaire.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0604, ANALYTICAL DEVELOPMENTS RELATING TO THE CONTROL OF LIGHT WATER FUELS
DOZOL, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0605, CONTAMINATION OF PRIMARY CIRCUITS IN FAST NEUTRON REACTORS
LAPICORE, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Department de Surete Nucleaire.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0606, EROS
LAPICORE, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Department de Surete Nucleaire.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0607, CHAMPLAIN 3, IMPROVING THE PWR EMERGENCY INJECTION SYSTEM
LEBORGNE, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0608, ACCIDENT SAFETY
MEYERHEINE, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0609, SAFETY STUDIES
OCERAIES, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commisariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0610, COMMON PROBLEMS OF REACTORS - CONTROL, STUDIES, REALIZATION
OLLIER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0611, COMPLEMENTARY SHUT-DOWN SYSTEM FOR FAST REACTORS
UNKNOWN, Electricite de France, *Paris, France* 76008
Nuclear reactor safety depends on the control rods functioning correctly.
Two entirely independent shut-down systems are desirable, one of which does not require a measurement and control network outside the reactor.
The goal of this study is to perfect safety devices different from those now in existence and entirely unrelated to them, which will automatically shut down the reactor in case the core temperature becomes abnormally high or if reactivity increases.
Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0612, NUCLEAR SAFETY BEHAVIOR OF PRIMARY CIRCUIT PUMPS (SINGLE PHASE AND TWO-PHASE)
UNKNOWN, Electricite de France, *Paris, France* 76008
Obtaining characteristic curves of primary pumps, using mechanical and thermodynamic parameters characterizing their operation.
Tests were carried out under stationary conditions and include 2 phases: a. Tests in water on the cold model, 1/2, 2 scale; b. Tests on the cold model, 1/10 R 1/18 scale, in 2 phase water-steam flow.
Finally, studying cavitation similarity by determining the differences between the conditions under which cavitation occurs in water and sodium.
Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0613, THERMAL ASPECTS AND SAFETY OF THE FAST SODIUM REACTOR CORE
UNKNOWN, Electricite de France, *Paris, France* 76008

The goal is to understand the thermal and hydraulic behavior of a heating assembly simulating the conditions inside the core of a rapid reactor.

The study deals with the effects of several abnormalities in cooling (partial stoppage, simulation of fission gas fall - off, etc.). These results are important for analyzing the safety of fast neutron reactors.

We are simultaneously looking into the possibility of detecting these defects by analyzing thermal noise.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0614, SAFETY OF SODIUM-COOLED FAST REACTORS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Since the CEA has established safety regulations, parallel studies being carried out in this field include: a. Fixing nomen-clature for safety regulations; b. Evaluating technical-economic aspects resulting from these regulations; c. Defining uncertainties; d. examining technical solutions engendered by the exigencies of safety.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0615, EVALUATING PWR AND BWR SAFETY USING PROBABILITY METHODS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Producing a list of a series of accidents in a PWR: a. analyzing the reliability of PWR systems important for safety; b. studying common failures; c. evaluating radiation effects of a series of accidents.

Perfecting a method of collecting data and typical failure shafts: a. perfecting methods of analyzing and calculating reliability; b. formulating reliability requirements to be introduced in CST's of equipment or systems; c. effects of plutonium recycling on PWR safety; d. analyzing BWR safety using probability methods; e. analyzing fast neutron reactor, using, probability methods.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0616, EXTERNAL PROJECTILES AND NUCLEAR POWER STATIONS - EVALUATING THE EFFECTS OF AN AIRPLANE CRASH
UNKNOWN, Electricite de France, *Paris*, *France* 76008

The goal of this project is: a. To evaluate the probability and consequences of an airplane or missile crashing into a nuclear power plant located close to a civilian airport, a military air base, a recreational airport, or an industrial area; b. To estimate damages resulting from such an event.

Addenda: Supporting agency and Performing organization: Electricite de France, Direction des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0617, INTERNAL PROJECTILES AND NUCLEAR POWER STATIONS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

The goal of this project is: a. To develop a list of equipment which could emit internal projectiles within a nuclear power plant; B. to demonstrate the risks of this equipment (turbines, flywheels, pressurized pipes, etc.); to study impact absorbing devices used to contain internal projectiles from their emission on or to predict their emission.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0618, NUCLEAR POWER STATIONS AND THE DANGERS OF HUMAN ACTIVITY IN SURROUNDING AREAS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

We shall provide the technical data needed to evaluate the effects of an appreciation of these dangers on power stations and to propose safety measures if the dangers materialize. There are 2 types of technical data: a. Determinants: Qualitative and quantitative description of dangerous phenomena coming from outside the power station and their effects; b. Probabilities: Sizes allowing us to determine effects.

They provide a better understanding of the necessary protection, and thus, of their development cost and the distance to be maintained between the power station and certain human activities.

SUPPORTED BY France - Electricite de France - Paris

3.0619, VIOLENT SODIUM-WATER REACTIONS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

This project studies the effects of a violent sodium-water reaction in the steam generator and the secondary circuit. It involves: a. perfecting a 3-dimensional computation code for predicting temperature and pressure development in a steam generator; b. superimposing this code on test results of different Cadarache Power Station models; and c. perfecting a code for calculating the effects of a violent sodium-water reaction on the power station's secondary circuit and intermediate exchanger.

Addenda: Supporting agency and Performing organization: Electricite De FRance, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0620, DETECTION, DEVELOPMENT, AND LOCATION OF WATER LEAKS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

This project studies the detection, development, and location of small leak of water into sodium, plus methods of examining damaged tubes.

The goal of the project is to determine the procedure to be followed for a steam generator. This includes: a. Developing a Hydrogen Detection System; b. Exploring the possibility of detecting and locating leaks acoustically; c. Experimentally studying the development of small leaks of water in the 1.5 MW sodium-water loop; d. Locating and examining damaged tubes using Foucault currents, endoscopy, helium tests, ammonia tests, hydrogen injection, etc.; e. Analyzing the operation of the 1.5 MW sodium-water loop's cold trap; f. Studying Helium and materials corrosion.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0621, RELIABILITY OF EQUIPMENT AND GROUPS OF EQUIPMENT IN THERMAL AND NUCLEAR POWER STATIONS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

This project has 2 goals: 1. Discover the reliability of the equipment used in light water power stations. This study will be based on an analysis of unexpected problems that have occurred in American PWR and BWR power stations. It will enable us to acquire some statistical data on this equipment. 2. Predict the operating possibilities of different nuclear power station circuits (emergency electrical circuits, shut-down system, residual energy removal circuit, etc.) by using different models (probabilities of state method, fault shaft method.)

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0622, TECHNICAL TEST OF SODIUM HEATED STEAM GENERATOR ELEMENTS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Perfecting and developing certain construction elements in order to increase their safety and reliability. Testing appropriate technological models to support the choice which will have to be made between the different versions proposed for constructing Super-phenix steam generators. Once the choice is made, verify-

ing the validity of the chosen solutions by prolonged testing of fatigue and friction problems of steam generator tubular clusters due to thermal cycles.

Addenda: Supporting agency and performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0623, AUTOMATING LIGHT WATER POWER STATIONS

UNKNOWN, Electricite de France, *Paris*, *France* 76008

Studying control instruments to be installed in light water nuclear compartments (PWR and BWR) in order to improve the process of putting the first installments into operation and preparing a future normalization. Critical analysis of existing types, using models to study dimensioning, control performance, and preliminary studies of the power station's operation; coordinating tests of the putting into operation process.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0624, SUPER PHENIX - STUDYING REGULATION AND CONTROL

UNKNOWN, Electricite de France, *Paris*, *France* 76008

Identifying Phenix on the basis of planned tests of the putting into operation process in order to compare study models. Super Phenix models and regulation studies can benefit from this or be validated. Similarly, an analysis of Phenix control and information processing while in operation will enable us to choose for Super Phenix.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0625, OPERATION AND RELIABILITY OF CONTROL LOGIC

UNKNOWN, Electricite de France, *Paris*, *France* 76008

Creating a methodology and perfecting a method of calculation for studying the operation and reliability of complex logic circuits. The developed methods will first be applied to automatic electromagnetic or static devices for nuclear protection (emergency shut-down circuits and reactor safeguards).

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0626, TECHNOLOGICAL TESTS OF SODIUM HEATED STEAM GENERATOR MATERIALS

UNKNOWN, Electricite de France, *Paris*, *France* 76008

Develop fabrication materials in order to improve their safety and reliability. Test auxiliary production systems that will protect Superphoenix generators in cases of sodium-water reaction; apply such systems to this reactor's generators.

Test the validity of results obtained about problems of fatigue and friction in the tubular sections that result from thermal cycles; use two technological models for tests (one the Superphoenix steam generator, the other the generator that was proposed but not selected). These results may be used to design generators of reactors, and new tests may be carried out if new steam generators are planned.

SUPPORTED BY France - Electricite de France - Paris

3.0627, COOLING ACCIDENTS IN THE FUEL SYSTEM OF A SODIUM COOLED FAST REACTOR

UNKNOWN, Electricite de France, *Paris*, *France* 76008

Our objective is to examine the thermal and hydraulic behavior of heating system that simulates the conditions that exist inside the core of a new fast reactor. We will deal with different cooling anomalies (partial blocking, simulate the blowing off of fission gas, etc.). We will also study methods that can be used to detect such defects and particularly to analyze thermal noise. The results will be significant in analyzing the safety of fast reactors.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0628, SAFETY OF SODIUM COOLED FAST REACTORS

UNKNOWN, Electricite de France, *Paris*, *France* 76008

We will examine how reactors behave when accidents occur. Analyze and simulate physical phenomena, such as the mechanical and thermal behavior of fuels and the mechanical resistance of the system during accidents. Develop a series of codes that can be used to simulate accidents (based on existing American codes). Analyze the effect of an additional shut-down system on the definition of an accidental rupture. We will also participate in European work groups developing accident codes and containment methods in order to develop a European code. The results of this project will effect reactor design.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0629, EVALUATING PRESSURIZED WATER REACTOR SAFETY USING PROBABILITY METHODS

UNKNOWN, Electricite de France, *Paris*, *France* 76008

Probability methods which will be developed, and improved, will be applied to studying and evaluating PWR reactor safety in order to determine the relative importance of systems and components on reactor safety and to detect weak points that must be improved at once. This project will affect PWR reactor system design (contracts 1, 2, and 3 over several years). It will also affect each step from the fabrication (justify quality class) to the operation (logically determining loads) of systems and components that have a significant effect on safety.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0630, WATER LEAKS - DETECTION, DEVELOPMENT, AND LOCALIZATION

UNKNOWN, Electricite de France, *Paris*, *France* 76008

This project will study the development, detection, and localization of a water leak in sodium and methods of examining damaged tubes. Our objective is to determine the course of action to be taken if a water leak occurs in a steam generator.

We will develop systems of detecting hydrogen and oxygen in sodium, explore the possibilities of detecting and localizing leaks acoustically, conduct an experimental study of how water leaks in sodium develop using a 1.5 MW sodium-water loop, and experimentally verify the efficiency of methods of acoustical detection and hydrogen detection of water leaks in sodium using the CGVS. We will analyze and examine tubes damaged by flows in Foucault by using endoscopy, the helium test, the ammonia test, hydrogen injection, etc., and analyze the operation of the cold accumulator in the 1.5 MW sodium-water loop.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0631, VIOLENT SODIUM WATER REACTIONS

UNKNOWN, Electricite de France, *Paris*, *France* 76008

This project will study the results of a sodium-water reaction in steam generator and in the secondary circuit of a fast neutron nuclear reactor. It consists of developing a mathematical code to be used to predict the development of temperature and pressure in a steam generator, modifying this code using the results of tests carried out on different models at CEA Cadarache and apply it to commercial steam generators and developing a mathematical code on the effect of a violent sodium-water reaction on the reactor's secondary circuit and particularly on the intermediate exchanger.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0632, OPERATION AND RELIABILITY OF CONTROL CIRCUITS

UNKNOWN, Electricite de France, *Paris*, *France* 76008

To study the operation and reliability of logic circuits and modify methods and develop methods of analysis. Apply results to electromagnetic or static (magnetic or electronic) command and protection systems in reactors. Extend results to cover similar security and control channels.

AUTOMATION IN POWER STATIONS: The probable development of automation in nuclear station that will begin operation in 10 years. Work in related areas will deal with the degree of automation and control set-up, automatic control, automatic control logic, and analyzing data.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0633, OPERATIONAL START-UP OF THE CORDEMAIS II CONTROL SYSTEM
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Prepare models, coordinate tests, run the equipment on site, verify 700 MW control specifications and then modify diagrams.

DEVELOPING CONTROL MECHANISMS FOR LIGHT WATER REACTORS: Define the characteristics and effectiveness of controlling light water reactors: in initial rests, and in controlling performance in the first unit of each type.

ADDENDA: Performing organization: Elctricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0634, SUPERPHOENIX CONTROL METHODS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Study the way the Crays-Malville power station is controlled in order to equip it to respond to conditions of primary and secondary frequency control. Study and analyze control systems and data analysis.

SUPPORTED BY France - Electricite de France - Paris

3.0635, SAFETY ASSISTANCE FOR THE HTR PROJECT
BAUR, Atomic Energy Commission, Div. for Stu. & Dev. Reactors, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0636, FAST REACTORS - METHODS OF CALCULATING SAFETY
BRANDICOURT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0637, PHENIX, INTERPRETING SAFETY TESTS AT START-UP TIME
CLADEL, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0638, SAFETY STUDIES SUPPORTING INNOVATIONS (GATHERING FORMER....)
DEVILLIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0639, DEVELOPING SAFETY CODES FOR THE LIGHT WATER REACTOR
DEVILLIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0640, CONTROL INSTRUMENTS FOR NEW LIGHT WATER REACTORS
FURET, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0641, STUDYING AND DEVELOPING MEASUREMENT AND CONTROL METHODS FOR DIFFERENT REACTORS
FURET, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0642, DRAFT - SUPER-PHENIX SAFETY STUDIES
LEDIEUDEVILL, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0643, BUGEY I - CONTROL RODS
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0644, CHAMPLAIN, INNOVATION 3, EMERGENCY INJECTION
PELTIER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0645, CONTROL OF FAST NEUTRON REACTORS
PLAIGE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0646, SIDE SAFETY OF THE 'PEC' REACTOR
RAPPENEAU, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0647, APPARATUS FOR PERMANENT RADIO-SAFETY MEASURES IN REACTORS
ROGUIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0648, DECONTAMINATION IN SITU
ROZENBERG, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0649, TECHNICAL ASSISTANCE FOR DRG GRAPHITE GAS REACTORS (NEUTRON CONTROL)
VASMIER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0650, CHAMPLAIN, EMERGENCY COOLING
DERUAZ, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble*, *France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Department de Transfert et Conversion d'Energie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0651, COMPUTER CONTROL SYSTEM SYNTHESIS FOR NUCLEAR POWER PLANTS (ABBREV)
E. ZOBOR, Hungarian Academy of Sciences, Central Res. Inst. for Physics, *Budapest 114*, *Hungary*

SUMMARY OF PROJECT: The scope of the research project is to investigate the applicability of the hierarchical control system approach to the control of nuclear reactors. Taking the WWR-SM research reactor as a guiding example, the investigations have shown that the three subsystems into which the reactor is the most expediently decomposed are: the reactor core, the primary coolant loop and the secondary coolant loop. The fact that the time constants determining the kinetics behavior of these subsystems fall into different ranges suggests that they could be controlled with different rates. This problem area will be investigated theoretically and through hybrid and digital simulation experiments.

The PROHYS block-oriented digital simulation program elaborated in the framework of this research project yields direct means to simulate problems given by an analogue computer diagram and by a set of digital task programs specified by their timing and priority. In order to save computer time in the case of solving problems like that outlined in the preceding paragraph it will be further developed for economically handling the 'stiff' systems so that the user can specify groups of integrators with different time steps. The program will be worked out for the ICT-1905 for the R-10 computers.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0652, PARTICIPATION IN THE LOFT (LOSS OF FLUID TEST) PROGRAM
UNKNOWN, U.S. Nuclear Regulatory Comm., Nuclear Reactor Testing Stat., *Boise*, *Idaho*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0653, A FEASIBILITY STUDY OF REACTORS WHICH PRODUCE NO PLUTONIUM
A. RADKOWSKY, Tel Aviv University, School of Engineering, *Tel Aviv*, *Israel*

A reactor of this type, using more highly enriched uranium than present commercial LWRs, is expected to have major advantages in safety, cost, reduced core and pressure vessel volume, simplified core design and manufacture, as well as a smaller critical mass, which should permit greater amounts of energy from a given amount of uranium ore. Excess neutrons can be utilized for transmutation of highly radioactive fission products. The object of this research is to explore the problems in cores of this type in ratings of interest from a commercial size, to define the areas in which further work is needed, and to put the advantages listed above on a quantitative basis. A reactor of this type will have a greater reactivity swing than present reactors in such a way to minimize mechanical control and to ensure a negative temperature coefficient of reactivity, depending on the moderator temperature. The latter should result in simplified control as compared with reactors having a large power (Doppler) coefficient. The burnup in these more highly enriched reactors is expected to be so high that there will be no need for reprocessing facilities, another great savings in cost.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0654, EMERGENCY COOLING - INVESTIGATION OF THE MIXING EFFECTS IN PARALLEL STREAM CHANNELS IN THE TWO-PHASE ZONE
C. BURCK, Euratom Research Center, *Varese*, *Italy*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0655, NUCLEAR MELTDOWN - MEASUREMENT OF MATERIAL DATA OF FLUID REACTOR CORE MATERIALS
BUSSE, Euratom Research Center, *Varese*, *Italy*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0656, EMERGENCY COOLING PROGRAM - SUBPROJECT - INVESTIGATION OF THERMO-HYDRAULIC INEQUALITIES
G. FRITZ, Euratom Research Center, *Varese*, *Italy*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0657, NUCLEAR MELTDOWN - SUBPROJECT - EXPERIMENTAL INVESTIGATION OF STEAM EXPLOSIONS
H. KOTTOWSKI, Euratom Research Center, *Varese*, *Italy*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0658, EMERGENCY COOLING PROGRAM

RIEBOLD, Euratom Research Center, *Varese, Italy*

Influence of the pressurized water reactor grinding wheel on the blowdown.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0659, SAFETY STUDIES ON SODIUM-COOLED FAST REACTORS

J.E. SPEELMAN, Reactor Center, *The Hague, Netherlands*

Safety studies are being performed on general safety aspects of sodium-cooled fast reactors in view of our cooperation with nuclear industry and licensing authorities. Secondly, theoretical studies are made for the evaluation of the running safety experiments at RCN. The work comprises the development of calculation codes to determine the fuel behaviour under overloading conditions and the thermohydraulics and fuel pin bending in partially blocked fuel elements. Amongst other things a code is being developed in which fuel coolant interaction effects are calculated.

Addenda: Performing organization: Reactor Centrum Nederland.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

3.0660, STUDIES CONCERNING SAFETY OF NUCLEAR REACTORS

H.J. VANGROL, Reactor Center, *The Hague, Netherlands*

In connection with plans to build three nuclear power plants in the Netherlands in the near future an exhaustive study concerning the risks associated with nuclear power is being performed. RCN scientists participate in a report to be prepared by the Ministry of Social Affairs on safety aspects and in a report to be prepared by the Ministry of Health on the health aspects.

Furthermore RCN is preparing for future assignments in connection with detailed evaluation of safety for particular nuclear power stations by adopting computer codes on thermohydraulics and meteorological dispersion in the atmosphere.

Also RCN scientists participate in several international bodies concerning the safety of nuclear reactors: CSNI, Euratom and IEA Study Group.

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

3.0661, AEROSOL RESEARCH

J.F. VATE, Reactor Center, *The Hague, Netherlands*

Experimental and theoretical studies are being carried out on aerosols enclosed in vessels of various sizes as part of a safety evaluation of a hypothetical serious reactor accident whereby the natural instability of aerosols is taken into account. During the coming two years an investigation will be performed on the influence of evaporation and condensation of sodium on the aerosol stability. Initial experiments have shown a reduced aerosol stability in a condensing water environment. A sodium installation of about 150 litres aerosol is being built. The sodium pool in the installation will have maximum temperature of 650 degrees C. It is scheduled to be put into operation during the second half of 1975.

Addenda: Performing organization: Reactor Centrum Nederland.

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

3.0662, STUDY OF LIGHT WATER & HEAVY WATER LEAKS IN NUCLEAR REACTORS & DEVELOPMENT OF TECHNIQUES FOR DETECTION, LOCATION ESTIMATION & CONTROL

B. MAHMOOD, Pakistan Atomic Energy Comm., *Islamabad, Nilore, Pakistan*

In heavy water types of Nuclear Reactors, the detection and control of heavy water and light water escapes from different systems is of vital importance in the successful and economic operation of these types of plants. The high cost of heavy water makes it imperative to minimise all such escapes, in order to reduce the direct as well as the upgrading costs of downgraded collection recovered from the reactor building by means of the dryers. This project aims to solve this problem. The following is the tentative programme for the project: a) Collection and analysis of H2O and D2O from the reactor building dryers over a period of time and explanation of D2O losses and degradation with reference to the operating experience of Karachi Nuclear Power Plant in that period. b) Determination of light water seepages from outside of the reactor building through the different sources. c) Development of reliable and accurate on-line techniques for D2O leak detection from the reactor end fittings and testing the success of the techniques over actual operation of the plant. d) Development of methods of reducing the escape rates, including such techniques as on line loading valves etc. e) Analysing the behavior of the leak characteristics from reactor end-fitting with power cycling.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0663, GENERATION OF AEROSOLS FOR FILTER EFFICIENCY TESTING IN NUCLEAR INSTALLATIONS

O. JOVANOVICKOVACE, Boris Kidric Institue, *Belgrade, Soc. Fed. Rep. of Yugoslavia* 11001

The potential environmental impact of gaseous wastes produced by the nuclear facilities can be reduced by the filtration of aerosols. The determination of efficiency of filters and filter systems represent important and serious problems. The criteria used in some countries to evaluate filters is their effectiveness in removing polydisperse liquid dioctylphtalate (DOP) aerosols. Sodium chloride (NaCl) aerosols have several important advantages compared to DOP such as: usefulness at temperatures above the vaporization of the DOP, convenient particle size and economy of generation. Therefore it is important to work on the development of sodium chloride aerosol generators. The research programme will be focused towards the generation and characterization of the polydisperse solid sodium chloride aerosol. In order to improve the generation capacity two available generators will be used: laboratory type generator based on the dispersion of the NaCl aqueous solution and a commercial one based on the flame evaporation of the NaCl powder. For the aerosol concentration measurement a portable Na-flame photometer and for particle size distribution analysis a multistage cascade impactor will be used.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3F. REACTOR TESTING, OPERATIONS AND ANALYSIS

3.0664, A NONDESTRUCTIVE BURNUP MEASUREMENT FOR NUCLEAR SAFEGUARD

C.M. FLECK, Nuclear Institute, *Vienna, Austria*

Nondestructive burnup measurements are possible, if one takes a probe of a milligram or less of the can material by an emery tool and analyze it. In Zircaloy as well as in stainless steel alloys of the fast breeder are a number of long lived activities, which allow easy measurement of the burnup in any laboratory. The need of small quantities of the probe material has several advantages: the activity is so small that one can handle the probe without difficulties. There are no self-shielding problems on the measurement. The probe can be taken under water or liquid sodium. For instance irradiated Zircaloy contains four measurable activities with sufficient long half lives: Fe-55 ... 2,6a; Ni-63 ... 92a; Sn-121 ... 76a; Zr-93 ... 1,5.106a; The specific activities one gets easily by comparing the activity measurement with results from X-ray fluorescence analysis of the probe.

ADDENDA: Performing organization: Atomininstitut d.osterreichischen Hochschulen.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0665, SPENT FUEL DIVERSION PATH ANALYSIS FOR THE DOUGLAS POINT NUCLEAR PLANT
UNKNOWN, Dilworth Secord Meagher Assoc., *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

3.0666, EXAMINATION OF THE STRENGTH OF PRESSURE TUBES WITH CRACKS IN THE AREA OF ROLLED JOINTS
J. SCHROEDER, Univ. of Waterloo, *Waterloo, Ontario, Canada*

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

3.0667, PLANT PROTECTION
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

The project is connected with the Electronics Department's work on system reliability, including the early recognition of the fact that human error, under normal operation or during the management of plants during breakdown, has shown itself to be an essential factor in the case of a breakdown. At the same time the human is the worst known and least reliable component in such installations.

The purpose of the project is to investigate the work situation of the operations personnel and, through the application of knowledge from control theory, data handling, cognitive psychology, etc., to identify the essential mental processes, their limitations and error mechanisms, in order to obtain background information for the effective utilization of modern control equipment (data meters) for supporting operational personnel in risky operational situations.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0668, DEVELOPMENT OF RADIATION EQUIPMENT FOR RESEARCH REACTORS
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

It is the purpose of the project to establish, locally in research reactors, conditions which stimulate the operating conditions in power reactors (max. 15 bar, 345 deg C), even though the research reactors operate under very divergent conditions (ca. 0.15 bar, 50 deg C).

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0669, DYNAMICS OF THE NUCLEAR POWER PLANT
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

The task leads into the general work that supports RISO's objectives.

The purpose of the project is to develop and improve computer methods for analyzing the dynamic and control-engineering conditions in nuclear power reactors.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0670, MODIFYING COMPUTER PROGRAMS FOR ANALYZING THE RELIABILITY OF NUCLEAR POWER STATIONS
O. PEIFFER, Reactor Safety Institute, *Cologne, Nordrhein Westfalen, Federal Republic of Germany* 5000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0671, AN AUDIO-VISUAL TRAINING SYSTEM TO IMPROVE THE EDUCATION AND PROFICIENCY OF OPERATING PERSONNEL IN NUCLEAR POWER STATIONS
H. BOEHM, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0672, ON-LINE MEASUREMENTS OF RADIONUCLIDE ACTIVITY IN THE PRIMARY COOLANT
BUDNICK, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

ADDENDA: Performing organization: Bereich Reaktortechnik der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0673, NUCLEAR POWER STATION EFFICIENCY IMPROVEMENT THROUGH COMPUTATION AND MEASUREMENT OF REACTORS AND DEMONSTRATION OPERATION
REINKE, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0674, HIGH PRESSURE TESTS OF THE PWR TYPE DNB - STUDIES OF A 25-FUEL ROD ASSEMBLY
O. SCHAD, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

ADDENDA: Performing organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0675, DEVELOPMENT OF AN EDUCATION SYSTEM IN AGREEMENTS TO INTENSIFY THE SCHOOLING AND TRAINING OF MANAGEMENT PERSONNEL OF NUCLEAR POWER PLANTS
UNKNOWN, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0676, FURTHER DEVELOPMENT OF A DRAG BODY FOR THE MASS-FLOW MEASUREMENTS DURING BLOWDOWN INVESTIGATIONS
UNKNOWN, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0677, KRB REFUELING 1976
K. ENNERST, Alkem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0678, TECHNOLOGICAL AND ECONOMICAL EVALUATION OF PHASE I OF THE GAS COOLED HTR PROGRAMS
SCHOLZ, Preussische Electrizitaets AG, *Hannover, Niedersachsen, Federal Republic of Germany* 3000

ADDENDA: Performing organization: Preussische Elektrizitaets AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0679, MEASURING RESONANCE IN REACTOR PRESSURE VESSELS AND IN PRIMARY CIRCUITS IN NUCLEAR POWER STATIONS
J. FELDMANN, Allianz Zentrum Technik Gmbh, *Ismaning, Bayern, Federal Republic of Germany* 8045

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0680, ADJUSTMENT AND FURTHER DEVELOPMENT OF ELECTRICAL, ELECTROMAGNETIC AND MAGNETIC TEST PROCEDURES FOR USE IN REACTORS
G. DEUSTER, Fraunhofer Society, Inst. for Non Dest. Test Proc., *Saarbruecken 11, Saarland, Federal Republic of Germany* 6600

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0681, COST-USE RESEARCH ON THE FURTHER DEVELOPMENT OF THE HELIUM TURBINE DIRECT CYCLE GAS COOLED HTR (HHT)
ERNST, Fichtner Consult. Eng. Gmbh, *Stuttgart 30, Baden Wuerttem., Federal Republic of Germany* 7000

ADDENDA: Performing organization: Fichtner - Beratende Ingenieure GMBH & Co KG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0682, DEVELOPING REMOTE CONTROL ULTRASOUND TEST TECHNIQUES FOR FAST BREEDER REACTORS (REPEATED TESTING/PREPARATORY PROGRAM)
L. JOGOROFF, Interatom Gmbh, *5060 Bensberg, Nordrhein West., Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0683, DETAIL SPECIFICATION OF A SINGLE-PURPOSE HOT-STEAM REACTOR BLOW-DOWN STUDY (PREINVESTIGATION)
A. BIRKHOFER, Technical Univ. of Munich, Lab. for Reactor Control, *8046 Garching, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0684, PHENIX OPERATION
BARRE, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0685, RAPSODIE IRRADIATION, FAST NEUTRONS
BEL, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0686, PROVISIONS FOR A FOLLOW-UP OF THE OPERATION
BRUNET, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0687, DEVELOPING MEASUREMENT TECHNIQUES APPLICABLE TO ALL REACTORS
CAMPAN, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Caradache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0688, PHENIX, TEST AND START-UP
CLAUZON, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0689, RAPSODIE OPERATION
DELISLE, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nuclearires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0690, EUA PROGRAM - END OF CONSTRUCTION - TESTING AND OPERATION
GAOUDITZ, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0691, EXPERIMENTAL PROGRAM FOR LIGHT WATER LATTICES
GOLINELLI, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0692, DRAFT - SUPER PHENIX - MOCK-UP OF INTEGRATED PURIFICATION
GOLLION, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomiqe. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0693, VANDELLOS REACTORS IN VARIOUS OPERATIONS
OLLIER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0694, REACTORS IN OPERATION - ASSISTANCE FOR OPERATORS (EDF POWER PLANT)
OLLIER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0695, ANALYSIS COMPLETED AT THE REQUEST OF THE OPERATORS OF DIFFERENT REACTORS
UNKNOWN, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0696, PHENIX OPERATION
VILLENEUVE, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY U.S. Natl. Science Foundation, Div. of Policy Res. & Analysis

3.0697, GENERAL OPERATION OF A FAST REACTOR POWER STATION
UNKNOWN, Electricite de France, *Paris, France* 76008

We are going to write and to use a numerical code for the fast MWE 1000 Reactor, which will facilitate all studies of the power station's general operation and some safety studies: 1. calculating continuous performance at different power levels - studying regulation, difficulties, long transitions (start-up, shut-down) - studies relating to the operation of the power station (blocking, remote control, priority network); 2. Other special problems such as: maximal accident, natural convection, stability of steam generators.

Validation will be based on real results (CGVS or CHATOU for certain elements, or phenix).

Addenda: Supporting agency and Performing organization - Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0698, SIMULATE THE THERMAL SHOCK
UNKNOWN, Electricite de France, *Paris, France* 76008

Test and analyze results of the dispersion and ISBP pumps in the PWR unusual operation that can have an effect on pumps.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0699, TESTING CONTAINMENT DEVICES FOR LEAKS - PRESSURIZED WATER REACTOR
UNKNOWN, Electricite de France, *Paris, France* 76008

Develop methods of testing containment devices for leaks. These methods will determine the flow rate during reception during periodical tests, and during continuous operation.

MATERIALS CORROSION IN THE VESSELS OF LIGHT WATER REACTORS: We will determine how much hydrogen is produced during aspersion in the pressure vessels of a pressurized water boiler that uses a boric acid and soda solution whose primary pipes have ruptured. Our conclusion will yield data on how aspersion solutions corrode vessel materials in light water reactors, which can be used to study safety.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0700, TESTING PRESSURE VESSELS
UNKNOWN, Electricite de France, *Paris, France* 76008

Develop the best possible methods of testing pressure vessels, particularly reactor vessels. We will examine a method of detecting and analyzing surface waves emitted by defects developing in materials under pressure.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0701, PHOENIX
UNKNOWN, Electricite de France, *Paris, France* 76008

With the intention of using Phoenix for heat production, we must develop computation methods to be used for testing: the physical aspects of the core (neutrons, heat, hydraulics) and fuel (cycles, behavior, when irradiated). We will use CEA's mathematical codes for the first stage and will meanwhile develop a simplified code that will meet the user's needs.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0702, PRESSURIZED WATER REACTOR MEASUREMENTS
UNKNOWN, Electricite de France, *Paris, France* 76008

Develop intervention methods for the nuclear boiler to be carried out while studying reactor instrumentation, at start-up time (in operation), and when difficulties occur during normal operation of the reactor. Develop a more precise method of measuring coolant water flow in PWRs: Test methods based on the decrease in the A...gite 16 produced in the core interior. Test operations in a loop at Gennevilliers (using ultrasonic methods). Develop acoustical and visual simulation methods that will enable the user to test the operation of a machine or other equipment from the control room. Develop methods of detecting or localizing water leaks in heat exchangers.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0703, MECHANICAL AND THERMAL BEHAVIOR OF STEAM GENERATORS IN 900 MW PRESSURIZED LIGHT WATER REACTORS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Experimental project for: testing the mechanical behavior of steam generators with hydraulic tests that measure and analyze damage to tubular plates in the basic structure and in the secondary vessel; testing steam generators in operation (Fessenheim 1, Bugey 3) for secondary water flow at the mouth and base of the secondary vessel, by measuring and analyzing temperature distribution, speed and pressure.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0704, DIMENSIONS AND OPERATION OF STEAM GENERATORS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Our objective is to help define and select steam generators for fast neutron reactors, particularly the Creys-Malville reactor.

This project: defines, prepares, carries out, and analyzes tests of models of the CGVS circuit and of the 1.5 MW sodium-water loop as well as develops codes for computing high amplitude continuous, dynamic, and occasional operation.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0705, VIBRATORY EQUIPMENT MONITORING AND MECHANICAL CONDITION
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Use vibratory sounding to determine the internal mechanical condition of equipment components without disassembling the equipment and while it is in operation.

Determine how this mechanical condition developed in the short run (monitoring for the method of operation) and in the long run (diagnosis). Develop methods of detecting faulty operation or the abnorml wear and tear of stationary or turning components of a specific material by analyzing signals taken from these materials.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0706, VANDELLOS - TECHNICAL ASSISTANCE FOR THE OPERATOR
BASTIEN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0707, ASSISTANCE FOR EDF REACTOR OPERATORS (CHINON, ST. LAURENT, BUGEY I)
BASTIEN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0708, PROVISIONS FOR FOLLOWING UP THE OPERATION OF THE REACTOR
BOUDOURESQUES, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0709, DEVELOPING METHODS AND TECHNIQUES OF ANALYSIS RELATING TO VARIOUS REACTORS
DARRAS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0710, DEVELOPING METHODS OF ANALYZING POOR GRADES OF LIGHT ELEMENTS
ENGELMANN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0711, PHENIX TESTS
GEFFROY, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0712, EXPERIMENTAL REACTORS, EXTERNAL PROVISIONS
MORIER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Construction des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0713, PREINSPECTION OF FESSENHEIM
NIFENECKER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0714, WRITING AND OPERATING CODE FOR THE PWR POWER PLANT - STUDIES OF DYNAMICS
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0715, STUDYING, PERFECTING, AND SETTING UP MODES OF OPERATION FOR ANALYSIS
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble*, *France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0716, NEUTRON DEVELOPMENT IN FUELS DURING IRRADIATION

BOUCHARD, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0717, EXPERIMENTAL FOLLOW-UP OF WATER REACTORS

BOUCHARD, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0718, PERFECTING METHODS OF ANALYZING TRACES IN WATER USED IN REACTORS

CITTANOVA, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0719, ADVANCED TECHNIQUE REACTORS, MELTED SALTS REACTORS

F. LECOCQ, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0720, RUNNING AWAY, E.C., SUPER PHENIX

LUCAS, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0721, PERFECTING METHODS OF ANALYSIS FOR THE HTR REACTOR

REGNAUDDENIS, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0722, NUCLEAR PLANT RELIABILITY THROUGH DEVELOPMENT OF QUALITY ASSURANCE MEASURES

N.G. CHRYSOCHOIDES, Nuclear Research Center, *Athens, Greece*

The availability analysis of supervised and non-supervised systems used for the protection of nuclear reactors is considered in the proposed work; computer-oriented methods are investigated in relation with computation speed and required computer core memory. On-line adaptation of supervision and fault identification are also included. The availability maximization problem is investigated for a wide variety of objective functions on the basis of the imposed techno-economical constraints. The project aims to apply the methods to be developed in the protection of nuclear reactors.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0723, DEVELOPMENT AND DEMONSTRATION OF ADVANCED INSTRUMENTAL METHODS TO DETERMINE THE VOLUME IN THE INPUT ACCOUNTABILITY VESSEL

C. TOMMASO, Atomic Energy Commission, *Rotondella, Italy*

Application of TDR system for the volume measurement in the input accountability vessel at the ITREC plant. Comparison of the accuracy and precision of data using TDR system and the conventional dip-tube pneumatic system.

Accountability of the fissile material remaining on the leached hulls of the ERR elements by gamma spectometry. Collection data to assess its usefulness as an accountability technique.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0724, DEVELOPMENT OF SUSPENSION-TYPE NUCLEAR REACTOR

J. KUYPERS, N.V. K E M A, *Arnhem, Netherlands*

Development of a nuclear reactor of the suspension type. Ultimate system to operate on U233-Th cycle, achieving breeding or at least conversion factor of 0.9. Fuel: suspension of 5./um spherical particles of ThO2 - 1.5% UO2 (fully enriched).

Present status: Operation of 1 MW(Th) model reactor, moderated with light water and fuelled with ThO2 - 15% UO2 (fully enriched). Irradiation tests of fuels at 310 degrees C in water. Design study of 1000 MW(e) reactor; including continuous on-line removal of gaseous and solid fission products.

SUPPORTED BY Netherlands - N.V. Kema - Arnhem

3.0725, REACTOR STRATEGIES

W.K. WIECHERS, N.V. K E M A, *Arnhem, Netherlands*

Combinations of two or three reactor types in a model of electricity supply by nuclear means are investigated with respect to: minimum use of natural uranium, minimum use of separation work and minimum costs.

The reactor types are: LWR, MFBR, HTGR, heavy water reactors and liquid fuel reactors.

An assumption about the production of electricity in the future is made.

It is shown that large gains may be expected if combinations of LMFBR and heavy water reactors or liquid fuel reactors are used. The enrichment work necessary passes through a flat maximum. An economy solely based on LWR will rapidly exhaust the world's stock of natural uranium and, moreover, require an ever-increasing enrichment capacity.

SUPPORTED BY Netherlands - N.V. Kema - Arnhem

3.0726, RESPONSE ANALYSIS OF A NUCLEAR FISSION REACTOR BUILDING

A.W. VANBEEK, Central Org. Adv. Appl. Res., Inst. for Mechanical Constr., *Delft, Netherlands*

Development and application of numerical methods for the response analysis of a reactor building to dynamic loadings, which cause non-linear material behaviour.

It is important to know which loadings, due to external effects such as blast effects of an explosion or the impulsive force of a crashed aeroplane, can be carried and to what extent the building will be damaged.

SUPPORTED BY Netherlands - Ministry of Social Affairs - The Hague

3G. REACTOR AND NUCLEAR PHYSICS

3.0727, NEW METHODS IN LINEAR TRANSPORT THEORY

J. MIKA, Internat. Atomic Energy Agency, *Vienna, Austria*

The general objective of this research contract is to improve the mathematical basis of existing and new methods in neutron transport theory and reactor calculations and implement the results in practical applications. This year will be devoted to methods of global static reactor calculations and to the singular perturbation method as applied to reactor dynamics equations.

In both fields the theoretical investigations concerning the accuracy and convergence of numerical methods will be carried out and the results checked numerically with specially prepared test programs and implemented in reactor codes.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0728, MATHEMATICAL METHODS IN NEUTRON TRANSPORT THEORY

J. DEVOOGHT, Free University of Brussels, *Brussels, Belgium* 1050

The application of Galerkin methods to neutron transport theory, including the study of error bounds and numerical tests in simple situations.

The convergence analysis of factorization iterative methods, including: extensions of former results for n x n matrices to operators defined on ordered Banach spaces, the study of the 'strongly implicit procedure' of Stone and the method of Buleev-Dupont, studies on the optimization of the iteration parameters, and auxiliary studies on the extension of some matrix concepts to ordered Banach spaces.

The solution of linear evolution equations (Cauchy problem) with special emphasis on neutron kinetics. The main development is concerned with mixed analytical-numerical methods of integration which are A-stable. Particular points investigated are, the optimal choice of the interpolating points based on a knowledge of the spectrum of the evolution's operator, the choice of the line step, the use of extrapolation methods and the practical implementation of error bounds.

The same techniques will be used for benchmark problems in burn-up.

N.B. Several of these studies are done in collaboration with people from the Institute of Nuclear Research of Swierk.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0729, STATISTICAL REACTOR PHYSICS

UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

Reactor physics is one of the fundamental disciplines for establishing information on the processes and development of energy in nuclear power plants. The purpose of the project is to develop suitable methods of quantitative and qualitative appraisal of the reactor-physics phenomena in (preferably) light water reactors, which are important for their operation, economy and safety.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0730, NUCLEAR AND THERMAL TECHNOLOGY UNDERLYING FURTHER DESIGN AND DEVELOPMENT OF 3-DIMENSIONAL NEUTRON PHYSICS CALCULATION PROGRAMS

BUDNICK, Kraftwerk Union AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

ADDENDA: Performing organization: Bereich Reaktortechnik Der Kraftwerk Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0731, FINITE ELEMENT METHODS & METHODS IN SHIELDING

F.A. SCHMIDT, Univ. of Stuttgart, Inst. for Nuc. Energy, *Stuttgart, Baden Wuerttemberg, Federal Republic of Germany* D7000

Investigation of the applicability of the Finite Element method to realistic 2D and 3D reactor problems. Writing of a 3D production type code for diffusion theory problems. Investigation of data management problems in shielding.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0732, PHYSICS OF FAST REACTORS, MASURCA

BARRE, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0733, PHYSICS OF FAST REACTORS, HARMONIE

BARRE, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0734, COLLECTION OF FORMULAS FOR THE PHYSICS OF FAST REACTORS

BARRE, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0735, TRANSPORT AND DEPOSIT OF MEASURED FISSION PRODUCTS AND INTERPRETATION OF EXPERIMENTS

BRUNET, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0736, MODEL OF THE SUPER-PHENIX NEUTRON GUIDE

CAMPAN, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0737, Q MEASURES
CHAMPEIX, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0738, THE PHYSICS OF LIQUIDS FOR THE DRNR
KHAIRALLAH, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0739, TRANSPORT AND DEPOSIT OF MEASURED FISSION PRODUCTS AND INTERPRETATION OF EXPERIMENTS
LERIDON, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0740, COLLECTION OF FORMULAS FOR HTR REACTOR PROJECTS
LOTT, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0741, EXPERIMENTAL NEUTRON STUDIES OF THE HTR LATTICE (IN MARIUS)
LOTT, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0742, OPTIMIZATION
RAVIER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0743, BASIC NEUTRON MEASUREMENTS
SCHMITT, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0744, CALCULATING REACTOR BLOCK STRUCTURES IN FAST REACTORS
UNKNOWN, Electricite de France, *Paris, France* 76008

The vessel containing the core, intermediate exchangers, pumps, and other components, should be completely safe in fast reactors because of the nature of the liquid sodium coolant.

The stress on these structures differs from that normally found in pressure vessels: because the internal pressure in relatively low, most of the stress is due to the structure's own weight and to thermal shock. We therefore need to develop codes for computing the elastic, viscous, and plastic properties of vessels under all the conditions that occur in fast reactors that are sodium cooled.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0745, OPTIMIZATION MODELS FOR FAST NEUTRON REACTORS
UNKNOWN, Electricite de France, *Paris, France* 76008

We have developed a mathematical method for optimizing some of the independent physical variables that represent the reactor as a whole which will make it possible to minimize both the investment cost and the cost of a Kwh. The experience that we acquired during projects in the past will be applied in using this mathematical code to meet research needs, particularly in order to optimize high power and fast neutron reactors (1800-2000 MWE unit power). This code can also be used in the required studies of the Superphoenix.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0746, HTGR REACTOR
UNKNOWN, Electricite de France, *Paris, France* 76008

Develop computation methods for technologically and economically evaluating the HTR. CEA and EDF used the Marius for the series of tests now being carried out. Their objective was to validate neutron computation methods using a general atomic fuel (study heterogeneity). Take part in international working groups on the economic and technological aspects of the reactor. Examine the increased capacity of Fort Saint Vrain when this becomes a reality. Examine the technical development of the reactor.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0747, THE UMGG REACTOR - ASSISTANCE IN STUDYING NEUTRONS
CHABRILLAC, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0748, ADAPTING THE APOLLO CODE FOR BOILING REACTORS
A. KAVENOKY, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0749, CALOGENE REACTOR - PRELIMINARY ANALYSIS OF BASIC PROBLEMS

PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0750, COMPUTATION METHODS AND CODES

RAVENOKY, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0751, INSTITUTION AND PHYSICAL QUALIFICATION OF THE APOLLO CELL CODE

N. REUSS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0752, EVALUATING BASIC NEUTRON DATA

RIBON, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0753, INNOVATION 13, INCREASING SPECIFIC POWER

SERMA, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0754, METHOD C(N) - GENERALIZATION OF THE LAWS OF ANISOTROPY FOR PROBLEMS MORE THAN ONE-DIMENSIONAL - INTRODUCTION OF ENERGY SPECTRA

P. BENOIST, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

In plane geometry, the method C(N) permits resolution of the problems of the laws of linear force anisotropy. It would appear to be of interest to extend the treatment of the laws of force to include a quadratic term, in cos squared theta, so that these laws will tally at high energy, in the realm of, for example, the resonance of graphite. Treatment of the law of diffusion through a discrete and very anisotropic representation is also envisaged; one encounters here in particular the problems of protection (diffusion through iron).

Finally, we anticipate the introduction of energy spectra in plane and cylindrical problems, with force isotropy.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0755, PHYSICS OF FAST NEUTRON REACTORS, ERMINE EXPERIMENT

BOUCHARD, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0756, PHYSICS OF LIGHT WATER REACTORS - EXPERIMENTAL STUDY OF DEVELOPMENT

DARROUZET, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0757, MEASURING THE FALLING-OFF FACTOR OF GASEOUS FISSION PRODUCTS DURING IRRADIATION

DEBEAUCOURT, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0758, TRANSPORT THEORY AND ADVANCED REACTOR CALCULATIONS

V. BOFFI, Univ. of Bologna, Lab. of Nuclear Engineering, *Bologna, Italy* 40136

OBJECTIVE: Construction of exact analytical solution of neutron transport theory to be used as a reference in formulating benchmark problems.

METHOD ADOPTED: Integral transform method in its accelerated version, and asymptotic method.

PROGRESS: Anisotropic version of both integral transform and asymptotic method.

CURRENT PLANS: Extensions of the results to the case of integral transport theory for test particles in a conservative field.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0759, COMPARISON OF NEUTRON SPECTRUM UNFOLDING CODES

W.L. ZIJP, Reactor Center, *Petten, North Holland, Netherlands*

Determination of neutron flux density spectra in research and power reactors (reactor cores, irradiation facilities, and accessible locations of interest) can be achieved by simultaneous irradiation of set of activation and fission foils, and applying a computer code for spectrum unfolding to arrive at a multigroup set of flux density values. The results of the spectrum unfolding procedures combined with a recognized displacement model should provide means to establish the best correlation between dosimetry data and damage effect leading to a good prediction of reactor pressure vessels.

The project implies a study of the merits of three very promising computer programs, using calculations on a CDC-6600 computer.

Specification: a. To convert three selected computer programmes (SAND-II, RFSP-JUL), CRYSTAL BALL) to the CDC-6600); b. To check them by testing their ability to reproduce

several reference spectra using calculated data; c. To study uniqueness; d. To compare the output of these programmes for the same input conditions; e. To investigate the behavior of characteristic functions; f. To find the interdependence of similarly shaped reaction cross sections; g. To establish criteria for defining an optimum set of detectors for given spectrum problem; and h. To make recommendations to achieve the optimum application of the unfolding codes.

ADDENDA: Performing organization: Reactor Centrum Nederland, Westerduinweg 3, Petten (N.H.), The Netherlands.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0760, DETERMINATION OF FISSION PRODUCT CROSS SECTIONS (STEK)

J.B. DRAGT, Reactor Center, *The Hague, Netherlands*

Fission products have a large influence on the reactivity and void reactivity coefficient in fast sodium-cooled breeder reactors. This project is aimed at improving the knowledge of the fission product cross sections. To determine the reactivity effect of integral and isotopic fission product samples measurements were performed in a fast thermal critical facility STEK. The reactivity worths of three integral mixtures of fission products have been compared with calculations on the basis of the RCN-1 cross section evaluation. The aim of this work has been to derive improved cross-sections for the fission product of the important fissile nuclides in a fast breeder after a specified burn-up by applying a special cross-section adjustment technique. A start is being made now to make a complete analyses of the isotopic sample measurements. The measured results will be compared to calculations based on an improved cross-section set (RCN-2) to derive an adjusted group cross section set and in a later stage an adjusted set in point wise representation also. At present, four of the about 60 measured isotopic fission products have been analysed. The work is continued and will be concluded in early 1976.

Addenda: Performing organization: Reactor Centrum Nederland.

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

3.0761, HIGH PRECISION ABSOLUTE DETERMINATION OF THE U-235 NEUTRON FISSION CROSS-SECTION

M. PETRASCU, Univ. of Bucharest, *Bucharest, Rumania*

The Project Objective consists of the absolute measurement of 235U neutron fission cross section at 2200 m/sec neutron velocity. The accuracy aimed at should be of the order of 0.5%, or better. The method for the absolute neutron flux determination is based on the use of a thick boron target (thus avoiding the knowledge of the boron cross-section), the gamma rays from the 10B(n, alpha gamma) reaction being detected with a GeLi spectrometer. The efficiency of gamma ray detection is to be determined by using a thin boron target in the same geometry and by using the 4 pi alpha-gamma coincidence technique for the determination of the rate of the 10B(n, alpha gamma) reactions. The detection of the fission fragments is based on the same method as that described within the contract 1576/R1/RB.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0762, NEW METHODS IN TRANSPORT THEORY

D. STEFANOVIC, Boris Kidric Institue, *Belgrade, Soc. Fed. Rep. of Yugoslavia* 11001

Neutron transport theory is the basis for development of reactor theory and reactor calculational methods. Some of the advanced neutron transport theory methods can be easily adapted in the mathematically related fields, as for example plasma physics, astrophysics and rarified gas dynamics, and vice versa, methods used in other branches of linear transport theory may be valuable in the reactor applications.

The present research includes the following topics: (a) Further development of the analytical solution methods for the neutron slowing down and diffusion including the energy dependence of the anisotropy of the neutron scattering. (b) Development of new numerical formalisms and techniques suitable and needed for neutron transport calculations. (c) Neutron transport treatment in space-point energy groups for criticality calculation of a reactor core. (d) Monte Carlo sampling scheme from neutron transport equation including anisotropic elastic scattering and calculation of the mean neutron flux over the space zones in the reactor cell. (e) Development of a cluster nuclear model for the evaluation of fast neutron cross section.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0763, METHOD DEVELOPMENT OF SOLVING THE TRANSPORT AND DIFFUSION EQUATIONS

J. LIGOU, Reactor Research Institute, *Wurenlingen, Switzerland*

Improvements of the 1 D transport codes in operation at Wurenlingen, based on an original formalism: integral transport equations mixed with differential equations. One important point is the derivation of recursive formulae which allow fast computations of the generalized collision probabilities.

Application of the same ideas to 2 D transport problems, at least (x,y) geometry.

Discrete Ordinate Integral Theory (DOIT) already developed at Wurenlingen. Using approximate angular fluxes, continuous in each angular domain, this theory avoids most of the drawbacks of the usual SN formalism (negative angular fluxes, ray effect, etc..). Application to light water reactor boxes is foreseen with the quadrupole P1 approximation.

Finite Element Method for solving diffusion equation in xy and xyz geometries. The first code is now ready to be tested.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0764, RESEARCH WITHIN THE COORDINATED PROGRAMME ON NEUTRON TRANSPORT THEORY

V.I. LEBEDEV, I.V. Kurchatov Inst. Atom. En., *Moscow, Russian S F S R, Union of Soviet Soc. Republics*

Difference approximations with heightened precision, by an iteration method, the Galerkina method.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3H. URANIUM EXPLORATION AND MINING

3.0765, URANIUM PROSPECTING IN CENTRAL AND WEST AUSTRALIA

UNKNOWN, Uranerzbergbau Gmbh, *Perth, Australia*

Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0766, URANIUM DISTRIBUTION IN URANIUM ORES AND THEIR RESPECTIVE SOURCE ROCKS

G. KURAT, Natural History Museum, *Vienna, Austria* 1014

A mineralogical and mineral chemical study of samples from different uranium deposits is undertaken as part of a coordinated program entitled 'Study of Factors Controlling Ore Formation in Sandstone Type Uranium Deposits'. Research underway under this contract concentrates on; (1) Mineral chemistry of primary uranium minerals by optical microscopy, electron scanning microscopy, electron microprobe analysis, (2) Uranium content and its distribution in presumable source rocks associated with uranium deposits (lexan fission track mapping and counting).

ADDENDA: Performing organization: Naturhistorisches Museum Wien.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0767, STUDY OF RA-226 WASTES FROM URANIUM MINING AND MILLING OPERATIONS

A.S. PASCHOA, Pontifical Catholic University, Technical & Scientific Center, *Rio de Janeiro, Brazil*

The objectives of this project are to evaluate the levels of Ra-226 in liquid effluents of uranium mining and milling operations in the region of Pocos de Caldas, Minas Gerais, Brazil, and to investigate the fate of Ra-226 in the vicinity area as far as man's food chain is concerned. The methodology for measuring Ra-226 involves gamma-counting and radon-emanation for alpha-counting. The data to be obtained will permit us to estimate the exposure to the surrounding population due to the Ra-226 intake through drinking water and food.

ADDENDA: Performing organization: Pontificia Universidade Catolica, Depto. de Fisica.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0768, OXYGEN ISOTOPE FRACTIONATIONS AND GEOTHERMOMETERS AMONG MINERALS OF URANIUM DEPOSITS
R.D. MORTON, Univ. of Alberta, *Edmonton, Alberta, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0769, CO-ORDINATE, ADMINISTER AND CONDUCT A TRAINING COURSE FOR URANIUM MINE INSPECTORS
UNKNOWN, Elliot Lake Centre, *Elliot Lake, Ontario, Canada*

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

3.0770, NATIONAL INDIVIDUAL STANDING OFFER FOR HAVING URANIUM SAMPLES IRRADIATED
UNKNOWN, McMaster University, *Hamilton, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0771, SEDIMENTOLOGICAL AND MINERALOGICAL STUDY OF URANIUM-BEARING MINERALS FROM THE ELLIOT LAKE-BLIND RIVER AREA
L.G. BERRY, Queens University, *Kingston, Ontario, Canada*

OBJECTIVES: a) To complete a detailed study of uranium-bearing minerals and quantify variation in their distribution and chemical composition to spatial relationships within the quartz pebble conglomerates. b) To establish more accurately the true nature of 'brannerite'. Quartz pebble size, pyrite grain size and packing are useful indicators of the depositional environment and define energy gradients both laterally and vertically within the Rio Algom-Denison ore zone. The distribution of radioactive centres as recorded on 8' X 10' autoradiographs is confined to the matrix of the quartz pebble conglomerate and reflects the depositional fabric of the rock. The identification of uranium-bearing minerals was confirmed by X-ray diffraction, and the chemical composition of individual mineral grains was determined by electron microprobe analysis. Element ratios and concentration found in individual minerals enable the interpretation of bulk from the above samples in terms of their mineral components. Slabs cut from the above samples were analyzed for: U, Th, Pb, Ti, Fe, La, Ce, Y, Zr and K by bulk chemical methods (XRF). Multi-variant analyses show that the distribution of uraninite and the heavy minerals, monazite and zircon, are hydrodynamic in character. The bulk chemical analyses show systematic variations in the U3O8/ThO2 ratio, content of rare earth elements and Zr content when compared to quartz pebble size and pyrite grain size. The genesis of brannerite is also discussed, and the conclusion is consistent with modified placer mode of origin for the orebody.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0772, ANALYSES OF URANIUM IN ROCK, SOIL, STREAM AND LAKE SEDIMENT, AND MINERAL SAMPLES BY DELAYED NEUTRON ACTIVATION (ABBREV)
UNKNOWN, Atomic Energy of Canada Ltd., *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0773, ANALYSES OF URANIUM IN ROCK, SOIL, STREAM AND LAKE SEDIMENT, AND MINERAL SAMPLES BY DELAYED NEUTRON ACTIVATION (ABBREV)
UNKNOWN, Atomic Energy of Canada Ltd., *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

3.0774, GEOCHEMICAL ANALYSIS OF WATER SAMPLES FOR URANIUM, FLUORIDE AND PH IN THE VANCOUVER AREA
UNKNOWN, Bondar Clegg & Company Limited, *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0775, ORIENTATION SURVEY FOR URANIUM EXPLORATION IN THE YUKON
UNKNOWN, C.F. Gleeson & Associates Ltd., *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0776, URP AIRBORNE GAMMA-RAY SPECTROMETRY
A.G. DARNLEY, Geological Survey of Canada, *Ottawa, Ontario, Canada*

OBJECTIVE: To ensure all potential resource areas in Canada are known and delineated in order to facilitate the discovery and assessment of new deposits, and to improve methodology of exploration techniques.

WORK: Airborne gamma-ray spectrometry surveys of potential uraniferous resource areas in Canada using high sensitivity equipment. This is a 10-year program. Approximately 150 thousand square miles will be covered annually. Reference: Uranium Exploration '76. Geol. Surv. Can. Paper 76-26.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0777, URP NATIONAL GEOCHEMICAL RECONNAISSANCE
A.G. DARNLEY, Geological Survey of Canada, *Ottawa, Ontario, Canada*

OBJECTIVE: To ensure all potential resource areas in Canada are known and delineated in order to faciliate the discovery and assessment of new deposits, and to improve methodology of exploration techniques.

WORK: Airborne geochemical reconnaissance of selected potential uraniferous resource areas in Canada. Geochemical surveys in areas unsuited for airborne surveys, in areas where geochemical methods are more effective than radiometric methods and in areas of above average potential. This is a 10 year program. Reference: Uranium Exploration '75. Geol. Surv. Can. Paper 76-26.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0778, URP FOLLOW-UP AND EVALUATION OF DATA FROM PROJECT OERD 3.2.1.1. AND 3.2.1.2.
A.G. DARNLEY, Geological Survey of Canada, *Ottawa, Ontario, Canada*

OBJECTIVE: To ensure all potential resource areas in Canada are known and delineated in order to facilitate the discovery and assessment of new deposits, and to improve methodology of exploration techniques.

WORK: Improvement on a continuing basis of the effectiveness of the methods used in URP by related reconnaissance survey indication to previously known or newly discovered uranium occurrances and the overall geological context. Follow up work may include detailed geological, geophysical and geochemical surveys. Reference: Uranium Exploration '75 Geol. Surv. Can. Paper 75-26. The first full year of funding for each of the three project above was 1976-77.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0779, CHEMICAL LEACHING STUDIES
A.W. ASHBROOK, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To improve the technology for extraction of Canadian uranium and thorium.

WORK: Investigation of new leaching agents for extracting uranium from complex ores in order to reduce extraction cost.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0780, CONSULTING AND ANALYTICAL SERVICES (NUCLEAR ENERGY)
A.W. ASHBROOK, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To improve the technology for extraction of Canadian uranium and thorium.

WORK: Contribution to national and international scientific committees and provision of consulting and analytical services to industry, in the field of uranium extraction.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0781, PRECIPITATION OF URANIUM CAKE
A.W. ASHBROOK, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To improve the technology for extraction of Canadian uranium and thorium.

WORK: Determination of feasibility of using hydrogen peroxide for recovering uranium from solution.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0782, GEOLOGY OF URANIUM RESOURCES OF CANADA 3
R.T. BELL, Dept. Energy Mines & Resources, Regional & Econ. Geology Div., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To carry out comprehensive research on the geology of uranium deposits in order to 1) support or provide geologically based estimates of Canada's uranium resources; 2) to provide guidelines for their discovery; 3) to provide advice to government for uranium policy and related matters.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0783, NATIONAL GEOCHEMICAL RECONNAISSANCE
E.M. CAMERON, Dept. Energy Mines & Resources, Resources Geophy. & Geoch. Div, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To provide for industry high quality, multielement, reconnaissance exploration data to indicate areas of highest potential for uranium and other mineral commodities. To provide government with nationally consistent systematic data to serve as a basis for the resource appraisal of uranium and other mineral commodities.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0784, GAMMA-RAY LABORATORY OPERATIONS
G.W. CAMERON, Dept. Energy Mines & Resources, Resources Geophy. & Geoch. Div, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To provide analytical facilities for the determination of Th, U and K in geologic samples, and for the determination of radioactive disequilibrium in rock samples. To provide adequate standards for calibration facilities. To provide data storage and retrieval system relating to the gamma-ray analytical results produced by the laboratory.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0785, EVALUATION OF URANIUM RECONNAISSANCE DATA
B.W. CHARBONNEAU, Dept. Energy Mines & Resources, Resources Geophy. & Geoch. Div, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: 1) To develop guidelines for interpretation of Uranium Reconnaissance program data; 2) to identify features in reconnaissance data that are diagnostic of mineralization; 3) to maximize the usefulness of URP data; 4) to correlate URP data with uranium resource potential.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0786, GEOLOGY OF URANIUM RESOURCES OF CANADA
H.E. DUNSMORE, Dept. Energy Mines & Resources, Regional & Econ. Geology Div., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: Comprehensive research on the geology of uranium deposits in order to: 1) support or provide geologically based estimates of Canada's uranium resources; 2) provide guidelines for their discovery; 3) provide advice to government for uranium policy and related matters.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0787, GROUND WATER GEOCHEMISTRY APPLIED TO URANIUM EXPLORATION
W. DYCK, Dept. Energy Mines & Resources, Resources Geophy. & Geoch. Div, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: 1. To determine the effectiveness of dissolved constituents in ground waters in detecting uranium deposits. 2. To determine the geochemical relationship of dissolved constituents in ground waters to overburden, bedrock, and mineralization.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0788, SUCCESSOR BASINS OF THE WESTERN CORDILLERA
G.H. EISBACHER, Dept. Energy Mines & Resources, Regional & Econ. Geology Div., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To determine the structure and sedimentology of late Mesozoic clastics in basins which contain coal deposits and have an unknown potential for uranium and fossil placer deposits. To develop models which might help in the appraisal of successor basins as exploration targets. Compilation of Spatsizi map-area.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0789, URANIUM RESERVE ASSESSMENT
D.K. FAURSCHOU, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To quantitatively assess uranium and thorium reserves and resources on a Canada-wide basis for the formulation of future plans and policies.

WORK: Determine on an annual basis, the economically recoverable ore reserves, the productive capacity of the domestic uranium industry and the technical feasibility of bringing known ore bodies into production. Validation of ore reserves is included.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0790, AIRBORNE GAMMA-RAY SPECTROMETRY - EXPERIMENTAL SURVEYS
P.B. HOLMAN, Dept. Energy Mines & Resources, Resources Geophy. & Geoch. Div, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: 1. Demonstration of suitability of airborne gamma-ray spectrometry method in various parts of Canada, by conducting orientation surveys in advance of U.R.P. contract surveys. 2. Development of follow-up procedures, by conducting detailed surveys over areas of interest located on reconnaissance survey maps. 3. Provide acceptable standards for the acquisition and compilation of airborne gamma-ray spectrometric data.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0791, ENVIRONMENTAL GEOCHEMISTRY
I.R. JONASSON, Dept. Energy Mines & Resources, Resources Geophy. & Geoch. Div, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: 1) To ascertain the nature and controls on chemical and physical processes of elemental dispersion in the surficial environment from known and presumed mineral occurrences, with emphasis on uranium rich sources, in areas to be established as model systems; 2) to contribute to an assessment of mineral resource potential by providing detailed surficial geochemical and physico-chemical data in areas under follow-up study by U.R.P. scientists; 3) to collaborate with D.O.E. (CCIW) in establishing a common geochemical data base from NGR drainage sediment sampling and CCIW land drainage studies; 4) to review all NGR and URP data in order to assess the impact such data could have on environment protection and related epidemiological studies.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0792, URANIUM DRIFT PROSPECTING TECHNIQUES, LOWER KAZAN RIVER AREA
R.A. KLASSEN, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To develop drift prospecting techniques applicable to the search for uranium deposits with particular reference to obtaining an understanding of the processes of transport and weathering of uranium minerals in permafrost terrain.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0793, GEOLOGY OF URANIUM AND THORIUM DEPOSITS OF CANADA
H.W. LITTLE, Dept. Energy Mines & Resources, Regional & Econ. Geology Div., *Ottawa, Ontario K1A OE8, Canada*

Objective: To carry out comprehensive research on the geology of uranium and thorium deposits in order to: 1) support or provide geologically based estimates of Canada's mineral resources; 2) provide guidelines for their discovery; 3) provide advice to government for mineral policy and related matters. The work entails: development of systematic records and appraisals of geological data; use of these to classify types of deposits of economic commodities and to determine criteria for their recognition, development of understandings of the relationships between deposit types and their geological environments; development of concepts on genetic processes that govern these relationships; application of the foregoing to determine regions and geological units favourable for the occurrence of each type of deposit, and estimates of mineral resources therein. The work further entails transmitting information and advice through consultations, reports and maps to government agencies and others.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0794, ORIENTATION SURVEYS--URANIUM
Y. MAURICE, Dept. Energy Mines & Resources, Resources Geophy. & Geoch. Div, *Ottawa, Ontario K1A OE8, Canada*

Objective: To organize and carry out orientation surveys to assess the use of various geochemical sample media for application in uranium reconnaissance surveys in different geological and environmental settings across Canada.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0795, URANIUM RECONNAISSANCE PROGRAM (GAMMA-RAY SPECTROMETRY)
K.A. RICHARDSON, Dept. Energy Mines & Resources, Resources Geophy. & Geoch. Div, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To stimulate and facilitate exploration for uranium by providing basic information on the distribution of uranium, obtained by airborne radiometric methods.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0796, MINERALOGICAL RESEARCH ON THE RABBIT LAKE URANIUM DEPOSIT, SASKATCHEWAN
J.Y. RIMSAITE, Dept. Energy Mines & Resources, Regional & Econ. Geology Div., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To carry out systematic laboratory research on the development of chlorite, clay minerals and other alteration products at the Rabbit Lake uranium deposit in order to determine their relationship to ore-forming processes.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0797, GEOLOGY OF URANIUM AND THORIUM RESOURCES OF CANADA
V. RUZICKA, Dept. Energy Mines & Resources, Regional & Econ. Geology Div., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To carry out comprehensive research on the geology of uranium deposits in order to: 1) support or provide geologically based estimates of Canada's uranium and thorium resources; 2) provide guidelines for the discovery; 3) provide advice to government for nuclear energy policy and related matters.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0798, GEOLOGY OF URANIUM RESOURCES OF CANADA
L.P. TREMBLAY, Dept. Energy Mines & Resources, Regional & Econ. Geology Div., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To carry out comprehensive research on the geology of uranium deposits in order to: 1) support or provide geologically based estimates for Canada's uranium resources; 2) provide guidelines for their discovery; 3) provide advice to government for uranium policy and related matters.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0799, URANIUM MINERALIZATION ASSOCIATED WITH THE ATHABASCA FORMATION, SASKATCHEWAN, CANADA
G.R. PARSLOW, Univ. of Saskatchewan, School of Science, *Regina, Saskatchewan, Canada*

The Precambrian Athabasca Formation of Saskatchewan contains uranium showings and has economic uranium mineralization associated with the regolith (?) at the sandstone/crystalline basement unconformity. At present there are no known economic deposits of the 'classical sandstone type' associated with the Athabasca Formation. Thus, the basic problems are: 1) WHAT IS THE POTENTIAL OF THE ATHABASCA FORMATION TO HOST 'SANDSTONE TYPE' URANIUM DEPOSITS? 2) WHAT CONTROLS, IF ANY, HAS THE ATHABASCA FORMATION HAD ON THE OCCURRENCE OF ECONOMIC URANIUM MINERALIZATION WITHIN REGOLITH OF THE UNDERLYING CRYSTALLINE ROCKS?

The research will concentrate on uranium migration and precipitation in a sandstone environment with studies on the sandstone petrography, groundwater flow, role of organic matter, study of known mineralization, study of accompanying elements (inc. Fe, Mn, V, Ni, Ra, Rn, He).

During the first year a detailed study of the known small uranium showings within the sandstone will be carried out. This work will consist of detailed geological mappings, mineralogy and elemental composition of the deposits, study of the possible uranium migration pathways and the reasons for uranium precipitation at a given point in the sandstone. If time allows in this first year a comparision of these deposits with the more important (at the present time) regolith type deposits will be made.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0800, GEOCHEMICAL ANALYSIS OF WATER SAMPLES FOR URANIUM, FLUORIDE AND PH IN THE YUKON AREA
UNKNOWN, Barringer Research Limited, *Rexdale, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

3.0801, A STUDY OF VENTILATION STRATEGIES FOR URANIUM MINES
UNKNOWN, Dames & Moore, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

3.0802, URANIUM PROSPECTING IN THE NORTHWEST TERRITORIES, CANADA
UNKNOWN, Uranerzbergbau Canada Limited, *Toronto, Ontario, Canada*

Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0803, URANIUM PROSPECTING IN THE FRAMEWORK OF THE NORTHERN SASKATCHEWAN JOINT VENTURE ON THE SOUTH EDGE OF THE ATHABASCA BASIN/CANADA
UNKNOWN, Uranerzbergbau Canada Limited, *Toronto, Ontario, Canada*

Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0804, FRONT RANGES URANIUM EXPLORATION PROJECT (USA) USING MINERALS ENGINEERING
A. SIEGERS, Urangesellschaft Mbh & Co. Kg, *Denver, Colorado* 80207

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0805, HEALY BASIN URANIUM EXPLORATION PROJECT IN ALASKA, USA
UNKNOWN, Urangesellschaft Mbh & Co. Kg, *Denver, Colorado* 80207

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0806, URANIUM EXPLORATION IN CALIFORNIA, NEVADA, AND UTAH (USA)
W.A. CARLSON, Uranerzbergbau Gmbh & Co. Kg, *Wheat Ridge, Colorado* 80023

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0807, URANIUM PROSPECTING IN THE FRAMEWORK OF THE WYOMING JOINT VENTURE BETWEEN INEXCO AND URANIUM ORE, WYOMING GENERAL, USA
UNKNOWN, Uranerzbergbau Gmbh & Co. Kg, *Wheat Ridge, Colorado* 80023

Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0808, URANIUM EXPLORATION IN THE FRAMEWORK OF THE WYOMING JOINT VENTURE BETWEEN INEXCO AND URARERZBERGBAU PROJECT CHARLIE OREBODY, USA
UNKNOWN, Uranerzbergbau Gmbh & Co. Kg, *Wheat Ridge, Colorado* 80023

Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0809, URANIUM PROSPECTING OF THE MOKTA-GETTY URANIUM ORE, USA, INC. (JOINT VENTURE)
UNKNOWN, Uranerzbergbau Gmbh & Co. Kg, *Wheat Ridge, Colorado* 80023

Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0810, SYSTEMATIC URANIUM PROSPECTING
UNKNOWN, Council of Natural Sciences, *Copenhagen, Denmark*

Normally, permission to prospect for uranium in Greenland is denied to private concessionnaires, since the uranium prospecting is done by the Danish government. This still complies with the resolution of the Euratom treaty regarding the denial of such an activity if a member country desires access to another country's uranium reserves.

Thus the purpose of the project is a systematic prospecting for uranium deposits in the ice-free areas of Greenland.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0811, THE URANIUM DEPOSIT AT KVANEFJELD
UNKNOWN, Council of Natural Sciences, *Copenhagen, Denmark*

In 1955, when uranium prospecting was on the increase, the Atomic Energy Commission took the initiative for the prospecting work in southern Greenland. In 1959-60 the area was mapped by the Greenland Geological Survey, which has, since then, done the detailed geological mapping, mineralogical investigations and the work in economic geology. The drilling projects and the ore concentration questions have been handled by the Atomic Energy Commission.

The geological aspects of the project include a mapping of the number and purities of the uranium ores at KVANEFJELD, an economic appraisal of the possibilities of opening mines, and an investigation of the processes that have led to the formation of the ILIMAUSSAQ intrusion and its mineralizations.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0812, URANIUM IN THE SEA-SEDIMENTS IN DALSLAND, SWEDEN
UNKNOWN, Univ. of Copenhagen, Inst. of Petrology, *Copenhagen, Denmark* 1168

Since 1971 a working group at the Institute of Petrology has been engaged in research on the bed-rock in DALSAND and VAERMLAND (southwest SWEDEN). Here the study involves metaarkoses and meta-conglomerates, which have a relatively high content of uranium.

A special attempt will be made to explain the occurrence of uranium minerals in the DALSLAND rock group (age of 1,200 - 1,000 million years), to conduct petrological, mineralogical and geochemical research in order to explain the mode of formation of the uranium minerals, and to evaluate the economic importance of the deposit (project in initial stage).

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0813, GEOCHEMISTRY OF URANIUM
UNKNOWN, Univ. of Copenhagen, Inst. of Petrology, *Copenhagen, Denmark* 1168

For many years the Institute has engaged in international cooperation with the International Atomic Energy Agency with respect to uranium geology and uranium research and has contributed data on the appearance of uranium in magma. The work is based on experiences gained in the ILIMAUSSAQ intrusion and KVANEJELD.

The purpose of the project is to explain the behavior of uranium during the formation of the magma, with the view toward setting up models that can be used in the search for 'hidden' uranium deposits. The work is also aimed at the identification of possible 'low-grade' uranium deposits, as a part of future uranium research will be derived from such deposits.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0814, MINERALOGY, GEOCHEMISTRY AND PETROLOGY OF THE ILIMAUSSAQ INTRUSION
UNKNOWN, Univ. of Copenhagen, Inst. of Petrology, *Copenhagen, Denmark* 1168

Since 1962 the Institute of Petrology of the university has been in charge of the geological research work in the ILIMAUSSAQ intrusion on behalf of the Greenland Geological Survey. The KVANEFJELD deposit and other uranium deposits are in this intrusion. Investigations of deposits with the interesting amounts of thorium, niobium, beryllium, lithium and other rare earth elements are being conducted concurrently with mineralogical, geochemical and petrological basic research. A new geological mapping is in progress.

The purpose is to explain the mineralogy, petrology and geochemistry of the ILIMAUSSAQ intrusion, to localize interesting mineralizations, to study the general petrological and geochemical problems in light of the results obtained at the ILIMAUSSAQ intrusion, with the view of drawing general conclusions regarding the behavior of these elements during the formation of the intrusions.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0815, URANIUM DEPOSITS AT KVANEFJELD
UNKNOWN, Univ. of Copenhagen, Inst. of Petrology, *Copenhagen, Denmark* 1168

In 1962 the Greenland Geological Survey entrusted the Institute of Petrology, in cooperation with the Atomic Energy Commission, to continue the detailed geological exploration of the Kvanefjeld deposit on behalf of the Greenland Geological Survey.

The purpose is: 1) to elucidate the manner of deposition and mineralization of the uranium with respect to the estimation of the purity of the deposit and the amount of uranium ore in the main deposit; 2) to explore other mineral deposits in the area, and 3) to develop and improve the apparatus used in uranium prospecting.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0816, NUCLEAR GEOPHYSICS
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

The governmental search for uranium and other minerals in Greenland makes it desirable for the Greenland Geological Survey to be supplied with technical expertise and capacity for analysis. RISO has very good possibilities of providing such a support.

The purpose of the project is to cooperate in the search for minerals in Greenland through deliveries of measurement equipment and technical personnel, conducting raw material analyses, namely uranium analyses, and the study of methods of radiometric field measuring techniques (current activity).

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0817, EXTRACTING URANIUM FROM SEAWATER
G. BALS, Uranerzbergbau Gmbh & Co. Kg, *Bonn, Nordrhein Westfalen, Federal Republic of Germany* 5300

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0818, URANIUM EXPLORATION BY THE KERR-MCGEE CORPORATION IN THE CENTRAL POWDER RIVER BASIN, WYOMING, USA
W.A. CARLSON, Uranerzbergbau Gmbh & Co. Kg, *Bonn, Nordrhein Westfalen, Federal Republic of Germany* 5300

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0819, URANIUM EXPLORATION IN THE HOTZENWALD - SCHWARZWALD LICENSED AREA
H. DRIESSLE, Uranerzbergbau Gmbh & Co. Kg, *Bonn, Nordrhein Westfalen, Federal Republic of Germany* 5300

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0820, SECURING A SUPPLY OF URANIUM
D. NOTTMEYER, Uranerzbergbau Gmbh & Co. Kg, *Bonn, Nordrhein Westfalen, Federal Republic of Germany* 5300

3. FISSION SOURCES & ENERGY PRODUCTION

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0821, URANIUM PROSPECTING ON THE SOUTHERN EDGE OF THE ATHABASCA BASIN/CANADA (ABBREV)
UNKNOWN, Uranerzbergbau Gmbh & Co. Kg, *Bonn, Nordrhein Westfalen, Federal Republic of Germany* 5300
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0822, URANIUM PROSPECTING WITH THE JAMES BAY DEVELOPMENT CORPORATION AND CANICO IN THE OTISH MOUNTAINS/QUEBEC, CANADA
UNKNOWN, Uranerzbergbau Gmbh & Co. Kg, *Bonn, Nordrhein Westfalen, Federal Republic of Germany* 5300
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0823, URANIUM PROSPECTING IN TOGO
UNKNOWN, Uranerzbergbau Gmbh & Co. Kg, *Bonn, Nordrhein Westfalen, Federal Republic of Germany* 5300
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0824, COMBINED PARTICIPATION BY KERR-ADDISON LTD AND A SHAREHOLDING COMPANY IN TESTS OF URANIUM BED SITES AT AGNEW LAKE/CANADA (ABBREV)
UNKNOWN, Uranerzbergbau Gmbh & Co. Kg, *Bonn, Nordrhein Westfalen, Federal Republic of Germany* 5300
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0825, URANIUM PROSPECTING IN ALASKA
UNKNOWN, Uranerzbergbau Gmbh & Co. Kg, *Bonn, Nordrhein Westfalen, Federal Republic of Germany* 5300
Addenda: Suppooting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0826, BAKER LAKE URANIUM EXPLORATION PROJECT IN NORTHWEST TERRITORIES, CANADA
G. BUNDROCK, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0827, URANIUM EXPLORATION PROJECT IN THE JOHAN BEETZ AREA OF QUEBEC, CANADA
G. BUNDROCK, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0828, URANIUM EXPLORATION WITH THE BRINEX FIRM IN LABRADOR, CANADA
H.R. HAMPEL, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0829, SECURING A SUPPLY OF URANIUM
H.R. HAMPEL, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0830, KUEPER URANIUM EXPLORATION PROJECT, FEDERAL REPUBLIC OF GERMANY
M. OESTERLEN, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0831, SALT LAKE URANIUM EXPLORATION PROJECT IN WEST AUSTRALIA
W.E. SCHINDLMAYR, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0832, SONESTOWN URANIUM EXPORATION PROJECT IN PENNSYLVANIA,U.S.A.
A. SIEGERS, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0833, MANITOU URANIUM EXPLORATION PROJECT IN OKLAHOMA, U.S.A.
A. SIEGERS, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0834, DATE CREEK URANIUM EXPLORATION PROJECT, ARIZONA, U.S.A.
A. SIEGERS, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0835, INYA KARA URANIUM EXPLORATION PROJECT IN SOUTH DAKOTA, USA
A. SIEGERS, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0836, URANIUM EXPLORATION PROJECT WITH SCANDIA MINING AND EXPLORATION LTD. CANADA
UNKNOWN, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0837, URANIUM EXPLORATION PROJECT WITH THE CONTINENTAL OIL CO. IN THE CHURCHROCK REGION (NEW MEXICO, USA)
UNKNOWN, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0838, EXPLORATION PROJECT WITH THE RANCHERS EXPLORATION AND DEVELOPMENT CORP., USA
UNKNOWN, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0839, URANIUM PROSPECTING IN THE USA WITH THE ROCKY MOUNTAIN ENERGY CO.
UNKNOWN, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0840, URANIUM EXPLORATION WITH THE WESTERN MINING COMPANY IN WEST AUSTRALIA (PROJECT YEELIERRIE)
UNKNOWN, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0841, EXPLORATION FOR URANIUM IN CENTRAL SUMATRA, SUBPROJECT B
UNKNOWN, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0842, URANIUM PROSPECTING IN THE REGION OF THE DJADO, NIGERIA
UNKNOWN, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0843, URANIUM PROSPECTING CENTRAL PACIFIC (NORTHERN TERRITORY) IN AUSTRALIA
UNKNOWN, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0844, URANIUM PROSPECTING AND EXPLORATION PROJECT WITH THE BRAZILIAN STATE COMPANY NUCLEBRAS
UNKNOWN, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0845, URANIUM EXPLORATION WITH THE BRINEX FIRM IN LABRADOR, CANADA
UNKNOWN, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0846, EXPLORATION PROJECT WITH THE FEDERAL RESOURCES CORP. IN THE REGION OF TONOPAK, NEVADA, USA
UNKNOWN, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0847, URANIUM EXPLORATION BY THE CANADIAN NICKEL COMPANY LTD - URANIUM EXPLORATION & MINING LTD - JOINT VENTURE, PROJECT BURLEIGH, CANADA
UNKNOWN, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0848, URANIUM EXPLORATION IN AUSTRIA
H. ZIEHR, Urangesellschaft Mbh & Co. Kg, *Frankfurt 17, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0849, THE EXCHANGE OF BGR'S SCIENTIFIC RESULTS TO ASSIST BMFT AND GERMAN FIRMS SELECT AND COMPLETE NUCLEAR FUEL SUPPLY PROJECTS
F. BARTHEL, Geosciences & Mineral Inst., *Hannover 23, Niedersachsen, Federal Republic of Germany* 3000
ADDENDA: Performing organization: Bundesanstalt fur Geowissenschaften und Rohstoffe.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0850, EXPLORING FOR URANIUM IN CENTRAL SUMATRA, SUBPROJECT A
UNKNOWN, Geosciences & Mineral Inst., *Hannover 23, Niedersachsen, Federal Republic of Germany* 3000
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0851, URANIUM SEPARATION INSTALLATION 25 JATO, ALMELO
H. MOHRHAUER, Uranit Gmbh, *Juelich, Nordrhein Westfalen, Federal Republic of Germany* 5170

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0852, URANIUM EXPLORATION IN THE GRANITE OF THE FALKEN MOUNTAINS
H. GUDDEN, Geological Survey of Bavaria, *Munich 22, Bayern, Federal Republic of Germany* 8000
ADDENDA: Performing organization: Bayerisches Geologisches Landesamt.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0853, URANIUM PROSPECTING IN THE BLACK FOREST AND ADJACENT AREAS
UNKNOWN, Arbeits. Saarberwerke AG, *Saarbruecken, Saarland, Federal Republic of Germany* 6600
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0854, URANIUM PROSPECTING IN THE HESSIAN PART OF THE ODEN FOREST
UNKNOWN, Arbeits. Saarberwerke AG, *Saarbruecken, Saarland, Federal Republic of Germany* 6600
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0855, URANIUM EXPLORATION IN SCHWARZWALD (BLACK FOREST) AND NEIGHBORING AREAS
H.G. ERTLE, Saarberg Interplan Gmbh, *Saarbruecken, Saarland, Federal Republic of Germany* 6600

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0856, URANIUM EXPLORATION IN MOROCCO
M. KNEUPER, Saarberg Interplan Gmbh, *Saarbruecken, Saarland, Federal Republic of Germany* 6600

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0857, UTILIZATION OF LOW GRADE AND WASTE URANIUM ORES BY MEANS OF BIOLOGICAL LEACHING
B. CZEGLEDI, Mecsek Ore Mining Enterprise, *Kovagosollos, Hungary*
In the mining and radiometric separation of uranium ores an ore-fraction with low-grade uranium is formed. The utilization of this stockpile can be accomplished by dissolution with acid or sodium carbonate. For the processing of low-grade uranium ores, Mecsek, a percolation leaching process with extremely high effectiveness, has been used on the industrial scale.

According to the procedure the ore with uranium concentration below 200 g per ton is ground to minus 30 mm, then it is piled up in the prism-shaped heaps at heights of about 15 m on an area of 10,000 square meters which is covered with plastic sheeting. The leaching solution filtrated from the shallow-ponds on the heap is pumped into the column containing ion-exchange resin, where soluted uranium will be concentrated. The uranium free leaching solution will be returned to the heap.

To the present, several millions tons of uranium grade ores have been processed by the method outlined above. Because of the long time (3-5 years) for dissolution the technology requires further development. Researches cover the investigation of those factors which have an influence on the rate and volume of the dissolution. During the experiments such phenomena occurred which were indicated by biological processes influencing over leaching. It might be supposed that some of 10-12 breeds of bacteria present in the sodic leaching solutions take part in the oxidation of uranium compounds with high valence. The researches aim at increasing effectiveness of sodic leaching of low-grade uranium ores according to the following plan: 1. Identification of bacilli found in the alkaline solution of percolation and mine waters. 2. Determination of functional mechanism and the optimal conditions for life-function of the bacteria contributing to the leaching. 3. Selection of bacteria best suited for promoting the oxidation of four valent uranium in the sodic medium.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0858, BACTERIAL LEACHING OF URANIUM FROM ORES
K.M. JAYARAM, Dept. of Atomic Energy, Atomic Minerals Division, *Hyderabad, Andhra Pradesh, India*
The object of the proposed research is to carry out investigations on the Chemistry of Uranium solubilisation and its precipitation in the presence of both Chemoautotrophic and heterotrophic bacteria. The study would include: (1) Geo-microbiological investigations on samples collected from uranium deposits associated with different country-rocks. (2) Isolation, identification and preservation of bacteria from the above deposits. (3) Study the role of Fe2 ion and Fe3 ion in the oxidation and solubilisation of uranium in the presence of microbes. (4) Study the role of heterotrophs in the solubilisation and precipitation of uranium. (5) Adaptation of heterotrophs to increased hydrogen concentration and their subsequent use for precipitation of uranium.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0859, STUDIES ON THE DISTRIBUTION OF RADIUM IN SURFACE AND WASTE WATER OF THE URANIUM MINES IN JAPAN
Y. KUROKAWA, Power Reactor Nucl. Fuel Corp., *Tokyo, Japan*
We have a working plan to measure periodically the radium concentration in mine effluents, river water, river sediments or soil at the fixed monitoring points around the uranium mines, also to take a monitoring of its trend. The frequency of monitoring for radium is once a month at the vicinity of the mines and at least once a year around the mines. At certain measuring points, double checks will be performed by the Institute of Physics and Technology of Waseda University or the Prefectural Hygienic Research Laboratory.

This programme in our PNC was continued from 1967 at the Ningyo-Toge Mine and from 1971 at the Tono Mine in Japan. Results of our environmental monitoring up to now indicated that no impact could be found in the vicinity of the mines.

In addition to this programme, from this year, we are going to measure radium isotopes caused by uranium and thorium series in the samples near the mines.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0860, THERMODYNAMIC STUDY OF THE EXTRACTION OF URANIUM AND THORIUM BY POLAR ORGANIC SOLVENTS
D. PETKOVIC, Boris Kidric Institue, *Belgrade, Soc. Fed. Rep. of Yugoslavia* 11001
The continuation of the research dealing with the investigation of extraction equilibria of uranium and thorium by polar organic solvents. Determination of thermodynamic equilibrium constants of thorium nitrate by tributyl phosphate and dialk

sulphoxides in different diluents according to the method presented in the progress report of Renewal Project, R1.

The interpretation of the dipole moments of different polar extractants in the light of the extractive power of these extractants.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0861, RESEARCH WITHIN THE COORDINATED PROGRAMME ON BACTERIA LEACHING OF URANIUM ORES

D. MARJANOVIC, Mining Institute, School of Natural Sci. & Math., *Belgrade, Soc. Fed. Rep. of Yugoslavia* 11080

It is well known that the effect of bacterial leaching of uranium ores depends upon activity of bacterial culture applied in the leaching process.

The programme of work for the period 1976 to 1977 comprises the continuation of investigations accomplished till now on the influence of different magnetic field intensity to the improvement of Thiobacillus ferrooxidans, bacteria of great importance in leaching process. In this respect, it was anticipated to study velocity growth and oxidative ability of Th. ferrooxidans in dependance of magnetic field action.

Also within the Project of Bacterial Leaching of Uranium Ores, we will study the possibilities of biocide application in order to prevent bacterial activity in dumps containing uranium waste material.

Delaying of biochemical processes, which intensify uranium leaching from dumps, will at the same time contribute to the environmental protection from pollution.

The tests will be carried out in open space and exposed to climate influence as to simulate conditions in situ.

Investigations will be carried out by microbiological and chemical standard methods and apparatus.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0862, STUDY OF FACTORS CONTROLLING FORMATION OF SANDSTONE TYPE URANIUM DEPOSITS OF NORTHWEST YUGOSLAVIA

L. EGON, Ljubljana Geological Institute, *Ljubljana, Soc. Fed. Rep. of Yugoslavia* 61000

All known uranium occurrences in NW Yugoslavia are found in greenish-gray sediments of the lower part of the groeden beds. In the explored areas the greenish-gray layers contain numerous red sandstone and siltstone intercalations, both of which are interbeded in the ore-bearing horizon.

It is believed that for these uranium ore deposits' formation it is not a question whether sediments are of marine, lagoonal, alluvial or terrestrial origin. It seems that this hypothesis would be proved most easily by the same approach taken on the deposits at Zirovski vrh, taking into consideration that it should be always possible to differenciate by means of appropriate sedimentological studies, the continental from marine sediments.

The programme of work shall be: a) Study of the source of U, Cu, Pb, Zn, etc. and forms of appearance of uranium in source rocks; b) Detailed petrographic study of host rocks, including research of heavy mineral concentrates in sandstones and rock alteration; c) Investigation of sulphur isotope composition of pyrite, contained in uranium ore bodies; d) Research of geochemical halos of the deposit; and e) Detailed mineralogical study of uranium minerals including the use of micro-probe techniques.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3.0863, NUCLEAR MINERAL EXPLORATION METHODS

F.E. SENFTLE, U.S. Dept. of The Interior, Geological Survey, *Herndon, Virginia* 22092

The general objective is to develop, improve, and test field nuclear analytical equipment and techniques for mineral exploration. At the present time the major effort is on nuclear borehole sondes. A high energy sonde and a low energy sonde have been completed. The high energy sonde uses a Ge(Li) detector and a 252Cf neutron source. The low energy sonde uses the same type of neutron source but has an intrinsic germanium detector. Both sondes have been field tested with emphasis on uranium and coal deposits. Although the preliminary tests have been very successful, the sondes are being continually modified to improve the sensitivity and resolution. Additional field tests are planned to check the modifications. Tests are also being made to test the feasibility of building an additional sonde with radically new features and new types of electronic circuitry.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

3I. REACTORS - GENERAL

3.0864, ASSESSMENT OF NUCLEAR REACTORS AS A POWER SOURCE FOR PROPULSION OF UNDER-ICE VEHICLES

UNKNOWN, Westinghouse Canada Limited, *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

3.0865, SLOWPOKE NUCLEAR REACTOR RESEARCH

R.E. JERVIS, Univ. of Toronto, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

3.0866, GENERAL REACTOR DESIGN AND CIRCULATION ANALYSIS

UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

For many years a project has been in being with the designation general reactor design; it has been a means of fulfilling the AEC purpose clause. The idea is to establish and utilize a professional expertise in the area of reactor design, in order to provide consultaton to the government and authorities, electric power plants and other industries.

SUPPORTED BY Denmark - Danish Government - Copenhagen

3.0867, SITE EVALUATION FOR THE CONSTRUCTION OF A NUCLEAR POWER SUPPLY STATION (INVESTIGATION OF TWO ALTERNATIVE SITES)

W. ISSEL, K E W A Kernbrennstoff, *Frankfurt 80, Hessen, Federal Republic of Germany* 6230

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0868, RESEARCH AND DEVELOPMENT IN THE FIELD OF RADIOACTIVE MATERIALS TRANSPORT - PART II

R. CHRIST, Transnuklear Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0869, FBR DEVELOPMENT USING THE SMALL SODIUM-COOLED NUCLEAR REACTOR INSTALLATION WITH THE FAST CORE (KNK II)

W. MARTH, Soc. for Nuc. Research, *Karlsruhe 1, Baden Wuerttem., Federal Republic of Germany* 7500

ADDENDA: Performing organization: Gesellschaft fuer Kernforschung MBH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0870, BUILDING A STEREO PICTURE RELAY SYSTEM FOR MANIPULATORS AND REMOTE CONTROL VEHICLES IN NUCLEAR TECHNOLOGY INSTALLATIONS
H. KLEINWAECHTER, Kleinwaechter Res. & Dev. Lab., *Loerrach, Baden Wuerttemberg, Federal Republic of Germany* 7850

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0871, CONSTRUCTION OF A 300 MWE HIGH TEMPERATURE REACTOR PROTOTYPE NUCLEAR POWER PLANT (THTR 300)
UNKNOWN, Brown Boveri & Cie Company, *Mannheim 1, Baden Wuerttemberg, Federal Republic of Germany* 6800
Addenda: Supporting agency: Hochtemperatur-Reaktorbau GMBH.

SUPPORTED BY Germany - High Temperature Nuclear Power Plants - Manheim

3.0872, TRANSFER OF A 1160 MWE HIGH TEMPERATURE REACTOR POWER PLANT FROM THE GULF COMPANY TO GERMAN CONTROL
UNKNOWN, Hochtemperatur Reaktorbau Gmbh, *Mannheim, Baden Wuerttemberg, Federal Republic of Germany* 6800
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0873, SUPPLY FOR NUCLEAR POWER PLANTS - SIMULATOR CENTER FOR THE POWER PLANT SCHOOL EV ESSEN
O. SCHWARZ, Kraftwerkschule E.V., *4300 Essen, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0874, ERECTION OF A 280 MW FAST SODIUM REACTOR PROTOTYPE NUCLEAR POWER PLANT (SNR-300)
UNKNOWN, Fast Breeder Nuc. Pow. Pl., *5060 Bensberg, Nordrhein West., Federal Republic of Germany*
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0875, KNK II - FBR EXPERIMENTAL PROGRAM
H. ANDRAE, Interatom Gmbh, *5060 Bensberg, Nordrhein West., Federal Republic of Germany* 5070

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0876, SNR MARK II RESEARCH AND DEVELOPMENT PROGRAM
K. SCHMIDT, Interatom Gmbh, *5060 Bensberg, Nordrhein West., Federal Republic of Germany* 5070

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0877, CONSTRUCTION OF THE COMPACT SODIUM-COOLED NUCLEAR REACTOR INSTALLATION
UNKNOWN, Interatom Gmbh, *5060 Bensberg, Nordrhein West., Federal Republic of Germany*
Addenda: Supporting agency: Gesellschaft Fuer Kernforschung MBH (GFK).

SUPPORTED BY Germany - Nuclear Research Society - Frankfurt

3.0878, CONSTRUCTION-PERTINENT R&D PROGRAM FOR THE 280 MWE PROTOTYPE NUCLEAR POWER PLANT WITH A FAST SODIUM-COOLED REACTOR
UNKNOWN, Interatom Gmbh, *5060 Bensberg, Nordrhein West., Federal Republic of Germany*
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0879, PREPARATORY WORK FOR PLANNING A DEMONSTRATION POWER PLANT WITH A HIGH PERFORMANCE SODIUM-COOLED FAST BREEDER REACTOR (ABBREV)
UNKNOWN, Interatom Gmbh, *5060 Bensberg, Nordrhein West., Federal Republic of Germany*
Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

3.0880, RAPSODIE-FOREIGN IRRADIATION
BEL, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0881, GULLIVER
GOLLION, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0882, RAPSODIE, FORTISSIMO FISSION PRODUCTS
LERIDON, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0883, COMMON PROBLEMS OF THE SURETE REACTOR - DIFFICULTIES IN ITS BEHAVIOR
OLLIER, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0884, TIME-OF-FLIGHT
SCHMITT, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0885, STUDY AND DESIGN OF POWER STATIONS
UNKNOWN, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0886, REALIZING THE CAP (JOINT FINANCING)
UNKNOWN, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0887, EXTERNAL PROVISIONS OTHER THAN IRRADIATION
VILLENEUVE, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0888, STUDYING THE HTGR REACTOR
UNKNOWN, Electricite de France, *Paris*, *France* 76008

In order to truly appreciate the draft of a 1160 MW HTR Power Station. A certain number of studies have been developed, including: a. technical-economic comparison of various fuels used for the core; b. homogeneous prismatic fuel (neutron studies, thermal studies, mechanics, economics); c. operation and safety; and d. thermal transfers with helium.

Following-up experiments carried out in in the CESAR and MARIUS reactors, following-up the increase in power in Fort-Saint-Vrain (agreeing on the validity of computation codes).

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0889, PENETRATION STRATEGIES IN EDF FAST NEUTRON REACTORS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Considering the degree of technical confirmation of fast neutron reactors and forseeable improvements in performance, we shall analyze the problems created by installing such reactors in the EDF park. This will involve 3 areas: a. Integration into the electric energy network and risk of failure; b. Problems of fissile material supply; and c. Possible bottlenecks at the industrial level.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0890, FAST NEUTRON GAS-COOLED REACTORS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

The fast neutron gas-cooled reactor has a regeneration yield considerably greater than that of sodium-cooled reactors; since the fuel cycle is less expensive, the cost per KWH is also less. This project consists of a certain number of studies (to be carried out in collaboration with the fast gas reactors association), aimed at speeding up the technological development of this type of reactor and demonstrating the validity of announced costs. These studies concern: a. Optimization (perfecting a model); b. Operation; c. Pre-stressed concrete shields; d. Thermal transfers and vibrations; e. Fuel cycles; and f. Safety.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0891, CHEMISTRY IN LIGHT WATER POWER STATIONS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Chemistry of primary water: determining the source of the most troublesome elements (Cobalt 60, for example) and the conditions for decontaminating deposits by dissolution in boric acid solutions and demineralization. Chemistry of secondary water: we are dealing with chemically affected areas that exist locally (in crevices, under deposits) in cases of phosphate conditioning or contamination (Fe or Cu oxides, water in its raw state, soda).

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

3.0892, CHEMISTRY IN LIGHT WATER REACTORS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Chemistry of primary water: we will study the effects of corrosion products deposited in the circuit after passing through the reactor core. We will locate the origin of the most dangerous of the substances, such as cobalt 60 (in structural materials or in stellite deposits) and determine the effect of initial surface analysis (mechanical and chemical) on the development of contamination. We will study decontamination conditions by solubilization in boric acid solutions and demineralization or by using other chemical agents (ammonia, etc.) (experimental decontamination of a CHOOZ reactor loop in collaboration with SENA and CEA).

Chemistry of secondary water: This program of study completes the program on materials corrosion in PWR steam generators. Its objective is to examine the chemical environments existing locally (in crevices, under deposits)when contaminated by ferrous or copper oxide, water from condenser leaks, soda resulting from treating condensates with resins. We will emphasize the effects of salt water from the sea on the chemical characteristics of secondary water in pressurized water reactors.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

3.0893, FRANCO-SWEDE COOPERATION ON BWR
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0894, CALOGENE REACTORS AT TEMPERATURES, 250
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0895, ASSISTANCE FOR INDUSTRY - BWR REACTORS
AUBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0896, CHAMPLAIN, TECHNICAL COORDINATION
BENVENISTE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0897, CALOGENE REACTOR - SUMMARY
BLIAUX, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organizaton: Centre d'Etude Nucleaires de Saclay, Department de Transfert et Conversion d'Energie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0898, NUCLEAR HEATING FOR MERCHANT VESSELS
BONNET, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0899, DEVELOPING EXPERIMENTAL PHYSICAL AND CHEMICAL METHODS OF STUDY
BOYER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0900, SURETE STUDIES AND TESTS FOR SUPPLY
BRISBOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Center d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0901, PARTICIPATION IN THE CPC2 EXPERIMENT (PEGASUS)
BRISBOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay Division d'Etude et de Development des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0902, SSL2
BRISBOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0903, METHODS OF EXTRACTING TRITIUM FROM LIGHT WATER REACTORS
COURVOISIER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

ADDENDA: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0904, CHEMICAL PROBLEMS CREATED BY THE USE OF REACTORS
COURVOISIER, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0905, SMALL POWER STATIONS, DPN STUDIES
DELAFOSSE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0906, BAMBOU INNOVATION
DELAFOSSE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0907, LIGHT WATER COORDINATION
DELAYRE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0908, BEHAVIOR OF WATER CONTAINING BORON AND LITHIUM AND AQUEOUS SOLUTION DEPOSITS
DOLLE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0909, STUDIES OF FILTERS AT HIGH TEMPERATURES
DOLLE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0910, IMPROVING CERTAIN SPECIFIC POINTS OF THE NUANCE OF REFERENCE
DUPOUY, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0911, PRODUCING RADIOACTIVE RARE GASES
GOENVEC, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0912, PRODUCING THE 131I AND 129I GAS CALIBRATORS
GOENVEC, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0913, STUDY AND DEVELOPMENT OF INSTRUMENTS FOR IDENTIFYING RADIOACTIVE PRODUCTS
GRAFITEAUX, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0914, DEVELOPING FISSION CHAMBERS AND NEUTRON FLUX DETECTORS
GUERY, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0915, WATER SOLUBILITY STUDIES
LAMBERT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*
ADDENDA: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0916, HIGH ENERGY REFERENCES FOR GAMMA SPECTROMETER CALIBRATION
LEGRAND, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0917, MULTIGAMMA REFERENCES, DISINTEGRATION DIAGRAM OF 152 EU
LEGRAND, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0918, CARAMEL INNOVATION
LESTIBOUDOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0919, MAKING THE CEA THE EVENTUAL SUPPLIER - TESTS
LESTIBOUDOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0920, EVALUATING ACTUAL LIMITATIONS TO THE SPECIFIC POWER PLANNED
LESTIBOUDOIS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0921, CONTROLLING CO2 PURIFICATION PLANT, BUGEY I
MAIRE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0922, OVERSEEING COMPUTATION CODES, PUBLISHING THE DATA BANK
NIMAL, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0923, DIRECT CYCLE REACTORS - MAJOR OPTIONS
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0924, COLLECTIONS (OSIRIS IRRADIATION)
PATARIN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0925, HIGH TEMPERATURE REACTORS
PELCE, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre D'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0926, CARBON DEPOSITS FORMED BY CO2 RADIOLYSIS
RAPPENEAU, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0927, INCREASING SPECIFIC POWER
RINGOT, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0928, CALOGENE REACTORS
SERMA, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0929, CAP, THE FIRST CIVIL CORE
THOMAS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0930, HIGH TEMPERATURE REACTORS - PROPOSED SOLUTIONS - DIRECT CYCLE
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Construction des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0931, HIGH TEMPERATURE REACTORS - PROPOSED SOLUTIONS - CALOGENES REACTORS
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Construction des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0932, LIGHT WATER REACTORS - CALOGENE REACTORS
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Construction des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0933, LIGHT WATER REACTORS - COMMERCIAL PROPULSION - NUCLEAR HEATING
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Construction des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0934, EXTERNAL PROVISIONS
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0935, JOINT STUDIES ON NEUTRON REACTORS
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0936, STUDIES BASED ON CURRENT TECHNOLOGY (CHAMPLAIN)
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay*, *France*
Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Construction des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0937, LOW-POWER NUCLEAR POWER PLANT
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Construction des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0938, REACTOR PROPOSALS
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Construction des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0939, GULF TYPE HTR POWER STATIONS - STUDY AND DEVELOPMENT OF PROJECTS
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Construction des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0940, DRAFT - MWE 1200
UNKNOWN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Construction des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0941, STUDIES APPLIED TO REACTORS
UNKNOWN, Atomic Energy Commission, Div. for Stu. & Dev. Reactors, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0942, FRAMATOME STUDIES
COURTAUD, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Department de Transfert et Conversion d'Energie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0943, ASSIMILATING GGA TECHNIQUES
UNKNOWN, Atomic Energy Commission, Div. of Metall. Stu. Nuc. Fuel, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0944, FAST GAS REACTORS, IMPROVING SIC
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0945, PARTICLE STUDIES
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0946, GA ASSIMILATION - ECONOMIC STUDIES
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0947, ANALYTIC STUDIES NEEDED FOR REACTORS
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0948, MEASURING THE FISSION PRODUCT DISCHARGE RATE DURING OSIRIS IRRADIATION
DEBEAUCOURT, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0949, FISSION PRODUCTS - CREATION AND MANAGEMENT OF A BANK
FICHE, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organizaton: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0950, EXPERIMENTAL STUDY OF THE CONTAMINATION OF REACTOR CIRCUITS
FREJAVILLE, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

3. FISSION SOURCES & ENERGY PRODUCTION

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay.aux-Roses, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0951, DEVELOPING METHODS OF MEASURING THE RATE OF COMBUSTION
ROBIN, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

Addenda: Supporting Agency: Commissariat A L'Energie Atomique. Performing Organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

3.0952, STUDIES ON NUCLEAR REACTORS
UNKNOWN, N.V. K E M A, *Arnhem, Netherlands*

Objective: developing competence in the judgement of nuclear reactors, especially light water reactors.

Studies of reactor physics, fuel management schemes, fuel elements, shielding, flow patterns, thermohydraulic studies, normal and accident conditions.

Development of computer codes.

Checking of codes by means of measurement in the 'Dodewaard' BWR.

SUPPORTED BY Netherlands - N.V. Kema - Arnhem

3.0953, RE-EVALUATION OF A LIQUID-COOLED FAST-BREEDER REACTOR (SNR 300)
J.A. BOURDREZ, Economics Institute, *Rotterdam, Netherlands*

In 1971 an evaluation report on the SNR 300 project was prepared. In 1974/1975 a re-evaluation of the same project was carried out. For the Netherlands as well as for Belgium and Germany forecasts (till 2020) of the possible electricity consumption have been made. Running costs and investment costs of a 1000 MW fast-breeder (SNR 1000) reactor, a 1000 MW LWR and a 1000 MW fossil fuel electricity plant have been estimated. Sensitivity analyses have been carried out, especially for changes in: price of uranium ore; costs of enrichment, etc.; price of crude oil; investment costs; electricity forecasts; discount rate; year of introduction of the SNR 1000.

The consequences of the SNR 300 and SNR 1000 projects for the Dutch economy have been considered.

Addenda: Supporting agency: Ministerie van Verkeer en Waterstaat.

SUPPORTED BY Netherlands - Ministry of Transportation & Public Works

3.0954, STUDY OF GAS-COOLED FAST BREEDER REACTOR
A.H. DEHASSVANDORSSE, B.V. Neratoom, *The Hague, Netherlands*

The study of the Gas-Cooled Fast Breeder Reactor (GCFBR) is carried out in co-operation with institutions and industries of Germany, Belgium, France, Switzerland, Italy, Great-Britain and Sweden.

The target of the study is to get precise information on the potentials of a GCFBR as an alternative to the Liquid Metal Cooled Fast Breeder Reactor (LMFBR) and to identify the areas which need development work. This is done by making predesigns of potential prototypes.

SUPPORTED BY Netherlands - B.V. Neratom - The Hague

3.0955, WASTE HEAT UTILIZATION OF BARSEBACK 3 NUCLEAR POWER REACTOR FOR A HEATING SYSTEM TO FOUR CITIES IN THE MALMO REGION
E. NASLUND, Sydsvenska Kraft Ab, *Malmo 5, Sweden*

A third reactor unit is planned for the Barseback nuclear power plant and in order to utilize the waste power distribution system for 950 MW of heat is considered. Heating water will be supplied to four different cities in the Malmo region.

The investigations that will be carried out as a result of the funds granted here are: pressure transients of pumps and valves; insulation and covering design; supporting arrangement design; construction of a short distance test pipe line.

ADDENDA: Performing organization: Sydsvenska varmekraftaktiebolaget.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

4. GEOPHYSICAL ENERGY SOURCES

4.0001, STUDY OF THE POSSIBILITIES FOR THE INCREASED USAGE OF SOLAR ENERGY IN THE FEDERAL REPUBLIC OF GERMANY
W. HAFELE, Internat. Inst. of Appl. Anal., *Laxenburgh, Austria* A2361

DESCRIPTION OF PROJECT: OBJECTIVE: The system aspects related to an increased market penetration of solar technology are to be investigated.

WORK PROGRAM: a) Determination of the solar energy available in the Federal Republic of Germany, divided up according to regions. b) Determination of the required amount of low temperature heat divided up according to regions and low temperature areas. c) Comparison of supply and demand. d) Evaluation of the effects of increased solar energy use or the energy raw material and capital market of the Federal Republic of Germany. e) Effects of the use of solar energy in the production of room heating, process heat, electricity and hydrogen.

RELATION TO OTHER PROJECTS: This project is being worked on in conjunction with the Institut fur Systemtechnik und Innovationsforschung (ISI), Karlsruhe. The ISI has taken over the determination and analysis of the data available in the Federal Republic of Germany.

ADDENDA: Subcontractor: Institut fur Systemtechnik und Innovationsforschung, Karlsruhe.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0002, CONSULTATION SERVICES ON THE APPLICABILITY OF VARIOUS TIDAL REGIME MODELS TO THE CALCULATION OF TIDAL ENERGY GENERATION POTENTIAL
J.J. LEENDERTSE, Unknown Inst. or Indiv. Grant, *California*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0003, CONSULTATION SERVICES ON THE APPLICABILITY OF VARIOUS TIDAL REGIME MODELS TO THE CALCULATION OF TIDAL ENERGY GENERATION POTENTIAL
G.F. DUFF, Unknown Inst. or Indiv. Grant, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0004, DEVELOPMNT AND MONITORING OF A DOMESTIC WATER PREHEATING SYSTEM USING SOLAR ENERGY--PART OF THE PROGRAM ON SOLAR HEATING OF BUILDINGS
V. IRETON, Unknown Inst. or Indiv. Grant, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0005, DESIGN AND INSTALLATION OF SOLAR HEATING SYSTEMS IN DEMONSTRATION HOUSES - ONE WATER SYSTEM INSTALLATION IN VICTORIA, BRITISH COLUMBIA
D.B. THOMPSON, Unknown Inst. or Indiv. Grant, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0006, PLANNING AND CO-ORDINATION OF THE BAY OF FUNDY TIDAL POWER STUDIES
R.L. WALKER, Unknown Inst. or Indiv. Grant, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0007, MONITORING OF SOLAR HEATING SYSTEM OF THE FREE STANDING AIR HEATING SOLAR FURNACE TYPE--PART OF THE PROGRAM ON SOLAR HEATING OF BUILDINGS
UNKNOWN, Domshy Industries Limited, *Calgary*, *Alberta*, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0008, STUDY OF GEOTHERMAL RESOURCES IN SEDIMENTARY BASINS FROM EXISTING DATA
UNKNOWN, Sproule Associates Limited, *Calgary*, *Alberta*, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0009, INVESTIGATION OF THE POTENTIAL FOR GEOTHERMAL EXPLORATION OF SEDIMENTARY BASINS OF WESTERN CANADA
UNKNOWN, Sproule Associates Limited, *Calgary*, *Alberta*, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0010, THE MEASUREMENT OF DIRECT BEAM, HORIZONTAL SURFACE, AND DIFFUSE SURFACE, SOLAR INSOLATION
G.W. SADLER, Univ. of Alberta, School of Graduate Stu. & Res., *Edmonton*, *Alberta*, *Canada*

The measurement of direct beam (both total and in selected wave length regions), horizontal surface, and diffuse surface, solar insolation under clear sky conditions at Edmonton, Alberta. The determination of the appropriate extinction coefficients and turbidity. The data is to be used in establishing the solar energy contribution to the cooling load calculation for building air conditioning systems and compared with theoretical values presently used in design. The utilization of solar energy for heating and cooling of buildings is being studied.

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

4.0011, DEVELOPMENT OF HEAT STORAGE SUBSYSTEM FOR SOLAR HEATING--PART OF THE PROGRAM ON SOLAR HEATING OF BUILDINGS
UNKNOWN, Electrohome Limited, *Kitchener*, *Ontario*, *Canada*

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

4.0012, DEVELOPENT OF A FIXED POSITION FIXED CONFIGURATION SOLAR COLLECTOR - PART OF THE PROGRAM ON SOLAR HEATING OF BUILDINGS
UNKNOWN, Electrohome Limited, *Kitchener*, *Ontario*, *Canada*

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

4.0013, RESEARCH INTO SOLAR ENERGY STORAGE VIA PHOTOCHEMISTRY
J.R. BOLTON, Univ. of Western Ontario, *London*, *Ontario*, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0014, DEVELOPMENT OF METHODS OF REDUCING CORROSION IN SOLAR COLLECTORS--PART OF THE PROGRAM ON SOLAR HEATING OF BUILDINGS
UNKNOWN, Ontario Research Foundation, *Mississauga*, *Ontario*, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0015, PROJECTION OF COST PARAMETERS AND ASSESSMENT OF SOCIO-ECONOMIC CONSIDERATIONS FOR THE BAY OF FUNDY TIDAL POWER STUDY
UNKNOWN, Leonard & Partners Limited, *Montreal*, *Quebec*, *Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0016, PROTOTYPE HOUSING FOR QUEBEC INDIAN COMMUNITIES
B. MCCLOSKEY, McGill University, *Montreal*, *Quebec*, *Canada*
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Developing out of a course titled 'Shelter Systems for Developing Countries,' these grant funds will be used to construct low-cost housing prototypes suited to four Indian settlement areas in Quebec. A feedback system has been developed to insure consideration of Indian social, cultural and physical needs are accounted for. The prototypes also utilized solar collectors, stone heat exchanging walls, moss insulation, devices to improve wood stove efficiency, and windmill generators. The prototypes are buildable with local skills.

SUPPORTED BY Canada - Department of Indian and Northern Affairs - Ottawa

4.0017, DEVELOPMENT, TESTING AND OPERATION OF NUMERICAL TIDAL ENERGY MODELS FOR THE BAY OF FUNDY TIDAL POWER
UNKNOWN, Tidal Power Consultants Ltd., *Montreal*, *Quebec*, *Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0018, ALTERNATE GENERATION SUPPLIES AND TRANSMISSION STUDIES FOR THE BAY OF FUNDY TIDAL POWER STUDY
UNKNOWN, Tidal Power Consultants Ltd., *Montreal*, *Quebec*, *Canada*

4. GEOPHYSICAL ENERGY SOURCES

SUPPORTED BY Canada - Department of Energy, Mines and Resources Ottawa

4.0019, RESEARCH & DEVELOPMENT OF SOLAR HEATING SYSTEMS & SUBSYSTEMS-IN-GROUND HEAT STORAGE - PART OF THE PROGRAM ON SOLAR HEATING OF BUILDINGS
UNKNOWN, Acres Consulting Services Ltd., *Niagara Falls, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0020, FEASIBILITY STUDY AND CONCEPTUAL DESIGN OF A SOLAR POWERHOUSE FOR THE ARCTIC
UNKNOWN, Experimental Eng. Equip. Ltd., *Niagara on The Lake, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0021, PRELIMINARY INVESTIGATION OF THE GEOTHERMAL POTENTIAL OF THE CANADIAN CORDILLERA
D.W. STALKER, Geological Survey of Canada, *Ottawa, Ontario, Canada*

OBJECTIVE: To develop a data base on the geothermal potential of the Canadian Cordillera.

WORK: Incorporation of preliminary investigation of geothermal potential in ongoing projects of regional and economic geology and resource geophysics and geochemistry.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0022, PRELIMINARY STUDIES OF TIDE INLETS ON THE ATLANTIC COAST
D.W. STALKER, Geological Survey of Canada, *Ottawa, Ontario, Canada*

OBJECTIVE: To develop baseline data for the estimation of Canada's useable tidal and fluvial power potential.

WORK: Sediment analysis and current distribution studies as preliminary to estimation of the tidal power potential of the Minas Basin and other tide inlets on the Atlantic coast.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0023, ENVIRONMENT AND TERRAIN STUDIES
D.W. STALKER, Geological Survey of Canada, *Ottawa, Ontario, Canada*

OBJECTIVE: To develop baseline data for the estimation of Canada's useable tidal and fluvial power potential.

WORK: Environment and terrain studies in the areas of current and potential fluvial power development, for example, the Columbia River, the Lower Nelson River and James Bay.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0024, STUDY OF SOLAR ENERGY CONVERSION AND STORAGE BY PHOTO-ELECTROLYSIS OF WATER AT A SEMICONDUCTOR ELECTRODE
UNKNOWN, Infrared Photo Limited, *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

4.0025, GEOTHERMAL INVESTIGATIONS
L.S. COLLETT, Dept. Energy Mines & Resources, Resources Geophy. & Geoch. Div, *Ottawa, Ontario K1A OE8, Canada*

Objective: To maintain a watching brief on the developments in the field of geothermal energy resources in Canada.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0026, GEOTHERMAL ENERGY IN CANADA - COORDINATION OF RESEARCH
A.M. JESSOP, Dept. Energy Mines & Resources, Earth Physics Branch, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVES: To coordinate research by the Federal Government into the nature and location of geothermal resources in Canada.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0027, GEOTHERMAL ENERGY IN CANADA - SEDIMENTARY BASINS
A.M. JESSOP, Dept. Energy Mines & Resources, Earth Physics Branch, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVES: To evaluate the energy potential of the hot water in sedimentary basins.

DESCRIPTION: A preliminary survey of the temperatures of aquifers in the Western Canada Sedimentary Basin has been completed under contract by Sproule Associates Ltd. Existing data from oil company drilling record was used. A second phase is under way to examine the potential in selected areas where user potential on the surface is present.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0028, GEOPHYSICAL TECHNIQUE STUDIES
A.M. JESSOP, Dept. Energy Mines & Resources, Earth Physics Branch, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To develop and adapt geochemical, geophysical and related techniques to the field of geothermal energy.

WORK: Adaptation of the techniques of reservoir technology to the development of geothermal reservoirs sedimentary basins. Examination of the feasibility of seismic and magneto-telluric methods of reservoir detection and delineation.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0029, GEOCHEMICAL TECHNIQUE STUDIES
A.M. JESSOP, Dept. Energy Mines & Resources, Earth Physics Branch, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To develop and adapt geochemical, geophysical and related techniques to the field of geothermal energy.

WORK: Examination of volcanological characteristics of Canadian thermal areas to establish criteria of size, productivity and renewability. Analysis of geochemical data to develop techniques of resource detection. Use of the 'geoprobe' as a geothermal exploration tool.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0030, GEOTHERMAL ENERGY IN CANADA - GEOPHYSICAL INVESTIGATIONS
L.K. LAW, Dept. Energy Mines & Resources, Earth Physics Branch, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVES: To use geophysical techniques to determine the nature and location of geothermal resources in the volcanic belts of Canada.

DESCRIPTION: The main target of current work is the Meager Creek area of the Garibaldi Volcanic Belt. A magneto-telluric study of the adjacent Lillooet valley has been completed. Measurements on the thermal conductivity of rocks are being made to assist in the interpretation of temperature profiles.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0031, FUNDY TIDAL DEVELOPMENT STUDIES
A.R. SCOTT, Dept. Energy Mines & Resources, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To improve design and cost data presently available on Bay of Fundy Tidal Development.

Selection of power plant site with a view to optimize production. Studies on transmission and markets and related systems. Investigations of foundation conditions and construction methods. Studies for environmental assessment. Detailed estimation of capital costs. This project is jointly managed and funded by the Federal government and the provinces of Nova Scotia and New Brunswick.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0032, GEOTHERMAL ENERGY RESOURCES IN CANADA
J.G. SOUTHER, Dept. Energy Mines & Resources, Regional & Econ. Geology Div., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To make an inventory of the distribution, nature and geological setting of hot springs in Canada and the chemistry of their waters.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0033, RESEARCH AND DEVELOPMENT INTO NEW TECHNOLOGIES ASSOCIATED WITH LOW COST THIN FILM SOLAR CELLS
UNKNOWN, Garrett Manufacturing Limited, *Rexdale, Ontario, Canada*

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

4.0034, ANALYSIS OF TIDAL POWER PLANT DESIGN
UNKNOWN, Albery Pullerits Dickson Ltd., *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0035, ASSESSMENT OF TIDAL POWER PLANT DESIGN AND COSTS FOR THE BAY OF FUNDY TIDAL POWER STUDIES
UNKNOWN, Canadian Atlantic Power Group, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0036, COLLECTION & REVIEW OF DATA ASSOCIATED WITH LONG-TERM ENERGY ASSESSMENT OF SOLAR HEATING, WIND ENERGY & FORESTRY BIOMASS ENERGY OPTIONS
UNKNOWN, Middleton Associates, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0037, DEVELOPMENT AND EVALUATION OF VARIOUS SYSTEM COMPONENTS OF SOLAR HEATING SYSTEMS FOR URBAN DWELLINGS
UNKNOWN, Mississauga Solar Demon. Proj., *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Ministry of State for Urban Affairs - Ottawa, Ont.

4.0038, STUDY OF THE POTENTIAL OF CANADA'S RENEWABLE ENERGY RESOURCES
UNKNOWN, Peter Middleton & Assoc. Ltd., *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0039, DESIGN AND INSTALLATION OF SOLAR HEATING SYSTEMS IN DEMONSTRATION HOUSES
UNKNOWN, Proctor & Redfern Group, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0040, ASSESSMENT OF GEOTHERMAL RESOURCES IN CORDILLERAN YUKON AND NORTHWEST TERRITORIES
UNKNOWN, Nevin Sadlier Brown Goodbrand, *Vancouver, British Columbia, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0041, MONITORING OF A SOLAR HEATING SYSTEM OF THE TROMBE-MICHEL TYPE WALL--PART OF THE PROGRAM OF SOLAR HEATING OF BUILDINGS
B.P. WISNICKI, Univ. of British Columbia, School of Architecture, *Vancouver, British Columbia, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0042, DESIGN AND DEVELOPMENT OF AN ACOUSTIC TELEMETERING MARINE GEOTHERMAL HEAT FLUX PROBE
UNKNOWN, Applied Microsystems Limited, *Victoria, British Columbia, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

4.0043, DEVELOPMENT OF A STRATEGY TO STIMULATE THE ADOPTION OF SOLAR ENERGY TECHNOLOGY IN CANADA
UNKNOWN, Delphic Consulting Limited, *Victoria, British Columbia, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0044, CONTINUATION STUDY OF THE POTENTIAL FOR SOLAR HEATING OF BUILDINGS IN CANADA
K.G. HOLLANDS, Univ. of Waterloo, *Waterloo, Ontario, Canada*

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

4.0045, DEVELOPMENT OF A FIXED POSITION AND FIXED CONFIGURATION SOLAR COLLECTOR--PART OF THE PROGRAM ON SOLAR HEATING OF BUILDINGS
UNKNOWN, Solco Energy Systems Limited, *Weston, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0046, DEVELOPMENT OF A VERTICAL AXIS WIND POWER CONVERSION SYSTEM IN THE 1-10KW RANGE
UNKNOWN, Bristol Aerospace Limited, *Winnipeg, Manitoba, Canada*

SUPPORTED BY Canada - Department of National Defense - Ottawa, Ontario

4.0047, DEVELOPMENT OF SOLAR ENERGY IN MANITOBA
R. GEMMELL, Manitoba Dept. of Public Works, *Winnipeg, Manitoba, Canada*

SUPPORTED BY Canada - Manitoba Provincial Government - Winnipeg

4.0048, ELECTRICAL MACHINES AND POWER SYSTEMS
R.W. MENZIES, Univ. of Manitoba, *Winnipeg, Manitoba, Canada*

CURRENT AREAS OF RESEARCH: 1) Reluctance motor and generators. 2) Permanent magnet generators. 3) Cost Optimization of Large Induction motor design.

POTENTIAL AREAS OF RESEARCH: 1) Optimum load-flow of Power Systems. 2) Cost Optimization of electrical devices. 3) Novel wind turbine generators and conversion equipment.

SUPPORTED BY Canada - University of Regina - Regina, Saskatchewan

4.0049, ORGANIZATION OF AN ENVIRONMENTAL WORKSHOP ON THE IMPLICATIONS OF FUNDY TIDAL POWER
UNKNOWN, Acadia University, *Wolfville, Nova Scotia, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0050, INTEGRATED WIND POWER INSTALLATION FOR HEATING
H.N. JOHANSEN, Aalborg University Center, Inst. of Indus. Struct. & Eng., *Aalborg, Denmark* 9100

Purpose of project is to investigate whether is is technically possible, economically and ecologically responsible to base heat supply on a wind power installation combined with a heat pump installation, and storage of thermal energy.

SUPPORTED BY Denmark - Danish Government - Copenhagen

4.0051, MEASURING THE WIND PROFILE
H.N. JOHANSEN, Aalborg University Center, Inst. of Indus. Struct. & Eng., *Aalborg, Denmark* 9100

In order to utilize wind power, for example for heating water, it is necessary to know the wind profile at the site where the wind motor is to be set up, and its variation during the year.

The project is thus aimed at measuring the wind profile variation of force and direction at 10, 20, and 30, meters in the course of a year; an attempt will also be made to take measurements at selected sites.

SUPPORTED BY Denmark - Danish Government - Copenhagen

4.0052, WINDMILL GENERATOR DESIGN
K. LUNDGREN, Aalborg University Center, Inst. of Indus. Struct. & Eng., *Aalborg, Denmark* 9100

The aim of the project is to develop a rotor for a windmill generator in the form of a Voith-Schneider propeller, taking into account new technology, reliability, economy and ecological/esthetic effect.

SUPPORTED BY Denmark - Danish Government - Copenhagen

4.0053, THEORETICAL AND EXPERIMENTAL GEOTHERMAL RESEARCH IN SOUTHERN SCANDINAVIA
UNKNOWN, Univ. of Aarhus, Lab. for Geophysics, *Aarhus, Denmark* 8000

Research in geothermics is quite new here in Denmark. It was initiated at the Geophysics Laboratory by the under the leadership of Dr DAVID MALMQVIST, formerly of BOLIDEN, SWEDEN, when he was at the laboratory as guest professor from 1970 to 1973. The project has grown out of the work that was begun then. Since then a joint effort has been arranged with the Geophysics Institute of the Technical University of CLAUSTHAL, WEST GERMANY. The primary purpose of the project is to determine the temperature distribution in the earth's crust, and accordingly to construct geothermal models of the earth's crust in southern Scandinavia. Local investigators at various sites in JULLAND have the task of determining the heat flux through the surface layers and the specific inhomogenieties of the thermal conductivity (for example, salt structures) and movements of the ground as factors that influence the temperature distribution.

SUPPORTED BY Denmark - Danish Government - Copenhagen

4.0054, WIND POWER FOR HEATING AGRICULTURAL BUILDINGS
UNKNOWN, Royal Veterinary & Agricult U, Agricultural Engin. Institute, *Copenhagen, Denmark* 1870

The initiative for this research was taken shortly after the oil crisis, among other things, after various applications by farmers for alternative power sources. From other activities, the Institute had experience with the so-called 'water brake' or hydraulic dynamometer, where the mechanical energy is utilized in connection with the measurement of the power output of tractors. Here the combination of wind driven motor with an hydraulic dynamometer becomes obvious.

The principal purpose of the research is to determine whether the described method will prove itself functionally and economically in the case of the heating of water in a central heating plan and production of water for use.

SUPPORTED BY Denmark - Danish Government - Copenhagen

4.0055, WIND GENERATOR
M.B. PEDERSEN, Technical Univ. of Denmark, *Copenhagen, Denmark*

The project includes the development of wind-generator rotors with long service life and high efficiency.

SUPPORTED BY Denmark - Danish Government - Copenhagen

4.0056, UNINSULATED HEAT ACCUMULATORS IN THE GROUND
UNKNOWN, Technical Univ. of Denmark, Numerical Institute, *Copenhagen, Denmark*

Heat accumulators are required in connection with the use of solar systems for heating houses. One possible version of accumulator is a ground tank with water as the heat storing medium. For this type of heat accumulators an investigation is desired on the extent to which the surrounding layer of ground can also be considered a heat storing medium.

An accumulator system that uses the layers of soil directly for storing heat is under construction at the firm of BRUEL, SCHIOLER AND TEJLGAARD. In this system the heat is distributed within a spherical area, so that the temperature is highest in the area closest to the center. The heat that is conducted to the accumulators from the solar reflector is led into the central part, but the heat is used from the outermost layer, thus obtaining an insulating effect.

For both developments the desire is to make possible calculations of data with respect to the dimensioning of the size and con-

figuration of an installation. Simulations will especially be devised which can explain the effectiveness of the solar heating system under the weather conditions that prevail in Denmark with a zero-energy house as the consumer system.

This part of the project is being done in cooperation with the Heat Insulation Laboratory.

SUPPORTED BY Denmark - Danish Government - Copenhagen

4.0057, SOLAR HEATING SYSTEM WITH HEAT PUMP
UNKNOWN, Technical Univ. of Denmark, *Copenhagen*, *Denmark*

The current laboratory project, 'The Zero-Energy House', has indicated that even for providing a very low heat requirement a large solar heating system is required here in Denmark. One possibility for reducing the size of the system is to add a heat pump. Thus the purpose of the project is to investigate the possibilities of satisfying the heating requirements of a building in Denmark, wholely or in part, by means of a solar heating system incorporating a heat pump.

SUPPORTED BY Denmark - Danish Government - Copenhagen

4.0058, SOLAR HEATING SYSTEMS FOR DANISH CLIMATE
UNKNOWN, Technical Univ. of Denmark, *Copenhagen*, *Denmark*

The aim of the project is to appraise the possibilities of using solar heating systems under Danish climatic conditions. Emphasis is on the technical side of the problem. The following main points can be mentioned: 1. Investigation of advantages and disadvantages of various types of solar heating systems. 2. Compilation of EDP programs for computing the productivity of individual components. 3. Measuring the productivity of individual components. 4. Compilation of EDP programs for computing the productivity of the solar system for heating under Danish climatic conditions.

SUPPORTED BY Denmark - Danish Government - Copenhagen

4.0059, LONG PERIOD STORAGE OF THERMAL ENERGY
UNKNOWN, Technical Univ. of Denmark, Lab. for Heat Insulation, *Copenhagen*, *Denmark*

The conceptual background stems from the work with solar heating systems where time after time it has been evident that the main problem deals with the storage of solar energy. This also applies obviously with wind energy.

THE PROJECT AIM INCLUDES: 1) an analysis of the generally used storage systems with regard to efficiency, storage capacity, and economy; 2) optimizing and eventually improving these systems; 3) investigation the applicability of unconventional storage systems.

SUPPORTED BY Denmark - Danish Government - Copenhagen

4.0060, COMBINATION WINDMILL AND TORQUE CONVERTER
UNKNOWN, Technical Univ. of Denmark, Lab. of Power Engineering, *Copenhagen*, *Denmark*

The idea is, by means of a hydrodynamic torque converter, to adapt the characteristics of the windmill to the electric generator, heat pump, or other characteristics. It is expected that the windmill will operate near optimum efficiency without adjustable vanes. The heat of friction of the torque converter will be stored for heating purposes.

SUPPORTED BY Denmark - Danish Government - Copenhagen

4.0061, SOLAR CELLS FOR GENERAL ENERGY PRODUCTION
UNKNOWN, Technical Univ. of Denmark, Lab. for Elec. Semicond. Comp., *Copenhagen*, *Denmark*

The aim of the project is the investigation of the possibilities of producing solar cells that are inexpensive enough to make energy producing with them competitive with conventional power plant energy. Even though the research results of the past few years are promising with respect to making solar cells cheaper, the price is still high.

SUPPORTED BY Denmark - Danish Government - Copenhagen

4.0062, UTILIZATION OF SOLAR HEAT AS SUPPLEMENT TO HEATING OF EXISTING HOUSES
UNKNOWN, Technical Univ. of Denmark, Lab. for Heat Insulation, *Copenhagen*, *Denmark*

The conceptual background for the project is the fact that most houses, in the course of the warm season, are exposed to a considerable amount of solar energy, of which only very little is utilized.

An attempt is being made to find out whether it will or will not be possible, with a reasonably moderate economic expenditure, to utilize greater part of the solar energy to heat a house, without essentially altering the appearance of the house. The intention is primarily to achieve this by capturing and storing the solar heat that strikes the southern, sloping roof surfaces or vertical gables by making them simple solar heat receivers with air as the heat conducting medium. It is expected that the heat will be stored in a magazine filled with stones, possibly water in small plastic containers kept in a cold room or insulated detached structure.

SUPPORTED BY Denmark - Danish Government - Copenhagen

4.0063, ZERO-ENERGY HOUSE
UNKNOWN, Technical Univ. of Denmark, Lab. for Heat Insulation, *Copenhagen*, *Denmark*

The idea of a highly insulated, solar-heated house with a high degree of heat recovery was expressed by professor V. KORSGAARD in May 1973, because of the very large part of Denmark's imported energy that goes to space heating in spite of the many years of work on the improvement of insulation standards here. Altered building style, lighter sheathing, greater desire for comfort and larger total built-up area have all far outpaced the effect of increased insulation in both existing dwellings and new housing. When the energy crisis erupted it became possible to realize the project.

AIM OF THE PROJECT: 1) to ascertain how long heat consumption can be reduced with heavy insulation, night insulation of windows, controlled low exchange of air, heat recovery from air exchange and hot water used; 2) to test a year-round solar heating system with flat-plate solar receiver and heat storage in heavily insulated water tanks; 3) to test the house's living quality with a family in residence.

SUPPORTED BY Denmark - Danish Government - Copenhagen

4.0064, MEASURING THE VARIATIONS OF DAYLIGHT
UNKNOWN, Academy of Technical Sciences, Illumination Engin. Laboratory, *Lyngby*, *Denmark* 100

The aim of the project is to determine the statistical distribution of daylight illumination in the course of one 'normal year' so that the required data can be obtained for dimensional designing. The corresponding temperature data can be found in the already available, 'The Reference Year'.

4. GEOPHYSICAL ENERGY SOURCES

SUPPORTED BY Denmark - Danish Government - Copenhagen

4.0065, SYSTEMS FOR USING SOLAR ENERGY AND RATIONAL ENERGY APPLICATION IN BUILDINGS
H. HOERSTER, Technical Univ. of Aachen, Philips Research Laboratory, *Aachen, Nordrhein Westfalen, Federal Republic of Germany* 5100

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0066, UTILIZATION OF SOLAR ENERGY FOR HEATING AND HOT WATER PREPARATION IN BUILDINGS
H. HORSTER, Technical Univ. of Aachen, Philips Research Laboratory, *Aachen, Nordrhein Westfalen, Federal Republic of Germany* 5100

MAIN OBJECT: Conversion, transport and storage of energy.

FIELD: Solar energy.

OBJECTIVE: The development of a high-efficiency solar collector for room heating and hot water preparation. The efficient use of energy for household appliances. The integration of all energy consuming components into an optimized system, as a result of operating an experimental house under real conditions.

WORK PROGRAM: Collecting, rearranging and analyzing insolation data for central Europe. Development of a high-efficiency solar collector. Analyzing measured collector performance curves, using real meteorological data, in order to achieve system optimization. Studying the efficient use of energy conversion for household appliances. Integrating household appliances into the energy supply system. Design and construction of the experimental house, its components, and its measuring and processing equipment. Experimenting by simulated and real occupancy. System analysis.

STATUS: The experimental house has been constructed. At present, the measuring, data aquisition, data handling and energy systems are being set up.

ADDENDA: Philips Forschungslaboratorium, Aachen GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0067, DATA ON OBTAINING GEOTHERMAL ENERGY FROM DRY HOT ROCK
W. KERTZ, Technical Univ. Braunschweig, Inst. for Geophysics & Meteor., *Braunschweig, Niedersachsen, Federal Republic of Germany* 3300

ADDENDA: Performing organization: Inst. Fuer Geophysik Und Meteorologie Der Tu Braunschweig.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0068, TEST AND DEMONSTRATION CENTER FOR A SOLAR HEATED PUBIC POOL IN WIEHL
B. STOY, Energy Engineering Gmbh, *Essen 18, Nordrhein Westfalen, Federal Republic of Germany* 4300

ADDENDA: Performing organization: Energietechnik GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0069, HEAT-PIPE SOLAR ABSORBER
GEHRJE, Dornier System Gmbh, *Friedrichshafen, Baden Wuertt., Federal Republic of Germany* 7990

DESCRIPTION OF PROJECT: OBJECTIVE: Adaptation of the Solar Heat-Pipe-Absorber which was developed for solar desalination to the requirements of a house heating system. A prototype plant is provided and tested during a full heating season.

WORK PROGRAM: a) Examination of the solar energy supply and of the energy demand. b) Design of solar system and components. c) Construction and manufacture of prototype plant. d) Adaptation of absorber to the roof construction. e) Measurement installation and installation of a data registration device. f) Test performance and data analysis.

STATUS: The installation of some 7O square meter Heat-Pipe collectors into an occupied test dwelling in the town Essen has taken place. Solar energy is transported by means of a water primary circle to central water storages of around 7.2 cubic meters, built into the house cellar. A water-water heat-pump increases the efficiency during winter time with low solar insolation. During summer time the four tenants of the house are supplied with warm water, during winter time the solar device operates the floor heating system of a 210 square meter apartment.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0070, 10 KW SOLAR POWER PLANT
GEHRKE, Dornier System Gmbh, *Friedrichshafen, Baden Wuertt., Federal Republic of Germany* 7990

DESCRIPTION OF PROJECT: OBJECTIVE: Design and construction of a solar driven 10 kW turbogenerator for local TV-educational systems, irrigation pumps and other applications in developing countries.

WORK PROGRAM: a) System design and thermodynamic calculation. b) Design of the collector array and construction. c) Fixing of components and auxiliary units. d) Turbine design, construction, manufacture and test run. e) Generator design, construction, manufacture and test run. f) Turbogenerator integration and test. g) Electrical supply, plant control and regulation. h) Test assembly, performance and analysis.

ADDENDA: Subcontractor: KKK, Frannkenthal.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0071, DEVELOPMENT OF HIGH TEMPERATURE RESISTANT SOLAR ABSORBER SURFACES
W. SCHERBER, Dornier System Gmbh, *Friedrichshafen, Baden Wuertt., Federal Republic of Germany* 7990

DESCRIPTION OF PROJECT: Objective: The properties and drawbacks of various coatings for solar absorbers are to be investigated. The results are useful to define the application and efficiency of the coatings.

WORK PROGRAM: a) Preparation of multilayer interference coatings. Selection of refractory and non-diffusable film systems. b) Preparation of selective coatings using semiconductor layers and diffusion barriers. c) Comparison of the methods with respect to economical application.

RELATION TO OTHER PROJECTS: This project yields basic data for the system study ET 4045 on the technical utilization of solar energy.

STATUS: The goal of a first section of the project, to give a survey of the group of interference filters and semiconductor filters has been reached. More than 200 different samples have been prepared. Among these there are about 30 different interference stacks, about 20 different semiconductor films and some approaches of the 'seraphin-filter.' As far as possible, low cost production methods like electroplating, thermal spraying, conversion methods, plasma oxidation etc. have been used.

At all samples the alpha and beta values have been measured by a standard procedure, and general film properties like adhesivity, wear, roughness etc. have been checked. For about 30 samples with promising properties life time tests have been conducted at 600 degrees C up to 100 hours.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0072, EXPERIMENTAL INVESTIGATION INTO THE DEVELOPMENT OF TERRESTRIAL SOLAR CELL GENERATORS
R. BUHS, A E G Telefunken AG, *Hamburg 11, Federal Republic of Germany* 2000

DESCRIPTION OF PROJECT: OBJECTIVE: Based on the present statenof-the-art of solar cell generators for space applications, processes are to be investigated which permit a substantial reduction of costs. The cost analyses will be largely supported by experiments. Finally, a development program based on these results is to be defined for cheap terrestrial solar cell generators.

WORK PROGRAM: a) Application of conventional techniques. b) Modification of conventional techniques with a view to drastic reduction of costs. c) Test and application of unconventional techniques.

RELATION TO OTHER PROJECTS: To support the study on the technical application of solar energy , a 1 kW test generator consisting of several subsystems will be set up in accordance with the respective state of development within the complete program.

The major effort in 1975 (phase I) was the testing of materials and technologies for the embedding of interconnected solar cells. Developmental efforts have resulted in two types of manufactured generators which survived laboratory tests without degradation. One type is encapsulated in glass, the other in plastic. 20 modules of each type (approx. 300 W-peak) are currently being investigated at the 'Universitat Stuttgart' to test their long-term behaviour under realistic environmental conditions.

ADDENDA: Subcontractor: 1) AEG TfK B2. 2) Wacker-chemie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0073, TEMPERATURE FIELD EIFEL

O. KAPPELMEYER, Geosciences & Mineral Inst., *Hannover 23, Niedersachsen, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: OBJECTIVE: The most recent vulcanic activity in Germany appears in the Eifel. Through experimental investigation in a 750 m deep hole, it is to be tested whether this geological phenomenon, which dates back only 1200 years, Still influences the temperature field in the Eifel, and could promote an economical production of geothermal energy.

WORK PROGRAM: Determination of the undisturbed, natural rock temperatures, the thermal conductivity of the rock, the hydraulic rock properties, the chemical and isotope chemistry properties, as well as the density of the terrestrial flow of heat in a 750 m deep hole at Ochtendung. These experimental investigations should represent the beginning and boundary condition for a model calculation of the distribution of heat sources underground in the Eifel. From the measured values and results of the model calculation, it is to be determined which possibilities for an economical production of terrestrial heat in the Eifel exist. The investigation is also in conjunction with the selection of areas for an eventual experimental field for the development of technology for the extraction of terrestrial heat from dry hot stones.

STATUS: The hole had a depth of ca. 100 m in January 1976. The conclusion of the hole work is planned for March 1976. The conclusion of the experiment in the hole is planned for winter 1976. The final report will be submitted at the end of 1976.

ADDENDA: Performing organization: Bundesanstalt Fuer Geowissenschaften Und Rohstoffe (BGR).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0074, GEOTHERMAL ENERGY FROM HOT DRY ROCKS

O. KAPPELMEYER, Geosciences & Mineral Inst., *Hannover 23, Niedersachsen, Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: OBJECTIVE: The underground geothermal energy potential can be economically utilized if it is possible to extract the energy contained in the dry stones to a large extent. The premise is the artificial production of widespread heat exchanger surfaces at a depth of at least several thousand meters.

WORK PROGRAM: For the evaluation of the chances of success and to determine the present scientific status, a scientist was sent to the research project 'Dry Hot Rock' in Los Alamos, USA, for two months. This geophysicist took part in an experiment for the production of a crack at a depth of 2000 m. In addition to the production of the crack, the localization of the dimensions of the crack was subject to research.

STATUS: The stay in the U.S.A. lasted until June 15, 1976. The report and publication are available.

ADDENDA: Performing organization: Bundesanstalt Fuer Geowissenschaften und Rohstoffe (BGR).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0075, STUDY USING GEOTHERMAL ENERGY FOR HEATING PURPOSES IN THE GERMAN FEDERAL REPUBLIC

UNKNOWN, Geosciences & Mineral Inst., *Hannover 23, Niedersachsen, Federal Republic of Germany* 3000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0076, LONG-TERM ENERGY STORAGE TANKS FOR RESIDENTIAL BUILDING - SOLAR HOUSE ARCHITECTURE

B. DIETRICH, Energy Technology Gmbh, *Kettwig, Federal Republic of Germany* 4307

DESCRIPTION OF PROJECT: OBJECTIVE: A suitable long-term termperature water storage unit will be developed, tested and optimized technically and economically. Furthermore, investigations of the architectural configuration of future solar residential houses are proposed with regard to the requisites for solar energy.

WORK PROGRAM: a) Draft of storage containers and their insulation. b) Structural preparatory work and storage installation. c) Experimental measurements for the registration of storage behavior. d) Optimization through the variation of heat input and output appliances. e) Cost optimization of the storage unit.

ADDENDA: Subcontractor: Architekten Bahr & Gansfort Dusseldorf. Performing organization: Energietechnik GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0077, WIEHL TEST AND DEMONSTRATION PLANT FOR A SOLAR HEATED OPEN RESERVOIR

B. STORY, Energy Technology Gmbh, *Kettwig, Federal Republic of Germany* 4307

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0078, SEARCH FOR ECONOMICALLY ADVANTAGEOUS PHOTODIODES AND METHODS FOR THE PRODUCTION OF SOLAR ENERGY

E. BUCHER, Constance University, *Konstanz, Baden Wuerttemberg, Federal Republic of Germany* 7750

OBJECTIVE: Production of solar energy by photovoltaic means. Study of economically advantageous photovoltaic diodes (p-n transistors, heterodiodes and Schottky diodes) by means of a systematical material research.

WORK PROGRAM: a) Completion of preparatory arrangements. b) Erection of the test plants of solar cell semi-conductors. c) Optical measurements. d) Investigation of the transport properties (conductivity, Hall effect, thermo-electric power). e) Effectivity measurements as solar cells, Schottky diodes, heterodiodes and p-n homodiodes.

ADDENDA: Performing organization: Universitat Konstanz.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0079, HOT WATER SUPPLY BY SOLAR ENERGY WITH PLASTIC SOLAR COLLECTORS

H. KLEINWAECHTER, Kleinwaechter Res. & Dev. Lab., *Loerrach, Baden Wuerttemberg, Federal Republic of Germany* 7850

DESCRIPTION OF PROJECT: OBJECTIVE: Development and testing of low-priced modular plastic solar collectors. Models

can be used for a wide range of applications, from swimming pool heating to roof collectors with variable orientation.

WORK PROGRAM: a) System study. b) Basic element is a plastic tube with a transparent cover and a dark bottom. c) Manufacturing of a prototype I, only for horizontal, plain surfaces. e) Measurements. d) Manufacturing of some prototypes with honeycomb structure of the tube. Can be placed on inclined surfaces. e) Measurements. f) System study for framed collectors. Optimization of system parameters; selective coatings. g) Manufacturing of Prototype III, low weight plastic collector. Measurements - final report.

STATUS: Data of R & D contract: December 3, 1975. Several prototypes I were built and are in service in several European countries for heating swimming pools.

Various prototypes II and III were built and are now being tested.

ADDENDA: Kleinwachter Entwicklungs und Forshungslabor.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0080, FLAT SOLAR ENERGY COLLECTOR

E. HUSSMANN, Jenaer Glaswerke Schott & Gen., *Mainz, Federal Republic of Germany* 6500

DESCRIPTION OF PROJECT: OBJECTIVE: Different flat solar energy collectors with especially high efficiency are to be developed, in order to make better use of the high degree of diffuse radiation in our climate.

WORK PROGRAM: a) Development of IR-reflecting glass coverings as well as non-reflecting layers. b) Development of alpha/epsilon layer system. c) Development of a honey-comb structure in order to prevent the loss of radiation, power and convection. d) Development of a hollow glass fiber absorber plate with very good heat dissipation. e) Development of an evacuated all-glass flat collector on the basis of hollow glass fiber absorber plates.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0081, CONSTRUCTION OF A SOLAR COLLECTOR PLANT FOR HEATING OF AN OUTDOOR SWIMMING POOL

F. WEIL, Brown Boveri & Cie Company, *Mannheim 1, Baden Wuerttemberg, Federal Republic of Germany* 6800

DESCRIPTION OF PROJECT: OBJECTIVE: Planning, design and construction of a solar collector for the heating of an outdoor swimming pool.

WORK PROGRAM: a) Construction of a 1100 absorber solar collector plant for life tests and demonstration purposes. b) Development of large scale manufacturing processes for solar heaters.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0082, MODULAR SOLAR HOUSE HEATING SYSTEM

H. GRALLERT, Messerschmitt Boelkow Blohm, *Munich 80, Bayern, Federal Republic of Germany* 8000

DESCRIPTION OF PROJECT: OBJECTIVE: Theoretical and experimental investigations for the development of a modular solar house heating system, which will be commercialized by cooperation between MBB and other firms. This system is suitable especially for solar house heating in European latitudes. A subsequent system modification with cooling elements will be suitable for air conditioning, too.

WORK PROGRAM: a) Investigation, development and construction of solar-energy collectors, storage fluid, energy storage tank, heat exchange unit, sensor and regulator units. b) Off-design of complete system. c) Building up of a complete system for functional demonstration. d) Preparations for mass production.

STATUS: During the first development-phase, detailed technical and economical system analyses had been made which were initial-points to the necessary component development. These analyses contained the estimate of weather influence, a conceptional study, investigations of all collector-design parameters, control, characteristics of energy demand, system cost estimate and optimisation, complete simulation of the solar thermal and conventional heating circle, and thermal and mechanical calculations of each component. Some evident results are: a) The application of selective absorber coatings and IR-coatings on coverglasses are still uneconomical in comparison with simple double glazing flat plate collectors; b) For the application in 1- and 2-family-houses a thermal storage tank, which is adapted to a one week energy demand and which is constructed like a cubic hot water tank, shows optimum solution.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0083, 10 KW SOLAR POWER STATION

H. HOPMANN, Messerschmitt Boelkow Blohm, *Munich 80, Bayern, Federal Republic of Germany* 8000

DESCRIPTION OF PROJECT: OBJECTIVE: Development and construction of a small power generation prototype station appropriate for countries with high insolation values.

WORK PROGRAM: a) System analysis and designing of components. b) Manufacturing and assembly of solar collectors, thermal storage tank and thermo-mechanical energy conversion unit; definition and procurement of measurement and electrical control equipment. c) Testing of components and system integration. d) Testing of the prototype power station.

STATUS: First generation of solar collector is designed as flat-plate collector and is mainly identical to the collector design evaluated within the framework of the Modularized Solar House Heating and Cooling Program (ET 4066 A). Schedule tentatively established on August 1, 1975.

ADDENDA: Subcontractor: Linde AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0084, COMPARISON OF VARIOUS BASIC DESIGNS OF SOLAR ENERGY POWER PLANTS IN THE RANGE 100 W TO 10 MW

UNKNOWN, Messerschmitt Boelkow Blohm, *Munich 80, Bayern, Federal Republic of Germany* 8000

DESCRIPTION OF PROJECT: OBJECTIVE: Comparison of known basic designs of solar thermal developing countries. Development of general methods of comparison.

WORK PROGRAM: a) Review of components and systems. b) Characterization of selected systems. c) Comparison of systems. d) Appropriate systems for developing countries and optimization of systems. e) Second comparison of systems. f) The effect of the results on the parameters of the components, local parameters and the weight attached to systems' characteristics.

RELATION TO OTHER PROJECTS: Results of analogous studies of photovoltaic systems in project No. ET 4045 will be incorporated into the final report.

STATUS: Preparation has been completed for the first comparison of systems.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0085, WIND ENERGY - MEASURING PROGRAM AT THE SYLTER WIND POWER PLANT

W. SCHOENBALL, Energy Constr. Installation, *Solingen, Nordrhein Westfalen, Federal Republic of Germany* 5650

DESCRIPTION OF PROJECT: OBJECTIVE: Follow-through of a measuring program for wind data in conjunction with the production of electrical energy from the wind using an existing wind power plant on Sylt. The power plant has horizontal rotation axis.

WORK PROGRAM: The object of this project is the follow-through of a measuring program for wind data in conjunction with the production of electrical energy from the wind using an existing wind power plant on Sylt.

The measuring program includes: a) Measuring of wind speed, wind way and wind direction. b) Measurements of a

generator: power, voltage, curent, RPM (frequency), number of working hours, kWh-counting. c) Recording and evaluation of measured results from a) and b). d) Documentation and recording of plant operation.

STATUS: During the period from July 15 to December 10, 1975 the plant operated for 91 days and produced in this time 10 710 kW/h electrical energy. Peak values were 82 kW energy supply at a wind velocity of 17.2 m/s. In addition, in a short measuring program, the preliminary results have been gathered of the electrical properties of the generator with a simultaneous registration of the meteorological data.

ADDENDA: Subcontractor: Messerschmitt-Bolkow-Blohm, Hamburg. Performing organization: Energie-Anlagenbau GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0086, SYSTEM STUDY FOR THE USE OF SOLAR ENERGY

G. LEHNER, Solar Energy Engineering Soc., *Stuttgart 1, Federal Republic of Germany*

MAIN OBJECT: Conversion, transport and storage of energy.

FIELD: Solar energy.

OBJECTIVE: Investigation and development of energy conversion methods which are interesting for the coversion of solar energy into a practically useful form of energy. Optimization of components and systems with respect to their economic use.

WORK PROGRAM: Collectin of the incoming solar energy by collectors with and without concentration. Conversion of the solar energy into electrical energy by means of solar cells, thermoelectric generators, and thermodynamic engines or by combinations of these devices; chemical conversion.

ADDENDA: Performing organization: Institutsgemeinschaft fur die Technische nutzung Solarer Energie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0087, A SYSTEMS STUDY OF A HORIZONTAL AXIS WIND POWER PLANT OF ALTERNATIVE DESIGN

U. HUTTER, Univ. of Stuttgart, Windpower Tech. Res. Inst., *Stuttgart, Baden Wuerttemberg, Federal Republic of Germany* D7000

A systems study of a large (diameter 113 m, electrical output 3 MW) wind power plant design, characterized by the two-bladed wind turbine being situated in front (compared to the wind direction) of the inclined tower. The work will include a technical description of the plant as whole as well as of major components. It will also include estimates of cost and production capacity. The consequences of an increase or decrease in size should be demonstrated. The effects on power capacity from geographically separated wind power plants should be demonstrated.

INTENDED USE OF RESULTS: The project is a part of a comprehensive study in evaluation of different plant concepts for large units (1-5 MW) connected to the power grid.

ADDENDA: Performing organization: Universitat Stuttgart, Forschungsinstitut Windenergietechnik.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

4.0088, DRAWING UP AS WELL AS INVESTIGATION OF WORKING CONDITIONS OF A WIND ENERGY CONVERTER WITH 10 M DIAMETER IN MODULAR STYLE

U. HUTTER, Univ. of Stuttgart, *Stuttgart, Baden Wuerttemberg, Federal Republic of Germany* D7000

DESCRIPTION OF PROJECT: OBJECTIVE: At a plant with 10 m rotor diameter (according to wind availability 3 to 10 kW power output) a pilot program with a view to new technology of the rotor construction style and the regulation will be tested.

WORK PROGRAM: a) Measurement of the wind velocity - power dependence and the regulation characteristic of an existing 10 m diameter plant at the DFVLR, system Hutter (repairing and erection of the plant at the Institut fur Flugzeugbau). b) Layout and construction of composite-rotor blades for the 10 m wind energy plant (fiber composite material). In order to obtain optimal efficiency of the rotor, a high quality aerodynamic configuration is required. c) Operation and power measurement of the wind energy plant, system Hutter, with these composite blades and comparison with the results from point a). d) Rough draft of the 10 m plant in modular style. Individual building units are to be combined to modular units and thereby form a quick-change system. e) Operation and power measurement of the prototype in modular style and collection of operational experience over a long period of time.

ADDENDA: Performing organization: Universitat Stuttgart.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0089, SYSTEM STUDY FOR THE USE OF SOLAR ENERGY

G. LEHNER, Univ. of Stuttgart, Inst. for Tech. of Solar Ener., *Stuttgart, Baden Wuerttemberg, Federal Republic of Germany* D7000

DESCRIPTION OF PROJECT: OBJECTIVE: Investigation and development of energy conversion methods which are interesting for the conversion of solar energy into a practically useful form of energy. Optimization of components and systems with respect to their economic use.

WORK PROGRAM: a) Collection of the incoming solar energy by collectors with and without concentration. b) Conversion of the solar energy into electrical energy by means of solar cells, thermoelectric generators, and thermodynamic engines or by combination of these devices; chemical conversion. c) Optimal preparation, transmission, storage, use of generated energy. d) Follow through of an extensive system study.

STATUS: The investigations carried out by the 'Institutsgemeinschaft fur die Technische Nutzung Solarer Energie' are aiming at a clarification of the possibilities to convert solar energy into useful energy taking into account technological and economical boundary conditions. Main subjects of investigation are systems producing thermal energy or electrical energy.

In the field of thermal energy, different types of flat plate collectors are tested. These tests are supposed to result in standardized test methods. Furthermore special problems (e.g. the heat exchanger properties of the absorber and its manifold, selective surfaces, etc.) are studied to improve the collectors available at present. An important part of the work is related to the problem of heat storage. Systems to produce high temperature heat by concentrating devices are also studied.

Concerning the production of electric energy the main emphasis is on the technology of solar cells and solar cell systems. The technology and behaviour of CuxS-CdS solar cells is intensely studied. Work on Silicon solar cells is done in close cooperation with AEG. On a smaller scale also thermoelectric energy conversion is tested by concentrating tracking devices.

ADDENDA: Performing organization: Institutsgemeinschaft fur die Technische Nutzung Solarer Energie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0090, USING THE HEAT CAPACITY OF EARTH

F. KALISCHER, Rhine Westphalian Elect Plant, *4300 Essen 1, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

4.0091, CONSULTATION SERVICES ON THE APPLICABILITY OF VARIOUS TIDAL REGIME MODELS TO THE CALCULATION OF TIDAL ENERGY GENERATION POTENTIAL

R. GIBRAT, Unknown Inst. or Indiv. Grant, *France*

4. GEOPHYSICAL ENERGY SOURCES

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0092, SOLAR PHOTOCELLS WITH VARIABLE SUSPENDED BAND WIDTH
Y. MARFAING, Scientific Research Center, Lab. of Solid State Physics, *Bellevue, France* 92190

Epitaxial expansion, using the Edri method (evaporation - diffusion in isothermal clusters), of (Cd Hg)Te and (Zn Hg)Te systems on the monocrystalline substratum: Monocrystalline structures with controlled thickness, composition, and optimal composition gradient. Doping control, creating a junction during multiplication. Photovoltaic effects (function of wavelength, illumination intensity, and total conversion yield). Theoretical analysis and interpretation of results similarly. Concept, creation, and perfection of the cathodic pulverization device for subsequent deposit study of problems connected with structure in thin layers.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0093, POSSIBILITY OF USING THERMAL ENERGY FOR HEATING BUILDINGS
J. OLIVET, Electricite de France, *Chatou, France*

Defining and evaluating the best possible heating system with sanitary hot water provision to have using the following criteria: optimizing heat use; optimizing energy transfers.

Systems will be studied to determine their reliability, the relationship of their establishment, and the flexibility with which these can be used.

Our search for technical solutions deals with a group of diagramed stations such as: a. Drilling sites (characteristics, reliability); b. Secondary distribution points (diagrams of heat transfer, characteristics, reliability); c. Heat distribution in buildings and residences; and d. Secondary and tertiary transport networks. The choice of the optimal system will be made on the basis of possible combinations between solutions possible for each station.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0094, AID FOR ORGANIZING GEOTHERMAL COLLOQUIUM
G. MARSILY, A.R.M.I.N.E.S., *Fontainebleau, France* 77350

Preparations for using geothermal energy in industrial and residential heating.

ADDENDA: Performing organization: A.R.M.I.N.E.S., Centre D' Information Geologique, Ecole des Mines de Paris.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0095, EXPERIMENTAL STUDY OF A HYDROTHERMAL JACKET
G. MARSILY, A.R.M.I.N.E.S., *Fontainebleau, France* 77350

Functioning of the hydrothermal jacket. Hydrodynamic characteristics using tracers. Experimental injections of cold water. Intermittent injections of cold water. Practical regulation of experiments in situ.

ADDENDA: Performing organization: A.R.M.I.N.E.S., Centre D' Informatique Geologique Ecole Des Mines De Paris.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0096, CONSULTATION SERVICES ON THE APPLICABILITY OF VARIOUS TIDAL REGIME MODELS TO THE CALCULATION OF TIDAL ENERGY GENERATION POTENTIAL
UNKNOWN, Sogreah Engineers Council, *Grenoble, France*

ADDENDA: Performing organization: Soqreah Ingenieurs Conseils.

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0097, NEW SOLUTIONS FOR HEATING DOMICILES USING THERMAL ENERGY
M. POPINEAU, Compa Society, *Le Pontet, France*

Using geothermal energy for heating domiciles studying various solutions: Using a primary water-secondary water exchanger: Using 2 exchangers. 'Heat pump' system. Comparison with fuel oil heating systems (groups of 100 to 200 domiciles). Economic study of the geothermal energy heating system.

Addenda: Performing organization: Societe Compa.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0098, HETEROSTRUCTURE FOR SOLAR CELLS
L. HOLLAN, Electronic & Phys. Appl. Lab., *Limeil Brevannes, France*

Choice of materials (metal on 5i equals p such as Ti, Cr, Ni, Hf). Increasing the height of the barrier. Silicates.

ADDENDA: Performing organization: (L.E.P.) Laboratorie d'Electronique et de Physique Applique, France.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0099, ELECTRICAL, OPTICAL, AND PHOTOELECTRIC PROPERTIES OF THE CDS 'SPRAY' LAYERS IN RELATION TO THEIR STRUCTURE
S. MARTINUZZI, Univ. of Aix Marseille, Lab. of Photoelec. Gas & Cond., *Marseille 13, France* 13013

Study of the crystallographic, electrical, optical, and photoelectrical properties of the pure layer and layers with modified deposition conditions.

ADDENDA: Performing organization: Universite Aix-Marseille III, Laboratoire De Photoelectricite Gaz et Semi Conducteurs.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0100, EXPERIMENTAL STUDY OF A HYDROTHERMAL JACKET
A. GRINGARTEN, Ministry of Industry & Res., Bureau of Geol. & Mining Res., *Orleans, France* 45100

Functioning of the hydrothermal jacket. Hydrodynamic characteristics using tracers. Experimental injection of cold water. Intermittent injections of cold water. Practical regulation of experiments in situ.

ADDENDA: Performing organization: Bureau Recherches Geologiques Minieres.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0101, STUDY OF PRODUCTION PROBLEMS AND CORROSION PROBLEMS POSED BY THE EXPLOITATION OF THE GEOTHERMAL SOLUTIONS
M. LOPOUKHINE, Ministry of Industry & Res., Bureau of Geol. & Mining Res., *Orleans, France* 45100

Installation of geothermal pressure and temperature recording devices. First Stage: Sample state of geothermal solution. Second stage: State of geothermal reservoir. Third stage: Circuit modification for addition of degassing.

ADDENDA: Performing organization: Bureau Recherches Geologiques Minieres.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0102, EVALUATION OF GEOTHERMAL BOREHOLES IN THE T.F.A.I.
L. STIELTJES, Ministry of Industry & Res., Bureau of Geol. & Mining Res., *Orleans, France* 45100

Logging operation. Measurement of conductivity, temperature and pressure.

ADDENDA: Performing organization: Bureau Recherches Geologiques Minieres.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0103, CHAUDES-AIGUES (CANTAL) - AREA WHERE THERMOMINERAL WATER EMERGES

R. BROUSSE, Univ. of Paris, *Orsay*, *France*

Studying the area where Chaudes-Aigues thermomineral water emerges in order to determine: the origin of the hot water (meteoric, magmatic, magmatic and meteoric). The mechanism by which the water is heated (geochemical characteristics). Mechanism by which the water rises.

Our work deals with: local hydrogeology (mapping springs, geochemical characteristics, variations in characteristics of springs). Geochemistry of isotopes and hot water studies will be carried out in the field and in the laboratory. They will provide new data on the possibilities of using geothermal energy in the Massif Central.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0104, PROSPECTION, EXPLOITATION, AND CONDITIONING OF PRIMARY ENERGY SOURCES

UNKNOWN, Electricite de France, *Paris*, *France* 76008

The work carried out in this area consists primarily of synthesizing information on new forms of energy--solar energy, geothermal energy, wind--in order to determine prospects of their eventual use.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

4.0105, AUTOMATIC CONTROL OF HYDROELECTRIC POWER STATIONS

UNKNOWN, Electricite de France, *Paris*, *France* 76008

Defining mechanisms regulating the levels of different water levels of power stations located on certain rivers (Rhine, Rhone, Durance), in order to automatically control flow and centralize factory operation management. Studying possible methods of managing floodgates and the operation of dam spillway regulators.

ADDENDA: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

4.0106, HEAT STORAGE

UNKNOWN, Electricite de France, *Paris*, *France* 76008

Study the technical and economic aspects of devices for use in urban heating or for industry, heating greenhouses, and electricity production, etc. Apply this to the use of solar energy.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

4.0107, AUTOMATIC OPERATION IN HYDRAULIC STATIONS

UNKNOWN, Electricite de France, *Paris*, *France* 76008

Study the coordinated control and individual control of water levels at different points along the same waterway with the objective of centralizing and automatically running factories. Apply results to factories along the Durance and along the Rhone.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

4.0108, HABITAT AND ECOLOGY

UNKNOWN, Electricite de France, *Paris*, *France* 76008

Introduce different existing methods that will utilize natural energy sources to the utmost and will reduce pollution. We will develop methods that are: (1) completely electrical - solar energy, (2) completely electrical - geothermal energy, (3) completely electrical other types of natural energy.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

4.0109, GEOTHERMAL ENERGY

UNKNOWN, Electricite de France, *Paris*, *France* 76008

We will examine two uses of geothermal energy: (1) geothermal heating using heat pumps and (2) using hot water or steam beds to produce electricity.

We will study the different subsystems required for a solar energy thermodynamic conversion station and their interactions, and determine conversion systems that are technologically feasible. We assume that there will be great variations in conditions (concentration, temperature, liquids, etc.) for each component. We will therefore explore ways of improving conversion processes.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

4.0110, DRAFT OF A SOLAR ENERGY STATION

UNKNOWN, Electricite de France, *Paris*, *France* 76008

Evaluate different subsystems required for a prototype electrosolar power station, their interactons, and the feasibility of the system in order to develop a thermodynamic conversion unit that is technologcally and economically feasible. Allowing for delays, we will work with CRNS to examine variations in order to find a solution among the options already available.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

4.0111, EXPERIMENTAL STUDY OF A HYDROTHERMAL JACKET

L. BOURGUET, Geology Application Bureau, *Paris*, *France* 75015

Functioning of the hydrothermal jacket. Hydrodynamic characteristics using tracers. Experimental injection of cold water. Intermittent injections of cold water. Practical regulation of experiments in situ.

ADDENDA: Performing organization: Bureau De Geologie Appliquee (Burgeap).

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0112, OPTIMAL IMPLANTATION CONDITIONS FOR CAPTURING WIND ENERGY IN A GIVEN SITE

M. DUCHENEMARULLAZ, Ministry of Equipment, Building Ind. Sci. & Tech. Ctr, *Paris*, *France*

Goal: Since we are currently experiencing serious energy shortages and high energy costs, we should not ignore the possibility of transforming the energy contained in wind into electricity. In addition to technological problems of constructing equipment, we must also determine favorable sites for setting-up wind blades so that they can achieve the best possible output.

Method: The topography of a site profoundly modifies flow structure and the temperature distribution of the surrounding air. The speed up observed at the crest of a slope depends on both these factors and especially on how often their favorable or unfavorable conditions coincide. This is why a statistical study is needed for average flow speeds and vertical temperature gradients (air stability). Studying the particular case of pouzauges (and relationship to results from the CSTB Nantes station) is an indispensable step toward a regional generalization of stability classes.

Progress: We have used a mathematical model to show the role of stability on the amplitude coefficient of the increased speed of air at the top of an obstacle. The STELA mini-calculator program has been modified for acquiring the climatological data needed for the study.

1975 Program: Drawing up average flow statistics measured at different areas of a slope, in relation to stability classes. Study-

ing the stability classes characteristic of the site and correlating them with those acquired at the CSTB Nantes Station.

Equipment: Atmospheric local environment telemeasurement system.

SUPPORTED BY France - Ministry of Equipment & Housing - Paris

4.0113, DETERMINING THE AMOUNT OF SOLAR ENERGY THAT CAN BE USED FOR HEATING HOMES

C. MOYE, Ministry of Equipment, Building Ind. Sci. & Tech. Ctr, *Paris, France*

Goal: Determine how much solar energy can be used for heating homes.

Method: 1. We will determine the average frequency of all daily average temperature couples and daily sunshine factor during the entire heating season for 5 years, using approximately ten stations characterizing different French climates. 2. We will compute the minimum and maximum figure for solar energy gathered during the heating season. The minimum figure is obtained by adding up instant lists (hour by hour) of losses minus additions, with the increase in additions being annulled when it is greated than losses.

The maximum figure is obtained by using the same lists of losses minus additions, but every 24 hours, with the internal temperature assumed to be constant.

1975 program: We will compute minimum and maximum amounts of gathered solar energy by using the orientation and surface of vitreous bays and losses through the building's opaque walls.

SUPPORTED BY France - Ministry of Equipment & Housing - Paris

4.0114, USING LOW TEMPERATURE THERMAL ENERGY

UNKNOWN, Ministry of Equipment, Building Ind. Sci. & Tech. Ctr, *Paris, France*

Defining the long range goal: The general goal of the study is to discover whether, and under what technical and economic conditions, low temperature energy sources can be used for heating, replacing, or in addition to, ordinary sources of fuels. The sources we plan to use are characterized by the fact that they contain free energy, either because of their natural origin (geothermal, solar, etc.), or because they are currently unused byproducts of human activities (industrial or power station wastes, domestic wastes, etc.). The temperature level of these sources is below that now used for heating, a level that results from practice and makes traditional technical solutions at the best economic cost possible. We will therefore consider a relatively significant range of temperatures since they fall between the atmospheric temperature (around 15 degrees C) and the temperature making traditional utilization possible (around 90 degrees C).

Proposed method-validity limits: The proposed method is to free it from the thermal energy source without forgetting, however, that this source implies its own investment and maintenance costs which must be entered in the final balance sheet. The 'source cost' will, for example, be drilling and exchange costs for a geothermal power plant, branching costs for an electric power station, the cost of devices to trap sunlight, and recovery devices. In addition to this 'source cost', we will try to define the economic conditions of transporting and using the energy according to the intrinsic characteristics of the source: thermal and temperature output. This study will deal with known traditional solutions and it will be extrapolated as far as possible to include new solutions which might occur to us while studying the problems that have to be solved.

The proposed method is good for cases in which heating must come entirely from one source. When traditional types of energy must be used as a base or in addition, the idea of installation again becomes highly significant and we will have to once again do case by case economic studies with discontinuous variations.

Medium-term goals: If this study is to proceed as planned, we must know several price elements which must be acquired by investigation. For the new solutions planned, we will occasionally have to resort to consultation.

SUPPORTED BY France - Ministry of Equipment & Housing - Paris

4.0115, GEOTHERMAL ENERGY FOR HOME HEATING - HOW TO MAKE IT COMPETITIVE

P. COULBOIS, Ministry of Industry & Res., Bureau of Geol. Mining Res., *Paris 15E, France*

The use of low temperature geothermal energy (55-60 degrees C) depends on the significant fixed drilling cost for each operation (5-6 million French francs) that is largely independent of the amount of heat that must be delivered.

The total cost of geothermal heat production also depends on pumping costs which, in turn, depend on the output and characteristics of installations where such heat is used. For the given heating needs of an area, there is an optimal geothermal solution whose total heat production cost is minimal. However, we do not know how to conduct such optimum research with a program that includes discreet variables and non-linear relationships.

We propose an alternate method of using an iterative process that would make it possible to come close to optimum levels and whose computations could, if necessary, be automized. This paper discusses methodology alone; it does not include practical applications of the proposed method.

ADDENDA: Supporting and performing organization: Ministere de L'Industrie et de la Recherche Bureau de Recherches Geologiques et Minieres Service Geologique National.

SUPPORTED BY France - Ministry of Industry & Research - Paris

4.0116, GEOLOGY OF THE SOUTHWEST REGION OF THE FRENCH TERRITORY OF AFAR AND ISSA (FTAI) - 1/100,000 GEOLOGICAL MAP OF LAKE ABHE AND LAKE ASAL REGION

J. DEMANGE, Ministry of Industry & Res., Bureau of Geol. Mining Res., *Paris 15E, France*

During a geothermal prospecting expedition to FTAI, we studied the southwest region of the territory and published a 1/100,000 geological map. This map synthesizes the tectonic, volcanic, sedimentary, and geophysical data we accumulated in this region; we have compiled a comprehensive list of useful substances for the applied geologists; geothermal aspects have been equally well developed.

During the Upper Miocene, volcanic activity was accompanied by several series of basaltic fissure flows. There were many cycles of such activity until Holocene time. Acid massifs generally signalled the end of each of these cycles. The expulsion of basaltic material was accompanied by highly active tectonic detachment as evidenced by the striking division of these series into horsts and grabens. From the Middle Pleistocene on, tectonic and volcanic activity has been concentrated in the Asal region; the Asal Rift began to develop, creating magamatism whose marine character is obvious. This structure has been interpreted as part of the echelon structure that connects the Carlsberg and Red Sea dorsals through the Afar region.

ADDENDA: Supporting agency and performing organization: Ministere de L'Industrie et de la Recherche Bureau de Recherches Geologiques et Minieres Service Geologique National.

SUPPORTED BY France - Ministry of Industry & Research - Paris

4.0117, EXPPRIMENTAL DRILLING OF CHALK FOR COOLING BUILDINGS, VICTOR BOULEVARD, PARIS-15

P.H. DIFFRE, Ministry of Industry & Res., Bureau of Geol. Mining Res., *Paris 15E, France*

With the intention of using water from chalk beds for cooling and heating its new headquarters on the Victor Boulevard in Paris, SNECMA asked BRGM to do a preliminary study of the thermal effects of reinjection and of possible effects on near-by drill sites.

The hydrothermal study was done by incorporating the thermal and hydrological characteristics of the system into the framework of the Stendhal program (Thermal Simulation in a

Heterogeneous Field, Analytical Determination). We used shaft 3 to simulate the pumping and reinjection of 50 m3/h all year at 7 degrees C for 9 months (January through December) and at 21 degrees C during the 3 summer months (June, July, Aug.); the temperature of water from the Seine varied between 4 degrees and 23 degrees C, depending on the season. Under these conditions, the temperature of the pumped water varies from 11 and 16 during a cycle of about 12 months. Shaft temperature was lowest in summer and highest in winter. To improve security and system output, we advised a reversal of pumping and reinjection functions according to season. The first drill site would be used in summer to inject water at 21 degrees C and in winter to produce water above 14 degrees C trapped by heat pumps for heating.

The second drill site would be used in winter to inject water at degrees C and in summer to produce water at a temperature under 14 degrees C. Such a system should not cause problems for other users of the field if the average flow is under 50 m3/h and if the water is not reheated or recooled by more than 7 degrees C.

ADDENDA: Supporting agency and performing organization: Ministere de L'Industrie et de la Recherche Bureau de Recherches Geologiques et Minieres Service Geologique National.

SUPPORTED BY France - Ministry of Industry & Research - Paris

4.0118, TEMPERATURES IN PETROLEUM DRILL SITES IN THE PARIS AREA AND IN AQUITAINE

H. FABRIS, Ministry of Industry & Res., Bureau of Geol. Mining Res., *Paris 15E, France*

We measured temperatures in petroleum drill sites when: diagraphic registrations occurred; exploration tests (DST) were done; Control measurements were made during production.

Although the two latter categories are the most representative, the former are the most numerous; however, a statistical comparison of the results obtained through these three methods shows that they have an average error of 15-16 degrees C.

In the Paris region, we analyzed the gradients between the soil and the field roofs and found them to be higher than generally assumed. Thus, the average value computed for fields with Dogger roofs is nearly 3.6 degrees C/100 cm. This high value corresponds to that calculated for other productive horizons.

In the Aquitaine region, the average value computed for all the gradients of the oil fields studied is about 3.4 degrees C/100 m. This is a high figure compared to the values obtained by other methods. The geological deversity of the productive horizons also makes interpretation more difficult.

ADDENDA: Supporting agency and performing organization: Ministere de L'Industrie et de la Recherche Bureau de Recherches Geologiques et Minieres Service Geologique National.

SUPPORTED BY France - Ministry of Industry & Research - Paris

4.0119, SIMULATING HEAT TRANSFER IN HETEROGENEOUS AQUIFEROUS SEDIMENTS

A.C. GRINGARTEN, Ministry of Industry & Res., Bureau of Geol. Mining Res., *Paris 15E, France*

We have developed a method of numerically computing heat transfer in heterogeneous water-bearing beds in order to simulate the development of fields used for urban heating or cooling.

In most cases, users reinject the water after using its thermal properties (removing its heat or cold as the case may be). This method has the advantage of limiting the depressions created by the removal; it also makes it possible to dispose of the water which can become a problem on the surface (volume, composition, temperature); however, it creates an expanding zone of higher or lower than natural temperature around each reinjection shaft. This water can even be carried to production shafts after a relatively long period, creating a partial recycling that imperceptibly reduces the output of installations.

The research done in 1975 expanded the possibilities of the purely analytical methods developed previously which could be applied only to homogeneous end infinitely aquiferous beds oriented horizontally (or limited by simple geometrical boundaries). We thus developed a mixed processing method, using space limitations for solving hydrodynamic problems; we also devised an analytical method for evaluating thermal phenomena.

This method was tested under various terrain conditions. We were particularly interested in the case of a surface source connected to underground water flow. We studied the impulsional responses of temperatures in sump shafts to variations in reinjection temperatures and to water flow. This helped us understand the thermal evolution of extracted water in relation to the operating conditions at drilling sites and the temperature fluctuations in circulating water.

ADDENDA: Supporting and performing organizations: Ministere de L'Industrie et de la Recherche Bureau de Recherches Geologiques et Minieres Service Geologique National.

SUPPORTED BY France - Ministry of Industry & Research - Paris

4.0120, GEOPHYSICAL CONTRIBUTION TO DETECTING GEOTHERMAL ENERGY SOURCES

R. HORN, Ministry of Industry & Res., Bureau of Geol. Mining Res., *Paris 15E, France*

All sources of geothermal energy now in use were discovered by drilling close to surface manifestations. The geophysical methods developed at these sites have contributed to the search for extensions and to the improved choice of sites for exploratory and actual drilling.

However, certain physical parameters of hydrothermal sources have opened up new possibilities of detection and, during the last few years, have stimulated a significant development of geophysical exploration methods. The search for geothermal energy fields is no longer limited to areas where surface hydrothermal manifestations occur; studies conducted on these 'hidden sites' indicate that geophysical methods may become increasingly useful in the search for new geothermal energy sources (PISE Conference, 1970).

Its primary role is to contribute to the study of underground tectonic characteristics that affect water circulation and to increase our understanding of the lithological nature and thickness of the impermeable areas that overlie a geothermal field. Thus, by using certain techniques (electrical, electromagnetic, etc.), we can localize anomalous areas in a source rock which may be due to water circulation; such water usually has a greater conducting capability than adjacent zones.

BRGM carried out two methodological surveys to test geophysical techniques that may later be useful in prospecting for geothermal fields (of the sedimentary type).

In Limagne, between Riom and Gannat, where geological data led us to expect an area favorable for such fields, we used the following techniques: By using electric prospecting, we mapped the depth and extent of an inferior detritic Stampien horizon. The variation in restivity inside this formation revealed certain conductive areas, one of which coincides with an intense anomaly in 'seismic noise.'

In Alsace, in a region located north of Haguenau where the average geothermal gradient is 5 degrees C/100 m, we studied the Soultz-Sous-Foret area characterized by a gradient of 11 degrees C/100 m and by underground deposits of water-bearing sediments, particularly Lower Triassic sandstones.

Through geophysical research, we were able to study the in depth structure of the area and to analyze the variations in restivity among these sandstones by localizing a conductive area corresponding to the anomaly in the geothermal gradient.

SUPPORTED BY France - Ministry of Industry & Research - Paris

4.0121, EVALUATING THE GEOTHERMAL POTENTIAL OF THE PARIS REGION

J. LAVIGNE, Ministry of Industry & Res., *Paris 15E, France*

In order to complete the existing qualitative list, we must specify the amount of heat that can be extracted under the conditions determined for known deposits.

This study cannot be separated from an evaluation of the potential needs of that part of the area located above the deposit, since transporting hot water from far away is hardly likely. The physical and chemical characteristics of the deposits will be revealed (potential).

A model for extraction will be completed based on the confrontation between needs and resources.

The numerous needs of the Paris region have led us to study this region in order to better understand the various layers capable of being worked (Mid Jurassic, Triassic, Usitanian and even Albian).

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0122, THE ASAL RIFT - EXAMPLE OF A GEOTHERMAL FIELD IN A ZONE OF OCEANIC EXPANSION (AFAR ISSA, AFAR DEPRESSION, EAST AFRICA) (ABBREV)

L. STIELTJES, Ministry of Industry & Res., Bureau of Geol. Mining Res., *Paris 15E, France*

Following geothermal prospection by BRGM in the Asal rift in 1970 and 1973, a zone bordering the rift was selected for exploratory drilling for steam. This zone first attracted attention because of hot springs along the edges of the graben and because of the very structure of the rift.

Detailed petrological analysis of the lavas of the rift revealed transitional volcanism resembling that found in ocean dorsals. The axial valley contains many open fissures, some of which generate magma; its morphology and size approach those of the mid-oceanic ridges. The present annual tectonic movement along the rift was estimated at between 2 and 4 cm/year; seismic activity is significant.

The average heat flow in the dorsals is three times higher than in ocean basins. The gradient measured at Asal is 45 c/100 m on the flanks of the 10 km-wide tectonic dome formed by an intrusion of magma probably related to the upper mantle. The intrusion is characterized by differentiation strictly determined by a fractionated crystallization process. This dome affects the entire central section of the rift.

The accretion zone, 4-5 km wide, is not well suited for trapping geothermal zone (enormous number of intrusive dikes, fissuration, few indexes, etc.). We drilled at the edges of this zone where there is a normal stratigraphic series, even more intense surface impermeability, and hydrothermal indexes along faults.

ADDENDA: Report presented at the Second United Nations Conference on Geothermal Energy, San Francisco, May 20-29, 1975; published as part of the minutes of the conference. Supporting and performing organizations: Ministere De L'Industrie et de la Recherche Bureau de Recherches Geologiques et Minieres Service Geologique National.

SUPPORTED BY France - Ministry of Industry & Research - Paris

4.0123, STUDIES ON GEOTHERMAL ENERGY IN DRY ROCKS

J.P. SARDA, Petroleum Institute, *Rueil Malmaison, France* 92502

Injection of fluids by shafts up to the point of thermal fracturing and the hydraulics of rocks. Recovery of production fluids from the shafts. Technical problems resulting from the fluids used in the turbines for producing electricity.

ADDENDA: Performing organization: Institut Francais Du Petrole.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0124, HEAT TRANSFER IN POROUS AREAS - APPLICATION OF GEOTHERMAL METHODS

UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

OBJECTIVE: Study the phenomena related to heat and mass transfer in a porous area with application to the exploitation of high temperature geothermal energy to water circulation in soil, and to transfers in oil and gas fields.

SUMMARY: High energy geothermal methods: Vaporizing hot water in porous areas by decreasing pressure; running a high energy geothermal field by using a mathematical model incorporating previous results. Heat migration. Determining the related mechanisms of heat and mass transfer that occur in unsaturated porous areas subjected to slight gradients of temperature. This analysis uses both a mathematical and physical model.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

4.0125, OPTIMAL USE OF GEOTHERMAL ENERGY

J. LEJARRE, General Heating Company, *St. Andre Lez Lille, France* 59350

Maximum exhaustion of heat energy contained in a given output of geothermal water: wise choice of methods of heating buildings, using heat pump. Increasing the temperature level of the secondary circuit by using hot pumps. Finding the distribution best suited to the temperature level of the secondary circuit for residences. Optimizing the production and distribution system (wells, heat pumps, and network). Producing a mathematical model.

Addenda: Performing organization: Compognie Generale de Chauffe.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0126, STUDY OF PRODUCTION PROBLEMS AND CORRROSION PROBLEMS POSED BY THE EXPLOITATION OF GEOTHERMAL SOLUTIONS

J. LEJARRE, General Heating Company, *St. Andre Lez Lille, France* 59350

Installation of the geothermal pressure and temperature recording device. Measure the state of the geothermal solution, extent of resource, and circuit modifications.

ADDENDA: Performing organization: Compagnie Generale De Chauffe.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0127, A TRANSPARENT ELECTRODE PHOTOELECTRIC CONVERTER

SAVELLI, Univ. of Montpellier, Center for Stu. Solid St. Elec, *34060 Montpellier, France*

General physical study of the SnO2-semiconductor heterojunction and a more detailed look at the SnO2-Si couple.

Optimizing junction manufacture parameters (avoiding silicon oxidation before SnO2 deposit in particular).

Heterojunction characteristics: Photovolt response spectrum, power curve under standard illumination, conversion yield under standard solar illumination, linear quality of the response in accordance with incident flux.

Physical study of heterojunctions: Gate height, doping and space charging zone, discontinuity of interface (I V characteristics in darkness and under illumination, impedence at different operating points).

Addenda: Supporting agency: Delegation Generale A La Recherche Scientifique et Technique. Performing organization; Universite des Sciences et Techniques du Languedoc, Centre d'Electronique des Solides.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0128, COPPER SULFIDES-CHARACTERIZATION OF THE MATERIAL OBTAINED BY THE SPRAY METHOD-INFLUENCE OF DOPING ON THE ELECTRICAL AND OPTICAL PROPERTIES

SAVELLI, Univ. of Montpellier, Lab. of Electronics, *34060 Montpellier, France* 3400

Characterization of CU(2-x)S obtained by the spray method. Influence of dopants on the properties of CU2S.

ADDENDA: Performing organization: Universite Sciences Techniques Languedoc Laboratoire D'Electronique Departmen De Physique.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0129, EXPERIMENTAL STUDY OF A HYDROTHERMAL JACKET

S. GUIZERIX, Atomic Energy Commission, *38 Grenoble, France* 38000

Functioning of the hydrothermal jacket. Hydrodynamic characteristics using tracers. Experimental injection of cold water. Intermitant injections of cold water. Practical regulation of experiments in situ.

ADDENDA: Performing organization: Commissariat Energy Atomique Grenoble Section D'Application Des Radioelements.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0130, STUDYING DOPING PROFILES MADE BY IONIC IMPLANTATION AND THEIR EFFECT ON THE OUTPUT OF DIFFERENT GRADES OF SILICON

J. LACOUR, Atomic Energy Commission, Electronic & Info. Tech. Lab., *38 Grenoble, France* 38000

The goal of this project is to complete studies on the optimal grade of silicon to use for perfecting solar cells.

We are studying the change in length of life of Czochralski Silicons (CS) or zone fusion (ZF), subjected to thermal processing after joining by implantation: Development of length of life in different substrata in accordance with the form of concentration profiles and thermal processing after irradiation. We will try to get as close as possible to profiles determined by conventional processes. Studying doping profiles by ionic implantation: Analyzing several techniques (low energy predepositing and high temperature redistribution - using SiO2 for implantation - multienergy implantations). Implanting phosphorus and arsenic above 3.1014 square cm. Measuring ionic analyzer profiles.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0131, USING SOLAR ENERGY FOR AIR CONDITIONING

F. TROMBE, Univ. of Paris, *75 Paris 5E, France*

Energy model of odeillo houses (solar houses) studying storage processes, analyzing capacities and optimization. Defining complementary energy needs and adapting a heating sytem already in operation for this. Comparing different houses. Drawing up a usage manual for architects. Energy balance sheet and modification of old houses.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0132, CADMIUM SULFIDE SOLAR CELLS STUDYING AND ANALYZING THE SPRAY METHOD

M. BESSON, Telecommunications Corp., *75013 Paris, France*

Creating a deposit area by reactive pulverization in the liquid phase (obtaining a cloud of cadmium and sulfur ions).

Using the spray method to deposit layers. Studying parameters: spring (solution temperature and composition), nature and temperature of the coolant gas, aerosol dimensions and pulverization rate, temperature of heating walls, support temperature.

Annealing cadmium sulfur layers (Cd S): Temperature and weather, annealing atmosphere (vacuum or controlled atmosphere).

Characteristics of layers (chemistry, optics electrical characteristics, crystallography).

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0133, OPTIMIZATION OF THE HIGH-EFFICIENCY SILICON CELL AND CONTACTS

M. BESSON, Telecommunications Corp., *75013 Paris, France*

OBJECTIVE: The aims of this study are: control of each operation of the cells according to specifications (accurate flowchart); development of a quality assurance program for silicon wafers production; determination of electric grid contact; back-contact with field effect from a gradient of concentration.

ADDENDA: Supporting agency: Centre National d'Etudes Spatiales. Performing Organization: Societe Anonyme Telecommunications.

SUPPORTED BY France - National Space Studies Center - Paris

4.0134, STUDY TO INCREASE THE ENERGY CONVERSION EFFICIENCY OF HETEROJUNCTION CU2S/CDS SOLAR CELLS

M. BESSON, Telecommunications Corp., *75013 Paris, France*

OBJECTIVE: To maximize efficiency in vacuum conditions (about 8 per cent) for Cu2S/CdS solar cells.

APPROACH: Study the alloying composition of ZnS-CdS to increase the height of the voltage barrier. The following aspects will be involved: composition; doping; thickness. Procedures and facilities are already available to conduct this study.

PROGRESS: Recent results have shown the positive effects of doping on stability. The open circuit voltage remains lower than for a standard cell.

ADDENDA: Performing organization: Societe Anonyme de Telecommunications.

SUPPORTED BY France - National Space Studies Center - Paris

4.0135, CHARACTERISTICS OF SILICON FOR HIGH EFFICIENCY SOLAR CELLS

M. BRUNET, Radiotechnique, *92 Suresnes, France*

Studying limitations on silicon grade in relation to a multiplication process, in order to produce large diameter ingots whose grade is suited to the reproducible making of high energy efficiency solar cells.

Comparing results on silicon from Czochralski drawings and floating zones, in order to determine the nature and origin of defects. Conclusion on the process most suitable from a technical and economic point of view.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

4.0136, A SHROUDED AEROGENERATOR TO EXPLOIT WIND POWER

O. IGRA, Ben Gurion Univ. of The Negev, *Beersheba, Israel*

The main purpose of the present research is to develop a shroud for a wind turbine that will increase the turbine output, at a given free stream conditon, by a factor of three or so. The shroud should be as small as possible in order to minimize the required investment in its construction.

An additional aim is to design a special wind turbine that will be the most suitable one to operate with the considered shroud. This turbine is of the axial flow type.

During the research period, three types of models have been built and tested. A pilot plant having a 3m diameter turbine is now under construciton.

SUPPORTED BY Israel - U.S. Israel Binational Science Foundation- Tel Aviv

4.0137, RESEARCH AND DEVELOPMENT ON SOLAR COLLECTORS CONSTRUCTED FROM PLASTIC MATERIALS

D. WOLF, Ben Gurion Univ. of The Negev, *Beersheba, Israel*

Solar collectors constructed from various plastic materials are being designed and tested with the aim of developing economically competitive models. We are investigating the use of plastic solar collectors for domestic hot water, pre-heating fluids for industrial usage and simple mobile units for both recreation and military usage.

SUPPORTED BY Israel - Ministry of Commerce & Industry - Jerusalem

4.0138, CENTRAL SOLAR HOT WATER SYSTEM IN A MULTI-STORIED BUILDING

D. WOLF, Ben Gurion Univ. of The Negev, *Beersheba, Israel*

We have added a central solar hot water system to an already existing multi-storied building (4 floors). The building is one of the student dormitories and the original system (now the auxiliary system) consisted of individual electric water heating units (120 liter or 60 liter tanks depending upon apartment size), one per apartment. The building consists of two attached units with two separate entrances. One unit has sixteen apartments (60 liter tank) and the other consists of eight apartments (120 liter tank). The central solar hot water system has its own tank (2000 liter). The hot water is stored both in the central tanks and the individual tanks in each apartment. The individual tanks each have a thermostat and act as auxiliary heating units. The system is ready to be put into operation and will be continuously monitored during the year.

SUPPORTED BY Israel - Ministry of Commerce & Industry - Jerusalem

4.0139, COOLING UNIT OPERATED BY LOW THERMAL POTENTIAL ENERGY SOURCES

I. BORDE, Research & Development Author., *Beersheva, Israel*

The utilization of low-grade thermal sources for refrigeration, cooling and air-conditioning is being investigated. A comparion is being made of potential solutions for absorption-refrigeration systems. The supply of heat by a flat-plate solar collector is being tested for prototype refrigeration unit.

New thermodynamic cycles and new engineering concepts are being tested.

SUPPORTED BY Israel - Ministry of Commerce & Industry - Jerusalem

4.0140, EXPLOITATION OF GEOTHERMAL ENERGY IN AGRICULTURE

D. PASTERNAK, Research & Development Author., *Beersheva, Israel*

The exploitation of geothermal water for soil warming is being investigated.

Experiments are being carried out on cucumbers, melons and watermelons to determine the effect of soil warming with geothermal water on their growth.

SUPPORTED BY Israel - Ministry of Commerce & Industry - Jerusalem

4.0141, SOLAR AIR-CONDITIONING WITH AN ABSORPTION SYSTEM

G. GROSSMAN, Israel Inst. of Technology, School of Mech. Engineering, *Haifa, Israel*

The aim of this study is to find a method to circumvent the problem of the temperature obtainable in the generator of a solar absorption system operating on flat plate collectors. This low temperature causes a low coefficient of performance, meaning larger areas of collectors are necessary. The research includes a thorough study of possible working materials, the design of the generator and the possibility of operating the system as a heat pump for winter heating. A solution for the problem of low temperature in the generator might be the use of the novel concentrating collector mentioned above.

SUPPORTED BY Israel - Ministry of Commerce & Industry - Jerusalem

4.0142, AN EXPERIMENTAL AND ANALYTICAL INVESTIGATION OF A NATURAL - CIRCULATION SOLAR WATER HEATER

G. GROSSMAN, Israel Inst. of Technology, School of Mech. Engineering, *Haifa, Israel*

The experimental set-up consists of a commercial system which includes two flat plate collectors with a total area of 3 square meters connected in parallel to a 120 liter storage tank. Temperature distributions in the various components of the system are measured by thermocouples, the flow rate is measured by a low resistance flowmeter designed especially for this purpose, and the heat flux is measured by Pyranoheliometer. All the measurements are recorded by a data acquisition system, and are processed by computer to yield results such as temperature distributions and their variation with time, instantaneous and accumulated amounts of heat, efficiencies, etc. Preliminary results show typical system efficiencies at about 40 percent. However, current designs seem to be deficient and improvements in collection efficiency might be affected by changing the thermal bond between the tubes and the collector plate.

Experiments are also carried out for testing solar heaters consisting of the regular flat plate collectors and tank, but with different lengths of the connecting pipes, different heights of the tank, and various hot water utilization patterns. Preliminary results show that the amounts of hot water accumulated in the tank and the efficiencies of the system do not decrease significantly even for long pipes on the order of 8 meters between the collectors and the tank.

SUPPORTED BY Israel - Ministry of Commerce & Industry - Jerusalem

4.0143, DESIGN OF AN IMPROVED SOLAR STILL

G. GROSSMAN, Israel Inst. of Technology, School of Mech. Engineering, *Haifa, Israel*

The operation of present solar stills is based on evaporation from the free surface of a pool of salt water and condensation on a tilted cold glass surface. The aim of this study is to improve the output of the still by increasing the evaporation area through the addition of wicking material, e.g., cloth dipped in the water and wetted through capillary action. An experimental still was constructed and tested, in order to compare it with a conventional design. It was found that the still improved by the wicking material yields 25 percent - 40 percent more than the output of the regular configuration (1 gallon per square meter per day). Further improvements in the design of the still, where an attempt is made to recover some of the heat of condensation, are under investigation.

SUPPORTED BY Israel - Israel Institute of Technology - Haifa

4.0144, DESIGN AND CONSTRUCTION OF SOLAR ENERGY STORAGE SYSTEMS

G. GROSSMAN, Israel Inst. of Technology, School of Mech. Engineering, *Haifa, Israel*

This project is aimed at developing storage systems for solar energy. This system is an essential part in any solar driven system. Storage is typically achieved by either sensible or latent heat.

Sensible heat storage has found wide applications in engineering mostly by employing liquids or solids. It is planned to investigate some of the problems and develop more efficient designs of the heat exchanger. Latent heat storage usually involves the change of phase of substance. The advantages of this method are the lower masses required and the possibility of obtaining constant temperatures. The work is aimed at studying various materials for this purpose and the physical parameters relevant to the design of such systems.

SUPPORTED BY Israel - Israel Institute of Technology - Haifa

4.0145, SOLAR AIR-CONDITIONING WITH DESICCANTS

G. GROSSMAN, Israel Inst. of Technology, School of Mech. Engineering, *Haifa, Israel*

The object of this study is to explore the possibility of utilizing solar energy in conjunction with controlled dehydration and evaporation for air conditioning. The process of evaporative cooling, which is most suitable for dry and arid zones, cannot be used effectively in humid areas due to the high dew point of the ai

The scheme under investigation includes application of chemical absorption using liquid or solid desiccants to dehydrate the air, then evaporation of predetermined quantities of water into it so as to control both humidity and temperature. The desiccant is regenerated by means of solar heating. This system is expected to be simpler and cheaper than mechanical or absorption-type refrigeration, which has a low coefficient of performance when used with a low-temperature solar heat source.

SUPPORTED BY Israel - Israel Institute of Technology - Haifa

4.0146, SPACE HEATING

G. GROSSMAN, Israel Inst. of Technology, School of Mech. Engineering, *Haifa, Israel*

A solar system for space heating for the library of the Mechanical Engineering Faculty in the Energy Laboratory Building, is currently being designed and constructed. The system consists of a large area of flat plate collectors, a storage tank, fan-coils for the distribution of heat in the library, a connecting network of pipes including a pump, an auxiliary electrical system, and a control system. Some of the problems existing in the central hot water supply have to be solved along with the specific problem of heating by a relatively low-temperature medium.

SUPPORTED BY Israel - Israel Institute of Technology - Haifa

4.0147, CENTRAL HOT WATER SUPPLY SYSTEM

G. GROSSMAN, Israel Inst. of Technology, School of Mech. Engineering, *Haifa, Israel*

A central hot water supply system is currently being designed and constructed in order to provide hot water to the Energy Laboratory Building of the Technion. The purpose of this project is to solve some problems which exist in central systems and are not encountered in the commercially used system for a single apartment. Among these problems are the opeation of a forced circulation-cycle optimal control and operation of the pump, optimal storage system and control of the necessary back-up system.

Finally, the economics of such systems will be evaluated.

A research proposal was submitted to Miromit Ltd., an industry specializing in solar heaters.

SUPPORTED BY Israel - Israel Institute of Technology - Haifa

4.0148, EXPERIMENTAL AND ANALYTICAL STUDY OF AIR HEATERS

G. GROSSMAN, Israel Inst. of Technology, School of Mech. Engineering, *Haifa, Israel*

A solar air heating system is being studied which would be used for domestic space heating in the winter and for drying of desiccants forming part of an air conditioning system in the summer. The main part of the system is air-heating type solar collectors, operating on the flat plate principle. Several types of those collectors are under investigation including ones working with finned metal channels, packed bed, and overlapping glass. The air heating system is a more direct method for space heating than the commonly used one based on hot water. It requires lower temperatures of the working fluid and can be simpler and cheaper, once the heat storage problem is solved.

SUPPORTED BY Israel - Israel Institute of Technology - Haifa

4.0149, CONCENTRATING COLLECTORS

G. GROSSMAN, Israel Inst. of Technology, School of Mech. Engineering, *Haifa, Israel*

Two types of concentrating solar collectors designed to obtain high temperatures are being built and studied. The first is a parabolic type concentrator, having a parabolic cylinder as a reflector which focuses the radiation on a linear absorber oriented in the east-west direction. Collectors of this type have been built before, and an attempt is made to improve the design and technique of construction. The second collector is of a novel type consisting of a stationary spherical reflector and a solar-tracking cyclindrical absorber. This collector would be capable of heating, cooling, and providing hot service water for a residential building, and can heat a working fluid to a sufficiently high temperature to store heat compactly and economically. An economic analysis of the overall system of which the proposed collector is the key component indicates that it can provide energy at less cost per useful energy than a flat plate solar collector, can be mass produced, and can be integrated into the wall of a building and incorporated into existing heat systems.

A project of building a small scale model of 2m diameter is sponsored by the Israeli Ministry of Industry and Development. A project of building a full-scale mirrow of 10m diameter is sponsored by the U.S.A.-Israel Binational Science Foundation.

ADDENDA: This project is also supported by: Israeli Ministry of Industry and Development.

SUPPORTED BY Israel - U.S. Israel Binational Science Foundation- Tel Aviv

4.0150, EXPERIMENTAL AND ANALYTICAL STUDY OF FLAT PLATE COLLECTORS

G. GROSSMAN, Israel Inst. of Technology, School of Mech. Engineering, *Haifa, Israel*

An analytical model was developed which shows that an optimal collector has to be based on a compromise between high temprature and high efficiency. Furthermore, the performance of the regular, commercial collector can be improved significantly by better design of its geometry and heat transfer parameters.

Several new types of flat plate collectors were designed and constructed. They include collectors with better thermal contact between the tubes and the absorber plate, and collectors in which the flow is between two parallel plates instead of tubes. The collectors were tested and compared with commercial ones. Our novel designs have higher efficiencies than the regular tube collectors: a few of them are comparable with the more expensive roll-bond (integrated-channels) copper collectors.

Experiments were carried out with a flat plate collector tracking the sun, in which an increase of up to 60 percent of absorbed heat was obtained, compared to a stationary collector.

ADDENDA: This project is also supported by: the Messing Foundation.

SUPPORTED BY Israel - Israeli Government - Jerusalem

4.0151, ELECTROCHEMICAL SOLAR CELLS

I. BALBERG, Hebrew University of Jerusalem, Racah Institute of Physics, *Jerusalem, Israel*

The present research is concerned with the photoelectrolysis of water that is obtained by the catalytic process in rutile and similar materials. This effect is known but is of very small efficiency. Our study is intended for increasing the conversion efficiency by controlling the optical and electrical properties of the catalytic material as well as to study their surface properties responsible for this process.

SUPPORTED BY Israel - Hebrew University of Jerusalem

4.0152, A SEARCH FOR ALGAE STRAINS WITH HIGH PHOTOSYNTHETIC EFFICIENCY FOR SOLAR ENERGY CONVERSION

I. OHAD, Hebrew University of Jerusalem, *Jerusalem, Israel*

As a result of our work on the biogenesis of chloroplast membranes, we have isolated mutant strains of unicellular algae able to grow relatively fast and perform photosynthesis quite efficiently. Our present program is devoted to devising an analytical system for the isolation and improvement of strains of algae able to utilise with efficiency high light intensity for growth of bio-mass while containing high level of protein and carbohydrate but low levels of chlorophyll.

SUPPORTED BY Israel - Hebrew University of Jerusalem

4.0153, CONSULTATION SERVICES ON THE APPLICABILITY OF VARIOUS TIDAL REGIME MODELS TO THE CALCULATION OF TIDAL ENERGY GENERATION POTENTIAL

D.F. HARLEMAN, Unknown Inst. or Indiv. Grant, *Massachusetts*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

4.0154, ENERGY CONSERVATION AND SOLAR ENERGY FOR SPACE HEATING AND AIR CONDITIONING
UNKNOWN, Bronswerk Heating & Aircondit., *Amersfoort, Netherlands*

Preliminary studies have been made to optimize energy conservation measures to be taken in industrial space heating and air conditioning. A general study regarding the feasibility of the application of solar energy is finished. Further studies and development of solar energy systems are considered, including software as well as hardware.

Addenda: Supporting agency: Verenigde Machine Fabrieken (VMF.)

SUPPORTED BY Netherlands - United Machine Factories - Amsterdam

4.0155, WINDPOWER
UNKNOWN, Physics Dynamic Research, *Amsterdam, Netherlands*

A preliminary impression has been obtained about types of rotors which could be used in industrial plants, and the contribution which the United Machine Factories could give in software and hardware of complete windpower installations. Research and development on testbed installations will be necessary before realistic prototype designs (in stepped-up sizes) can be made. Fokker-VEW has completed a series of experiments on a small scale model of a vertical axis wind-turbine (1,20 m). A larger model (5 m) is under construction; tests will start at the end of 1975. Proposal for design and construction of a 12 m test-installation with a subsequent research program is in preparation.

SUPPORTED BY Netherlands - United Machine Factories - Amsterdam

4.0156, HYDROGENASE, A SYSTEM FOR HYDROGEN PRODUCTION
E.C. SLATER, Univ. of Amsterdam, Lab. of Biochemistry, *Amsterdam, Netherlands*

Specific types of algae are able to split water into molecular hydrogen and oxygen using sunlight. This requires, in addition to a photochemical system, a chain of electron-transferring catalysts and a hydrogenase. The latter can catalyze the reduction of protons by electrons to molecular hydrogen. To produce hydrogen by means of solar energy, (applying intact algae, membranes isolated from algae or synthetic catalysts) requires detailed knowledge about the operation of the hydrogenase system. The enzyme will be isolated from convenient organisms. Its properties will be studied. It is known that the enzyme has an active centre consisting of iron and sulphur. The research team has a lot of experience with iron-sulphur containing proteins.

SUPPORTED BY Netherlands - University of Amsterdam

4.0157, BACTERIORHODOPSIN
K. VANDAM, Univ. of Amsterdam, *Amsterdam, Netherlands*

An electrical potential can be generated by illuminating bacterio-rhodopsin situated in a lipid double layer. The thesis is that during this reaction a transmembrane proton transfer takes place. In this way a photon cell could be constructed, in which the electrical current should be equivalent to the effectively absorbed photons.

The first objective is to prove this thesis (transmembrane proton transfer): bacterio-rhodopsin will be isolated from Halobacterium halobium and inserted into a lipid double layer. A method described in the literature will be applied.

The electrical properties and the ion-transport capacity of this bilayer structure will be determined. Later the influence of phospholipid composition and the chemical stability of the bacterio-rhodopsin will be of importance.

SUPPORTED BY Netherlands - University of Amsterdam

4.0158, INVESTIGATION REGARDING THE UTILIZATION OF WIND POWER APPLYING AEROTURBINE GENERATORS BUILT ON ARTIFICIAL ISLANDS
N. FEIS, Central Org. Adv. Appl. Res., Central Technical Inst., *Apeldoorn, Netherlands*

Within the framework of investigations on windpower utilization (by means of aeroturbogenerators built on artificial islands) wind tunnel experiments are performed concerning: a) The perturbation of the wind profile by an aeroturbine; b) The optimal configuration of a set of aeroturbines for the utilization of the windpower.

Addenda: Supporting agency: Nijverheidsorganisatie TNO. Performing organization: Centraal Technisch Instituut TNO.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

4.0159, SCOUTING THE POSSIBILITIES OF THE DEVELOPMENT OF PRODUCTS AND SYSTEMS NECESSARY FOR THE UTILIZATION OF SOLAR ENERGY (ABBREV)
H.J. BEYER, A K Z O, *Arnhem, Netherlands*

Scouting the possibilities of the development of products and systems to be manufactured by the chemical industries necessary for the utilization of solar energy.

SUPPORTED BY Netherlands - A K Z O N.V. - Arnhem

4.0160, AERO-TURBINES AS AN ENERGY SOURCE
J.H. HAAGH, Breda Academy of Technology, *Breda, Netherlands*

Design, construction, and testing of an aero-turbine constructed according to model rules.

Addenda: Performing organization: Hogere Technische School Breda.

SUPPORTED BY Netherlands - Ministry of Education and Science - The Hague

4.0161, DETERMINATION OF THE EFFICIENCY OF A SOLAR ENERGY COLLECTOR
J.H. HAAGH, Breda Academy of Technology, *Breda, Netherlands*

A solar collector of simple construction with water as a coolant, is studied. The efficiency is determined as a function of the temperature of the collector.

Addenda: Performing organization: Hogere Technische School Breda.

SUPPORTED BY Netherlands - Ministry of Education and Science - The Hague

4.0162, EFFICIENCY OF FLAT-PLATE COLLECTORS UNDER DUTCH METEOROLOGICAL CONDITIONS - DEVELOPMENT OF SOLAR HEATING SYSTEM FOR A DUTCH DWELLING
C. DENOUDEN, Central Org. Adv. Appl. Res., Inst. for App. Physics, *Delft, Netherlands*

Experimental verification of calculations based on hourly data measured by the Royal Meteorological Institute of the Netherlands (KNMI), De Bilt, during the period 1961-1970 giving the amount of solar energy that can be collected in the Netherlands with some types of flat-plate collectors.

Measurement of the effect of dirt on the efficiency of flat-plate collectors. From the calculations and measurements mentioned above, a solar heating system will be developed. Components of this system will be flat-plate collectors with a spectral selective surface, a storage system with auxiliary heating for storing heat over a certain period, and an adapted heating system. The system must be capable of heating dwelling with a mean overall heat-transfer of 0.8 W/square meter degrees C about 70 percent with solar energy.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

4.0163, DEVELOPMENT OF A HYBRID COMPUTER MODEL FOR A 'SOLAR HOUSE' AND ENERGY-SAVING DWELLING

C. DENOUDEN, Central Org. Adv. Appl. Res., Inst. for App. Physics, *Delft, Netherlands*

A hybrid computer model will be developed for calculation of the energy consumption in three typical Dutch dwellings under actual outdoor conditions. The thermal behaviour of the dwellings is simulated by an analogous model. The outdoor conditions (temperature, wind speed, solar radiation) will hourly be fed into the model by means of a digital computer, which is also used for handling the results.

Energy demand (area of collector surface), storage capacity, room temperatures, wall insulation, percentage of windows in the various walls, etc. can be calculated.

Addenda: Supporting agency: Nijverheidsorganisatie TNO. Performing organization: Technisch Physische Dienst TNO-TH-Delft.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

4.0164, FIELD INVESTIGATION ON THE EFFICIENCY OF SOLAR ENERGY COLLECTORS APPLIED IN ROW HOUSES (ABBREV)

P. EUSER, Central Org. Adv. Appl. Res., Inst. for App. Physics, *Delft, Netherlands*

Field investigation of the efficiency of solar energy collectors applied in some row houses of a more or less conventional type, both with calculations about the energy consumption in dependence of wall insulation and heating system.

Several energy saving provisions will be tried out, e.g., application of solar energy, conventional central heating versus air heating and wall insulation. By means of computer calculations a more extensive evaluation of said provisions will be made.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

4.0165, UTILIZATION OF WIND POWER

P. VANSTAVEREN, Central Org. Adv. Appl. Res., *Delft, Netherlands*

The project regards technological and economical studies to inform the Dutch Government and industry about the possibilities of utilizing wind energy. The project is carried out in cooperation with Dutch research institutions and industries.

If the Dutch Government gives financial support, a second project will start concerning an experimental utilization of windpower. The investigation is planned for a period of about ten years. A third project may be sponsored by the Dutch Government, concerning the utilization of wind power in developing countries.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

4.0166, UTILIZATION OF SEA WAVE ENERGY FOR POWER GENERATION

J.A. BATTJES, Delft Univ. of Technology, *Delft, Netherlands*

First feasibility study has been finished. Various possible solutions are studied more in detail now.

SUPPORTED BY Netherlands - Delft University of Technology

4.0167, CYCLO-GYRO WING SYSTEMS FOR ENERGY EXTRACTION

R. COENE, Delft Univ. of Technology, *Delft, Netherlands*

Aerodynamic calculations indicate that a nearly two-dimensional cyclogyro wing system with its axis parallel to the ground and perpendicular to an oncoming wind can be used for the extraction of wind energy. In a proper design the ground effect increases the mass flow and thereby the amount of energy that can be extracted for a given frontal area at a certain height. On the scale of the span of the system, it acts as a pair of vortex-generators and one may expect that in a ground surface distribution of large systems, the spacing can be relatively close.

The investigation is focused on the aerodynamic aspects, theroretically as well as experimentally, but structural aspects and aero-elastic effects are not ignored.

SUPPORTED BY Netherlands - Delft University of Technology

4.0168, SOLAR ENERGY FOR SPACE HEATING

C.H. HOOGENDOORN, Delft Univ. of Technology, *Delft, Netherlands*

The project concerns two studies regarding photo-thermal conversion of solar radiation: a) Efficiency of solar energy collectors, b) Transport of heat by means of heat pipes.

The first study concerns the reduction of the heat losses (caused by radiation and convection) of solar energy collectors. Regarding the radiation losses, the research is carried out on spectral selective coatings, concerning the losses of a plain collector by convections, experimental (laser interferometry) and theoretical studies (mathematical solutions for the Navier-Stokes and energy equations) are performed.

The sub-project regarding heat pipes, focusses at the research on liquid and gas streams in the 50-300 degrees C temperature region for this equipment (important temperature region for solar energy thermal conversion). The Research Team on Heat Transport of the Delft Technological University cooperates closely with the Heat Transfer Group of the Institute of Applied Physics TNO-TH, Delft, The Netherlands.

Addenda: Supporting agency: Technische Hogeschool Delft.

SUPPORTED BY Netherlands - Delft University of Technology

4.0169, MAXIMUM POWER POINT ALTERNATING CURRENT ELECTRIC WINDMILL GENERATOR SYSTEM

F.C. SCHWARZ, Delft Univ. of Technology, Lab. for Power Electronics, *Delft, Netherlands*

Objective: To develop the technology for (a) efficient frequency stabilization of a variable speed driven a.c. generator with worst case loss of less than 1 percent of the synchronous maximum generator power for all conditions of operation and (b) to extract the maximum power available in the aero-mechanical system at any instant by self-alignment to the optimum torque-speed characteristics of wind-wick interaction. To attain these objectives with reliable and low cost implementation of the system as explained in projects 1 through 3.

Approach: Stabilization of generator frequency by application of variable rotor frequency, powered from a static inverter which supplies a maximum of 15 percent of the maximum generator power in the worst case. Application of the principle of maximum power point tracking implemented via the solid state inverter, analogous to maximum power point tracking used in solar electric space power systems.

Application: Windmill generator systems, energy storage and recovery from flywheels, variable speed and torque motor drives as defined under project 3 with improved efficiency and requiring lower inverter effort.

State-of-the-art: Application of maximum power point principle unknown for the described type of machine drive. Field modulation of generators is known; it suffers from inadequate flexibility and efficiency of static inverters.

Present state: Principles of shaft and inverter driven generator have been quantitatively verified at the 10 kVA level. Maximum power point tracking mechanism is awating implementation pending availability of manpower and funds (2nd geld stroom or afstudeerders).

SUPPORTED BY Netherlands - Ministry of Education and Science - The Hague

4.0170, SOLAR ENERGY COLLECTOR COMBINED WITH A HEAT PUMP

M.F. VANDERJAGT, Delft Univ. of Technology, *Delft, Netherlands*

The project can be divided in the following subprojects: 1. Combination of solar heat collector with a heat pump. The objective is to improve the efficiency of a solar energy collector under the Dutch climatological conditions. 2. Calculation of the efficiency of heat pumps as a function of the temperature difference to be recovered, the temperature of the collector and the type of coolant. 3. Calculation of the economical applicability of space heating systems (floor-, ceiling- and central heating) coupled to solar heat collectors combined with a heat pump. 4. Making estimates about the energy conservation by improvement of building regulations (better insulation, influence of the window-surface, orientation with regard to the sun, etc.), by means of hybrid simulation methods. 5. Research on the efficiency of regenerators and recuperators.

SUPPORTED BY Netherlands - Delft University of Technology

4.0171, WINNING OF GEOTHERMAL ENERGY

W.H. VANEEK, Delft Univ. of Technology, *Delft, Netherlands*

Recently a preliminary investigation has been performed on the possibilities of the winning of geothermal energy in the western part of The Netherlands. Research is being carried out to improve the (at present sub-marginal) economic efficiency of the process by substantially increasing the output of a well.

Consideration is further given to a multi-disciplinary investigation of the possibilities to winning of geothermal energy from volcanic power found on the Mid-Atlantic ridges. This geothermal heat could then be applied to generate electric power for the production of hydrogen.

SUPPORTED BY Netherlands - Delft University of Technology

4.0172, WINDMILLS WITH INCREASED POWER OUTPUT DUE TO TIPVANE INDUCED DIFFUSION OF THE AIRSTREAM

T. VANHOLTEN, Delft Univ. of Technology, *Delft, Netherlands*

Betz's formula for the maximum power output of windmills is valid only for windmill types causing a steady, axial force to be applied to the air. Types not covered by Betz's analysis, such as windmills applying radial as well as axial forces to the air, may have a much larger power output.

The project deals with a type of windmill where relatively small vanes, attached to the tips of the millblades, deflect the air radially outwards. The diffuser effect caused by the tipvanes downstream of the windmill is associated with a general type of flow resembling a Venturi-flow, where the windmill is placed near the narrowest part of the streamtube. The resulting increased mass flow of air through the disc plane of the windmill causes a larger power output per unit of area swept by the millblades.

The feasibility of this type of windmill is investigated theoretically as well as experimentally.

SUPPORTED BY Netherlands - Delft University of Technology

4.0173, CLIMATOLOGICAL STUDY IN RELATION TO ENERGY CONSERVATION IN HOUSES AND OTHER BUILDINGS AND THE UTILIZATION OF SOLAR ENERGY FOR SPACE HEATING

J. HAMAKER, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

An optimal protection against climatological impact requires extended knowledge about the climate and its dynamic behaviour. The data, collected by the Royal Dutch Meteorological Institute (KNMI) over a period of ten years will be processed and amplified. The results of this study will be utilized for the development of a computer model to determine the optimal power and control of equipment to be installed (space heating, warm-water supply, freezing, air conditioning, solar collector) and the amount of fuel to be consumed.

SUPPORTED BY Netherlands - Eindhoven University of Technology

4.0174, PRODUCTION OF ELECTRIC ENERGY UTILIZING WIND POWER

J.A. SCHOT, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

The objective is to control an aeroturbine-generator in such a way that the energy obtained from the wind at every wind speed and the electric energy produced are both optimal.

Addenda: Supporting agency and performing organization: Technische Hogeschool Eindhoven.

SUPPORTED BY Netherlands - Eindhoven University of Technology

4.0175, WIND POWER

P.T. SMULDERS, Eindhoven Univ. of Technology, Lab. for Fluid Dynamics, *Eindhoven, Netherlands*

Compilation of wind energy bibliography; about 1000 references; information retrieval with aid of a computer with keywords; to be completed first half of 1975 (associate ir. R. van Steyn).

Investigation of behaviour of wind machine in fluctuating winds. The programme will comprise three stages. a) Set-up of measuring system that collects essential data on a time scale comparable to time scale of relevant wind fluctuations; b) Evaluation of measured data with aid of computer in terms of state and dynamic characteristics; and c) set-up of mathematical models for subsystems of wind generator. Time span of project: 3 to 4 years.

Participation in programme to evaluate possibilities of use of wind energy in developing countries. Participants TNO and RU Groningen. A proposal to obtain financial aid to carry out a research programme is in preparation.

SUPPORTED BY Netherlands - Eindhoven University of Technology

4.0176, DEVELOPMENT OF A SOLAR CELL ON A DEFECTIVE SILICON CRYSTAL BASIS

F. VANDERMAESEN, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

The objective is to study the possibilities of manufacturing silicon solar cells of silicon layers that do not satisfy the highest requirements concerning a single crystal.

The project has just been started. The team consists of about three scientists and three technicians. A Vapor Deposit Apparatus will be ordered. (Dfl. 150,000). There is an exchange of information with Dutch industrial and university laboratories.

Addenda: Supporting agency and Performing organization: Technische Hogeschool Eindhoven.

SUPPORTED BY Netherlands - Eindhoven University of Technology

4.0177, PRODUCTION OF HYDRO-ELECTRIC POWER BY MEANS OF BANKI TYPE RADIAL FLOW TURBINE GENERATORS FOR SMALL DROP IN DEVELOPING COUNTRIES

C.W. VANKOPPEN, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

SUPPORTED BY Netherlands - Foundation Tool - Eindhoven

4.0178, SOLAR HEATING OF RESIDENTIAL BUILDINGS IN THE NETHERLANDS

C.W. VANKOPPEN, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

The project consists of two complementary parts: a) The design, construction, testing and further development of a solar

heating installation on a single house, and b) The scientific analysis of the performance of the installation, and the development of a design method for solar heating installations under the climatic conditions prevailing in the Netherlands.

The support from the government, amounting to Dfl 369,500, mainly concerns part a) of the project, whereas part b) is being incorporated in the current work of the staff members and students of the Eindhoven University.

The project is an integral one in the sense that scientific, technical, economical, architectural and social aspects are considered simultaneously both in the design and in the analysis of the performance.

The project is coordinated with the research going on at TPD-TNO, Delft and at Bouwcentrum, Rotterdam.

SUPPORTED BY Netherlands - Ministry of Education and Science - The Hague

4.0179, PHOTOSYNTHESIS

J.S. WESSELS, Philips Research Laboratories, *Eindhoven, Netherlands*

Various aspects of photosynthesis (such as electron transport in higher plants, the effect of herbicides on photosynthesis and carbohydride metabolism in efficient plants).

SUPPORTED BY Netherlands - Philips Research Laboratories

4.0180, GEOTHERMICS

UNKNOWN, Ministry of Economic Affairs, *Harlem, Netherlands*

Studying the recordings of temperature and pressure measurements, water analyses, and geological factors for an inventory of geothermal energy. This project is a part of a long term program of the Geological Department of the Dutch Ministry for Economic Affairs.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

4.0181, MECHANISM OF PHOTOSYNTHESIS

L.N. DUYSENS, State University at Leyden, *Leyden, Netherlands*

The purpose of the project is the elucidation of the mechanism of photosynthesis in all relevant details. The main studies at present concern: 1) transfer of electronic excitation energy between photosynthetic pigments and pigment systems; 2) the primary reactions in reaction centers 1 and 2 of oxygen evolving organisms and in that of purple bacteria; 3) the electron transfer chains in photosynthetic organisms.

SUPPORTED BY Netherlands - State University at Leyden

4.0182, INVESTIGATIONS IN THE FIELD OF THE EXCITED STATES OF PORPHINS IN THE FRAMEWORK OF THE RESEARCH ON PHOTOSYNTHESIS

J.H. VANDERWAALS, State University at Leyden, Gorlaeus Laboratories, *Leyden, Netherlands*

The objective is to identify the excited electronic state(s) of porphins with as ultimate aim a better understanding of the primary processes involved in photosynthesis.

SUPPORTED BY Netherlands - State University at Leyden

4.0183, GROWTH OF POLYCRYSTALLINE SILICON LAYERS

J. BLOEM, Catholic University Nijmegen, *Nijmegen, Netherlands*

Since January 1974 the department is doing research in the field of growing polycrystalline silicon layers applying the chemical vapour deposition method. The objective is to study the possibility of relatively high growth rates at low temperature (approximately 300 degrees C), as it has recently been found that the addition of boron hydride in the gas phase catalytically accelerates the growth of the silicon layers.

The basic aspects of this catalytic process in relation to the semi-conductive properties of silicon are regarded to be of great importance to the realization of the production of cheap solar cells. The process may also be applied in the field of thermo solar collectors.

SUPPORTED BY Netherlands - Catholic University of Nijmegen

4.0184, FORMATION OF SILICON SINGLE CRYSTALS BY CONTROLLED CHEMICAL VAPOUR DEPOSITION

J. BOLEM, Catholic University Nijmegen, *Nijmegen, Netherlands*

Historical: The department has a great experience with the chemical vapour deposition process to produce epitaxial Si layers on single crystalline silicon substracts. The CVD-apparatus has been used to study the incorporation of phosphorus as dope element into the silicon lattice.

Current situation: At the moment the influence is studied of the composition of the vapour on the growth and the etching of silicon single crystals. Besides, an investigation has started concerning the incorporation of oxygen in the silicon lattice. The results of this research will be of direct importance to the technology of producing solar cells. The present know-how will be certainly useful in applied research projects in this field.

SUPPORTED BY Netherlands - Catholic University of Nijmegen

4.0185, FEASIBILITY STUDY OF AN AEROTURBINE IN THE NORTH SEA FOR ENERGY GENERATION

P. CROOCKEWIT, Rijn Schelde Verolme N.V., *Rotterdam, Netherlands*

Development of energy conversion systems in connection with aeroturbines to optimize the most attractive energy form.

Addenda: Supporting agency and Performing organization: Rijn-Schelde-Verolme N.V.

SUPPORTED BY Netherlands - Rijn Schelde Verolme N.V. - Rotterdam

4.0186, UTILIZATION OF WIND FOR ELECTRIC POWER PRODUCTION

R.J. SCHLIEKELMANN, Fokker V F W, *Schiphol Oost, Netherlands*

Historical (1973-1975): The following studies have been finished: 1. Calculation of the mean annual energy production as a function of the diameter and the efficiency of the aeroturbine for locations at the Dutch coast, near the shore and at the middle of the North Sea. 2. Determination of the conversion efficiency for a 1.5 m diameter aeroturbine (Darricus type, vertical axis) as a function of the wind velocity, the speed of the blade(s), the ratio of covering (area of the blades/area of the rotor). 3. The development of an electronic controller to adjust and keep speed of the blade(s) to maintain an optimal conversion efficiency at fluctuating flow rates of the wind for a fixed diameter and ratio of covering. 4. Analyzing the merits of existing aero-power stations. 5. Estimating of acceptable building expenses of aero-power stations onshore and offshore (North Sea), depending on the kWh-delivery costs to the mains.

Subjects under study this year and following years are: 1. Constructing and testing a 5 m. diameter aeroturbine (vertical axis) to confirm the experimental data of 1.2. for higher values of the Reynold's number. The sizes of the blade chord, for a 1.5 m diameter model (45, 75, 90 mm) are of such small dimensions, that the blade profile data (from wind tunnel experiments) are simply not applicable. The estimates of the yield of large-size aeroturbines (50 m rotor diameter and more) require an unacceptable extrapolation with respect to the 1.5 m diameter turbine. The data obtained from experiments with a 5 m model will lead to more reliable estimates of the annual energy production. 2. Measurements of the stresses and deformations of the blades of a vertical type aeroturbine. This investigation has been started on the 1.5 m diameter model. The research will be extended to the 5 m diameter aeroturbine. The objective is to acquire a better understanding of the loading of the blades as a basis for developing blades with acceptable strength and resistance against fatigue. 3. Development of blade design for vertical and horizontal aeroturbines of very large diameters (50 m and more) which will satisfy the desired conditions concerning strength, durability under fluctuating loads and in corrosive environments, and which will meet stringent demands as regards low cost price in series production.

SUPPORTED BY Netherlands - Fokker V.F.W. - Schiphol Oost

4.0187, APPLICATION OF GEOTHERMAL ENERGY IN THE NETHERLANDS

W.A. VISSER, Central Org. Adv. Appl. Res., *The Hague, Netherlands*

The research concerns the possibilities of using hot (90 degrees-100 degrees C), underground waters (depths 2-3 km) as a source of energy for the heating of buildings, greenhouses, etc.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

4.0188, WINDPOWER R & D PROGRAMME PREPARATION

J. PELSER, Reactor Center, *The Hague, Netherlands*

Preparation of a proposal for a co-ordinated national windpower R&D programme by a group of experts from Governmental Services, National Laboratories and Universities.

SUPPORTED BY Netherlands - Ministry of Education and Science - The Hague

4.0189, PHOTOCATALYZED PRODUCTION OF FUELS BY MEANS OF SOLAR ENERGY

A. MACKOR, Central Org. Adv. Appl. Res., Inst. for Organic Chem., *Utrecht, Netherlands*

The research concerns the hydrogeneration of simple molecules (e.g. CO2 and N2) photocatalysed by a photo-excited organo metal complex. The reducing agent is a hydrogen compound (e.g. water), decomposed by the excited simple molecule/organo metal complex.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

4.0190, GEOTHERMAL ENERGY IN NON-VOLCANIC AREAS

R.D. SCHUILING, Vening Meinesz Laboratory, *Utrecht, Netherlands*

THE PROJECT CONCERNS: a) Collecting and interpretation of geothermal data (for the Netherlands, the neighbouring countries and the North Sea) in order to trace favourable spots to win geothermal energy in non-volcanic areas. b) Study of the interaction of groundwater and neighbouring rock layers. c) Study of the reactions in deep ground water, caused by diminishing pressures and temperatures.

LITERATURE: Schuiling, R.D. (1974): A future for induced geothermal energy? Geol. Mijnb. 53, p. 25-26

Schuiling, R.D. & Varekamp, J.C. (1974): Geothermische energie. Atoomenergie en haar toepassingen, Juni 1974, p. 133-138

SUPPORTED BY Netherlands - State University at Utrecht

4.0191, STUDY OF PHYSIOLOGICAL, PHYSICAL AND CHEMICAL ASPECTS OF CHLOROPHYLL SYSTEMS, ESPECIALLY IN PURPLE BACTERIA

G.H. KRONENBERG, Wageningen Ctr. of Agric. Sci., *Wageningen, Netherlands*

The objectives are: a) Purification of, study of reactions of and structure determination of several pigment-protein complexes of bacteriochlorophyll as well as of photo-chemical centers. b) Research on the existence of an Emerson effect in photosynthetic bacteria. c) Investigation of the differences in physiological activity and chemical composition, caused by breeding under different conditions: the project may lead to a better understanding of the photosynthesis by bacteria, also in comparison with algae and more differentiated plants.

Addenda: Supporting agency and Performing organization: Landbouwhogeschool.

SUPPORTED BY Netherlands - State Agricultural University - Wageningen

4.0192, PHOTOSYNTHESIS & PHOTOPHOSPHORYLATION IN GREEN PLANTS IN DEPENDENCY ON LIGHT INTENSITY, WAVELENGTH, AREA & OTHER INTERNAL & EXTERNAL FACTORS

W. LINDEMAN, Wageningen Ctr. of Agric. Sci., *Wageningen, Netherlands*

The objective of this investigation is to elucidate the light conversion efficiency during internal and external conditions in vivo.

SUPPORTED BY Netherlands - Agricultural University at Wageningen

4.0193, HEAT BALANCE, TRANSMISSION OF LIGHT AND DIFFUSION RESISTANCES IN THE LEAVES OF POPLAR AND OF OTHER PLANTS

G.A. PIETERS, Wageningen Ctr. of Agric. Sci., *Wageningen, Netherlands*

The object is to obtain a better understanding of the interactions between the individual plant and its surroundings. The influence of the root environment is a complicating factor in this respect. An understanding of the behaviour of the individual plant may improve our insight in the interaction between the plant and vegetation, which may be useful in relation to cultivation and improvement.

These plants will be cultivated under different conditions of light intensity, temperature, and root environment.

Addenda: Supporting agency and Performing organization: Landbouwhogeschool.

SUPPORTED BY Netherlands - State Agricultural University - Wageningen

4.0194, ENERGY BALANCE OF POPLAR & OTHER PLANTS IN SITU, ON THE RATES OF PHOTOSYNTHESIS & RESPIRATION & THE TRANSPORT OF ASSIMILATES (ABBREV)

G.A. PIETERS, Wageningen Ctr. of Agric. Sci., *Wageningen, Netherlands*

The object is to obtain a better understanding of the mechanism of production, distribution and utilization of photosynthetic products in the plant. So an explanation may be developed regarding the control-mechanisms of growth in the plant itself and of the behaviour of the plant as part of the vegetation. An exact understanding of the physiology of plants as part of the vegetation may be of profit in relation to cultivation and improvement.

Addenda: Supporting agency and Performing organization: Landbouwhogeschool.

SUPPORTED BY Netherlands - State Agricultural University - Wageningen

4.0195, MICROWAVE-ENERGY FROM PHOTOSYNTHETIC PIGMENTS

T.J. SCHAAFSMA, Wageningen Ctr. of Agric. Sci., *Wageningen, Netherlands*

Degradation of photo-energy in photosynthetic pigments does not always lead to thermal energy. In pheophytin-like compounds, part of the light can be converted into microwaves, due to stimulated emission from the lowest triplet state. One goal of the project is the accurate definition of conditions under which this microwave emission can be observed. In a wider scope this research is part of a program to study energy conversion and conservation in photosynthesis.

Addenda: Performing organization: Landbouwhogeschool.

SUPPORTED BY Netherlands - Agricultural University at Wageningen

4.0196, EXCITED STATES OF PHOTOSYNTHETIC PIGMENTS

T.J. SCHAAFSMA, Wageningen Ctr. of Agric. Sci., *Wageningen, Netherlands*

The conversion of solar energy into useable form, by making use of the photosynthetic system, presents some severe problems. Energy production by biological sources invariably runs into transportation problems and interferes with food production if large areas of (potential) fertile land are used. Therefore, this project aims at elucidating the unique properties of the photosynthetic system by analyzing the energy conversion in the molecular pigments of this system when it interacts with light. When the peculiar properties of the whole system can be unambiguously related to those of its parts, this should be of invaluable help to construct solar energy-conversion cells (e.g. photovoltaic cells or hydrogen sources) which are both stable and independent of fertile soil. They may further decrease the cost of energy production by solar cells. We study therefore chlorophylls and analogues by methods which are suitable to clarify the fundamental steps in the energy-conversion in these pigments.

Addenda: Performing organization: Landbouwhogeschool.

SUPPORTED BY Netherlands - Agricultural University at Wageningen

4.0197, PHOTOREACTIONS AND ELECTRON TRANSPORT IN PHOTOSYNTHESIS

C.J. SPRUIT, Wageningen Ctr. of Agric. Sci., *Wageningen, Netherlands*

Different electron carriers are involved in the chemical storage of photoenergy during photosynthesis.

Sensitive spectrophotometrical methods have been developed to study these processes.

SUPPORTED BY Netherlands - Agricultural University at Wageningen

4.0198, RELATION BETWEEN ELECTRON TRANSPORT AND PHOTOPHOSPHORYLATION OF CHLOROPLAST MEMBRANES AND THEIR LIPID COMPOSITION

J.J. VANRENSEN, Wageningen Ctr. of Agric. Sci., *Wageningen, Netherlands*

The transport of electrons in photosynthetic active tissues has a coupling with the photophosphorylation processes leading to the formation of ATP. It is highly probable that the structure of the chloroplast membranes has a great influence on this coupling.

The molecular structure of the membranes depends strongly on the lipid composition.

The coupling is studied by measuring the electron transport and the phosphorylation in membranes of isolated chloroplasts in relation with their lipid composition.

Addenda: Supporting agency and Performing organization: Landbouwhogeschool.

SUPPORTED BY Netherlands - Agricultural University at Wageningen

4.0199, EFFICIENCY OF LIGHT ENERGY CONVERSION IN THE GROWTH OF ALGAL CULTURES AND FIELD CROPS

J.C. WESSELIUS, Wageningen Ctr. of Agric. Sci., *Wageningen, Netherlands*

Objective: Research on environmental factors influencing the growth and photosynthetic efficiency of Cyanophyta in comparison with field crops, to get information about the conditions related to the strong development of the Cyanophyta in polluted surface water.

A mathematic model will be developed to forecast the phenomenon of the strong flourishing of the Cyanophyta, a blue colored weed vegetating in fresh water.

SUPPORTED BY Netherlands - Agricultural University at Wageningen

4.0200, COOPERATION BY SWEDISH RESEARCHERS IN AMERICAN STUDIES OF THE TREATMENT OF WASTEWATER USING BIOLOGICAL PROCESSES

S. DELIN, Unknown Inst. or Indiv. Grant, *Sweden*

OBJECTIVE: Studies of biological processes which utilize solar energy to build up high-molecular material from waste in aquatic environments will be carried out. Energy is extracted in the form of detoxification, pure water and protein, i.e. an enthropy reduction is obtained.

APPROACH: Review and studies of international literature. Visits to and studies at companies involved in development work, in Tel Aviv and California, etc. Participation as guest researchers in Prof. Oswald's team at the University of California, Berkeley, USA.

PROGRESS: Research work is to concentrate on the basic parameters and development of individual steps in the process.

INTENDED USE OF RESULTS: In future stages experiments on series of steps in a Swedish project are planned.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

4.0201, THERMOSIPHON BOILER

L. HORWITZ, Unknown Inst. or Indiv. Grant, *Sweden*

Current research in the field of solar heat and solar energy for space heating and production of hot water is mainly concerned with conditions and solar collectors. The object of this project is to develop a new type of boiler for rational operation and storage of heat. Calculation of optimum storage sizes will be made so that good overall economy is obtained. The boiler will be developed both for detached houses and for industries and municipal installations. It will be capable of application in new production even in existing installations, and for space heating and/or water heating. As a consequence of the above object, a new system will be developed which, in connection with solar collectors, can give rise to considerable savings in energy consumption.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

4.0202, THERMOSIPHON FURNACE

L. HORWITZ, Unknown Inst. or Indiv. Grant, *Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

4.0203, COLLECTION OF SOLAR ENERGY BY MEANS OF MIRRORS, AND ACCUMULATION OF THIS ENERGY OVER LONGER PERIODS (1-6 MONTHS)

L. PETREN, Unknown Inst. or Indiv. Grant, *Sweden*

Utilization of solar energy at a low price is of great importance. The investigations which we have made indicate that the cheapest solution is a solar collector of mirror type which concentrates solar radiation onto a small area which can be insulated, cooled and shut off in an inexpensive manner. The accumulator should be cheapest if it consists of water in a rock chamber at a relatively great depth (100 m), or in a borehole of conventional type at a depth of about 125 m. We base our views on the tables provided by the Swedish Meteorological and Hydrological Institute, price details from glassworks, construction firms and forging firms, and on our own experience. The objective of this project is to verify the above and to obtain technical data in order to make possible and facilitate the design of major commercial installations. Other advantages are that only conventional technology is required for utilization of solar energy and that the environment is not harmed; finally, there is the great national economic advantage that provision of vital energy need not place a burden on the balance of trade.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

4.0204, SUN COLLECTOR SYSTEM WITH PIGMENTED LIQUID AS AN ENERGY ABSORBING MEDIUM

J. SVENSSON, Unknown Inst. or Indiv. Grant, *Sweden*

The object of this project is to study the possibilities of producing all glass solar-energy collectors using a pigmented liquid as an energy absorbing medium. Problems associated with mechanical construction and assembly methods will be studied in consultation with Emmaboda Glassworks. The rest of project work will be performed at the Department of Physics and Measurements Technology, University of Linkoping. The prinicipal aim of it will be to study the thermal properties of the sun collector as regards different types of pigmentation.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

4.0205, SOLAR HEATING SYSTEMS FOR DOMESTIC HOT WATER

A. WESTROM, Wahlings Installationsutv Ab, *Danderyd 1, Sweden*

The purpose of this project is to investigate the technical and economic background for utilizing solar energy for heating hot water in buildings combined with heat recovery from the exhaust air. A prerequisite is that a system of this type can be used in both existing and new buildings. The following will be investigated: 1. suitable size and design of the components included in the system, such as solar heat collectors, storage tanks, heat pumps and hot-water heaters, 2. suitable water temperatures in the system, 3. suitable control functions for the system, 4. special requirements on buildings and other installations, such as transport openings, collected exhaust air, etc., 5. calculation of installation and operation cost for a solar heating system in a multi-family house with existing installations and an assessment of the profitability.

SUPPORTED BY Sweden - Council for Building Research

4.0206, DEVELOPMENT OF METHODS FOR PROSPECTATION OF GEOTHERMAL ENERGY RESERVOIRS IN GRANITE ROCKS

K.G. ERIKSSON, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

OBJECTIVE: To investigate and develop methods for prospectation of geothermal energy reservoirs in the granite rocks in Sweden.

APPROACH: In stage 1 of the project, the following measurements were carried out: a) analyses of samples of granite rocks by radiometric technique for U, Th and K contents. b) measurements in situ of heat and temperature conductivities; c) measurements of temperature gradients in already existing drill holes.

PROGRESS: The preliminary results have been presented and discussed in a report from Dept. of Geology, Chalmers Univ. of Technology, January, 1976. In stage 2 of the project methods for prospectation were further investigated. A Ge(Li)-detector was introduced for in situ gamma radiation spectrometry to analyze U, Th, and K contents. In stage 3 (the current phase of the project) the prospectation technique is further studied.

INTENDED USE OF RESULTS: The methods and instruments that will appear as a result of the project are intended for use in a more systematic survey of possible geothermal energy reservoirs in Sweden.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

4.0207, POSSIBILITIES FOR UTILIZING WAVE ENERGY IN SWEDEN

C. FALKEMO, Chalmers Univ. of Technology, Inst. of Ship Hydromechanics, *Gothenburg 5, Sweden*

OBJECTIVE: Analysing the possibilities for wave energy utilization in Sweden.

APPROACH: Available methods for wave energy conversion will be studied. Wave conditions along the Swedish coasts will be analyzed. The resulting energy price from a possible wave power plant in Sweden will be estimated.

INTENDED USE OF RESULTS: The findings will be used in the Board's R&D planning and decision making.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

4.0208, THE UTILIZATION OF SOLAR ENERGY IN SWEDEN - A PRELIMINARY STUDY

B. LECKNER, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

This project consists of a preliminary study intended to establish the parameters and relative factors which can occur in conjunction with solar heating systems. The main work, which should follow this preliminary study will comprise a study of system parameters in active solar heating systems under varying technical, economic and climatic conditions. The aim is to map out the conditions for the use of solar energy in active solar heating systems in Sweden.

SUPPORTED BY Sweden - Council for Building Research

4.0209, ELECTRICAL SYSTEMS FOR WIND POWER PLANTS OF TODAY AND TOMORROW

S. VONZWEYGBERGK, Chalmers Univ. of Technology, Inst. of Electrical Machinery, *Gothenburg 5, Sweden*

OBJECTIVE: To provide a basis for evaluation of wind power systems as regards the electrical system.

APPROACH: The project includes evaluation of different kinds of conventional (syncronous, induction high rpm) and unconventional (syncronous low rpm, special types of induction generators) generators. It also includes problems from running in parallell with the net, switching in and out, stability etc. A method for computation of the primary torque from electrical data is developed.

PROGRESS: In stage 1, the following were investigated: conventional (synchronous-, asynchronous-) generators in combination with suitable gear, different sorts of static frequency changeovers etc.

In stage 2 (the current phase of the project) the conventional generators are further studied as well as certain unconventional machines.

INTENDED USE OF RESULTS: The project is managed in collaboration with the Saab-Scania project with No. 53 5060 031.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

4.0210, LOW-ENERGY HOUSES - INVESTIGATIONS INTO A PRACTICAL TESTS ON SOLAR ENERGY FOR ONE-FAMILY HOUSES

G. TORNEBACK, Ostgota Byggen Ab, *Linkoping, Sweden*

The purpose of this project is to build a solar energy system, which can contribute 40-60% of the energy requirements for heating and domestic hot-water, in a traditional one-family house.

This pilot project should provide experience for building a large, joint heating plant for several houses and for developing newer, simpler and cheaper solar heat collectors and better accumulators.

SUPPORTED BY Sweden - Council for Building Research

4.0211, SOLAR ENERGY SYSTEM FOR A ROW-HOUSE AREA

G. TORNEBACK, Ostgota Byggen Ab, *Linkoping, Sweden*

Design of solar energy system for hot-water and heating supply for a row-house area of approximately 50 units.

Water, which is heated by means of solar energy via solar heat collectors, is to be stored in a thoroughly insulated heat storage tank which is wholly or partly sunken in the ground. The purpose of the planned project is to provide an answer as to whether it is economically and technically justified to utilize solar energy in the manner described.

Computerized calculations of the temperatures and heat losses in the water and in the ground will be carried out for a predetermined, assumed charging of the storage tank.

The project will also include the production of a prototype of a new, simplified type of solar heat collector.

SUPPORTED BY Sweden - Council for Building Research

4.0212, DESIGN AND MANUFACTURE OF A 50 KW WIND POWER TEST UNIT - A SYSTEMS ANALYSIS ON FULL-SCALE WIND POWER PLANTS

A. FISCHER, Saab Scania Company, *Linkoping, Sweden*

OBJECTIVE: 1) To design and manufacture a wind power plant test unit, in order to be able to: a) test components and whole systems of wind power equipments. b) During the construction and production of the test unit give a realistic touch to the 'systems analysis' which is running parallelly within this project. 2) To accomplish a systems analysis of full-scale wind power units.

APPROACH: This horizontal axis test unit will be equipped with a 18 m two-bladed aluminum wind turbine in its initial design. Electrical output 50-70 kW, induction generator of standard design 1540 rpm. The 75 rpm of the turbine is geared to the generator rpm by a standard gear-box. The unit is mounted on top of a 23 m pre-stressed concrete tower and will be connected to the grid at Alvkarleby at the coast of the Baltic 140 km north of Stockholm.

The aim of the systems analysis is to provide a basis for a technical and economical evaluation of full-scale wind power units running in parallel with the electric grid. The technology phase will deal with, e.g., technical evaluation of alternative horizontal-axis configurations, design and materials for blades, different types of gearing and generators as well as control systems and towers. The design phase will result in a few different designs that will be evaluated regarding cost and efficiency in the last phase.

INTENDED USE OF RESULTS: The intention is to redesign the test unit at a later stage by introducing new types of wind turbines (e.g. fibre glass) or generators. The test unit will be open for use by other organizations when not occupied by testing for the Swedish Wind Energy Program. Operation intended to start in April, 1977.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

4.0213, USE OF SUN COLLECTOR FOR DRYING OF GRAIN AND HAY FOR THE PURPOSE OF SAVING ENERGY

I. JANSSON, Agricultural College of Sweden, *Lund 6, Sweden*

1250 terajoules/year of energy is consumed for drying of fodder grain and breadstuffs (3,4 million tons). The energy required for drying of hay may well be of the same order of magnitude. A sun collector of simple design has proved to provide 9.25 megajoules/square meters of useful energy per twenty-four hours. A collector area of 50 square meters is adequate for a 42-ton grain drier and a decrease of moisture content by 3% in 3 days and as a heat source for drying of hay.

WORKING PROGRESS: 1) To determine types of plants to be used for different groups of sizes. 2) Further development of sun collector with regard to material and design. 3) To adapt to the new drying technique buildings for storing of grain and hay at the farms concerned. 4) To carry out application tests using a sun collector.

The application tests are to be carried out by the Department of Farm Buildings (LBT) and the Swedish Institute of Agricultural Engineering (JTI) jointly, LBT being responsible for design and development, while JTI will attend to matters like handling and airing/drying of grain and hay.

A 20% saving in energy consumption where grain drying is concerned would mean saving 7000 cubic meters of fuel oil per annum.

INTENDED USE OF RESULTS: To serve as a basis for a further development of simple sun collectors, as well as for dimensioning of the size of sun collectors to be used for grain and hay drying.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

4.0214, SUN AND WIND AS ADDITIONAL SOURCES OF ENERGY FOR BUILDINGS

S. BORGLIN, Univ. of Lund, School of Technology, *Lund 7, Sweden*

The Department of Heat and Power engineering intends to investigate, within the framework for the project on resource conserving construction, the extent to which the use of solar and wind energy in significant manner can contribute to supplying a building with energy when the conversion takes place centrally for an urban area or for a group of buildings. This work is directed towards producing the necessary theoretical methods for carrying out an assessment of the type described here. Part of the methods can already be distinguished. A knowledge of the energy available in the outdoor air and in daylight is, for example, necessary. Meteorological data must be supplemented. The methods must be able to take varying characteristics in the energy requirements of the buildings into consideration. The physical characteristics of the energy conversion plant are dependent on the design and size of individual components and on how they are connected to the system as a whole. On top of this, additional heat is supplied from conventional sources of energy such as hot-water boilers, district heating, heat pumps, etc. The method will probably require a description of the physical characteristics of the energy conversion and on the characteristics of the storage unit and the distribution system.

SUPPORTED BY Sweden - Council for Building Research

4.0215, PHOTO-THERMAL CONVERSION OF SOLAR ENERGY

H. GRIMMEIS, Univ. of Lund, School of Technology, *Lund 7, Sweden*

OBJECTIVE: To develop absorber material with minimal energy losses for converting the sun's rays to usable heat energy.

APPROACH: In stage 1 the proposed project is to be developed and pilot study/project within the solar power/photophysics sector is to be carried out.

PROGRESS: In future stages the following examinations are to be carried out: A theoretical and empirical review of the optical properties of suitable semiconductors within the wavelength bands in question. The absorption and emission abilities of homogeneous semiconductors and insulating material with suitable absorption bands within infra-red band. The suitability of amorphous materials as absorbers.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

4.0216, SHARE OF COST FOR PROCURING AND TESTING OF A 6 KW VERTICAL AXIS WIND POWER PLANT

K. NORBACK, Sydkraft Ab, *Malmo, Sweden*

OBJECTIVE: To test and evaluate a 6 kW Darrieus-type vertical axis wind power plant, which is manufactured on a commercial basis by the Dominion Aluminum Fabricating Ltd., Canada.

If possible the unit will become equipped with an alternator and run in parallel with the net.

INTENDED USE OF RESULTS: To demonstrate the properties and quality of the unit.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

4.0217, MAPPING AND EVALUATION OF AVAILABLE WIND ENERGY IN SWEDEN

L.E. OLSSON, Meteor. & Hydro. Institute, *Norrkoping, Sweden*

A primary aim of this project is to map and evaluate available wind energy in Sweden on actual heights (50 to 150 m). Ordinary low level (10m) measurements will be transferred to 50 to 150 m by the use of a computer model that takes into account e.g. stability data of the atmosphere and roughness parameters for the surrounding terrain. The results will be verified from data from nine different 100 m meteorological masts.

4. GEOPHYSICAL ENERGY SOURCES

Turbulence data is of immediate interest when designing wind power units. In this phase existing and on-going measurements of turbulence will be evaluated, to a large extent in collaboration with another project that is studying wind forces on buildings.

The effects on power capacity from geographically separated wind power plants will be investigated in another phase that is conducted in collaboration with the utilities of Sweden.

A first stage of this project has been financed by Styrelsen for teknisk utveckling (STU). In a final stage of the project an evaluation will be made of the losses in power production that will be probable draw-back of the method to situate a fairly large (ca 100) number of wind power units geographically close to each other.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

4.0218, RADIATION CLIMATOLOGICAL DATA FOR INVESTIGATIONS CONCERNING THE USE OF SOLAR ENERGY IN SWEDEN

B. RODHE, Meteor. & Hydro. Institute, *Norrkoping, Sweden*

Processing and compilation of existing Swedish radiation measurements in suitable table forms and charts for using planning buildings heated by means of solar energy in Sweden.

An investigation of the co-variation between radiation parameters and other climatological elements.

A follow-up of the development of instrumental technology for new measuring methods in planning buildings heated by means of solar energy.

Literature studies and international contacts for the purposes mentioned above.

SUPPORTED BY Sweden - Council for Building Research

4.0219, PRESTUDY ON COMBINED SUN-ENERGY SYSTEMS FOR HEAT AND ELECTRICITY PRODUCTION

D.J. BRAUN, Ab Atomenergi, *Nykoping 1, Sweden*

OBJECTIVE: Analysing the technical-economical possibilities for converting sun energy to electric energy and process heat for industrial, agricultural and forestry use.

APPROACH: Units of 10 MW correspond to actual needs and will therefore be studied. The study covers the following issues: 1) Applications; 2) Energy forms and effect/energy criteria; 3) System designs at different temperatures; 4) Solar energy systems' and conventional systems' interaction; 5) Technical-economical analysis.

INTENDED USE OF RESULTS: The findings will be used in the Board's R & D planning and decision making.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

4.0220, HEATING OF BUILDINGS BY USE OF SOLAR ENERGY

F. STRANICKY, Concordia Development Ab, *Sollentuna, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

4.0221, SOLAR HEATING PROJECT IN SWEDEN 1976 - A SURVEY

J. HOLMBERG, Hugo Theorells Ingeniorsbyra, *Solna, Sweden*

This project is intended to provide a survey of the solar heating project which are being carried on at present in Sweden - both inside and outside the Swedish Council for Building Research framework. The survey is intended to present projects in progress as well as time schedules in force and expected results. The survey is intended to disseminate information outside the groups active in these issues and thus to increase the interest in solar heating projects and, at the same time, initiate other research projects. The survey will be published as a Bulletin.

SUPPORTED BY Sweden - Council for Building Research

4.0222, PRESTUDY ON SUN-STEAM-ELECTRICITY PROCESS

J. HOLMBERG, Hugo Theorells Ingeniorsbyra, *Solna, Sweden*

OBJECTIVE: Analysing the possibilities of converting solar energy to electric energy at medium scale by sun-steam-turbine process.

APPROACH: The study is based on the IEA-500 kW pilot plant. An economical-technical analysis will be carried out. Insolation data for Sweden will be taken into account.

INTENDED USE OF RESULTS: The findings will be used in the Board's R&D planning and decision making.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

4.0223, R & D PROGRAM FOR SOLAR HEAT

I. HOGLUND, Hugo Theorells Ingeniorsbyra, *Stockholm, Sweden*

This project consists of the following parts: A presentation of the international research of the last ten years and an inventory of research in progress within Sweden and in the Nordic countries.

Planning a seminar for discussing the research field.

Proposing a program for R & D activities during the next 10 years. Three options will be studied with investment frameworks of SKr 3 million, 7 million and 10 million respectively.

SUPPORTED BY Sweden - Council for Building Research

4.0224, FORECAST ON COST FOR SUN-ENERGY PRODUCTION BY SI-CELLS

P. WEISSGLAS, Microwave Institute Foundation, *Stockholm, Sweden*

OBJECTIVE: To establish potential cost for electric energy produced by semiconductor-cells. The study is based on the assumption that the goals set abroad concerning cost reduction for semiconductor-cells manufacture are met.

APPROACH: Large scale units of 10 MW and units located at houses from 2 kW upwards. The following system components will be studied: 1) Si-chips; 2) Wire and contacts; 3) Deactivation and AR-coating; 4) Frame and mounting; 5) DC-AC converter; 6) Maintenance; 7) Land planning.

INTENDED USE OF RESULTS: The findings will be used in the Board's R&D planning and decision making.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

4.0225, NEW HORIZONTAL AXIS WIND POWER PLANTS WITH INTEGRATED TRANSMISSION

O. LJUNGSTROM, Research Station of Stockholm, *Stockholm, Sweden*

OBJECTIVE: To perform an initial study of new horizontal axis wind power plants characterized by transmission that are integrated in the design.

INTENDED USE OF RESULTS: To obtain a survey of possible future plant concepts for large scale wind power units.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

4.0226, SYSTEMS ANALYSIS, SOLAR HEAT

A. LINDH, Sven Tyren Ab, *Stockholm, Sweden*

Solar heat can be regarded as part of the energy supply system for heating premises. Its value in monetary terms is directly dependent on how much of a certain type of output and how much energy -at a certain cost- it replaces. The conditions are complicated in electrical heating systems. The extremely low period of utilization (energy/output) in conjunction with input and the probable coincidence of high-pressure weather (sunny and cold) indicates that solar heat has a high economic value. Simultaneity between localities and other power rates in the system indicate the opposite. In the same way, the thermal inertia of buildings has a strong and probably negative effect on the value.

The use of solar energy combined with district heating should also be analyzed. The value of the sun is lower here than is the case in conjunction with electricity and the conditions may also be so simple that computer analysis will not be necessary.

This work is intended to be carried out at a gentle pace with regular meetings in an executive group which will gradually procure the pieces necessary to fit the puzzle together. The systems work will be carried out in a more continuous manner between Sven Tyren AB and Nordisk ADB AB.

SUPPORTED BY Sweden - Council for Building Research

4.0227, SOURCE MATERIAL FOR PFE 78 (BASIC DOCUMENT FOR SWEDISH ENERGY R&D PROGRAM 1978-1981) SUBPROGRAM - SOLAR HEATING SYSTEMS & ENERGY STORAGE

L. ENGSTROM, Uhlin & Malm Arkitektkontor Ab, *Stockholm, Sweden*

To produce source material for PFE 78 (energy-policy decision 1978) concerning the subprogram 'solar heating systems and energy storage' in accordance with the directives issued by DFE (Energy R&D Commission) 1976-06-30.

SUPPORTED BY Sweden - Council for Building Research

4.0228, CLIMATE-ADAPTED BUILDINGS, WITH PARTICULAR REFERENCE TO SOLAR HEATING

B. HIDEMARK, Royal Institute of Technology, School of Architecture, *Stockholm 70, Sweden*

Conventional solar heating systems, solar heat collectors and solar storage are 2-3 times more expensive than traditional heating methods using the technology and energy costs in force today.

Adapting the building itself to the sun through orientation, window location, accumulating parts, skin assemblies, etc., can, on the other hand, provide major heating gains at little or no costs if associated with a climate-adaption of the building and a better use of the internal heat balance.

Various methods for making use of solar energy will be tested in the project and will be compared partly with isolated measuring cells located outdoors and partly through the use of a computer program.

Studies of the consequences of plan layouts and constructions of buildings, and their relation to other buildings will be carried out with regard to technical solutions and systems and taking the behavior of the users into consideration.

SUPPORTED BY Sweden - Council for Building Research

4.0229, SOLAR ENERGY AND BUILDINGS III

I. HOGLUND, Royal Institute of Technology, *Stockholm 70, Sweden*

This project refers to R&D concerning technical and economic prerequisites for heating buildings by means of solar energy. The project embraces literature studies; calculations of the performance and operational characteristics of solar heating systems in Swedish climate conditions. Some of these calculations have been carried out with the aid of computer programs; the production of a design method for solar heating systems; the final assembly and startiing up of a plant with high accuracy for R&D purposes concerning solar collectors and other components in solar heating systems; experiments with a complete solar heating system with a new heat accumulation unit developed at the Department of Physical Chemistry; the design of a solar house.

The results will be summarized and used by Swedish Council for Building Research in a proposal for future R&D within the solar heating sector.

SUPPORTED BY Sweden - Council for Building Research

4.0230, SIMULATION AND OPTIMIZATION OF SOLAR HEATING SYSTEMS

E. ISFALT, Royal Institute of Technology, *Stockholm 70, Sweden*

The annual energy requirements for heating a building can, even in the northern parts of Sweden, easily be covered by means of solar energy collected in flat solar heat collectors of a simple type which can be housed in the external surfaces of the building. A prerequisite for Swedish climate conditions is, however, that a considerable part of the energy can be stored from summer to winter. This must take place in material which can deliver heat at various temperatures during the winter season. Consequently, the storage system must be broken down into a number of units in which heat is stored at various temperature levels.

This project aims at charting out, by means of systems studies, how this breakdown can be implemented and how the solar heat collectors should be designed for this purpose. The quantities of energy which can be collected at various temperatures depend on the climatic conditions, as do the heat requirements. A prerequisite for this project is that the co-variations between different climate parameters throughout the entire year be studied first.

SUPPORTED BY Sweden - Council for Building Research

4.0231, FLUIDISTOR CONTROL OF RADIATOR SYSTEMS

A. NOREN, Royal Institute of Technology, *Stockholm 70, Sweden*

Individual control of room temperatures has an advantageous effect in conserving energy. Valves used for this purpose have many weaknesses today due to friction and narrow openings sensitive to clogging. A fluidistor valve with a high energy efficiency and which operates with pulse-length modulation and which is directly controlled from a temperature bulb via a flapper provides a solution to this problem.

The purpose of this project is to create a system with three fluidistors and three radiators, one of which is located in a climate chamber. A flowmeter will be used in the system to establish how the fluidistors are controlled when the heat emission is varied, the pressure drop over the radiators is changed and sudden changes are made to a thermostat bulb setting.

SUPPORTED BY Sweden - Council for Building Research

4.0232, THE COSTS OF HEATING DOMESTIC HOT WATER BY SOLAR ENERGY

F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

No cost estimate for the application of solar heating seems to have been carried out up until now for specifically Swedish conditions. Since numerous projects are under way in this field such an estimate -even if it be no more than a rough estimate - is of considerable importance. A cost estimate for hot-water heating would appear to be of primary importance here.

SUPPORTED BY Sweden - Council for Building Research

4.0233, POSSIBLE USES OF SOLAR HEAT COLLECTORS - AN INVENTORY (PRELIMINARY STUDY)

F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

This project proposes an inventory of the available roof surfaces for solar heat collectors. The inventory will be based on town plans, building designs, etc., and will be carried out for a number of localities with 'typical' settlements. The study is a preliminary study and embraces the production of a suitable method which will be tested and applied to the localities mentioned above. (A report is estimated to be ready on January 31, 1977).

SUPPORTED BY Sweden - Council for Building Research

4.0234, SOLAR ENERGY AND BUILDINGS - II

G. WETTERMARK, Royal Institute of Technology, *Stockholm 70, Sweden*

This project deals with the development of equipment for heating buildings by means of solar energy. This is the second stage of the project.

Scope of project: literature studies, theoretical calculations of the operations properties of the heating system, the development of computer programs for simulated operations, calculation of the efficiency and economy of various system solutions supported with relevant radiation measurement in various localities, special laboratory studies and tests of collectors, control equip-

ment, thermal storage, etc., with the aid of photo-chemical reactions, heat pumps and low temperature radiators, the weather resistance and optical properties of plastics, the radiation physics of selective surfaces, an investigation of water, air and some radiation physics of selective surfaces, an investigation of water, air and some radiation-absorbent fluid as transport media. The architectural adaption of the solar collectors to the building and the urban environment will be investigated for new constructions and existing constructions. Using a knowledge of the properties of the system components as a basis, single-family houses of 125-150 square meters will be designed with solar heating. The literature studies and the results from the investigations carried out in this project will be documented in a catalogue entitled 'Methods and materials' adapted for design. An effort will be made in the project to collaborate nationally and internationally with specialists in various fields of research. A valuable body for international exchange in 'The Solar Energy Society' in which Hoglund has been requested to form a Swedish or Scandinavian section.

SUPPORTED BY Sweden - Council for Building Research

4.0235, PRESTUDY ON PHOTOCHEMICAL SUN-ENERGY SYSTEMS
S. CLAESSON, Univ. of Uppsala, Inst. of Physical Chemistry, *Uppsala, Sweden*

OBJECTIVE: To identify and analyse systems for converting solar energy to fuel and electric energy.

APPROACH: The study will cover the following issues: 1) Micellous and colloidal systems; 2) Light-induced redox reactions; 3) Metal complex in photochemical reactions; 4) Photochemical reduction of CO2.

INTENDED USE OF RESULTS: The findings will be used in the Board's R&D planning and decision making.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

4.0236, CONSULTATION SERVICES ON THE APPLICABILITY OF VARIOUS TIDAL REGIME MODELS TO THE CALCULATION OF ENERGY GENERATION POTENTIAL
UNKNOWN, Oceanographic Sciences Inst., *Surrey, England, United Kingdom*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

5. CONVERSION TECHNOLOGY

5.0001, THE NATURE, EXTENT, AND ORIGIN OF CYCLIC PRESSURE VARIATION IN ENGINES
G.A. KARIM, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

5.0002, PROBLEMS ASSOCIATED WITH HYDROGEN AS AN ENGINE FUEL
G.A. KARIM, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

5.0003, NATURE OF COMBUSITON PROBLEMS ASSOCIATED WITH DUAL FUEL ENGINE OPERATION
G.A. KARIM, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

5.0004, ROLE OF TURBULENCE LEVEL AND OF REYNOLDS NUMBER OF A FLOWING COMBUSTIBLE STREAM WITHIN A TUBULAR DUCT
G.A. KARIM, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

5.0005, PROCESSES THAT GOVERN THE EXTENT OF COMPLETION OF COMBUSTION, ENERGY RELEASE RATE AND THE FORMATION OF POLLUTANTS
G.A. KARIM, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

5.0006, DEFINITION OF THE STUCTURE OF FLAMES, NATURE OF COMBUSTION PHENOMENA AND THE PARAMETERS THAT CONTROL THE HEAT RELEASE
G.A. KARIM, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

5.0007, DEVELOPMENT OF A PRESSURE GENERATING, DUCTED, PULSATING COMBUSTOR WHICH DOES NOT CONTAIN ANY MOVING PARTS
J.A. KENTFIELD, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

5.0008, IMPROVING ENGINEERING COMBUSTORS OR REDUCED ACOUSTIC OUTPUT
P.J. VERMEULEN, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

5.0009, IMPROVING COMBUSTION PERFORMANCE FOR SMALL GAS TURBINES
P.J. VERMEULEN, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

5.0010, STIRLING CYCLE MACHINES WITH A TWO PHASE, TWO COMPONENT WORKING FLUID
G. WALKER, Univ. of Calgary, *Calgary, Alberta, Canada*

Stirling engines are energy conversion devices that may be used as prime movers, refrigerating engines or heat pumps. Currently they are used commercially as cryogenic cooling systems and are under development as low noise, low emission automotive engines. Other prospective applications include low power electrical generators for remote unattended sites, and refrigerating and air conditioning systems. Conventional Stirling engines use a gaseous working fluid such as air hydrogen or helium. Substantial improvement in specific output may be gained through the use of a compound working fluid with one component changing phase from liquid to vapor in transition from the cold compression space to the hot expansion space. An idealized theory for the operation of a regenerative engine with a compound working fluid has been developed and experimental work is in progress.

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

5.0011, CALCULATION OF TRAIN AERODYNAMIC DRAG (FOR ENERGY MANAGEMENT PROGRAM)
O. COLAVINCENZO, Ontario Min. of Transp. & Com., *Downsview, Ontario, Canada* (128041 (HRB NO.))

The purpose of this project is to: 1. Calculate the steady and unsteady aerodynamic drag of vehicles in tunnels and free air. 2. Modify and/or develop computer programs for the calculation of the aerodynamic drag of vehicles as required by the energy management program. A literature survey and review of the aerodynamics of trains in tunnels under project 3603 is well underway. Also, a computer program has been acquired to estimate the unsteady aerodynamic drag of vehicles in tunnels. With this program, it is now possible to start to perform the drag calculations for the purpose of obtaining preliminary power profile and energy loss estimates. It is anticipated that the program will have to be modified to incorporate the latest information obtained in the literature review. This project covers the calculation of aerodynamic drag for the three cases of deep tunnel, cut and cover, and free air, and studies on propulsion systems with and without energy storage. The result, conceptual designs on a total energy basis.

ADDENDA: Document provided to S.S.I.E. by the R.R.I.S.

SUPPORTED BY Canada - Ontario Provincial Government - Toronto

5.0012, ENERGY MANAGEMENT PROGRAM COORDINATION - R&D PHASE
V. SOOTS, Ontario Min. of Transp. & Com., *Downsview, Ontario, Canada* (128007 (HRB NO.))

The purpose of the energy management program is to initiate and coordinate investigations aimed at improving and, where appropriate, optimizing energy subsystems in rail transportation. At present at least eight such projects are envisaged and of these two have already been defined. Almost the entire program will be useful to other transit modes. The first step is a review of technologies connected with energy management; traction motors and power conditioning, electrification and energy storage. In the second step the energy and power requirements of a base-line transit system at various line levels (deep tunnel, cut-cover tunnel, free air) will be determined and the actual energy consumptions and power profiles calculated for different propulsion systems: cam-controlled and chopper controlled with or without regeneration and with or without energy storage. This step requires with traction motors, their controls, characteristics, efficiencies and costs. It also requires studies dealing with aerodynamic drag forces, performance requirements, line and network strategies and with various energy storage devices. The third step constitutes the conceptual design and a preliminary recommendation of energy subsystems for each line level. This involves optimization procedures including trade-offs between the cost and performance of the energy subsystem. On the basis of this study an optimum energy subsystem in terms of benefit and cost can be selected for a specific application.

Document provided to S.S.I.E. by the R.R.I.S.

SUPPORTED BY Canada - Ontario Provincial Government - Toronto

5.0013, FLYWHEEL ENERGY STORAGE STUDY. FEASIBILITY STUDY
V. SOOTS, Ontario Min. of Transp. & Com., *Downsview, Ontario, Canada* (128008 (HRB NO.))

The purpose of this project is to conduct a technology review and data acquisition of existing operational flywheel units as well as of flywheel units that are being actively developed. The units to be considered are complete energy storage systems including the flywheel itself, the input/output motor and controls and the ancillary systems such as the vacuum, lubricating, safety and containment systems. The factors of interest are the cost, energy storage properties and efficiencies, size and weight, reliability, safety, etc. This project will further conduct a preliminary assessment of the feasibility and viability of flywheel energy storage in rail transportation using a benefit cost analysis. This will lead into the Phase II study (if feasibility has been established) which will investigate actual flywheel energy storage applications and uses in terms of cost effectiveness, both in on-board and in-station configurations.

ADDENDA: Document provided to S.S.I.E. by the R.R.I.S.

SUPPORTED BY Canada - Ontario Provincial Government - Toronto

5.0014, COMBUSTION, EMISSIONS, MULTIPLE SPARK IGNITION, AND BOILER AND FURNACE EFFICIENCY
J.D. DALE, Univ. of Alberta, School of Graduate Stu. & Res., *Edmonton, Alberta, Canada*

CURRENT RESEARCH AND OBJECTIVES: (1) Emissions from automobiles, effects of low ambient temperatures, control techniques using multiple spark and plasma ignitions devices. (2) Operating characteristics and efficiency of natural gas fired infrared heaters. (3) Heat transfer from enclosed flames. (4) Boiler and furnace operating efficiencies and methods of finding optimum performance.

SUPPORTED BY No Formal Support Reported

5.0015, DEVELOPMENT OF A PROTOTYPE POWER SUPPLY UNIT
UNKNOWN, D.G. Instruments Limited, *Kanata, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

5.0016, SEAWATER BATTERY ANODE STUDY TO FABRICATE BINARY AND POSSIBLY TERNARY ALLOYS INTENDED FOR USE AS ANODES IN WATER-ACTIVATED BATTERIES
J.T. ATKINSON, Queens University, *Kingston, Ontario, Canada*

SUPPORTED BY Canada - Department of Agriculture - Ottawa, Ontario

5.0017, STUDY OF SEPARATORS FOR NICKEL-CADMIUM BATTERIES
J.W. LORIMER, Univ. of Western Ontario, *London, Ontario, Canada*

SUPPORTED BY Canada - Department of National Defense - Ottawa, Ontario

5.0018, STUDY OF A HIGH EFFICIENCY COMBINED CYCLE GAS TURBINE PLANT FOR MARINE PROPULSION
UNKNOWN, Pratt & Whitney Aircraft Ltd., *Longueuil, Quebec, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

5.0019, STUDY OF THE POSITIVE PLATE CHARACTERISTICS OF A LEAD ACID BATTERY AT VERY LOW TEMPERATURE
UNKNOWN, C O M I N C O Limited, *Mississauga, Ontario, Canada*

SUPPORTED BY Canada - Department of National Defense - Ottawa, Ontario

5.0020, STUDY OF THE RELATIVE FUEL EFFICIENCIES OF AUTOMOBILES USING CATALYTIC CONVERTERS VERSUS AUTOMOBILES USING LEAN BURN CARBURETION SYSTEMS
UNKNOWN, Shell Canada Limited, *Oakville, Ontario, Canada*

5. CONVERSION TECHNOLOGY

SUPPORTED BY Canada - Department of Energy, Mines and Resources Ottawa

5.0021, UNCONVENTIONAL ENERGY PRODUCTION AND UTILIZATION
W.B. COOKE, Saskatchewan Power Corporation, *Regina, Saskatchewan, Canada*

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

5.0022, STORAGE OF ENERGY
P.J. CATANIA, Univ. of Saskatchewan, School of Engineering, *Regina, Saskatchewan, Canada*

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

5.0023, MOLTEN SALT BATTERIES
K.E. JOHNSON, Univ. of Saskatchewan, *Regina, Saskatchewan, Canada*

CURRENT RESEARCH: 1) Molten salt batteries. 2) Thermoelectric Properties of salts. 3) Structural investigations of cobalt & nickel complexes of 1-Alkyl 3-Pyridyltriazene-1-Oxides. (est, compl: summer 1975. 4) Coordination of transition metal in fused SnCl3(-) & GeCl3(-) systems. (5) Phenol determination.

ADDENDA: This project is also supported by: Defense Research Board: Molson's Brewery.

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

5.0024, VARIED ENGINEERING PROJECTS WITH A BACKGROUND OF PHYSICS OR/AND INSTRUMENTATION
D. EYRE, Saskatchewan Research Council, *Saskatoon, Saskatchewan, Canada*

CURRENT AREAS OF RESEARCH AND STUDY: Development of instrumentation for fluorometric stream studies. Mechanical behavior of ice bridges. Development of potash mine stress measurements. Study of thermal behavior of water/sewer utilities in the north. Design of a highways test track. Design of desalination sprinklers.

PLANNED: Air-cushion vehicle development. Solar energy utilization in dwellings. Detection of leaks in buried water lines. Study of buried water-pipe fracture mechanisms. Development of remote ice-thickness scanning systems. Development of sanitary engineering design standards for the North.

OTHER AREAS OF PAST RESEARCH EXPERIENCE: Fluid dynamics, aerodynamics, heat transfer and associated instruments. Nuclear reactor engineering and physics. Solid-state physics. Computational techniques.

SUPPORTED BY Canada - University of Regina - Regina, Saskatchewan

5.0025, STUDY OF THE APPLICATION OF FLYWHEEL ENERGY STORAGE AND RECOVERY TO INTERMITTENT AND VARIABLE POWER SOURCE - PHASE 1
UNKNOWN, Dilworth Secord Meagher Assoc., *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

5.0026, RESEARCH INTO SEAL MATERIALS FOR USE IN LITHIUM BATTERIES
UNKNOWN, Quality Hermetics Limited, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of National Defense - Ottawa, Ontario

5.0027, STUDY TO DEFINE, SIMULATE AND ANALYZE A DIESEL/FLYWHEEL HYBRID-DRIVE SYSTEM
R.C. FLANAGAN, Univ. of Toronto, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

5.0028, QUANTITATIVE AND QUALITATIVE STUDY ON HYDROGEN AS A COMPONENT OF THE NATIONAL ENERGY BASE
UNKNOWN, Biomass Energy Institute Inc., *Winnipeg, Manitoba, Canada*

SUPPORTED BY Canada - Ministry of State for Science and Technology - Ott.

5.0029, ELECTRICAL MACHINES AND POWER SYSTEMS
R.M. MATHUR, Univ. of Manitoba, *Winnipeg, Manitoba, Canada*

CURRENT AREAS OF RESEARCH AND STUDY: 1. Design of Generators for Wind Mills. 2. Performance and Design of Stepping Motors. 3. Indirect testing of Pipe-line pump motors. 4. HVDC Systems study.

POTENTIAL AREAS OF RESEARCH, STUDY OR POTENTIAL INTEREST: Electrical Machines and Systems study concerning (a) Energy problems and (b) Electric Transportation including cars.

OTHER AREAS OF PAST RESEARCH EXPERIENCE: (a) Novel Design of electric motors - Reluctance, stepping etc. (b) Power System Equivalents.

SUPPORTED BY Canada - University of Regina - Regina, Saskatchewan

5.0030, HEAT TRANSFER RATIO IN THE GROUND
UNKNOWN, Academy of Technical Sciences, Danish Geotechnical Institute, *Aarhus, Denmark*

In the spring of 1974 considerable interest was aroused in the use of heat pumps. Many firms began development and production without the essential basic information on the physical realities surrounding, among other things, heat uptake. SOFUS-jern therefore decided to conduct an across-the-board interdisciplinary analysis of the available practical experience with heat pumps and, on this basis, selected six themes for closer examination, including this one.

The aim of the project is to get a rational basis for the dimensioning of the evaporator arrangements for heat uptake from the ground and to explain the conditions essential for optimum operation.

The desired situation is where the otherwise perhaps well-motivated heat pump installation will not be brought into discredit because of the incorrectly configured evaporator, but will be planned on the basis of concrete knowledge on alternative practical possibilities for heat uptake.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0031, STIRLING ENGINES
UNKNOWN, Technical Univ. of Denmark, Lab. of Power Engineering, *Copenhagen, Denmark*

The aim is to contribute to the design of an engine that will be true competitor of the gasoline engine.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0032, MIXTURE AND TEMPERATURE CONTROL IN GASOLINE ENGINES
UNKNOWN, Technical Univ. of Denmark, Lab. of Power Engineering, *Copenhagen, Denmark*

The purpose of the project is, on the one hand, to improve the economy of the gasoline engine during partial loading and idling, and, on the other hand, to reduce the contamination of the atmosphere. On the basis of available information, the control method considered here has not been investigated previously, but the necessary experimental techniques are known from other investigations.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0033, PULSATING COMBUSTION
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

The project is based on a theoretical procedure developed by civil engineer SVEN HADVIG. With this procedure one can determine the frequency characteristic for the combustion in question. The stability of the total combustion system (blower, boiler, chimney) can then be determined.

The aim is toward a stable combustion in the combustion chamber and boiler installation, so that it will be possible to work with a slight excess air ratio and thereby obtain better firing economy and higher resistace (to corrosion) of the boiler installation.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0034, CONTROLLING PUMPS AND COMPRESSORS BY PRE-ROTATION
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

An attempt is being made to devise an inexpensive, simple and operationally safe method of controlling pumps that can be made economically attractive.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0035, THERMAL ENERGY STORAGE IN DENMARK
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

Involved here is an investigation and evaluation of practical possibilities of energy storage in Denmark.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0036, HEAT TRANSFER RATIO FOR AIR COOLERS WITH VIEW TOWARD HEAT PUMP INSTALLATIONS
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

One of a series of heat-pump projects initiated by an institute group inside SOFUS-jern. Air-to-air and air-to-water heat pumps can be assumed to be in wide-spread use, but no basis is available for the dimensioning of the air cooler for Danish climatic conditions.

The purpose is to investigate particularly the frosting of coolers under typical Danish weather conditions and to investigate the energy consumption and practical conditions involved in defrosting.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0037, DIESEL-STEAM POWER AND HEATING PLANT
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

There is mention of an investigation of the technical as well as the economic aspects of combined power and heat production based on diesel motors. What is specially considered here is the so-called diesel-steam-heat plant, which utilizes the heat in the diesel engine's exhaust gas for the production of steam for driving a back-pressure turbine, and which further utilizes the heat from the engine cooling system and the turbine condenser for central heating.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0038, HEAT TRANSFER RATIO AND EVAPORATION PROCESS IN GROUND EVAPORATORS FOR HEAT PUMPS
UNKNOWN, Technical Univ. of Denmark, Refrigeration Engin. Lab., *Copenhagen, Denmark*

The project is one of series on heat pumps initiated by an institute group within SOFUS-jern. The direct background comes from certain surprising results obtained with heat pump installations.

The purpose is to explain the interrelationship between the evaporator tube and control valve, with a view toward achieving a control of the fluid supply that will give optimum utilization of the ground evaporator tube.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0039, INSULATED DIESEL PREIGNITION CHAMBER
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

The purpose of the project is to increase the efficiency of preignition diesels by reducing the heat loss in the preignition chamber with the use of internal ceramic insulation.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0040, COMBINED DIESEL AND STEAM POWER PLANT WITH CENTRAL HEATING
UNKNOWN, Technical Univ. of Denmark, Lab. of Power Engineering, *Copenhagen, Denmark*

The purpose of the project is to reduce the energy loss that is suffered whenever diesel motors, gas turbines, and steam turbines are used independently.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0041, MATHEMATICAL MODEL FOR HEAT UPTAKE FROM THE GROUND
UNKNOWN, Technical Univ. of Denmark, Refrigeration Engin. Lab., *Copenhagen, Denmark*

The project has been taken over by the laboratory as a thesis work, since in reality there is no basis for the dimensioning of the heat uptake pipe of ground heat pumps. It has some connection with one of SOFUS-jern's projects on heat pumps, and is formulated in conjunction with the control group for these projects.

The purpose is to set up a numerical simulation model for heat uptake by horizontal and vertical pipes in the ground. The project is said to be viewed in connection with the main experimental study of the heat transfer ratio in the ground which is being done by the Geotechnical Institute. The two investigations together will be able to provide a basis for the dimensioning of the heat uptake pipes for earth heat pumps.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0042, SIMULATION OF THERMAL SYSTEMS
UNKNOWN, Technical Univ. of Denmark, Refrigeration Engin. Lab., *Copenhagen, Denmark*

Purpose of the project: 1) to develop methods for statistical and dynamic simulation of thermal systems, with a view toward power-engineering analysis and optimization; 2) to develop expertise and standardized computer programs; 3) to investigate concrete systems and proposed systems as a way into the development work.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0043, ELECTRIC AUTOMOBILE
UNKNOWN, Technical Univ. of Denmark, Lab. of General Elec. Engin., *Copenhagen, Denmark*

5. CONVERSION TECHNOLOGY

At the present time DC motors are used in electric fork-lift trucks. There is interest in going over the AC motors with more advanced semiconductor techniques. These techniques will also be of interest for electric automobiles, since it can be expected that the development of lighter batteries will provide an economic background for such cars. The aim of the project is to develop a control system for AC motors from storage batteries with particular regard for the control characteristics needed for driving an automobile. The system is to be tested in a passenger car.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0044, GASOLINE ENGINE COMBUSTION PROCESS
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

The project is a follow-up of an earlier project on the study of the boundary layer near the cylinder wall in a gasoline engine. Background information will be a more detailed knowledge of the combustion process, so that this process can be influenced both from the economic and the emissions-control point of view.

The purpose is to conduct theoretical and experimental studies on the combustions process in a gasoline engine, so that a theoretical model can be devised for the flame propagation and stagnation in relation to the flow conditions in the combustion chamber; the latter will be studied especially in the vicinity of the chamber wall on the basis of earlier experimental results.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0045, STUDY ON INCREASING THE OUTPUT POWER OF DIESEL ENGINES
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

Background for the project is an application from a motor factory for an opinion on the possibilities of increasing the output power of their diesels now in production.

The aim is to increase the power through slight design alterations.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0046, HEAT AND HOT WATER WITH THE HEAT PUMP
UNKNOWN, Technological Inst., *Copenhagen, Denmark*

Against the background of energy supply problems, SOFUSjern has established the project, which originated within the Danish Boiler Society's evaluation project for the heat pump.

The assembled project group represents an expertise within the fields of soils, heat engineering, refrigeration engineering, and installation engineering.

The aim of the project is to obtain the necessary basic knowledge for the selection and planning of heat supply systems for heat-pump installations.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0047, INVESTIGATION OF COMBINED PRODUCTION OF HEAT AND POWER
UNKNOWN, Danish Boiler Society, *Hellerup, Denmark*

Initiative provided by DEFU, HERNING Commune, and Danish Boiler Society. Combined production of power and heat means better energy conservation (better utilization of primary energy sources). Can small power-heat plants within or near cities be incorporated into an existing electric power supply system with primary electric power plants, and what consequences can this have?

The aim of the project is to throw light on the above-mentioned problems on the basis of one city's (HERNING) actual conditions and thereby obtain a 'tool' for use in the above energy supply possibilities.

SUPPORTED BY Denmark - Danish Government - Copenhagen

5.0048, DEVELOPMENT OF MULTISTEP PROCESS FOR THERMOCHEMICAL HYDROGEN PRODUCTION USING NUCLEAR HEAT
K.F. KNOCHE, Technical Univ. of Aachen, *Aachen, Nordrhein Westfalen, Federal Republic of Germany* 5100

DESCRIPTION OF PROJECT: Objective: Development of multistep thermochemical watersplitting processes using nuclear heat.

WORK PROGRAM: a) Evaluation of current experimental programs. b) Evaluation of existing knowledge. c) Development of a computer program for the modelling of multistep water splitting processes including process parameters. d) Application of this program for mass and energy flow optimization. e) Experimental investigation of coupled reaction steps and closed cycles on a laboratory scale with respect to regeneration and side products. f) Coupling of the primary energy source and use of rejected heat.

STATUS: With respect to a closed cycle in a laboratory scale the three steps have been performed each followed by a subsequent separation of the product gases. In addition, the reserve Deacon reaction has been coupled with the chlorination step and the hydrolysis has been operated using pellets. For the demonstration of a laboratory cycle a great deal of the preparatory work is finished. This cycle will be performed in reactor for both the chlorination and the hydrolysis and an additional reactor for the oxygen production.

A flexible computer program has been prepared for the balance and optimization of thermochemical multistep processes. Partial optimizations and sensitivity analyses have been done for the technical process. The feed-back of the separations has to be emphasized. An overall efficiency for the thermochemical cycle of about 45 percent has been analyzed up to now; an overall optimization has still to be done.

ADDENDA: Performing organization: RWTH Aachen, Lehrstuhl fur Technische Thermodynamik.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0049, THE CALCULATION OF THE RELIABILITY OF LARGE COMPLEX SYSTEMS ACCORDING TO THE METHOD OF RELEVANT STRINGS
G. MEMMERT, Technical Univ. of Berlin, Inst. for Nuc. Technology, *Berlin 10, Federal Republic of Germany* 1000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0050, TECHNICAL PHOTOSYNTHESIS
R. RADEBOLD, Technical Univ. of Berlin, *Berlin 10, Federal Republic of Germany*

DESCRIPTION OF PROJECT: OBJECTIVE: Elaboration of detailed steps of the research program 'Technical Photosynthesis' and its organizational structure. Definition of the objectives to be reached within three years. Obtaining the cooperation of institutions and individuals.

WORK PROGRAM: a) Formulation of scientific and technical problem sections, b) Establishment of a work circle, c) Search and invitation of future co-workers and experts for various sections for the purpose of specifying the sections and defining future cooperation, d) Requests for expertise on essential questions, e) Clarification of organizational questions for the later project, f) Final expert meeting for the conclusion of the study, g) Drawing up of the study and formulation of the proposals.

STATUS: Work was begun on December 1, 1975.

ADDENDA: Performing organization: Anerkannter Sonderforschungsbereich Magnetohydrodynamik an der TU Berlin.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0051, INVESTIGATION OF THE APPLICABILITY OF ULTRASONIC-IMPULSE SPECTROMETRY TO IMPROVING THE EVIDENCE RELIABILITY IN MATERIAL TESTING WITH ULTRASOUND

E. MUNDRY, Materials Testing Institute, *Berlin 45, Berlin, Federal Republic of Germany* 1000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0052, PRODUCING LITERATURE STUDY ABOUT THE INSERTION POSSIBILITY OF A SOUND EMISSION ANALYZER TO MONITOR WELD PROCESSES

NEUMANN, Materials Testing Institute, *Berlin 45, Berlin, Federal Republic of Germany* 1000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0053, ELECTRO GRAPHITE POWER AND SHIM-PARTICLES

PERSICKE, Ringsdorff Werke Gmbh, *Bonn Bad Godesberg 10, Nord. W, Federal Republic of Germany* 5300

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0054, SUPERVISION OF THE PROJECTS ON FUEL CELLS AND BATTERIES

W. VIELSTICH, Univ. of Bonn, Inst. for Physical Chem., *Bonn, Nordrhein Westfalen, Federal Republic of Germany* 5300

DESCRIPTION OF PROJECT: OBJECTIVE: Coordination of the current research projects carried out by the recipients of grants and evaluation of the intermediate results. Concentration of grant allocation on some important fields, for which extensive preparations have to be done in order to set up the program. Observation of the worldwide activities in this field of research.

WORK PROGRAM: a) Screening of intermediate reports and checking on achievements. b) Inspection of the experimental works in the laboratories of the applicants. c) Cooperation in the coordination between laboratories of industry and universities. d) Review and evaluation of the international literature; Reports about national and international meetings on the topic of fuel cells and batteries.

STATUS: The accomplishments of these tasks are performed in close cooperation with the appropriate section of the Federal Ministry of Research and Technology and with the project management for energy research.

ADDENDA: Performing organization: Institut fur Physikalische Chemie der Universitat Bonn.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0055, ELECTRODES AND DIAPHRAGMS FOR FUEL CELLS

W. VIELSTICH, Univ. of Bonn, Inst. for Physical Chem., *Bonn, Nordrhein Westfalen, Federal Republic of Germany* 5300

DESCRIPTION OF PROJECT: OBJECTIVE: Development of electrodes for electrochemical cells (batteries, fuel cells and electrolytes) using whisker structures according to Schladitz.

WORK PROGRAM: a) Investigations on the stability of whiskers in the respective electrolytic solutions. b) Development of battery and fuel cell electrodes. c) Analysis of the electrochemical properties of the electrode structures by recording potential scans and current-potential curves. d) Long-term experiments under suitable working conditions (potential, current density, temperature, electrolyte composition). e) Construction of complete cells (batteries, fuel cells etc.).

RELATION TO OTHER PROJECTS: Research and development work is suggested in order to support the other projects on electrochemical energy conversion.

STATUS: Points 1 and 3 of the research program are in progress.

ADDENDA: Subcontractor: Phys. Chem. Forschungslabor, Prof. Dr. H. Schladitz, 8 Muchen 60. Performing organization: Institut fur Physikalische Chemie der Universitat Bonn.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0056, SAVING FUEL IN (CONVENTIONAL) HOT WATER HEATING UNITS BY USING GAS-OPERATED HEAT PUMPS

ROSTEK, Ruhr Coal AG, *Dorsten, Nordrhein Westfalen, Federal Republic of Germany* 4270

MAIN OBJECT: Efficient utilization of energy.

FIELD: Economical heat utilization.

OBJECTIVE: The fuel comsumption of hot water heating systems is to be reduced by half by the utilization of heat pumps. Commercial gasoline or diesel engines equipped with exhaust heat exchangers are to be used as drive units.

WORK PROGRAM: Study of the suitability of various gasoline and diesel engines for gas operation; Conversion of rotary engines to gas operation; Construction and tests of heat pump systems equipped with rotary and reciprocating engines and compressors; Development of the necessary control equipment.

STATUS: Schedule tentatively established on: Jan. 2, 1975.

ADDENDA: Subcontractor: 1. Audi-NSU, Neckarsulm; 2. VW, Wolfsburg. Performing organization: Ruhrgas AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0057, STEAM

W. LENZ, German Engineering Soc. E.V., *Duesseldorf 1, Nordrhein West., Federal Republic of Germany* 4000

DESCRIPTION OF PROJECT: OBJECTIVE: Determination of the properties of water and steam under the conditions required for energy processes.

WORK PROGRAM: a) Experimental determination of the differential derivatives of the properties of water (Lehrstuhl und Institut fur Thermodynamik der TU Hannover, Prof. Rogener). b) Measurement of PVT Data and thermal conductivity at high temperatures and high pressures (Institut fur Physikalische Chemie und Elektrochemie der TU Karlsruhe, Prof. Franck). c) Theoretical and experimental investigation of the properties of water and steam, as well as those of heavy water (Lehrstuhl und Institut fur Thermodynamik der TU Munchen, Prof. Grigull). d) Measurement of the sound velocity of steam for the determination of the isentropic exponent at temperatures above T equals 500 degrees C (Lehrstuhl fur Dampf- und Gasturbinen der RWTH Aachen, Prof. Dibelius).

STATUS: Granted: October 31, 1975.

The project is a continuation of that previously promoted by the BMWI. All program points are being worked on.

ADDENDA: Performing organization: Verein Deutscher Ingenieure E.V. (VDI).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0058, 20 KW FUEL CELL PLANT OF COMPACT CONSTRUCTION

H. GUTBIER, Siemens AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

DESCRIPTION OF PROJECT: Objective: To develop a fuel cell prototype with an output of 20 kW, consisting of three 7 kW fuel sets, methanol reformer with a crude gas purification unit and a 20 kW inverter. The 7 kW sets consist of two modules of 35 cells each, an electrolyte regenerator with heat exchanger and a control unit.

WORK PROGRAM: Development of a compact hydrogen/oxygen fuel cell set with alkaline electrolytes. Develop-

ment of a 20 kW methanol reformer with gas purification. Construction of a 20 kW thyristor inverter. Construction of a test set-up incorporating these sets and testing in single and combined operation. Development of a test production method for gas-tight binder-free asbestos diaphragms.

RELATION TO OTHER PROJECTS: All work on the project is coordinated by the Institute of Physical Chemistry at the University of Bonn, the party responsible for the fuel cell section of the program under designation NT 4508.

STATUS: System analysis investigations and experimental preparatory work for developing a methanol reformer for a fuel cell with an output of 20 kW have been completed. On the basis of the results obtained, an estimate of the construction costs and economic viability was made. It shows that the costs for a reformer unit in the 20 to 100 kW range, 80 percent of which would have to be used for cleaning the crude gas, are so high that, as far as can be seen at the present, economic utilization appears doubtful. Therefore work on the methanol reformer will be stopped until new ideas are forthcoming for the gas cleaning unit.

With regard to the fuel cell catalysts, Raney nickel catalysts containing titanium proved superior to ordinary Raney nickel. Doped silver powder has proved itself a good oxygen catalyst. The catalysts can be loaded with up to 800 mA/cm2.

The continuous-duty performance of the fuel cells was considerably improved by fitting supporting meshes in the electrolyte chamber, thus expediting the movement of gas bubbles. Periods of more than 2,000 operating hours have been equalled in endurance tests.

The investigations for bonding metal and elastomer can be considered practically complete as a suitable process has been developed.

For testing the bonding methods, a fully-bonded 13-cell fuel cell test block was constructed. All the bonded joints proved to be tight. (Text Abridged.)

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0059, SPACE CHARGES IN POLYMERS

KLEEBERG, Siemens AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

DESCRIPTION OF PROJECT: OBJECTIVE: To gain further knowledge about the electrical conduction mechanism in the organic polymer polyethylene and the processes that initiate electrical breakdown.

WORK PROGRAM: Measurement of space charges; study of spacial and temporal build-up and decay, of the influence of inhomogeneities and the degree effected by additives. Development of a mathematical model. Measurement of the electric strength of polyethylene following pulsating field stressing.

STATUS: A test for prestressing polyethylene samples by pulsating fields has been built. Work has started on taking photocurrent measurements for determining space charges.

ADDENDA: Performing organization: Siemens AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0060, ELECTRIC MACHINES WITH SUPERCONDUCTING WINDINGS

KULLMANN, Siemens AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

DESCRIPTION OF PROJECT: Objective: To draw up electrical and mechanical designs for electrical machines with superconducting windings, in particular synchronous generators. To investigate the transient phenomena which could cause current overloading when the machine is connected to the system.

WORK PROGRAM: The current program has been extended because of the increased cooperation of KWU and the resulting extra investigations necessary in Erlangen. These include: basic investigations into superconductors for the windings, electrical features of the generator, design of the machine and its performance when connected to the system, clearing up the questions about materials and rating the refrigeration units, investigations into homopolar machines.

STATUS: The electrical design of the generator is almost complete, and the manner in which the rotor and stator are to be constructed has been finalized except for the connection head for the cooling media. The performance of the machine, when connected to the system, is being examined on a digital system analyser. Thorough tests will be carried out on suitable materials for the superconducting rotor. The plans for the refrigeration units are now being optimized. The basic research being done has been concentrated on the following main points: recording the losses in superconductors under conditions of single-phase loads and pulsating fields. Testing the first rotating coupling for helium transfer. Preparing experiments for measuring the effect of rotation on flowing helium. Investigating the possibilities for sealing rotating and stationary parts. Determining the characteristics of materials at 4.2 K.

ADDENDA: Performing organization: Siemens AG Kraftwerk; Union AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0061, ELECTRICAL CONDUCTION MECHANISM AND BREAKDOWN OF ORGANIC INSULATING MATERIALS

OSWALD, Siemens AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

DESCRIPTION OF PROJECT: OBJECTIVE: To investigate the conduction mechanism and electrical breakdown of organic insulating materials and semiconductors. To apply established conceptions of electrical conduction in inorganic semiconductors to organic semiconductors and insulators.

WORK PROGRAM: a) Synthesis of monomer and polymer EDA complexes. b) Measuring the dark conductance and determining the diffusion and mobility of charge carriers. c) Interpretation of the results and formulation of a model conception.

STATUS: The work has been completed. The results of electrical measurements carried out on characterized polyethylenes enable a concept of the conduction mechanisms to be formulated. Although simplified, this concept is matched to the structural characteristics of the dielectric. The conduction current is formed by electrode-injected electrons and leads to the buildup of a long-lived space charge. Initially the conduction current has a dipolar orientation current super-imposed which also gives rise to the discharge or reverse current. The dipoles are oxidation faults in the polymer network and in general cannot be avoided. The electrical breakdown of polyethylene is probably influenced by the buildup of the space charge. The breakdown behaviour of polyethylenes is greatly affected by any type of defect, but the intrinsic material strength of approx. 800 kW/mm is insensitive to external effects.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0062, HIGH-FIELD SUPERCONDUCTORS FOR ELECTRICAL MACHINES

PFISTER, Siemens AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

DESCRIPTION OF PROJECT: OBJECTIVE: To develop V3Ga and Nb3Sn multi-core conductors with a high current-carrying capacity and stable performance.

WORK PROGRAM: a) Production of V3Ga and Nb3Sn multi-core conductors of great length in the form of round conductors with varying number of cores, shaped conductors and transposed conductors. b) Investigations into the behaviour of these conductors when subjected to mechanical stresses, in particular bending. c) Development of a process to attain electric stabilization by external or internal stabilization. d) Examination of the electrical stability and mechanical behaviour of the conductors in test coils and in high-field windings. e) Improvement of the current-carrying capacity of the conductors by diffusing Ga into V3Ga and Sn into Nb3Sn conductors.

STATUS: The initial work has been concentrated on the development of Nb3Sn multi-core conductors in preference to V3Ga conductors. Multifilamentary Nb3Sn conductors with 1100, 1600 and 3700 filaments have been manufactured in Km lengths, in the form of both round and rectangular conductors. The current-carrying capacity of these conductors has been tested for varying diffusion conditions in the field range 30 to 18 T (30 to 180 kG). Measurements of the resistance and the critical

bending radii at which degradation of the critical current occurs have been carried out.

Two different methods were used for making the coils. The coils were made either of prereacted wire to take into account the critical bending radii determined to short-time tests or of wires which were wound first and then annealed to give them the brittle Nb3Sn layer. Both types were electrically stable. Coils made by the first method attained a flux density of up to 9 T and those with the second method up to 12 T and a rate of excitation of up to 8 T/min.

ADDENDA: Subcontractor: VAC, Hanau.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0063, CATALYSTS FOR FUEL AND CELLS

F. VONSTURM, Siemens AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

MAIN OBJECT: Conversion, transport and storage of energy.

FIELD: Electrochemical converters.

OBJECTIVE: Development of non-noble metal electrocatalysts for the conversion of economic, fluid, carbon-containing fuels and oxygen in fuel cells with acid electrolytes. Construction of a prototype of an economically operating fuel cell.

WORK PROGRAM: Preparation and investigation of interstitial compounds and other acid-resistant electron-conducting compounds; Increasing the surface area of catalytically active substances; Preparation and investigation of pyrolysis products; Preparation and investigation of fuel cell electrodes from the catalysts found; Construction and investigation of a fuel cell.

REFERENCE TO OTHER PROJECTS: The work was coordinated and defined with the firms AEG and Bosch.

ADDENDA: Performing organization: Siemens AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0064, METAL-AIR BATTERY

F. VONSTURM, Siemens AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

MAIN OBJECT: Conversion, transport and storage of energy.

FIELD: Electromechanical energy storage.

OBJECTIVE: Improvement of the electrodes and the construction and testing of laboratory models of zinc-air and iron-air batteries.

WORK PROGRAM: Improvement of the iron electrode; Development work to improve the zinc electrode; Investigation of iron and zinc electrodes; Development work to improve the air electrode; Mutual influence of the electrodes; Construction of air-hybrid electrodes.

REFERENCE TO OTHER PROJECTS: The work in the field of metal-air batteries was coordinated between Siemens and Varta. In the case of the negative electrode, Siemens is concentrating on the development of active masses, while Varta is carrying out the constructional development. For the positive electrode, Siemens is working on the hybrid electrode system, whereas Varta is developing the principle of the double skeleton (DSK) electrode with an auxiliary charging electrode for this special case.

STATUS: Date of R & D contract: April 1, 1971. The iron electrode was improved by changing over from a nickel to a copper expanded-metal cage. I oading tests corresponding to the driving cycle of an electric storage vehicle were carried out with complete cells. The mean value of the strongly altering current density was around 30 mA/cm2.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0065, HEAT RECOVERY WITH A DECENTRALIZED SMALL HEAT PUMP SYSTEM

J. PANTZ, Essen Electro Heat Inst. E.V., *Essen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Determination of operation features in order to examine the reliability and the economy of integrated heat recovery plants in air conditioning systems.

WORK PROGRAM: a) Equipment of an office and laboratory building with decentralized air conditioning system composed of small heat pumps and regenerative heat exchangers. b) Determination of energy consumption, simultaneous demand and typical load curves under various conditions in the different seasons. c) Economic feasibility studies.

STATUS: Consent November 12,1975. The air conditioning system will be installed in the Elektrowarme-Institut Essen e.V., first measurements will be started in March 1976.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0066, EMPLOYMENT OF BATTERIES WITHOUT PLATE PROTECTION

PETRI, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Operation of battery-powered locomotives in conditions of extra-high CH4 content.

WORK PROGRAM: a) Trying out different makes of battery. b) Research on service life and operational behaviour.

STATUS: Measurement work was carried out as specified in the program. So far, with all makes, the electrical behaviour of batteries has been found to be satisfactory.

Some of the batteries tested deteriorated because of faulty materials. Voltage and acid content in the ones received in exchange, however, are still normal after 40 respectively 100 dischargings.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0067, MOBILE, FLAMEPROOF POWER LEADS

THUNER, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Development of mobile, flameproof power leads for electrical drive units of conveying systems.

WORK PROGRAM: a) Elaboration of possible options in a basic feasibility study. b) Practical realization of optimum solution. c) Testing of prototype equipment. d) Continued development to series production status.

STATUS: The basic feasibility study on possible solutions for the given project is at present being worked on by the Union of Mineworkers at their testing gallery at Dortmund-Derne. There are indications that the problem may be capable of solution by forced ventilation of the powerleads as well as by inductive transmission.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0068, FUNDAMENTAL RESEARCH ON HEAT PUMPS

STEIMLE, Univ. of Essen G H S, Inst. Appl. Therm. Clim. Eng., *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Theoretical and experimental investigatons and improvements of heat pump systems and components of the refrigerating cycles.

WORK PROGRAM: a) Theoretical optimization and practical research on refrigerants and lubricants in heat pump systems. b) Evaluation of components of the refrigerant compressor especially for heat pump operation. c) Research on regulation performance of compressors and heat pump systems including the reheating. d) Comparison between absorption and compression heat pumps. e) Scaling of heat pump systems (cascades and multistage compression). f) Improvement of ice re-heating on air heat-exchangers.

STATUS: An investigation plant to figure out the performance values of compressors especially for heat pump systems

is in use since December 1975. Also the theoretical research on refrigerants and lubricants and systems is going on. Further investigation plants are being built.

ADDENDA: Performing organization: Institut fuer Angewandte Thermodynamik und Klimatechnik der GHS Essen.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0069, GRIDS FOR STORAGE BATTERIES

PETTER, Metallgesellschaft AG, *Frankfurt 1, Hessen, Federal Republic of Germany* 6000

DESCRIPTION OF PROJECT: OBJECTIVE: Development of grids for maintenance-free batteries made of lead-alkaline earth metal alloys.

WORK PROGRAM: a) Development of lead-alkaline earth metal base alloys generally suitable for battery grids. b) Development of melting, casting and rolling technologies for selected alloys on a pilot scale. c) Field tests to convert the results of experimental work to an industrial scale.

RELATIONS TO OTHER PROJECTS: The research project is of fundamental importance for the production of maintenance-free storage batteries.

STATUS: To develop lead-alkaline earth metal base alloys suitable for battery grids several alloys, containing Li, Ca, Ba, Cu, Sn, and Bi have been investigated. These alloys were cast and rolled to sheets under various conditions. The initial hardness of PbCa sheet was enhanced by additions of Bi (up to 150%), Ba (200 %), and LiBaBi (250%) resp. The highest values in hardness were achieved by hot rolling or heat treatment followed by cold rolling. The weight losses of PbCa sheet by corrosion in sulfuric acid were raised (30-60%) by additional contents of Ba or Li. In order to develop battery grid designs which can be produced from wrought lead-alkaline earth metal alloys different kinds of perforated and of expanded metal grids were manufactured. With respect to their good mechanical properties, low weight and sufficient support of the active material, such grids are suitable for battery applications.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0070, SODIUM-SULFUR BATTERY

B. BAUKAL, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

DESCRIPTION OF PROJECT: OBJECTIVE: Development of a chemical process for producing Beta-Al2O3 powder, which yields sintered ceramics with improved properties. Additional safety of the battery is to be achieved by immobilising the sodium.

WORK PROGRAM: a) Selection of a suitable process and development to an enlarged laboratory scale. b) Determination of the properties of the ceramic electrolyte made from Beta-Al2O3 powder (conductivity, microstructure, cyclic behaviour). c) Examining iron felts with respect to their capacity for absorbing sodium. d) Investigation into the electrical performance of a sodium electrode immobilised in iron felt.

RELATION TO OTHER PROJECTS: The overall project 'Sodium-Sulphur-Battery', which is managed by BBC, consists of this subproject and projects NT 4473 (BBC), ET 4083 G (Battelle), ET 4067 (KFA), ET 4068 (Friedrichsfeld GmbH) and ET 4069 (University of Constance). The research activities are coordinated at regular work conferences.

STATUS: Ceramic tablets of Beta-Al203 powder made by thermal decomposition of a nitrate solution have the same conductivity as conventionally produced ceramics but a better microstructure. This finding permits the conclusions that a longer lifetime in the battery can be expected; additional investigations are required to confirm this assumption. Economic efficiency calculations have been carried out. If molten sodium is immobilised in a highly porous iron felt, this has no substantial effect on the performance of the electrodes.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0071, PRODUCING A LITERATURE STUDY ON THE INSERTION POSSIBILITY OF SOUND EMISSION ANALYSIS FOR MONITORING WELDING PROCESSES

JAX, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0072, SODIUM-SULPHUR-BATTERY - CONVENTIONAL ELECTROLYTES WITH LONG LIFETIME, SELECTION & TESTING OF CASING FOR THE SULPHUR ELECTRODE (ABBREV)

R. KNODLER, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

DESCRIPTION OF PROJECT: OBJECTIVE: Characterization of Beta-Al2O3 electrolytes prepared by BBC with respect to their long-term stability; selection and testing of corrosion-resistant casing materials for the construction of prototype battery at BBC.

WORK PROGRAM: a) Investigation of Beta-Al2O3 tubes in half-cell arrangements of the type Na/Beta-Al2O3/Na under cycling conditions. b) Determination of a possible correlation between long-term stability and acoustic emission or impedance (early-detection and accelerated test) method). c) Determination of the corrosion rate of possible materials for cathode casings in Na2S4 melt under current load. d) Investigation into the influence of current density and length of test period on the corrosion rate.

STATUS: With the results of the long-term tests, BBC was able to define the preparation conditions and narrow down the range of composition of the B-Al2O3 ceramics to such an extent that an electrolyte with great prospective long-term stability is now available. The corrosion tests used for preselection showed that carbon steel is unsuitable and chromium nickel steels are conditionally suitable, whereas superalloys are stable. Before a final selection can be made, it is necessary to determine the exact dependence of the corrosion rate on time and current density, since a relationship has been found that cannot be extrapolated.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0073, NEW MATERIALS FOR THE ELECTRICAL CONNECTION OF THE ELECTRODES IN HIGH TEMPERATURE FUEL CELLS

K.G. REIFENKUGEL, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

DESCRIPTION OF PROJECT: OBJECTIVE: Development of an oxidic material for forming aggregates of high-temperature cells, which provides for the gas-tight and electrically conductive connection of the electrodes of adjacent cells.

WORK PROGRAM: Improvement of the workability of La-0.8, Sr-O.2, Cr-O.8, Ni-O.2, O3. Improvement of the chemical resistance of LaMnO3. Testing of a selected electrode interconnection material (ICM) in a cell.

STATUS: It has been impossible to improve substantially the workability of La-O.8, Sr-O.2, Cr-O.8, Ni-O.2, O3. But we succeeded in improving the chemical stability of LaMnO3. by partial replacement of manganese by chromium. However, this led to a reduction in sinterability and to possible residual porosity in the connecting layers. Attempts are now being made to cover the pores with a special glass.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0074, CATHODES FOR FUEL CELLS (RESEARCH AND DEVELOPMENT WORK ON CATHODES FOR A PRECIOUS-METAL-FREE FUEL CELL WITH ACID ELECTROLYTE)

H. BINDER, Battelle Institute E.V., *Frankfurt, Main, Federal Republic of Germany*

DESCRIPTION OF PROJECT: OBJECTIVE: Development of cathodes for precious-metal-free fuel cells with acid electrolyte. The research should create an alternative to the platinum additives commonly used.

WORK PROGRAM: a) Preparation of substances, b) Corrosion test at elevated temperature in sulfuric acid with and without hydrogen peroxide, c) Measurement of electric conductivity, d) Preparation of test electrodes, e) Electrochemical measurements of corrosion potential and electrocatalytic activity for the reduction of oxygen, f) Long-term experiments with catalytically active substances.

RELATION TO OTHER PROJECTS: A platinum catalyst is used in the fuel cell battery being developed under contract no. ET 4028 (AEG-Telefunken). The introduction of precious-metal-free catalysts would lead to appreciable economic advantages.

STATUS: Mainly porphyrin ring systems, pyrolysates of polyacenequinones (PAC) and polybenzimidazoles were prepared as catalysts. Various methods were used to link porphyrin systems to polymers. To characterize the PAC catalysts, surface group titrations and surface area and pore determinations were carried out. No corrosion was observed at the PAC catalysts. The catalysts were tested in electrodes with polyethylene or polytetrafluorethylene bonding. An appreciable activity could be measured just as with other platinum-metals-free catalysts, but this activity is still insufficient for technical fuel cells. In long-term experiments lasting up to one year with PAC polyethylene electrodes the activity decreased slowly.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0075, EXPERIMENTAL STUDY ON THE DEVELOPMENT OF THE HIGH-TEMPERATURE VAPOUR PHASE ELECTROLYSIS (HOT ELLY)

W. DOENITZ, Dornier System Gmbh, *Friedrichshafen, Baden Wuertt., Federal Republic of Germany* 7990

DESCRIPTION OF PROJECT: OBJECTIVE: Development, construction and trial of a high-temperature vapour phase electrolysis cell to produce hydrogen from water. Investigations of the fundamentals to be considered in the development of an electrolysis technique with a high overall efficiency.

WORK PROGRAM: a) Development and trial of the individual components and of the connecting elements necessary for the high temperature electrolysis cell. b) Optimization of the major process parameters and simulation of the overall process flow. c) Development of material for cost-effectiveness comparisons. e) Analysis of possible hybrid variants.

STATUS: The initial phase (1975) was concerned mainly with material testing and optimization work with regard to the layout of the cell.

ADDENDA: Subcontractor: LURGI Mineraloltechnik GmbH, Frankfurt; Max-Planck-Institut, Stuttgart; DFVLR Porz; Inst. f. techn. Thermodynamik; RWTH Aachen.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0076, REGENERATOR CONSISTING OF A MATRIX OF POLYCRYSTALLINE WHISKERS

F.X. EDER, Bavarian Academy of Science, Central Inst. for Low Tem. Res, *Garching, Bayern, Federal Republic of Germany* 8046

DESCRIPTION OF PROJECT: OBJECTIVE: Development of low temperature regenerators consisting of inexpensively producible matrices of whiskers with large internal surfaces, small pressure gradients and high commutating frequencies.

WORK PROGRAM: a) Production of matrices of iron, nickel and alloy whiskers with different diameters and filling factors. b) Measuring of the pressure drop for air and helium at temperatures of 300, 80 and 20 in the pressure region between 1 and 20 bars. c) Measuring of the thermal conductivity of the regenerator matrix as function of the whisker diameter, filling factor and temperatures between 20 and 300 K. d) Measuring of the efficiency of the regenator with helium as working fluid between 80 and 300 K in dependence of the switch frequency and the gas pressure. e) Measurements of the electrical conductivity at DC and HF of the whisker matrix at various diameters and filling factors.

STATUS: At the Phys. Chem. Research Labor Schladitz the cylindrical specimens are being prepared; at the Zentralinstitut the apparatus for tasks b) and c) are constructed.

ADDENDA: Subcontractor: Phys.-Chem. Forschungslabor, H.J. Schladitz, Bodenseestr. 3 a,8000 Munchen 60. Performing organization: Bayerische Akademie der Wissenschaften.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0077, DEVELOPING A RAW GAS-AIR FUEL CELL FROM ACID ELECTROLYTES WITH NON-PRECIOUS METAL ELECTRODES

H. BOEHN, A E G Telefunken AG, *Hamburg 11, Federal Republic of Germany* 2000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0078, SOLAR CELL GENERATORS

R. BUHS, A E G Telefunken AG, *Hamburg 11, Federal Republic of Germany* 2000

MAIN OBJECT: Conversion, transport and storage of energy.

FIELD: Solar energy.

OBJECTIVE: Based on the present state-of-the-art of solar cell generators for space applications, processes are to be investigated which permit a substantial reduction of costs. The cost analyses will be largely supported by experiments. Finally, a development program based on these results is to be defined for cheap terrestrial solar cell generators.

WORK PROGRAM: Application of conventional techniques; modification of conventional techniques with a view to drastic reduction of costs; test and application of unconventional techniques.

REFERENCE TO OTHER PROJECTS: To support the study on the technical application of solar energy (ET 45), a 1 kW test generator consisting of several subsystems will be set up in accordance with the respective state of develoment within the complete program.

ADDENDA: Subcontractor: (1) AET Tfk B2; (2) Wacker-Chemie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0079, OPTIMIZATION OF THE COMPONENTS OF SUPERCONDUCTING D.C. CABLES

FRANK, A E G Telefunken AG, *Hamburg 11, Federal Republic of Germany* 2000

DESCRIPTION OF PROJECT: OBJECTIVE: The components of a flexible superconducting cable shall be optimized in order to provide a reliable high energy transmitting system.

WORK PROGRAM: Laboratory work and testing of the following components: a) cable core, b) cryogenic envelope, c) terminations. Optimization of the reliability of all components mentioned.

RELATION TO OTHER PROJECTS: In this project, the components of a flexible superconducting cable for d.c. use are studied. An a.c. superconducting cable is being developed under the project number ET 4161. Both projects are synchronized such that by 1976 a decision can be made on a pilot line.

STATUS: A testline including two terminations with an overall height of 8 m and a cable of 26 m length was installed with regard to the results of a safety study. The testline was cooled down to 5 K. According to the suggestions of CIGRE a test program was carried out. Longtime tests at plus or minus 200 kV were successful. Parallel to these tests contraction and current capacity measurements were made on laboratory samples. The technology for making copper stabilized niobium corrugated tubes was developed. This cable technology, with flexible components, can be applied to a.c. cables, too.

The end of this project probably will be delayed by one year.

ADDENDA: Performing organization: AEG-Telefunken; Kabelwerke AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0080, DEVELOPMENT OF A CRUDE GAS/AIR-FUEL CELL SYSTEM

F.A. POHL, A E G Telefunken AG, *Hamburg 11*, *Federal Republic of Germany* 2000

DESCRIPTION OF PROJECT: OBJECTIVE: Design and development of a stationary 0.5 kW fuel cell power supply unit.

The unit will be supplied with air and crude gas containing hydrogen. The crude gas will be generated by catalytic cracking of methanol.

WORK PROGRAM: For operation with crude gas and air, blocking of the diffusion paths has to be prevented. Therefore, the electrolyte is fixed in a matrix.

The layer must be capable of fixing the sulfuric acid during all possible operating modes. In order to realize the WC-anode/matrix/C/Pt cathode system, thin electrodes with large areas have to be developed. In addition, the methanol cracker which was designed during the NT 20 contract will be optimized. To control the unit, ancillaries have to be developed.

REFERENCE TO OTHER PROJECTS: In this project, a cathode with a low platinum content is used. An alternative to this cathode will be developed in the ET 4030 project.

STATUS: In 1975 individual components of the fuel cell system were developed.

The conditioning of the liquid fuel methanol takes place in a tube reactor at 320 degrees C. CH3OH is thermally cracked into H2 and CO on a commercial methanol synthesis catalyst.

The working conditions and the long term performance of the cracker were investigated.

The resulting crude gas H2/CO is converted in a matrix type fuel cell with WC-anodes and C(Pt)-cathodes.

Either sulfonated plastic or porous layers filled with sulfuric acid are used as matrix. Since gas mixtures (crude gas and air) should be converted on both the electrodes, thin electrode layers are needed to lower the diffusion polarization. A rolling process was developed for the production of thin electrodes making it possible to achieve double layer electrodes with a thickness of 0.4 mm.

Matrix and electrodes were tested in a cell with an area of 100 cm2. Under H2/O2 70 mW/cm2 and under H2/air 50 mW/cm2 were obtained at room temperature. These tests indicate the difficulty in maintaining the water balance of the battery.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0081, ACID FUEL CELLS

F.A. POHL, A E G Telefunken AG, *Hamburg 11*, *Federal Republic of Germany* 2000

MAIN OBJECT: Conversion, transport and storage of energy.

FIELD: Electrochemical converters.

OBJECTIVE: Design and development of a stationary 0.5 kW fuel cell power supply unit. The unit will be supplied with air and crude gas containing hydrogen. The crude gas will be generated by catalytic cracking of methanol.

WORK PROGRAM: For operation with crude gas and air, blocking of the diffusion paths has to be prevented. Therefore, the electrolyte is fixed in a matrix.

The layer must be capable of fixing the sulfuric acid during all possible operating modes. In order to realize the WC-anode/matrix/C/Pt cathode system, thin electrodes with large areas have to be developed. In addition, the methanol cracker which was designed during the NT 20 contract will be optimized. To control the unit, ancillaries have to be developed.

REFERENCES TO OTHER PROJECTS: In this project, a cathode with a low platinum content is used. An alternative to this cathode will be developed in the NT 30 project.

ADDENDA: Subcontractor: AEG-Forschung, Frankfurt Kunststoffinstitut, Kassel. Performing organization: AEG - Telefunken AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0082, RELUCTANCE MOTOR OF NEW DESIGN WITH IMPROVED EFFICIENCY

W. OHM, Stephan Werke Gmbh & Co., *Hameln*, *Niedersachsen*, *Federal Republic of Germany* 3250

DESCRIPTION OF PROJECT: OBJECTIVE: Design of improved configuration of laminations for reluctance motors with improved efficiency.

WORK PROGRAM: Development of computer programs for computation of the electro-magnetic field of given improved laminations. Manufacturing of test specimens for checking and improving the program. Optimization of the given lamination by theoretical and experimental means. Extension to further output powers. Extension to further pole numbers.

STATUS: Computer programs are in progress and are being tested. Numerous laminations have been developed and tested.

ADDENDA: Subcontractor: Prof. Dr.-Ing. H. Eckhardt, Institut fur El., Maschinen, Antriebe und Bahnen Techn. Univ. Braunschweig.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0083, HEAT CONVERSION TO MECHANICAL ENERGY AT LOW TEMPERATURES BY USING METALLIC ALLOYS WITH SHAPE MEMORY EFFECT

F. MAYINGER, Technical Univ. of Hannover, Inst. for Process Techniques, *Hannover*, *Niedersachsen*, *Federal Republic of Germany* 3000

DESCRIPTION OF PROJECT: OBJECTIVE: Study of the possibilities of using the so-called 'Shape-Memory-Effect' of metallic alloys to produce mechanical energy out of heat at low temperature levels (30-90 degrees C) with engines of technical size.

WORK PROGRAM: Based on a detailed literature study deliberations on thermodynamic efficiency, power and technical layout of these engines were made. In particular the technical use of a nickel-titanium-alloy (called Nitinol) was studied. Also other alloys, containing copper, aluminum, etc. were included in the discussion, having also a shape-memory-effect - but with much smaller power. Due to the unsteady heat conduction, which is a typical feature of this process, the Nitinol-components of such an engine have to be designed and constructed very filigrane-like which rules out this energy conversion concept in larger power units.

RELATION TO OTHER PROJECTS: There is no direct connection of this study with other current projects.

STATUS: The study is finished. It shows that the thermodynamic efficiency of such an engine is very low - between a few 'per mille' and some percent - its design and layout would be very complicated and expensive. Engines with large, technically interesting power using this principle cannot be realized in a technical and economical sense.

ADDENDA: Performing organization: Institut fur Verfahrenstechnik der TU Hannover.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0084, DEVELOPMENT OF A SODIUM/SULPHUR BATTERY

W. FISCHER, Brown Boveri & Cie Company, *Heidelberg 1*, *Federal Republic of Germany* 6900

DESCRIPTION OF PROJECT: OBJECTIVE: Development of Na/S-cells of high energy and power density with Beta-Al2O3-tubes as solid electrolyte.

WORK PROGRAM: Development of Beta-Al2O3-ceramics with high sodium ion conductivity under current load. Development of a sulphur electrode with low polarisation. Finding of current collector and housing material which are corrosion resistant against sulphur and sodium polysulfides. Development and electric life test of cells. Construction and test of a 10 kWh test battery.

STATUS: Conductivities of MgO-doped Na-Beta-A1203 up to 0.3 omega to the minus first power cm to the minus first power at 300 degrees C and lifetimes of Na/Na-cells larger than 1.200 Ah/cm to the second power at 0.9 A/cm to the second power have been reached.

Results of a screening program for the selection of corrosion resistant materials (without electrical current) and primary tests in cells show that sufficiently resistant housing and current collector materials exist. Laboratory cells and semi-technical cells are presently running under long duration test. Up until the end of 1975, 600 charge/discharge cycles had been reached without change in properties. Tests with laboratory cells have shown that polarisation can be kept low for sulfur electrodes.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0085, DEVELOPMENT OF SODIUM SULFUR STORAGE BATTERIES

GRUENLING, Brown Boveri & Cie Company, *Heidelberg 1, Federal Republic of Germany* 6900

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0086, HIGH TEMPERATURE FUEL CELLS

F.J. ROHR, Brown Boveri & Cie Company, *Heidelberg 1, Federal Republic of Germany* 6900

MAIN OBJECT: Conversion, transport and storage of energy.

FIELD: Electrochemical converters.

OBJECTIVE: Development of the 2-3 kW prototype of a high temperature fuel cell battery.

WORK PROGRAM: Development of the interconnection technology for series connecting of single cells to form modules. Construction and tests of experimental modules. Model investigation of mass balance in battery of fuel cells. Investigations concerning start-up techniques.

REFERENCE TO OTHER PROJECTS: In a supplementary program, the Battelle Institute is investigating new materials for the electrical interconnection of electrodes (NT 333).

STATUS: When changing from the module concept to cylindrical cells, unexpected difficulties arose with the cathode. Therefore, the objective could not be reached within the projected time. Without allowing for more costs, the project has, meanwhile, been prolonged until the end of April 1975.

ADDENDA: Performing organization: Brown, Boveri & Cie AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0087, PLANNING, ERECTION AND OPERATION OF A BLOCK HEAT-POWER STATION

K. HEIN, Heidenheimer Heizkraft. Gmbh, *Heidenheim, Federal Republic of Germany* 7920

DESCRIPTION OF PROJECT: OBJECTIVE: A block heat-power station consisting of a gas-Otto-engine with a generator on the same frame, for 620 kW electrical power, two waste heat boilers, peak boiler and several heat exchangers, auxiliary units, electrical control and regulating equipment, etc., is to demonstrate the principle of heat-power-coupling in small units. An experimental program of at least two heating periods should supply answers to the following questions:

WORK PROGRAM: Optimization of full load operating time inclusive of additional heating and heat storage. Adaptation of electrical current production to the power output of the overall power supply. Energy and power requirement as a functin of time of day and year. Maintenance expenditures. Consumption and cost values. Stationary time and operational safety of all aggregate parts. Possibilities for automation. Standardization possibilities in regard to the supply of newly built and reconstructed districts with 300 to 400 residential units. Environmental interference due to emissions and noise.

STATUS: The block heat-power station officially came into operation on March 26, 1976. It supplies 282 residential units with heat (in summer, heat for hot water) and supplies electrical current to the network of the city works Heidenheim AG. At the moment measurements of the sound level and the emissions prescribed by the trade board are being completed.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0088, DETERMINATION OF WELD STRAINS WITH THE HELP OF X-RAY SCOPES IN MOVABLE INSTALLATIONS

CHRISTIAN, Allianz Zentrum Technik Gmbh, *Ismaning, Bayern, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0089, EXTERNAL AIR - HEAT PUMPS PLANT WITH LATENT HEAT STORAGE FOR ROOM HEATING

FLUCK, Badenwerk AG, *Karlsruhe 1, Baden Wuerttem., Federal Republic of Germany* 7500

DESCRIPTION OF PROJECT: OBJECTIVE: In the majority of application cases only the external air is usable as heat carrier from which the heat pump can withdraw the necessary heat for the room heating. Ground water and the earth can only be used as heat carriers in special cases.

The resulting performance factor, however, of an external-air heat pump decreases over proportionally as the external temperature decreases and the primary cycle heating temperature increases. The construction of heat pump plants for those days with low external temperatures, which according to weather statistics do not occur very often, leads to large units with relatively high supply demands. This difficulty can be circumvented by withdrawing heat from a water filled storage container in the case of external temperatures below 0 degrees C. The withdrawal of the latent heat results in the freezing of the water. During the days with external temperatures above 0 degrees C, the ice can be melted by a heat supply (e.g. supercooling heat of the heat pump).

Storing heat at a low temperature level causes no heat loss during the summer months. It is the objective in an analysis of a one-family house with built-in external air heat pump and latent heat storage to work out the design data for similar future projects.

The following points in particular are to be considered: a) Calculation of the size of the latent heat storage container. b) Production of ice and its influence on the heat exchanger. c) Use of the supercooling heat to melt the ice. d) Economy of the system.

WORK PROGRAM: The following work program is planned: a) till June 30, 1976 planning and erecting the plant. b) from July 1, 1976 to June 30, 1977 execution of measurements, c) from July 1, 1976 to September 30, 1977 evaluation of results and preparation of report.

STATUS: The latent heat storage container has been built. The heat pump plant is being set up. The start-up is planned for the end of June/beginning of July, 1976.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0090, FLOWING GAS/AIR MIXTURE AS A FUEL GAS FOR THE PUBLIC GAS SUPPLY IN THE WOBBE-INDEX REGION OF THE FIRST GAS FAMILY

D. BANCO, Univ. of Karlsruhe, Engler Bunte Institute, *Karlsruhe, Baden Wuerttemberg, Federal Republic of Germany* 7500

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0091, LEAD-ACID BATTERY

W. BORGER, Varta Batterie AG, *Kelkheim, Hessen, Federal Republic of Germany* 6233

5. CONVERSION TECHNOLOGY

DESCRIPTION OF PROJECT: Objective: Development and construction of a high energy density and high power density lead accumulator for off-peak power storage and electric vehicle propulsion. This battery should be a low maintenance type capable of storing at least 50 Wh/kg.

WORK PROGRAM: a) Substitution of grid lead by other metals. b) Improvement of active material utilization. c) Maintenance free and sealed battery. d) Cycle life problems. e) Charging and discharging techniques. f) Construction, assembly and testing of experimental cells. g) Construction, assembly and testing of a 12 V 1 kWh prototype battery.

STATUS: Contract granted on December 12, 1974. A negative plate (40 Ah) with a lead coated aluminum grid has been developed, the weight being 20 percent lower compared with usual negative plates. Methods for the production of positive active material with an optimized pore structure are being developed.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0092, NICKEL-IRON BATTERY

G. KRAMER, Varta Batterie AG, *Kelkheim, Hessen, Federal Republic of Germany* 6233

DESCRIPTION OF PROJECT: Objectives: Development of a low-maintenance nickel oxide-iron battery with an energy density of about 70 wh/kh cell weight.

WORK PROGRAM: a) Development of new techniques: for the manufacture of active materials, for the manufacture of electrodes, for the cell design. b) Development and testing of catalysts for hydrogen oxidation. c) Design, manufacture and testing of cell prototypes. d) Development of new techniques for economical cell manufacture inclusive cell formation. e) Development of a suited charging method adapted to cell construction. f) Preparation of production instructions. g) First draft of a suitable battery design.

STATUS: Instead of the tubular electrodes of the preceding year, flat electrodes which are better suited for manufacture, have been developed (pressed powder and sinter plates, respectively). Using these electrodes and a new kind of cell case, cells of 25 ah and 50 ah have been constructed. The energy density of about 50 wh/kg could be recovered. The activities for the preparation of positive active material with higher electrochemical efficiency, and the studies on the charge behaviour of the iron electrode and on the hydrogen oxidation have been continued.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0093, DEVELOPMENT OF A PERMANENT BATTERY WITH HIGH ENERGY AND POWER DENSITY

E. VOSS, Varta Batterie AG, *Kelkheim, Hessen, Federal Republic of Germany* 6233

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0094, GALVANIC CELLS WITH SOLID ELECTROLYTES - ANNUAL REPORT 1975

E. VOSS, Varta Batterie AG, *Kelkheim, Hessen, Federal Republic of Germany* 6233

DESCRIPTION OF PROJECT: OBJECTIVE: Examination of the feasibility of galvanic cells of the type Ca (Mg)/CaF2/MeIIF2, particularly a) open circuit voltage, b) cycling capability, c) self-discharge.

WORK PROGRAM: a) Preparation of Materials. b) Preparation of electrolyte pellets. c) Preparation of cells. d) Development of contacts. e) Testing of selected cells.

STATUS: a) Cells of the type Ca/CaF2/CuF2 show an open circuit voltage of 3.37 V which is in good agreement with the theoretical value (3.39 V). b) Ca/CuF2 cells can be charged and discharged (number of cycles obtained: 15). c) During cycling and several days at open circuit no indication of self-discharge could be detected. d) The feasibility of cells of the type Ca/CaF2/CuF2 has been demonstrated.

ADDENDA: Subcontractor: Battelle Institut e.V. Postfach 900 160 Frankfurt/Main.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0095, DEVELOPMENT OF SODIUM/SULFUR ACCUMULATORS HERE - INVESTIGATIONS OF SOLID STATE ELECTROLYTES B-AL2O3

J. FELSCHE, Constance University, *Konstanz, Baden Wuerttemberg, Federal Republic of Germany* 7750

DESCRIPTION OF PROJECT: OBJECTIVE: Support for the physical and chemical development division projects for Na/S accumulators with solid-state chemical work for the solid-state electrolytes Beta-Al2O3. Particular tasks: phase analysis for the electrolyte ceramics, optimization of the conduction properties of the electrolytes interfacial surface reactions and the aging behavior of the electrolytes. The experimental investigations should further contribute to the understanding of the electrolytical conductive mechanisms within Beta AL2O3.

WORK PROGRAM: a) Development of analysis procedures for the routine investigations of the phase durability of a Beta Al2O3 ceramic electrolyte. b) Drawing up of the phase diagrams Na2O-MgO-Al2O3 for temperatures up to 2000 degrees centigrade under normal pressure. c) Optimization of the conductive properties of the Beta Al2O3 diaphragm taking into account the (structure) chemical aspects and the effects of the texture and grain size of the ceramic. d) Long-term investigation of the aging behaviour of the electrolytes with a structure chemical evaluation. e) Development of a model for the conductive mechanisms in Beta Al2O3 Beta Al203 - type electrolytes.

RELATION TO OTHER PROJECTS: The projects dealing with the sodium/ sulfur battery encompass the section projects NT 4473 (BBC, Heidelberg), ET 4083 and ET 4483 (Battelle, Frankfurt), ET 4067 (KFA, Julich) and ET 4068 (Friedrichsfeld GmbH). The work is coordinated in regularly occuring consultations. Cooperation is especially intensive with the central research lab of BBC in Heidelberg.

ADDENDA: Performing organization: Universitat Konstanz.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0096, HOT WATER PREPARATION BY SOLAR ENERGY

H. BIRNBREIER, Brown Boveri & Cie Company, *Mannheim 1, Baden Wuerttemberg, Federal Republic of Germany* 6800

MAIN OBJECT: Conversion, transport and storage of energy.

FIELD: Solar energy.

OBJECTIVE: Experimental verification and extension of results of study prepared by Brown Boveri which is concerned with the utilization of solar energy in Central Europe.

WORK PROGRAM: Fundamental investigations on solar collectors. Design and construction of solar absorbers for calorimetric measurements. Rigging up and testing solar absorbers. Development of selectively absorbing layers. Developing and testing water heating systems with solar collectors. Performance of measurements and evaluation of results.

REFERENCE TO OTHER PROJECTS: This project yields results for a system analysis which was recently started under project number ET 45 and which is concerned with the technological utilization of solar energy.

STATUS: Schedule tentatively established on: March 15, 1974. Seven plants for calorimetric measurements have been installed at 4 different locations. A total of 22 solar collectors, 1,5 m2 each, have been set up.

ADDENDA: Subcontractor: 1) RWE, Essen. 2) Suddeutsche Metallwerke, Walldorf.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0097, LARGE GAS TURBINE FOR THE SUPPLY OF PEAK AND AVERAGE LOAD

BOEHME, Brown Boveri & Cie Company, *Mannheim 1, Baden Wuerttemberg, Federal Republic of Germany* 6800

DESCRIPTION OF PROJECT: OBJECTIVE: Development and testing of a large gas turbine with a performance level in the range of 200 - 300 MW and an efficiency of over 30%.

WORK PROGRAM: a) Optimizing of the gas turbine process for gas temperatures over 1000 Degrees Centigrade. b) Aerodynamic and thermodynamic calculations of the shovel grid. c) Evaluation of the operational behaviour of the gas turbine. d) Development and construction of a cooling system for the turbine shovel. e) Completion and calculation and mechanical oscillation calculations for high change structural parts. f) Construction of the gas turbine and its structural parts. Development and testing of the final process. g) Erection of Prototype plant at an electrical power station. h) Initiation of operation and testing of the plant. i) Measurement of the stress of the structural parts during stationary and changing operation. j) Determination of the operational characteristics of single components (condensor, combustion chamber, turbine) and the total system. k) Investigation of dynamic operational conditions. l) Acquisition of knowledge for additional increases in power and efficiency.

STATUS: Points a) - c) of the work program are in process. R & contract granted on Nov. 25, 1975.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0098, CONSTRUCTION OF A SOLAR COLLECTOR PLANT FOR THE HEATING OF AN OUTDOOR SWIMMING POOL

F. WEIL, Brown Boveri & Cie Company, *Mannheim 1, Baden Wuerttemberg, Federal Republic of Germany* 6800

MAIN OBJECT: Conversion, transport and storage of energy.

FIELD: Solar energy.

OBJECTIVE: Planning, design and construction of a solar collector plant for the heating of an outdoor swimming pool.

WORK PROGRAM: Construction of a 1000-absorber solar collector plant for long-term tests and demonstrational purposes. Development of large-scale manufacturing processes for solar heaters. Data acquisition from long-term tests with special emphasis on the behavior and optimum applicability of solar collectors.

REFERENCE TO OTHER PROJECTS: This project is based on first results of project No. ET 25.

STATUS: Schedule tentatively established on: Dec. 19, 1974. Date of R & D contract: Feb. 10, 1975.

ADDENDA: Performing organization: Brown, Boveri & Cie AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0099, EDDY-CURRENT CALCULATIONS IN ALL STRUCTURAL PARTS OF ELECTRICAL MACHINES AND TRANSFORMERS

F. HEINRICHS, Kraftwerk Union AG, *Muelheim, Federal Republic of Germany* 4330

DESCRIPTION OF PROJECT: Objective: Investigation of the eddy current losses in all structural parts of electrical machines caused by rotating and alternating magnetic fields.

WORK PROGRAM: The available programs for calculation of magnetostatic fields shall be extended, so that time dependent fields can be calculated, too. All these programs for solving Maxwell's equations shall be combined in a program system enabling an easy handling by manemonic instructions. This command sequence governs each special run. Furthermore the system shall contain some interpretation programs making it possible to calculate interesting values derivable from the known electrodynamic fields.

STATUS: The system has been finished and was consolidated in a row of production runs. It contains the solutions to magnetostatic problems and the following utilization programs. A program for calculating and plotting fieldlines. A program for calculating the electromotoric force in a conductor defined by a polygon. The electrical field can be induced by rotation or by an alternating induction. A program for calculating in detail one part of an earlier calculated arrangement. The most important extension of the present system is a program for computing the eddy current distribution within cylindrical bodies. It provides sinusoidal time dependence of the fields. The permeability can be a function of locus. Program runs had to be speeded up, so that the time in computation would not be found excessive.

ADDENDA: Subcontractor: AEG-Telefunken Rechenzentrum, 6 Frankfurt-Niederrad.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0100, DIRECT WET-AIR CONDENSATION IN THERMAL POWER STATIONS

S. SCHWAB, Technical Univ. of Munich, Inst. for Thermal Power Plants, *Munich 2, Bayern, Federal Republic of Germany* 8000

DESCRIPTION OF PROJECT: OBJECTIVE: The practicability of direct wet-air condensation for waste-heat rejection from conventional and nuclear thermal power stations will be investigated with regard to its technical, economical and environmental importance. In this system a combined condenser and cooling tower forming a new structural and functional unit is provided.

WORK PROGRAM: a) Fundamental research for the process at an existing research installation (1) with variations of the quantities of deionized water added (injection, straying, atomizing). b) Planning and production of the larger research installation (2) with systems partly transferable to power stations. c) Testing of research installation (2) with variation of all essential parameters. d) Summary and analysis of the determined data for the evaluation of the process.

STATUS: Research at research installation (1) commenced. Planning for research installation (2) in performance.

ADDENDA: Subcontractor: Uni Munchen. Performing organization: Institut fur Thermische Kraftanlagen mit Heizkraftwerk der TU Munchen.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0101, TESTS OF HEAT TRANSFER USING ICE CONDENSATION

J. STRAUB, Technical Univ. of Munich, Inst. for Thermodynamics, *Munich 2, Bayern, Federal Republic of Germany* 8000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0102, TECHNOLOGY RESEARCH ON THE DEVELOPMENT OF AN EXTRA-HIGH-PRESSURE WATER JET PULSATOR GUN

H. HOPMANN, Messerschmitt Boelkow Blohm, *Munich 80, Bayern, Federal Republic of Germany* 8000

DESCRIPTION OF PROJECT: OBJECTIVE: To work out the basic technology for the supply, transmission and utilization of power in a water-jet pulsator gun with a view to demonstrating the technical feasibility and advantages of using extra-high-pressure water jets for non-mechanized rock cutting with fully mechanized drifting or tunnelling.

WORK PROGRAM: a) Experimental research on energy conversion of monopropellant liquid fuels. b) Basic research on utilization of hydrodynamic effects and on optimum design structure of the water-jet nozzles. c) Study of extra-high-pressure water jets (up to approx. 10 kbar) on different types of rock.

STATUS: Work was started on the project on 1.10.1975.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0103, STUDY OF CONCERNING SEASONAL THERMAL STORAGE DEVICES FOR LOW TEMPERATURES

WEISSENBACH, Messerschmitt Boelkow Blohm, *Munich 80, Bayern, Federal Republic of Germany* 8000

DESCRIPTION OF OBJECT: OBJECTIVE: The aim is to investigate the possibility of storing waste heat by introducing it into the ground, aquifers or lakes. Low-temperature heat could be stored in this way during the warmer seasons to be extracted for

heating purposes in the winter. Exploitation of the waste heat from power stations and a more economic use of primary energy are the aims here. At the same time, this is associated with reduced emission in congested regions in the winter peak and less waste heat from power stations in summer.

WORK PROGRAM: a) System analysis of low-temperature thermal storage devices for the relief of energy supply. b) Technical concept for a low-temperature seasonal storage device in the Upper Bavarian aquifers. c) Proposal for a pilot storage device.

RELATION TO OTHER PROJECTS: This work is closely connected with the district heating study conducted by AGFW and the associated case studied incorporating relevant results. New technical potential solutions for the biological exploitation of waste heat, as pursued, for instance, in the 'Agrotherm' project, are also indicated. Concerning as it does a long-term storage device, the work is also of significance with regard to the storage of solar energy.

STATUS: Termination of the study is planned for the first quarter of 1976. The following topics have been dealth with to-date: Investigations of the geological prerequisites for establishing storage devices in the congested regions of the FRG. Concepts for storage devices in aquifers and in mainly artificial lakes (storage devices near the surface and at greater depths, displacement storage devices, storage devices in caverns, tube-system ground storage devices, among others). Component investigations for water retention and drainage, insulation, extraction and distribution, safety concept and approval potential.

ADDENDA: Subcontractors: Bundesanstalt fur Bodenforschung; Universitat Stuttgart, Institut fur Verfahrenstechnik und Dampfkesselwesen.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0104, STUDY OF ENERGY STORAGES IN SYSTEMS OF HEAT-POWER COUPLING

WEISSENBACH, Messerschmitt Boelkow Blohm, *Munich 80, Bayern, Federal Republic of Germany* 8000

DESCRIPTION OF PROJECT: OBJECTIVE: Supply systems with storage of heat and electricity are to be designed, analysed, evaluated with respect to their economic and ecological consequences and their effects on the national economy.

WORK PROGRAM: a) Demand analysis of electricity and heat until 1990 inclusive storage. b) Classification of supply grid concepts. Investigation of the economics in using power storages and heat storages. c) Analysis of defined grid systems by means of a computer model. d) Evaluation of these systems. e) Analysis and specification of components.

RELATION TO OTHER PROJECTS: Connection with AGFW studies of district heating: ET 5072 A to 5076 A.

STATUS: Demand analysis is nearly finished. Analysis of component is partly finished. Computer model and supply concepts are being developed.

ADDENDA: Subcontractors: KA-Plan, Heidelberg, BBC AG, Heidelberg, TU Stuttgart, Institut fur Thermodynamik, Prof. Bach.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0105, NONDESTRUCTIVE TESTING OF THE MATERIAL STATE USING THE SCATTERING OF ULTRASOUND

G. DEUSTER, Fraunhofer Society, Inst. for Non Dest. Test Proc., *Saarbruecken 11, Saarland, Federal Republic of Germany* 6600

Addenda: Performing organization: Fraunhofer Gesellschaft.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0106, LEAD-ACID BATTERY WITH BIPOLAR ELECTRODES

KIESSLING, Accumulatorenfab. W. Hagen AG, *Soest, Nordrhein Westfalen, Federal Republic of Germany* 4770

DESCRIPTION OF PROJECT: OBJECTIVE: Development of a low-maintenance lead-acid battery with an energy density of approx. 45 Wh/kg by use of bipolar electrodes with light grids.

WORK PROGRAM: a) Elaboration of the electrochemical basis for the construction of bipolar electrodes. b) Construction of the positive and negative grids. c) Investigation of the connection from cathode to anode compartment. d) Investigation of recycling of lead. e) Design and examinations of test batteries.

STATUS: Lead coating of copper was studied with commercial galvanic baths and various experimental procedures resulting in some improvements compared with the state of the art. Experimental grids were prepared and both corrosion tests with blank grids and cycling tests of pasted plates were made. In agreement with the theory, the inherent security for application in negative grids was demonstrated, so that fundamental technical difficulties no longer exist. Preliminary experiments in dip-coating with lead on aluminum were made, serious problems are to be expected. There is a promising commercial galvanic process with the advantage of good solderability for further working procedures.

Corrosion resistance of galvanic lead coating seem to be lower than that of cast parts of lead or lead alloys.

Further studies on that problem are necessary. Improvements by after-treatment are expected. For development of procedures and sample testing the necessary equipment was constructed and set in action. Test racks for complete electrodes were built.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0107, DRAFT OF A STANDARD FOR HEAT RECOVERY SYSTEMS

H. BACH, Univ. of Stuttgart, Inst. for Therm. & Heat Eng., *Stuttgart, Baden Wuerttemberg, Federal Republic of Germany* 7000

DESCRIPTION OF PROJECT: OBJECTIVE: Proposal to unify the design parameters, characteristic numbers of criteria to judge the energetic and economic qualities of heat recovery devices and to have a basis for a standard.

WORK PROGRAM: Collection of parameters for the layout and specification of heat recovery devices.

Development of a basis of evaluation in respect to energetics and economics for such devices, which are to be installed in air conditioning systems. Draft of methods to calculate the expected annual heat recovery at different running modes. Draft of standard.

STATUS: Start of project: June 1, 1975.

ADDENDA: Performing organization: Inst. fuer Thermodynamik und Waermetechnik der Universitat Stuttgart.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0108, LARGE HEAT STORAGE UNIT WITH A HEAT CAPACITY OF 1500 GCAL, IN THE KFA, JULICH

G. SCHOELL, Energy Technology Res. Inst., *Wolfschlugen, Baden Wuerttem., Federal Republic of Germany* 7441

DESCRIPTION OF PROJECT: OBJECTIVE: Drafting and production of the necessary plans, construction drawings and calculations of the heat storage unit.

WORK PROGRAM: Preliminary investigation in order to determine basin dimensions, excavation depth and dam height, under the condition that no transporting of earth from or to the building site is necessary. a) Drafting of a 3-cell basin with cell-separation walls, as well as the static calculations including reinforcement plans. b) The drainage of the basin bottom. c) The watertight 'proofing' of the basin bottom. e) The technical central center with measuring station, furnace and heat exhanger, pumps, amatures and the pipelines to the heating, filling, draining and using of the storage unit, including rain water removal.

ADDENDA: Performing organization: Forschungsinst. fuer Energietechnik.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0109, GALVANIC METAL-AIR CELLS

OLIAPURAN, Varta AG, *3000 Hannover, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0110, HEAT TEMPERATURE GAS-SOLID SUSPENSION COOLING IN HEAT EXCHANGERS

P.M. WEINSPACH, Univ. of Dortmund, *4600 Dortmund, Hombruch, Federal Republic of Germany*

DESCRIPTION OF PROJECT: OBJECTIVE: Development of suitable heat exchangers for the cooling of flows of high-temperature gas-solid suspensions such as those involved in the VEW process of coal conversion. Acquisition of the basic parameters of interest to industrial process engineering.

WORK PROGRAM: a) Design and construction of a suitable experimental arrangement. b) Determination of the overall heat transfer coefficient from the flowing hot gas/steam-solid suspension to the gaseous cooling agent. c) Determination of the optimum type of construction and the best method of operation for this heat transfer process. d) Optimization of the apparatus geometry for a suitable type of construction. e) Study of the influence of the erosion caused by solid particles on the availability of the apparatus.

STATUS: In order to investigate the cooling of high temperature gas-solid suspensions to determine the influence of the erosion caused by solid particles on the availability of heat exchangers, a plant was designed. The plant makes possible the investigation of heat transfer and the erosion of the pipes subject to cross-flow and through-flow of the suspension. At the heat exchange measurements, the maximum wall temperature can reach 800 degrees centigrade and the maximum gas-solid-material temperature can reach 900 degrees centigrade. An air-quartz-powder mixture to which water vapour and carbon dioxide can be added in order to investigate the importance of radiation in the heat transport, is being used as a model suspension. The gas-solid suspension can be cooled either by hot air or superheated vapour.

The erosion due to solid particles of electrically heated pipes is being investigated on bundles of tubes in a flow of cold suspension at wall temperatures up to 800 degrees centigrade.

The equipment and plant parts required for the investigation were dimensioned, constructed and manufactured. The commercially available equipment such as measurement and control equipment were purchased. The plant is in the final stage of assembly.

ADDENDA: Performing organization: Universitat Dortmund Abt. Chemietechnik.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0111, NIGHT ELECTRICITY RESERVOIR HEATING WITH A WATER VAPOR GENERATOR WITH BRINE AS A STORAGE MEDIUM

H. ENGELBRECHT, Bertrams Company, *5900 Siegen, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0112, BLOCK-TYPE HEAT ACCUMULATOR

H. ENGELBRECHT, Bertrams Company, *5900 Siegen, Federal Republic of Germany*

MAIN OBJECT: Conversion, transport and storage of energy.

FIELD: Thermal energy storage.

OBJECTIVE: Based on preliminary studies of the applicant, a heat accumulation system working with salt mixtures as storage medium is to be developed.

WORK PROGRAM: Design of an evaporation system that makes it possible to charge and discharge for use - the accumulator simultaneously. Optimization of condensation product feeding. Tests on heating-up switchgear to obtain a uniform admission to the cells. Tests on pilot plants. Elaboration of final design.

REFERENCE TO OTHER PROJECTS: The imporatance of economical and dependable accumulators for night current heating installations is well known. As results from first studies, regarding the use of sun and wind energy, and application without accumulators is not probable.

ADDENDA: Performing organization: Betrams AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0113, DEVELOPMENT OF ELECTROCHEMICAL ENERGY STORAGES WITH ENHANCED ENERGY DENSITY (DISSOLVED STATE METAL OXIDE SECONDARY BATTERY)

F. BECK, B A S F, *6700 Ludwigshafen, Federal Republic of Germany*

DESCRIPTION OF PROJECT: OBJECTIVE: Development of a new secondary battery, the active masses of which are deposited as smooth layers on to nonporous base electrodes in the charged state. In the discharged state, active masses are dissolved in aqueous electrolyte. In comparison to conventional lead sulphate battery, a distinct improvement in the case of lead tetrafluoroboate battery is expected in regard to energy density (larger conversion of lead) -current drain system) -costs.

WORK PROGRAM: a) Fundamental electrochemical investigations of electrode processes involved, especially cathodic dissolution of lead dioxide in HBF4 and other acids, which are, as yet not well known. b) Long range cyclic behaviour of model cells with an electrode area of 100 cm2. Electrolyte is moved slightly. c) Design and development of batteries, especially with bipolar electrodes. d) Reliability tests with battery prototypes.

STATUS: Polypropylene filled with mineral graphite has been developed as an economical, low weight and electrochemically inert material for base electrodes. A typical electrolyte is 2 mole/lPb (BF4)2 and 1 mole/l HBF4. Additives in the range of 0.1 mole % improve symmetry of deposition. Until now, greater than 2000 cycles with partial charge and greater than 200 cycles with full charge each with continuing runs and deep discharge, have been realized. The possibility of a bipolar switch was demonstrated.

ADDENDA: Performing organization: BASF AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0114, IN-LINE PUMP BEHAVIOR AT THE SITE OF A PARALLEL PIPE

M. VOLK, Sulzer Kernkraftwerkspumpen, *6710 Frankenthal, Rhein. Pfal., Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0115, PRODUCTION TECHNOLOGY OF BETA-ALUMINA CERAMICS FOR NA/S BATTERIES

G. HEIMKE, Friedrichsfeld Gmbh, *6800 Mannheim, Baden Wuerttem., Federal Republic of Germany*

DESCRIPTION OF PROJECT: Objective: Development and provision of production technology for Na solid electrolytes as developed by BBC as well as further improvement of this material in close cooperation with all other participants in this program.

WORK PROGRAM: a) Selection of raw materials and development of a powder handling technology, b) Development of a shaping technology capable of extension to mass production, c) Sintering in Na atmosphere, d) Development of a hot pressing process, e) Final treatment and testing.

RELATION TO OTHER PROJECTS: The development of the technology to produce beta-alumina ceramics for Na/S batteries is made in cooperation with the Research Center of BBC in Heidelberg.

STATUS: The beta-beta'-alumina-powder is prepared from a mixture of alpha-alumina, magnesia, and sodium carbonate powder by calcining in a temperature range around 1300 degrees C. It was found that the calcination in a rotary kiln is possible only in large scale continuous production. For this development work powder is calcined in single batches in a program controlled furnace.

Dry milling in ball mills led to mill packing of the charges. There were no difficulties when vibrating mills are used.

The tubes are produced by isostatic pressing (pressure 2000 atm).

It was possible to sinter single tubes in a laboratory Tramman-furnace and a batch of 50 tubes in a kiln heated with gas.

Tubes sintered in the gas heated furnace had densities of 3.11 g/cm3; tubes sintered in the Tramman-furnace had densities of 3.18 to 3.20 g/cm3 and a resistivity of 5 cm at 300 degrees C.

To have samples with the best properties of the composition concerned, it was tried to produce beta-alumina ceramic by hot pressing in the temperature range of 1300 degrees C to 1500 degrees C and pressure range of 200 kp/cm2 to 400 kp/cm2. Samples hot pressed with 1400 degrees C and 300 kp/cm2 had a density of 3.2 g/cm3. The experiments are stopped because of economical reasons.

It was necessary to work out new concepts for characterization of the products (microstructure, resistivity, etc.), especially for detecting degradation of the ceramic when used in the Na/S battery. The degradation effects could be detected by measuring the resonance frequencies of degradated tubes.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0116, HEAT CONVERSION AND HEAT STORAGE

W. BOKE, Fraunhofer Society, Inst. for Chem. of Fuels Expl., *7501 Berghausen Bei Karlsruhe, Federal Republic of Germany*

The possibilities of heat storage and conversion of heat into electric power in view of technical application and performance are studied.

The research program consists of two principal parts: 1. Heat storage by utilization of the latent heat of fusion of salts, salt mixtures, and salt hydrates (latent heat storage systems). The temperature ranges to 100 degrees C and more than 700 degrees C are favourable. 2. Heat conversion by means of the Seebeck effect (thermoelectric power generation). The most important aspects of the studies of thermocouples and thermopiles are working life, costs, heat input, and regulation.

Addenda: Performing organization: Fraunhofer-Gesellschaft Institut Fur Chemie der Treib und Explosivstoffe.

SUPPORTED BY Germany - Ministry of Defense - Bonn

5.0117, HYDROGEN AS A SOURCE OF ENERGY

J. DREHER, Fraunhofer Society, Inst. for Chem. of Fuels Expl., *7501 Berghausen Bei Karlsruhe, Federal Republic of Germany*

On account of the excellent properties of hydrogen as a fuel for direct electric power generation, the present possibilities of hydrogen storage and generation will be investigated.

Research work consists of the following main points: 1. Hydrogen storage in pressure vessels (high strength, light-weight cylinders), in vacuum-insulated tanks after liquefaction, and by chemically combining hydrogen with metals or intermetallic compounds to form decomposable hydrides. 2. Hydrogen generation by the reaction between metals or metal hydrides and water, and by pyrolysis of suitable hydrocarbons.

For the present hydrogen delivery to power plants of a low or medium output (5 kW maximum) is attractive. Experiments about hydrogen storage by means of metal hydrides and chemical reaction between metals and water will be carried out.

Addenda: Performing organization: Fraunhofer-Gesellschaft, Institut Fur Chemie der Treib und Explosivstoffe.

SUPPORTED BY Germany - Ministry of Defense - Bonn

5.0118, STORAGE BATTERIES AND PRIMARY CELLS

J. DREHER, Fraunhofer Society, Inst. for Chem. of Fuels Expl., *7501 Berghausen Bei Karlsruhe, Federal Republic of Germany*

Modern techniques of electrochemical energy generation and energy storage are matters of research. In detail, maintenance-free lead secondary cells (charge-retaining batteries) are checked and compared with conventional types. The properties of 'dissolved secondary batteries' and the practicability of metal-hydrogen secondary cells will be explored.

As for primary cells, the research work especially relates to modern high energy systems with alkali metal or alkaline-earth metal electrodes being used. The efficiency of industrial products will be determined, and electrochemical experiments with other proposed systems are carried out.

Addenda: Performing organization: Fraunhofer-Gesellschaft, Institut Fur Chemie der Treib und Explosivstoffe.

SUPPORTED BY Germany - Ministry of Defense - Bonn

5.0119, EXPERIMENTAL STRESS DEFORMATION AND ESTIMATION OF STRESS FACTORS FOR BREAKS IN COMPLEX LOAD SITUATIONS

S. WINKLER, Fraunhofer Society, Inst. for Rigid Body Mechanics, *7800 Freiburg, Baden Wuerttem., Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0120, SUPERCONDUCTORS

E. AMBERGER, Univ. of Munich, Inst. of Inorganic Chemistry, *8000 Munchen 22, Bayern, Federal Republic of Germany* 8000

DESCRIPTION OF PROJECT: OBJECTIVE: Synthesis of superconducting compounds in a covalent matrix with high critical temperature.

WORK PROGRAM: a) Synthesis of I-tetragonal compounds in a B12 icosahedron matrix. b) Synthesis of I-tetragonal compounds in a carborane icosahedron matrix. c) Search for other matrix structures, from which superconducting properties might be expected. d) Investigation of these compounds.

STATUS: Borides of the formula (B12)4X2XY with X equals B,C,N,Y equals Ti,V,Nb and y equals 1.5...2 were obtained by means of chemical vapour deposition. Their structures show a fixed framework of B12 icosahedrons and parallel chains of alternating atoms XY,... . The distances of the atoms X-Y are not influenced by the kind of the atoms. Therefore the structures are linear forms of the superconducting cubic transition metal borides, carbides and nitrides (which crystallize with the NaCl lattice) with constant cell parameters.

We obtained filled A15 structures (A3B, Cr3Si) of the formula MxPt304 with M equals Na,Mn,Ni,Cu, x equals O (?)... 1. Here the bcc sites (B) are occupied by M, the sites A of the orthogonal 'conductor chains' are occupied by Pt. The Pt-Pt distance is 2.80 A, in metallic platinum 2.77 A. In MxPt304 every Pt atom is planar quadratically surrounded by oxygen atoms. Thus the structure is to be considered as an orthogonal three dimensional expansion of the one dimensional KROGMANN compounds K2Pt(CN) 4BrO.3 (Pt-Pt distance 2.88 A). We suppose that, owing to the fixed sites in the hard lattice of MsPt304 and contrary to K2Pt(CN)4PrO.3, there is no PEIERLS transition to an isolator below about 120 K. We are on the point of working on a variation of the valence electron concentrations by means of a complete or partial substitution on the sites of M and O, respectively, and we are about to produce single crystals.

ADDENDA: Performing organization: Institut fur Anorganische Chemie der Universitat Munchen.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0121, FLYWHEEL STORAGE

O. BRANDSTADTER, Maschinenfabrik Augs. Nur. AG, *8000 Munich, Bayern, Federal Republic of Germany*

MAIN OBJECT: Conversion, transport and storage of energy.

FIELD: Kinetic energy storage.

OBJECTIVE: Basic investigations for energy storage with stationary flywheel plants, especially with regard to the use of new materials and technologies.

WORK PROGRAM: Basic research on the use of flywheels for energy storage. Definition of possible systems. Problems of electrical engineering. Research for potential application.

STATUS: Date of R & D contract: Aug. 23, 1973. The general storage problems were clarified. Investigations have been made by theoretical design of a 1 MW / 1MWh power plant for more detailed estimate of arising problems and cost. The final report is now being prepared.

ADDENDA: Performing organization: Maschinenfabrik Augsburg-Nurnberg AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0122, STATIONARY FLYWHEEL ENERGY STORAGE SYSTEM SSB

G. ISENBERG, Maschinenfabrik Augs. Nur. AG, *8000 Munich, Bayern, Federal Republic of Germany*

DESCRIPTION OF PROJECT: OBJECTIVE: Preparation of a concept for flywheel regenerative braking system on an underground train tunnel route. A concept for a flywheel unit will be developed up to the draft design for the above mentioned conditions. It is to be proved that the assigned task can be solved by a stationary flywheel. The draft design will be a basis for a fixed-price offer.

WORK PROGRAM: a) Flywheel construction with regard to size, speed of revolution motions and bed bearing repository. b) Investigation for material selection, LCF-sampling, worth-analysis. c) Constructive work for preparation of bed decision, judgment. d) Laying out of the electromechanical construction of plant part. e) Laying out of vacuum plant, flywheel Gehause-housing, case, cylinder plan, design. f) Preliminaries for manufacture preparations.

RELATION TO OTHER PROJECTS: The plan is continuation of the study 'Energy Storage with Stationary Flywheel Plants' (contract No. NT 4479 A).

STATUS: Schedule tentatively established on Aug. 1, 1975.

ADDENDA: Subcontractor: AEG-Telefunken, Fachbereich Sondertechnik.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

5.0123, STUDY OF A SIMPLIFIED METHOD FOR MAKING SILICON SOLAR CELL CONTACTS

M. BRUNET, La Radiotechnique Compelec, *Caen, France* 14001

Obtaining and handling of the serigraphic (silk screen) paste. Study of annealing and cell characteristics. Comparison of the technique and economics of making solar cells by metallic silk screen printing and making them by metal vapor deposition.

Addenda: performing organization: La Radiotechnique Compelec

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

5.0124, STUDY OF A PROCEDURE FOR MAKING POLYCRYSTALLINE LAYERS OF SILICON ON CONDUCTING SUBSTRATES (SOLAR PHOTOVOLTAIC CELLS)

BELOUET, Electronic & Phys. Appl. Lab., *Limeil Brevannes, France*

Definition and preparations - study of substrates. Study of the growth of polycrystalline layers (liquid phase in tin flux).

ADDENDA: Performing organization: Laboratoire D'Electronique et de Physique Appliquee L.E.P. SA.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

5.0125, STUDY OF A SIMPLIFIED METHOD FOR MAKING SILICON SOLAR CELL CONTACTS

M. BRUNET, Electronic & Phys. Appl. Lab., *Limeil Brevannes, France*

Obtaining and handling of the serigraphic (silk screen) paste. Study of annealing and cell characteristics. Comparison of the techniques and economics of making solar cells by metallic silk screen painting and making them by metal vapor deposition.

ADDENDA: Performing organization: L.E.P. Laboratoires Elect. Physi. Apliquee, Laboratoire D'Electronique Et De Physique Appliquee L.E.P. SA.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

5.0126, STUDIES ON COMBUSTION - LOW-GRADE FUELS

UNKNOWN, Coal Fields Research Center, *Paris, France* 75007

OBJECTIVE: To save energy and raw materials, examine the possibilities of using reactors with different treatments (combustion, gasification, pyrolysis, other treatments, etc.) and different fuels (highly cindereous solid fuels, graded wastes, industrial wastes, etc) in order to determine what technical problems need further study in the future.

ADDENDA: Supporting Agency: Ministere de l'Industrie et de la Recherche. Performing Organization: Centre d'Etudes et Recherches des Charbonnages de France (CERCHAR).

SUPPORTED BY France - Ministry of Industry & Research - Paris

5.0127, TESTBOARD FOR HEAT EXCHANGE

UNKNOWN, Coal Fields Research Center, *Paris, France* 75007

OBJECTIVE: Exploratory research indicated that we would be meeting a need by developing a testboard or heat exchange which would provide public authorities, users, and builders with an impartial data on equipment performance. Such research would also enable us to find new solutions for recovering low level energy.

PROCEDURE: We intend to study and devise a plyvalent heat testboard in order to test the possibilities of different existing heat recovery systems, for example, heat exchangers and pumps.

ADDENDA: Supporting agency: Ministere de l'Industrie et de la Recherche. Performing organization: Centre d'Etudes et Recherches des Charbonnages de France (CERCHAR).

SUPPORTED BY France - Ministry of Industry & Research - Paris

5.0128, SPRINKLING BASINS

UNKNOWN, Electricite de France, *Paris, France* 76008

Studying cooling by jets of water in an experimental sprinkling basin.

Studying the ouput of the system following different configurations based on various parameters; studying the effect of size.

Perfecting a mathematical model simulating the thermal behavior of a sprinkling basin.

Sprinkling basins could be the solution when a power station cooled by a circuit open to the river has operational difficulties (risk of a decrease in power) because of the need to respect the temperature of waste water at low tide. Used along with man-made lakes, they could be an alternative to building cooling towers.

ADDENDA: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0129, MATHEMATICAL MODELS FOR SIMULATING THE OPERATION OF OPEN CIRCUIT COOLING SYSTEMS

UNKNOWN, Electricite de France, *Paris, France* 76008

Perfecting mathematical models for calculating: the cooling capacity of watercourses, estuaries, and lakes. Temperature development in areas receiving thermal effluents from power stations.

These models are designed to provide a chronologic series of water temperature based on synoptic meteorological data.

ADDENDA: SUPPORTING AGENCY AND PERFORMING ORGANIZATION: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0130, PRODUCING AND USING HYDROGEN FOR ENERGY CONVERSION AND TRANSPORT

UNKNOWN, Electricite de France, *Paris, France* 76008

Producing hydrogen by electrolysis of water: This project studies the increase in the operating temperature of the electrolysis apparatus and its effect on the performance and the behavior of the materials. Taking part in the work being done by GDF on the thermochemical production of hydrogen and its transport and storage.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

5. CONVERSION TECHNOLOGY

SUPPORTED BY France - Electricite de France - Paris

5.0131, THE ENERGY SYSTEM
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Three areas are examined: A. Producing hydrogen by electrolysis (development of production and storage costs, the cost of competitive methods, modulation and storage suitability compared to competitive techniques, to markets); B. Using low temperature heat (analyzing the relationship between production plant design, localization, wastes, development of electricity and water networks); C. Industrial heat: Development of production possibilities and costs, direct electricity substitution techniques, markets.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0132, TURBINE-PUMPS AND TEMPORARY FLOWS IN POWER STATION CIRCUITS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Studying problems related to putting turbine-pumps into operation: a. Testing the Montezic model of the turbine-pump; b. Determining instability conditions in reversible turbine-pump adductions.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0133, THERMAL STORAGE OF ENERGY
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Show the benefits of an energy storage system used for simultaneously providing steam and electricity. Test the system's fluids and components.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0134, REVOLVING MACHINERY - VIBRATION CHARTS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Establishing a file characterizing the vibratory state of each piece of revolving machinery being considered. This file will: a. enable us to compare different vibration rates for each piece of machinery and thereby help us to eventually devise a means of diagnosing their mechanical state; b. enable us to evaluate the average values of vibrations corresponding to the normal operation of a given type of machinery.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0135, MECHANICAL AND THERMAL BEHAVIOR OF HEATERS AND THE ENTIRE WATER STATION OF POWER PLANTS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Experimental study of the operational behavior of water heater elements by: a) analyzing the mechanical and thermal behavior of tubular plates, b) testing models in situ, and c) studying thermal transfer in purge coolants.

Analyzing the behavior of water stations under temporary conditions by: a) a theoretical study (making models), b) an experimental study (check list in the power station during transitional tests).

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0136, CONTINUOUS AUSCULTATION DEVICE FOR A GTA
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Device for following the development of parameters associated with the operation of a GTA with the aim of acquiring information useful for diagnosing the mechanical state of this GTA.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0137, REVOLVING MACHINERY - VIBRATIONS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Determining vibration causing forces related to the rotation of revolving machinery in order to: a. Specify the transmission of stress of rotors by bearings; b. Reduce vibrations by equilibrating machines with several rotors in situ.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0138, STEAM TURBINES - GENERAL STUDIES
UNKNOWN, Electricite de France, *Paris*, *France* 76008

These studies support the development and operation of steam turbines in future stages: a. Mechanical problems: blade vibration, thermal limitations; b. Problems related to steam flow in the lowest levels of BP's, especially for runs exceeding nominal point (partial charges or raised cavities).

The experimental part of these studies is also being carried out on the wet steam test turbine and on actual turbines.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0139, CORROSION IN NATURAL AND ARTIFICAL SURROUNDINGS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

This study will enable us to: a. Furnish operators with ways of effectively counteracting materials corrosion and predicting the weather resistance of various proposed protection solutions. b. Improve the reliability of power stations located by the sea; study the aggressive quality of water in coolant circuits and the effect of adding iron sulfate on the resistance of copper alloy condensers.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0140, MATERIALS FOR STEAM TURBINES
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Materials for disks and blades: Using low alloy ferritic steels (1-3 percent Ni) and new proposed types (13 percent Cr) for manufacturing large disks for BP rotors in 900 MW level light water power stations has a number of problems which are studied in connection with equipment management: a. Low resistance to rupture (in correlation with mechanical characteristics determined in the factory when it was received). b. Corrosion under tension in actual surroundings and the effect of certain local concentrations. c. Fatigue resistance in different environments it could encounter. Materials for high temperature bolting: The effect of chemical composition and thermal processing on bolts' resistance to relaxation and weakening.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0141, AUTOMATIC CONTROL AT 2 LEVELS (START-UP AND MAJOR TRANSITIONS)
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Studying a control method which takes into account the overall behavior of the unit and achieves a controlled dosage between adjustments, including real interactions between chains at all operational loads. This type of regulation is suitable for a 2 level hybrid apparatus, with the numerical part assuring the optimization of the analogic part. Experiments using an ordinary thermal compartment (Martigues power station).

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0142, COORDINATING SPEED AND TENSION REGULATORS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Determining required characteristics of turbine speed regulators by taking into account the actual behavior of electric networks and tension regulators of alternators. Studying the compatibility of these characteristics with the need to move valves rapidly as required by the stability of the networks.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0143, REGULATING THE SPEED OF FEED TURBO-PUMPS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Analyzing the possibilities of feed turbo-pump speed regulators and defining their performance, taking into account the performance required of pumps.

Actual specifications will be validated through comparative tests of TPA mechanical and electrical regulators of 250 MW components and complementary tests on the 600 MW component TPA (eventually).

Addena: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0144, APPARATUS IN THE FIELD OF NEW PRODUCTION METHODS, ENERGY SYSTEMS, AND INDUSTRIAL APPLICATIONS OF ELECTRICITY
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Developing the correct control apparatus to assure the management of new production methods and energy systems, as well as some new industrial processes using electric energy under optimal safety and reliability conditions.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0145, PARTICIPATING IN SETTING-UP THE CORDEMAIS POWER STATION'S CONTROL
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Make certain that the 700 MW bearing's control specifications are easily applied and make necessary changes in the diagram.

Establish a file on tests and the putting into operation process. Coordinate tests and the putting into operation of the equipment on location. Prepare dynamic analysis and determination of definitive adjustments.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0146, BINARY CYCLES (CORROSION-EROSION)
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Studying a draft of a power station operating on the binary cycle: H2O-NH3 or H2O-isobutane, etc.

The study will consist of the following headings: a. Parametric study of the cycle, taking technical and economic aspects into consideration. b. Studying equipment characterizing this cycle - especially cold source, NH3 turbine, etc. c. Constructing a loop for testing corrosion and erosion of materials.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0147, INFORMATION IN PRODUCTION METHODS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Improving information in production methods by using numerical equipment (mini or microcalculators): a. Analyzing needs (management, 'a posteriori' analysis managing equipment); b. Studying processing and the most suitable restitution methods.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0148, PRODUCING AN EDF LOGIC
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Producing a logic applicable to calculators used to process complementary information in production methods. Determining specifications to be recommended in this type of application (defining the monitor and tasks establishing typical organigrams, programming languages), in order to unify the logic.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0149, STRUCTURE OF NUMERICAL SYSTEMS IN PRODUCTION METHODS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Studying decentralized numerical methods for processing information and realizing punctual automatic functions in production methods (using low numerical range equipment such as micro-calculators).

Determining the field and limitations studying the horizontal and vertical structure of the system.

Addenda: Supporting agency and Performing Organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0150, AMMONIA LOOP (HEAT DISSOCIATION AND TRANSFER)
UNKNOWN, Electricite de France, *Paris*, *France* 76008

The binary cycle is necessary for power stations with unit power exceeding 2500 MW because of the present state of ordinary steam turbines. A test loop must be developed to study dissociation phenomena and associated heat recombination and transfer in the ammonia cycle.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

5.0151, TESTING MONTEZIC'S PUMP TURBINE MODEL
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Studies relating to the use of turbines: Test the Montezic model to determine its hydraulic characteristics and synchronize those operating areas where vibration is a critical factor.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

5.0152, EXPERIMENTAL AMMONIA LOOP
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Ammonia can be used as the thermodynamic fluid in electricity generating reactors, particularly in a binary, water-ammonia cycle.

A small station for testing capacity has been completed; we will use it to study phenomena that may occur during an ammonia cycle, particularly during separations and recombinations. Heat exchange can be measured with the different exchangers of the cycle.

In current steam turbine technology, the binary ammonia cycle is required for extremely high unit power levels (2500 MW) and is of economic interest for reactors with a unit power of 1200 MW.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

5.0153, TESTING AMMONIA IN WET STEAM
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Study a rough draft of the binary cycle such as the water-ammonia or water-isobutane cycles. The following will be considered: (1) the conditions under which the cycle occurs and consider their technical and economic aspects, (2) the materials characterizing this cycle (particularly: cold sources, NH3, turbine, etc.). We also will develop a loop for testing materials corrosion and erosion.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

5.0154, TESTING AND STUDYING HEAT PUMPS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

We will deal with high-power heat pumps that can be used industrially or used to heat groups of houses: This study will consider the technical and economic aspects of using heat pumps and the feasibility and development of pumps that perform better than present pumps. Liquid injection compressors will be studied.

Technical and economic studies on using heat compression in industrial processes.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

5.0155, NEEDS OF LONG TERM ENERGY STORAGE
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Determine long term energy storage needs: On the national level, we will analyze the development of the energy available from nuclear sources during slack periods and determine the importance of certain hypotheses (reactor maintenance, exchanges abroad, etc.) in order to determine the amount of energy that will eventually be available for producing hydrogen through electrolysis.

Also, the characteristics of developing distribution networks and the improvements resulting from using electrochemical storage will be examined.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

5.0156, TECHNICAL AND ECONOMIC STUDIES OF HYDROGEN
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Study conditions under which vast quantities of hydrogen can be produced by electrolysis, and compare this method to others by determining the development of specific uses and by studying the decisive role of electrical energy.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

5.0157, PRODUCING HYDROGEN THROUGH ELECTROLYSIS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Analysis a battery of cells that produce hydrogen by electrolysis under pressure, using a potassium solution at a temperature under 200 degrees C; determine the conditions under which it can function in order to improve its yield and reliability.

Instrumentation and testing of an SRTI electrolyser (at BUC): Build and use test banks at Saint-Denis that include: (1) cells that simulate gas escape; (2) cells to test the rapid aging of diaphragm materials; (3) cells to test the characterization of surface states of electrons which are effected by operating conditions; (4) a loop for testing the behavior of components; (5) a loop to test a prototype electrolyser; (6) a cell for the hydraulic study and definiton of mathematical flow models. We will develop instrumentation suited for these tests.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

5.0158, ELECTROCHEMICAL METHODS AND METROLOGY
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Define and develop measurement methods that can be used for electrochemical applications of electricity. This involves measuring the electric characteristics of electrolysers, characterizing surface states of electrodes, the internal instrumentation of electrochemical cells, measuring the thermal characteristics of the electrochemical process, applying thermographic methods and controlling the process of metal deposition by using electrolytic techniques.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

5.0159, FLOW IN STEAM TURBINES
UNKNOWN, Electricite de France, *Paris*, *France* 76008

We will do a support study on the design and operation of future turbines. We will develop a mathematical code for computing three dimensional flow in turbines and for transonic blade grids. We will study the problem of wet steam flow along the top edges of BP blades particularly in cases of abnormal oprations, i.e., partial loads and variable vacuum operation. The experimental part of this project will use a turbine for wet steam tests; we will also cover turbines now in operation.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

5.0160, VIBRATORY BEHAVIOR OF TURBOMACHINE BLADING
UNKNOWN, Electricite de France, *Paris*, *France* 76008

To reduce shut-down due to blading ruptures, we need proven computation methods to determine the vibratory behavior of the blades and bladed parts of the steam turbine. EDF can use such methods to take measures against possible defects in materials design, especially in high power turbine BP wheels.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

5.0161, ROTARY EQUIPMENT - VIBRATIONS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Determine the vibratory effects that result from rotation. (1) Determine how effects on rotors are transmitted by bearings: (2) Reduce vibrations by balancing equipment on site.

To attain these objectives, we must use experimental methods that will yield a vibrations card index, and constantly test GTA and other reactor materials.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

5.0162, INSTALLING HOT WATER HEATING AND TECHNOLOGY OF 'MOTORIZED VALVE' TYPE CONTROL INSTRUMENTS
UNKNOWN, Ministry of Equipment, Building Ind. Sci. & Tech. Ctr, *Paris*, *France*

Long-term goal: The final goal of this project is to establish a norm eventually matching a mark of conformity. This norm will: Define the minimal list of technical information which should be available to the user and installer for choosing a control ensemble for heating plants; Make the expression of this technical information uniform; Determine the testing method enabling us to acquire this technical information; Determine the dimensional, physical-chemical, mechanical, hydraulic, and electronic characteristics that these control ensembles have to possess; Determine the testing techniques enabling us to control these characteristics.

Proposed method: The proposed method is the 'classic' method of deriving a norm. Contacts made during the preceding exercise have made it possible to complete a list of the technical characteristics of a control chain. A draft of the norm has been completed based on this list which will be discussed and completed point by point with representatives of the profession. Similarly the necessary information for creating and perfecting tests in beds have been gathered; they will enable us to analyze current fabrications.

Medium-term goals: Practically speaking, no medium-term goal is possible. The study will lead to a norm eventually matching a mark of conformity, which, given the present regulations, seems to be needed to avoid the proliferation of questionable equip-

ment. However, there are certain number of more or less fictitious intermediate steps, especially: Elaborating a list of criteria; creating test methods corresponding to each criterion; constructing the test bed; testing existing equipment; synthesizing results; perfecting a prototype eventually; determining specifications.

SUPPORTED BY France - Ministry of Equipment & Housing - Paris

5.0163, BASIC RESEARCH IN PHOTOCHEMISTRY RELATED TO THE PROBLEM OF ENERGY
UNKNOWN, Natl. Scientific Res. Center, *Paris*, *France* 75700

Energy of excited states. Energy development and transfer between excited states and molecules. Photochemical production of energy-rich molecules. Photochemical and photogalvanic processes. Photochemical properties of coordination compounds (photocatalysis). Chemical storage of solar energy.

ADDENDA: Supporting agency and performing organization: Centre National de la Recherche Scientific.

SUPPORTED BY France - National Science Research Center - Paris

5.0164, ELECTROCHEMICAL COMPOUNDS
UNKNOWN, Natl. Scientific Res. Center, *Paris*, *France* 75700

Our objective is to improve the energy conditions under which aqueous solution preparations are prepared by electrolysis. One of industry's main problems is to obtain efficient gas diaphragms that are durable and have low electric resistance levels.

Application to hydrogen and chlorine preparation.

ADDENDA: Supporting agency and performing organization: Centre National de la Recherche Scientific.

SUPPORTED BY France - National Science Research Center - Paris

5.0165, ELECTROCHEMICAL GENERATORS
UNKNOWN, Natl. Scientific Res. Center, *Paris*, *France* 75700

Research in this field concerns two important industrial problems: storing large quantities of electrical energy and finding energy sources for vehicles that need high mass energy at low cost.

We will examine the following: Separators for alkaline medium generators; morphologic changes in deposits during successive cycles, particularly with lead, cadmium, and zinc, using alloying if needed; the possibility of using manganese for developing a reversible electrode; enzymatic electrocatalysis.

ADDENDA: Supporting agency and performing organization: Centre National de la Recherche Scientific.

SUPPORTED BY France - National Science Research Center - Paris

5.0166, SYNTHESIS AND CHARACTERIZATION OF MATERIALS FOR ELECTROCHEMISTRY
UNKNOWN, Natl. Scientific Res. Center, *Paris*, *France* 75700

New electrolytes for high density batteries (for example, sodium or lithium batteries). Mixed conductor materials that can act as electrolyte and electrode. New materials for electrodes.

ADDENDA: Supporting agency and performing organization: Centre National de la Recherche Scientific.

SUPPORTED BY France - National Science Research Center - Paris

5.0167, ELECTROCATALYSIS
UNKNOWN, Natl. Scientific Res. Center, *Paris*, *France* 75700

Modification of surfaces without the effect of adsorption. Oxidoreduction of hydrogen and oxygen (application to secondary batteries, the electrolysis of water, fuel batteries.

ADDENDA: Supporting agency and performing organization: Centre National de la Recherche Scientific.

SUPPORTED BY France - National Science Research Center - Paris

5.0168, SYNTHESIS AND CHARACTERIZATION OF NEW MATERIALS OF INTEREST IN THE ENERGY FIELD
UNKNOWN, Natl. Scientific Res. Center, *Paris*, *France* 75700

Characterization and properties of the above materials (except for electrolytic properties already planned). Hydride: hydrogen storage. Solid electrolytes

ADDENDA: Supporting agency and performing organization: Centre National de la Recherche Scientific.

SUPPORTED BY France - National Science Research Center - Paris

5.0169, FUEL CELLS
Y. BREELLE, Petroleum Institute, *Rueil Malmaison*, *France* 92502

Fuel cells, as power generators for automotive use, offer a lot of peculiar features: good efficiency, range fitted to practical purposes, low noise and pollutant emissions. Since 1959 I.F.P. is involved in important basic and development works on the solution selected at first: low temperature (65 degrees C) air-Hydrogen with akaline electrolyte. On connected projects I.F.P. is also working on electricity generators and on Hydrogen generators fed with liquid fuels, methanol and hydrocarbons. Basic research underway now includes backing development program to study other electrolytic media (neutral or acidic) and the implementation of largely available low cost catalysts.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

5.0170, POSSIBILITIES OF USING SYNTHETIC OILS IN FORMULATING ENGINE LUBRICANTS
J. DENIS, Petroleum Institute, *Rueil Malmaison*, *France* 92502

CURRENT TRENDS IN ENGINE LUBRICATION ARE: prolonging engine life by reducing mechanical accidents and wear, reducing fuel consumption by using less viscous oils, spacing oil changes and hence improving thermal stability and oxidation resistance.

Some of these aspirations appear incompatible with conventional formulations based on petroleum oils. In particular, fluid mineral oils are volatile, cause excessive swelling of elastomers and lead to too much wear.

Bearing this outlook in mind, the aim of the project is to evaluate the possibilities of new base oils such as hydrocracking oils, synthetic hydrocarbons, esters and polyalkyleneglycol derivatives.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

5.0171, STUDY OF THE COMBUSTION CHARACTERISTICS AND MECHANISM OF H2/O2/N2/H2O SYSTEMS
G.G. DESOETE, Petroleum Institute, *Rueil Malmaison*, *France* 92502

SUMMARY OF PROJECT: The scope of the study is to provide information about the explosion characteristics (Explosion limits, delays) and the flammability characteristics (burning velocities, flammability limits as a function of pressure and temperature) of hydrogen/oxygen mixtures diluted by either pure water vapor or by vapor/nitrogen mixtures, which may be used in the future as input in combustion applications. At the same time the study aims at the explanation of the measured burning parameters on a kinetical base.

Some practical detonation characteristics of these mixtures (limits of detonability, distances of predetonations at different initial pressures and temperatures) are also determined: they are of great importance for security in the use of hydrogen as a fuel in industrial applications.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

5.0172, 4 CFR OCTANE NUMBERS FOR PREDICTING THE ANTI-KNOCK BEHAVIOUR OF FUELS AND ENGINES

A. DOUAUD, Petroleum Institute, *Rueil Malmaison, France* 92502

The thermodynamic analysis of pressure diagrams obtained during combustion with knock in S.I. engines sustains the elaboration of a knock model based on the autoignition delay zeta equals A p-n exp B over T, where A, n, B are characteristic parameters of the air-fuel mixture and determined by a non linear regression on Pressure, Temperature and gas Histories Data (PTHD). Previous studies have shown that this model can explain anti-knock behaviour of fuels for various running conditions and different engines.

The objective of the current research is to use the PTHD given by the universal ASTM-CFR engine at 4 different operating conditions to define with statistical error estimate the A, n, B delay parameters of fuel. The operating conditions selected are those of the Research and the Motor methods plus the cross-combination of their rotation speeds and intake mixture temperatures. These 4 tests yield 4 octane numbers.

A graphical method has been developed to obtain in a pressure-temperature time graph the A, n, B parameters of a fuel from the plot of its 4 octane numbers.

Furthermore, any engine can be represented if its knock tendency has been experimentally measured with 2 different fuels (for example PRF and Sensitive fuel). Thus, from its 4 octane numbers the behavior of any fuel can be predicted.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

5.0173, LOW AIR EXCESS COMBUSTION

F. MAUSS, Petroleum Institute, *Rueil Malmaison, France* 92502

SUMMARY OF PROJECT: Combustion in the presence of very small air excess enables sulfuric and vanadic corrosion to be reduced. From June 1969 to June 1975, I.F.P. and E.D.F. combined efforts to do research on burners designed for such combustion and having the following obligatory features: simple construction, fast and easy adjustment, increased fuel flowrate. The burner chosen has a double parallel flow, with the central flow passing through a baffle with vanes. Investigations of the following parameters were made: the air mass in the central stream, the angle of deflection and profile of the vane fins, the ratio of the speeds of the two airflows, the presence of a nozzle, interferences between parallel or opposing flames, and interference between the flame and the wall (cf. article by Droin and Perthuis in Revue Generale de Thermique, August-September 1974, and papers submitted to FRIF committees). Research is now continuing with the collaboration of oil companies to determine regulations promoting the non-polluting combustion of asphaltene-rich fuel oil.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

5.0174, CONCLUDING THE NUCLEAR THERMIONIC PROGRAM

SEEN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Departement de Transfert et Conversion d'Energie.

SUPPORTED BY France - Atomic Energy Commission - Paris

5.0175, SECOND GENERATION THERMOELECTRONICS APPLIED TO THE LEAD CYCLE

SEEN, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Departement de Transfert et Conversion d'Energie.

SUPPORTED BY France - Atomic Energy Commission - Paris

5.0176, THERMODYNAMIC STUDY OF SILICON DEPOSITS ON A CONDUCTOR SUPPORT

BOUGNOT, Univ. of Montpellier, *34060 Montpellier, France*

Choosing the solvent and the support.

Solvent: Low temperature fusion, good solubility of silicon within the range of temperatures used (500-200 degrees C), nonformation of eltectics or definite compound with silicon, low solubility in silicon in the solid state at high purity (possible materials: Bi, Sn, or Pb).

Support: Solid residue at temperatures used, conductor, practically insoluble in the solvent in the liquid state, little reaction with air obtained from the surface (we will try aluminum to begin with).

Perfecting deposit techniques if the tests are conclusive (epitaxial phase in liquid phase); studying the morphology of the layer and impurities present in accordance with production temperature.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

5.0177, ENERGY CONVERSION - LIQUID METAL MAGNETOHYDRODYNAMICS (MHD) POWER GENERATION FOR NAVAL APPLICATIONS

H. BRANOVER, Ben Gurion Univ. of The Negev, *Beersheba, Israel* (N00014-76-C-0886)

The objective of this research is to experimentally examine the behavior of turbulence in liquid metal magnetohydrodynamic (MHD) generators in strong magnetic fields in order to determine the capability of liquid metal magnetohydrodynamic power generation to meet the Navy's future power needs.

A test facility consisting of a mercury circulating loop with an azimuthal magnetic field in the test section will be constructed. The main measuring apparatus will be a hot wire (film) anemometer and thermocouple system for heat transfer measurements. The test section will be specifically designed to investigate the nature of the transition from laminar to turbulent flow in MHD generators.

ADDENDA: Supporting agency address is: Office of Naval Research Arlington, VA 22217

SUPPORTED BY U.S. Dept. of Defense, Navy

5.0178, GENERATION OF ELECTRICITY BY REVERSE ELECTRODIALYSIS

C. FORGAES, Research & Development Author., *Beersheva, Israel*

Reverse electrodialysis (RED) is being investigated as method for producing energy from the concentrated salt solution of the Dead Sea. Concentrated brines are mixed with dilute solutions to generate electricity.

New membranes are being prepared whose parameters meet the requirements of RED.

A small laboratory unit is being developed to demonstrate the capability of RED using extremely thin solution compartments and the new types of membranes.

SUPPORTED BY Israel - National Council for Research & Develop - Jerusalem

5.0179, ON-LINE DIGITAL CONTROL OF A THERMAL POWER STATION
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

This research aims at improving the operating conditions and the reliability of a thermal power plant. To this aim, the classical analogical controls of the steam-generator/turbine system are replaced by digital controls. The digital control has a very important advantage, i.e., the possibility to make a diagnosis of the operation of the plant in order to avoid the effects of important faults.

Part one of four.

Addenda: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0180, MATHEMATICAL MODELS OF THERMAL POWER STATIONS
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

The scope of the present research is to study the system steam-generator/turbine, in order to define the system of non-linear, partial derivatives, differential equations which characterize the plant under consideration. In order to integrate this system, it was necessary to introduce many simplifications based on the experience in modelling and on the necessity of obtaining a system of low order equations for the synthesis of the regulators.

Part two of four.

Addenda: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0181, STEAM-GENERATOR/TURBINE REGULATION
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

This research deals with the problems of synthesis of the different regulators in order to improve the static and dynamic characteristics of the plant. Starting from the classical synthesis techniques, the study continued utilizing the techniques of non-interacting controls, those of adaptive control, and those of multivariable control. Extremely useful in this research is the simulation of the power plant and of the control system on a hybrid computer.

Part three of four.

Addenda: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0182, DIRECT DIGITAL CONTROL OF UNIT A OF THE FUSINA POWER PLANT
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

The testing of the Direct Digital Control System for the Unit 'A' of the Fusina Thermal Power Plant is nearly completed; the control system will then be handed over to the staff of the power plant for the technical-economic evaluation. The tests were completed, both in the laboratory and in the plant, for the automatic adaptation of the parameters of the regulators to the changing load conditions of the plant; by this way it becomes possible to minimize a certain functional aspect of the errors on the controlled variables.

At present all digital controls are in operation in the conditions 'steam-generator follows' and 'coordinated', and the following evaluations are being made: optimum control algorithms (Kalmann theory); partial non-interaction algorithms.

Part four of four.

Addenda: Supporting agency & Performing organization: ENEL - Ente Nazioale per l'Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0183, ON-LINE DIGITAL CONTROL OF ENEL'S GENERATION AND TRANSMISSION SYSTEM
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

The main objective of this project is the improvement of the security of the generation and transmission system. There are also two other objectives: improvement of the operation economy, both as an indirect effect of a more rational utilization of the generation and transmission equipment for a better security, and as a consequence of the utilization of procedures for the economic optimization of the generation; qualitative and quantitative technological improvement of the equipment used in the operation of ENEL's system, in order to ensure an advanced level of performance of the control system.

The project consists in the design and construction of the new control system, and in a certain number of supporting research projects, which are described in the following NRP's.

Part 1 of 7.

Addenda: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0184, DYNAMIC BEHAVIOUR OF ELECTRIC SYSTEMS
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

This research includes the following studies: study on synchronous generator stability under small and large disturbances, with particular regard for the effects of voltage and speed regulators; a first step is being carried out with reference to the behaviour of longitudinal structure networks and the application of the optimal control theory; study of simplified dynamic equivalent models of the electric system; identification of system parameters be means of statistic methods; identification of the power-frequency transfer function, definition of the characteristic parameters of a generator under normal operation, analysis of the statistical characteristics of signals related to the equipment installed at the national dispatching centre; problems of system identification; evaluation of various algorithms for disturbance detection; digital simulation of electric and electromechanical system transients; identification of a synchronous experimental generator model.

Part 2 of 7.

Addenda: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0185, ON-LINE ANALYSIS OF DYNAMIC SECURITY
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

The purpose of this project is to formulate simulation programs, based on topological methods or on global methods (Liapunov) in order to simplify the determination of dynamic security indices, which indicate quantitatively the power system stability degree. Another item concerns the stabilizing measures (besides the automatic ones) to be taken by the dispatching centre to avoid possible instability situations. The last aspect is the theoretical and experimental study on choosing the most suitable means, either local or centralized, to detect quickly the initial oscillations and to be able so as to operate properly as actual instability situation happen on the power system.

Part 3 of 7.

Addenda: Supporting agency & Performing organization: ENEL p Ente Nazionale per l'Energia Elettrica, Direzione Studie Richerch.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0186, OPTIMAL GENERATION DISPATCHING
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

The aim of this research is to develop algorithms and digital programs for the economic dispatching of the generation, under security conditions, of ENEL's power system which is supplied by power plants of different types.

Methods and digital programs are being developed to achieve: economic dispatching of the actual, daily, weekly and seasonal generation, with security constraints; sub-optimization of the hydraulic resources of a valley, in order to coordinate the generation diagrams of cascade-plants and to obtain the best utilization of the available water; economic dispatcing of secondary regulating power by means of thermoelectric power plants.

Part 4 of 7.

Addenda: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0187, ALGORITHMS FOR THE ON-LINE CONTROL
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

This research is intended to develop the following items: off-line simulation of system transients; on-line dynamic security analysis with particular regard to the dynamic effects of operator's interventions or any possible disturbances, and development of digital programs for the computers of the National Dispatching Centre; determination of dynamic security indices useful for immediate interpretation by the operator, and related development of programs for the on-line control; determination of models to detect on-line dynamic perturbations with subsequent development of programs suitable for the control computer; identification of the dynamic characteristics of the system; voltage and reactive power regulation; analysis of possible corrective measures to restore dynamic security; restoration of operation after a long black-out in order to minimize the time required to restore operation; optimal dispatching of reactive power.

Part 5 of 7.

Addenda: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0188, DATA TRANSMISSION
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

The present project is meant to cope with several problems related to data transmission systems. The following aspects are examined closely: comparison among the several modulation systems used in data transmission; identification of the characteristics of ENEL's data transmission system; testing of the available equipment and of their performancs when used on ENEL's system; performances of automatic equilizers; problems of interconnection among computers by means of data transmission lines.

Part 6 of 7.

Addenda: Supporting agency & Performing organization: ENEL - Entr Nazionale per l'Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0189, HARDWARE AND SOFTWARE FOR THE CONTROL SYSTEM
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

This project comprises the following phases: to determine the specifications of the hardware which constitute the control system (computers, displays, etc.) and of the basic software, to carry out tests and make the appropriate choices; to set the specifications and to conform to the possible modifications and adjustments to basic software required by the manufacturers; to provide for installation and testing of the components and of the system as a whole; to provide for preparation and up-to-dateness of ENEL's personnel employed to be in charge of the system; to follow the implementation of the various system's functions as they become available; to train operators for the control system.

Part 7 of 7.

Addenda: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0190, MODEL OF THE DELTA OF THE PO RIVER
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

The construction and operation of big thermal power plants in a fluvial-maritime environment requires the solution of many hydro-geo-morphological problems bound to the intake and discharge from lagoons, estuaries or terminal parts of rivers with tidal influence, of large water quantities for condenser cooling.

The present general research program, started in 1972 and expected to terminate in 1978, is aimed at acquiring the technical-scientific knowledge necessary for the design, construction and operation of physical or mathematical models, and at evaluating and interpreting the experimental data.

In particular, this research will allow the acquisition of fundamental data for models of river hydraulics (discharge of maximum floods, subdivision of flows, propagation of tidal waves in the river, salt wedge), of maritime hydraulics (coast transportation, stability of natural and artificial estuaries, etc.) which are necessary for the design of a thermoelectric power plant.

The research program will study in detail the delta of the Po river, where the Porto Tolle thermal power plant will be built, and will utilize a physical fixed-bed model with density currents reproducing the area of the delta between the Po di Pila and the Po di Tolle and the corresponding area of the sea, as well as a mathematical model of the entire hydrographic network of the delta.

The research project is divided into seven sub-projects, which are described in the following NRP's.

Part 1 of 8.

ADDENDA: SUPPORTING AGENCY & PERFORMING ORGANIZATION: ENEL - Ente Nazionale per l' Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0191, STUDY OF THE HYDRO-GEOMORPHOLOGY OF THE DELTA OF THE PO RIVER
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

This research project comprises the following phases: research, evaluation and critical examination of bibliographical data; establishment of a measurement program in situ in order to complete the information; measurements in situ of oceanographic data (sea currents, tides, wave motion, temperatures, salinity and density of the water, transport of material in suspension, identification of the materials forming the sea-bed); measurements in situ of hydrologic data (flow velocity in control sections, fresh-water flows in the various branches of the hydrographic network, propagation of tides in the branches of the delta, hydrometric

levels, penetration of sea water, temperature, salinity and density of the water, transport of materials in suspension); topographic survey (topographic survey of the considered hydrographic network, aerophotogrammetric survey of the coast line, bathymetric survey of the lagoons, of the branches of the delta, of the corresponding sea zone); geological survey (stratigraphy of the delta, analysis of the materials forming the river-bed, the lagoons, etc.).

Part 2 of 8.

ADDENDA: SUPPORTING AGENCY & PERFORMING ORGANIZATION: ENEL - Ente Nazionale per l' Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0192, DESIGN OF THE PHYSICAL MODEL OF THE DELTA OF THE PO RIVER

UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

Design of the physical model (horizontal scale 1:333.3, vertical scale 1:33.3) of the sea, for a width of 9-10 km, between the Po di Tramontana and the Po di Tolle, and of the hydrographic network of the delta up to the branching of the Po di Tolle and Po di Pila from the Po di Venezia. The model will initially be a fixed-bed one and then a partially movable-bed one, and will reproduce, with their densities and salinities, the river flows, the sea flow, and the flow of the discharged hot water; tides, waves and sea-currents will be simulated.

The design of the model comprises: the design of civil works and of the air-conditioning system; the design of the feeding systems for fresh water, salt water and hot water, and of the physical structure of the model; the design or purchase of control equipment (tide generator, wave generator, sea-current generator); design or purchase of instrumentation for the measurement of salinity, temperature, current velocity, hydrometric heights, water flows; design or purchase of a suitable data logger.

Part 3 of 8.

ADDENDA: SUPPORTING AGENCY & PERFORMING ORGANIZATION: ENEL - Ente Nazionale per l' Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0193, CONSTRUCTION AND CALIBRATION OF THE PHYSICAL MODEL OF THE DELTA OF THE PO RIVER

UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

This project comprises the construction of the model and the calibration of the model and of the instrumentation, and the verification of the degree of precision by comparison between the results obtained from the model and the natural conditions.

Part 4 of 8.

ADDENDA: SUPPORTING AGENCY & PERFORMING ORGANIZATION: ENEL - Ente Nazionale per l' Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0194, BI-DIMENSIONAL MATHEMATICAL MODEL OF THE HYDROGRAPHIC NETWORK OF THE DELTA OF THE PO RIVER

UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

This mathematical model will take into account the geometry of the main branch of the Po river from Pontelagoscuro to the Punta Maistra lighthouse, and of the Tolle, Tramontana and Scirocco branches; the subdivision of flow among the Goro, Donzella and Maistra branches will be set on the basis of existing bibliographic data. Having established the flow at Pontelagoscuro and the components of the tidal wave at the mouth of the different branches, the model will allow the simulation of the hydrometric levels along the main branch of the Po river and the flows in the different branches of the delta.

The main objective of this project is to allow an extension of the data drawn from the physical model, which cannot be extended, for space reasons, up to the section where tidal effects become negligible.

Part 5 of 8.

ADDENDA: SUPPORTING AGENCY & PERFORMING ORGANIZATION: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0195, TESTS ON THE FIXED-BED MODEL OF THE DELTA OF THE PO RIVER

UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

This project comprises the following phases: simulation of the flows in flood conditions and forecasts of possible variations due to modifications of the river bed or to diversions; simulation of the fresh water flows and forecasts of possible variations as above; simulation of the propagation of tidal waves in the river and forecasts of possible variations as above; simulation of the penetration of sea water in the hydrographic network of the delta and forecasts of possible variations as above; forecast of the diffusion of important thermal discharges flowing into the hydrographic network at certain points.

The aim of this project is to evaluate the possible modifications of the hydraulic conditions of the hydrographic network of the delta caused by artificial interventions.

Part 6 of 8.

ADDENDA: SUPPORTING AGENCY & PERFORMING ORGANIZATION: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0196, TESTS ON THE PHYSICAL MODEL OF THE DELTA OF THE PO RIVER, PARTIALLY MODIFIED INTO A MOVABLE-BED MODEL

UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

The aim of the present project is to evaluate the suitability of the modified model (partially with movable-bed) for the study of hydromorphologic dynamics of the delta (simulation, in short periods, of the present situation of estuaries and coasts) and for forecasting the future configuration which will be influenced not only by natural factors but also by human factors.

This project comprises the following phases: modification of the model in order to change the terminal part of the Po di Pila branch, the area of the river mouth of the delta branches, and the area of the lagoon mouth into a movable-bed model; commissioning of the wave-generators; simulation of the growing and erosion of estuarine bars; simulation of the coast transport due to waves; simulation of the dynamics of the lagoon mouth; and forecasts of the modifications due to human interventions.

Part 7 of 8.

ADDENDA: SUPPORTING AGENCY & PERFORMING ORGANIZATION: ENEL - Ente Nazionale per l' Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0197, INTERPRETATION OF TEST RESULTS AND CONTROL OF FORECASTS CONCERNING THE DELTA OF THE PO RIVER

UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

All the results obtained from the physical and mathematical models of the delta of the Po river will be verified by comparison with the results given by classical theoretical studies (solid transport in turbulent or stratified currents, transport of tidal currents through lagoon mouth, taking into account the flocculation of soils in salt water, coastal movement taking into account wave energy and diffraction, diffusion of hot plumes computed by digital simulation).

Part 8 of 8.
ADDENDA: SUPPORTING AGENCY & PERFORMING ORGANIZATION: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0198, STUDY OF WAVE MOTION
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

The knowledge of the characteristic parameters of wave motion in the sea zones where future thermal and nuclear power plants will be built is important for a better design of the intake and discharge structures of the cooling water and for forecasting the diffusion of the discharge water in the sea. To this aim a big experimental program was started in order to record the characteristic data of wave motion along the Italian coast, in the areas where thermal or nuclear power plants may be possibly sited. The data are collected by wavemeters and are processed and analyzed in order to provide the design engineers the necessary information for the best location of the cooling water intake and discharge structures.

Addenda: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0199, RIVER MODELS FOR COOLING WATER INTAKE AND DISCHARGE STRUCTURES
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

Aim of this research, carried out on physical models, is to study for each important conventional or nuclear power plant utilizing water from a natural river for cooling purposes, the possible interactions between artificial structures and river bed, as well as the risk of recirculation of water between the discharge and the intake.

The following models have been built: movable-bed model of the Po river for the 'La Casella' thermal power plant; fixed-bed global model of the Po river for the thermal and nuclear power plant at Caorso; movable-bed model of the Po river for the thermal and nuclear power plant at Caorso.

ADDENDA: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studie Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

5.0200, FLYWHEELS FOR ENERGY STORAGE
UNKNOWN, Physics Dynamic Research, *Amsterdam, Netherlands*

The above mentioned project-team will study the feasibility of the application of flywheels for energy storage in stationary as well as in non-stationary installations.

At this moment the study is limited to the gathering of information, which is necessary for working out a proposal for further development.

Possible applications will be examined -- for instance, energy storage for rail and road transport, for power stations and for windpower installations.

SUPPORTED BY Netherlands - United Machine Factories - Amsterdam

5.0201, MAGNETOHYDRODYNAMIC POWER GENERATORS, PRELIMINARY STUDY
UNKNOWN, Physics Dynamic Research, *Amsterdam, Netherlands*

An initial conceptual design and feasibility study for a 20 - 50 MW closed cycle magneto-hydrodynamic power generator is carried out by Physics Dynamic Research.

Addenda: Supporting agency: Verenigde Machine Fabrieken (VMF).

SUPPORTED BY Netherlands - United Machine Factories - Amsterdam

5.0202, SUPERCONDUCTIVE MAGNETS
UNKNOWN, Physics Dynamic Research, *Amsterdam, Netherlands*

Initial design and feasibility study for a superconductive magnet for a contemplated 1 MW el 10 - 60 sec. MHD-generator experiment and larger magnets for future 25 MW el MHD-generators.

SUPPORTED BY Netherlands - United Machine Factories - Amsterdam

5.0203, DIESEL ENGINE TM 620 - AN UNCOMMONLY LARGE MEDIUM SPEED DIESEL ENGINE FOR POWER GENERATION
UNKNOWN, Stork Werkspoor Diesel, *Amsterdam, Netherlands*

A new engine, designation TM 620, of considerably larger capacity is under development. The unit power per cylinder is 1700 bhp, finally 2000 bhp/cyl. at 428 rpm.

The TM 410 engine has been succesfully applied for the generation of electricity. We expect that the TM 620 will meet the increasing requirements in this field.

In 1978 18 cylinder units will be available at 22.5 MW at generator terminals. (25 MW in 1980). The engine uses residual fuel oil and can easily be modified to use natural gas.

Economy comparison with steam plants shows advantage over 22,5 MW steam units at all load-schemes; at some load-schemes even over 45 MW steam-turbine units. This means, that this engine shifts the economical limit of diesel power stations to certainly 100 MW, probably 200 MW, and could fit into decentralized power systems.

An environmental advantage is a reduction of thermal pollution, because only about 27% of the total fuel heat will be found in the cooling water. If wanted, thermal water pollution can be completely avoided by the use of air-cooling, as is already applied in desert climates.

A further rise in total efficiency is possible by the use of waste heat in a steam-boiler and steam turbine. An efficiency of 43% for pure electricity production is obtainable with safe conventional equipment. A feasibility study is on hand. Of course a much higher efficiency is possible for the combined production of electricity and heat. (Total energy systems).

SUPPORTED BY Netherlands - Stork Werkspoor Diesel - Amsterdam

5.0204, DIPOLE OSCILLATOR
J. KISTEMAKER, Fund. Res. on Matter Found., Inst. for Atomic & Mol. Phys., *Amsterdam Wgm, Netherlands*

Historical: Professor J. Kistemaker worked incidentally on the Leyden/Frost phenomenon for 30 years. During this process heat is converted to kinetic and potential energy (dancing droplet of liquid on a heated surface). The subject was incidentally investigated also this year.

Current situation: Short of funds and scientists.

Interests: a) Energy conversion from heat to electricity at high temperature, with the possibility of improvement of the efficiency of power stations. b) Application in an engine and for generating mechanical vibrations. c) Electrical energy source for low power equipment, capable of working without supervision for a long time (measuring probes at sea in remote areas). d) Energy generation (combustion of inferior fuels). e) Useful for the sodium-technology: control of High Temperature Reactors (Kalkar-breeders).

SUPPORTED BY Netherlands - Fundamental Research on Matter Found - Utrecht

5.0205, INVESTIGATION OF THE PHENOMENA INDUCED BY COLLISIONS OF KEV IONS WITH SOLID SURFACES
J. KISTEMAKER, Fund. Res. on Matter Found., Inst. for Atomic & Mol. Phys., *Amsterdam Wgm, Netherlands*

Historical: Since 1955 researchers of the FOM Institute are working on subjects like: Cathode-atomization and on damage caused by fast-moving particles (electrons, neutrons, ions, etc.) and by electromagnetic radiation (photons).

Current situation: A topic is the investigation of the influence of non-common atoms, inserted in the upper layers of a single crystal or in the crystal lattice, by means of ion beams. Researchers of the FOM-Institute work on this subject using keV implanted ions (systematic scanning of the periodic system of the elements).

Interests for the production of: a) Transistors, micro-circuits; b) Cathode surfaces with low emitting potentials for electrons, whether or not photo-sensitive (solar cells); c) Chemical corrosion resistant surfaces; and d) Abrasion resistant surfaces.

SUPPORTED BY Netherlands - Fundamental Research on Matter Found - Utrecht

5.0206, DYNAMIC BEHAVIOUR OF HEAT EXCHANGERS

J. CLAUS, Central Org. Adv. Appl. Res., Central Technical Inst., *Apeldoorn, Netherlands*

The project consists of two main subjects. The defrosting of air coolers. The different defrosting techniques will be compared. Special attention will be paid to the defrosting with hot compressed gas. The behaviour of heat exchangers, heat accumulators etc. in nonstationary conditions.

Addenda: Supporting agency: Nijverheidsorganisatie TNO. Performing organization: Centraal Technisch Instituut TNO.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

5.0207, FLOW DYNAMICAL AND VIBRATIONAL INVESTIGATIONS CONCERNING STEAM BOILERS WITH COUNTER WOUND BUNDLES OF PIPES

C.B. COLENBRANDER, Central Org. Adv. Appl. Res., Central Technical Inst., *Apeldoorn, Netherlands*

Within the frame work of a study on a liquid sodium heated steam generator (having counter winded spiralized pipe bundles), the following models are being tested in water: a) Fluctuating pressures and forces on rigid pipes (at the beginning of the bundle and at some distances from the beginning); b) Fluctuating pressures and forces on 'non-rigid' pipes; c) Turbulent mixing within a pipe bundle and so near the wall of the steam generator.

The experiments are carried out with several types of screens (placed near the inlet of the heat exchanger) and under different conditions regarding the Re-number.

Addenda: Supporting agency: Nijverkeisorgahisatie TNO: Performing organization: Centraal Technisch Instituut TNO.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

5.0208, RESEARCH ON CREEP IN WELDED CONNECTIONS IN 'CREEP RESISTANT' STEELS AS CONSTRUCTION MATERIALS FOR ENERGY GENERATING APPARATUS

W. DORTLAND, Central Org. Adv. Appl. Res., Metal Research Institute, *Apeldoorn, Netherlands*

Although this project is not primarily focussed on the field of energy generating, the results may be of importance for a more economic utilization of construction materials. A deeper insight may be developed into the problem of safety margins of constructions, e.g., for energy generating apparatus.

Basis is a better understanding of the creep phenomena as well as welding connections as a whole for the several composing parts of the weld.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

5.0209, INVESTIGATION CONCERNING THE POSSIBILITIES OF PREVENTING OSCILLATIONS OF CHIMNEYS, BUNDLES OF PIPES, PILES OF DRILLING PLATFORMS ETC.

N. FEIS, Central Org. Adv. Appl. Res., Central Technical Inst., *Apeldoorn, Netherlands*

Within the framework of investigations concerning the possibilities of preventing oscillations of chimneys etc. (caused by Von Karman's eddies in the passing fluid flows), experiments are performed with cylindrical models, in water or wind tunnels. It is examined, if by the fitting of vortex generators, the coordinated shedding of eddies over long pipe lengths can be prevented.

Addenda: Supporting agency: Nijverheidsorganisatie TNO. Performing organization: Centraal Technisch Instituut TNO.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

5.0210, RECIRCULATION OF WARM AIR BY COOLING TOWERS

N. FEIS, Central Org. Adv. Appl. Res., Central Technical Inst., *Apeldoorn, Netherlands*

Within the frame work of investigations on the influence of wind on the efficiency of dry cooling towers the following subjects are being studied: a) What medium and maximum temperatures are to be expected on the lee-side at the air inlet of the cooling tower (ground level), caused by recirculation of warm air from the top of the tower? b) What flow patterns and types of cooling of the exhaust air in the tower may be caused by turbulence impact at the top? c) What flow patterns may exist at ground level near the air inlets?

It will be investigated if any unfavourable wind effects can be eliminated by modifying the shape of the cooling tower.

Addenda: Supporting agency: Nijverheidsorganisatie TNO. Performing organization: Centraal Technisch Instituut TNO.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

5.0211, INVESTIGATION OF THE REMAINING PART OF THE LIFE TIME OF METALS (AND ALLOYS) USED FOR HIGH TEMPERATURE APPLICATIONS

W. HOSSLAGE, Central Org. Adv. Appl. Res., Metal Research Institute, *Apeldoorn, Netherlands*

Although this project is not especially focussed on the field of energy generating, the results may be of importance for the construction of energy generating apparatus. The investigation focusses on a possible correlation between the consumed part of the lifetime and the changes in fatigue behaviour of the metals (number of cycles till rupture in high strain fatigue) and with changes of density of the metal. The correlations to be proved may result in better methods of forecasting the remaining life fraction.

Addenda: Performing organization: Metaal Instituut TNO.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

5.0212, INVESTIGATION CONCERNING THE BEHAVIOR OF METALS AT HIGH TEMPERATURE APPLICATION (IN THE FIELD OF IMPROVED EFFICIENCY OF ENERGY GENERATING)

W. HUSSLAGE, Central Org. Adv. Appl. Res., Metal Research Institute, *Apeldoorn, Netherlands*

Information about the behaviour of new high temperature resistant materials is of importance for the improvement of the thermal efficiency by means of increasing the operation temperature. This is based on a fundamental understanding of the processes influencing the mechanical properties of metals and alloys at high temperatures as a function of time.

The mechanical research focusses on properties, such as tensile strength, ductility and the change of these caused by creep and/or fatique under uni- and multi-axial stress conditions.

In relation herewith metals are investigated as to their structures and the changes that may have taken place.

The Metal Research Institute TNO should like to cooperate with other institutions, working in same and related fields. Such cooperation is considered to be necessary.

5. CONVERSION TECHNOLOGY

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

5.0213, HYDROGEN AS A FUEL FOR HEATING APPARATUS

G. SNELLINK, Central Org. Adv. Appl. Res., Central Technical Inst., *Apeldoorn, Netherlands*

The project aim is to construct an operational hydrogen burner and safety device for a domestic central heating boiler or air heater.

Addenda: Supporting agency: Nijverheidsorganisatie TNO. Performing organization: Centraal Technisch Instituut TNO.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

5.0214, THE HEAT PUMP AS A HEAT RECOVERY AND HEATING SYSTEM

H. VANDERREE, Central Org. Adv. Appl. Res., Central Technical Inst., *Apeldoorn, Netherlands*

The development of energy saving systems for heating and heat recovery by means of heat pump systems.

The project is started with a state of the outstudy and a technical and economical evaluation. Heat pump systems considered are: air-air systems; water-air systems; water-water systems; solar energy-heat pump systems. The next step will be to build an experimental system in which the behaviour of a solar-energy heat pump and a heat pump with the evaporator in the ground can be studied in practice.

A particular subject to be investigated will be the dynamic behaviour of the system.

Addenda: Supporting agency: Nijverheidsorganisatie TNO. Performing organization: Centraal Technisch Instituut TNO.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

5.0215, IMPROVING THE EFFICIENCY OF THE COMBINED STEAM/POWER GENERATING SYSTEMS

G.K. DORLING, A K Z O, *Arnhem, Netherlands*

AKZO, as an important consumer of energy, has acquired detailed information about combined steam/power generating systems.

The project is to be regarded as a continuous study to improve the energy conversion efficiency within an industrial economic framework.

SUPPORTED BY Netherlands - A K Z O N.V. - Arnhem

5.0216, CORROSION OF BOILERS

W.M. HUIJBREGTS, N.V. K E M A, *Arnhem, Netherlands*

Investigation of corrosion of boilers with large-scale facility. Main variables: thermohydraulic conditions; water conditioning; condensor leakages resulting in introduction of salts, especially from sea water; solid impurities; quality of steel; quality of weldings.

The work is supported by laboratory investigations, mainly with autoclaves.

SUPPORTED BY Netherlands - N.V. Kema - Arnhem

5.0217, PROBLEMS OF CONDENSORS

UNKNOWN, N.V. K E M A, *Arnhem, Netherlands*

An experimental condensor system has been installed in which a number of materials will be studied under realistic conditions, including the use of sea water.

Supporting activities are the use of 'May-jet tests' and the fundamental study of the formation of protective layers on the metals used.

Stress analysis of details of condensor construction.

SUPPORTED BY Netherlands - N.V. Kema - Arnhem

5.0218, PROBLEMS OF MECHANICS AND THERMOHYDRAULICS

UNKNOWN, N.V. K E M A, *Arnhem, Netherlands*

The project is concerned with: a. Stress-analysis, strength of constructions. Non-stationary conditions and non-uniform distributions of temperature will be taken into account in the development of computer programmes. b. Vibrations. Development of computer programmes aiming at the calculation of resonance of frequencies and induced vibrations, especially in turbine parts. c. Measurement of resonance frequencies of turbine blades. d. Thermohydraulic calculations for conventional boilers, including development of computer programmes and methods of measurement.

SUPPORTED BY Netherlands - N.V. Kema - Arnhem

5.0219, TOTAL ENERGY/HEAT PUMP SYSTEMS

P.J. COLLET, Central Org. Adv. Appl. Res., Inst. for Mechanical Constr., *Delft, Netherlands*

Evaluation of energy systems based on the combination of total energy (TE) installations and heat pumps for space-heating applications. The combined system improves the applicability of each of the energy saving component systems. The heat pump creates an electricity demand which improves the energy utilization efficiency of the TE-installation. The TE-installation produces cheap electricity which improves the heat pump economics. A preliminary study is aimed at evaluating the applicability of various system configurations with special reference to the comparison between centralized and decentralized TE-installations.

Continuation of the project features the development of a system optimalization procedure and the initiation of experimental work as indicated by the results of the previous evaluation.

Present work is carried out in cooperation with CTI-TNO. Future cooperation is envisaged with national gas and electricity companies, technical universities and mechanical industry.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

5.0220, INORGANIC PROTECTIVE COATINGS FOR TURBINE BLADES

H. VANAMERONGEN, Central Org. Adv. Appl. Res., Central Technical Inst., *Delft, Netherlands*

Objective: Best possible suppression of 'hot corrosion' of the blades--made from the superalloy IN-738--of stationary gas turbines, without impairment of their mechanical strength.

Motivation of research: The research constitutes the completion of earlier work (COST Project of EEC) fitting into research on wider applications of similar inorganic layers. It complies with NO-TNO's EEC commitments, and is in line with government policies. The research is coordinated by the Project Group for Turbomachines TNO.

Programme: a) Preparation of a number of titanium/silicon coatings (on the superalloy IN-738). The samples are to be tested in cooperation with the Metal Research Institute TNO, Apeldoorn, The Netherlands. b) Study of the mechanisms (accompanying the hot corrosion and the repression thereof) by means of chemical and mineralogical analysis of the substrate and of Ti/Si coatings of suitable types.

SUPPORTED BY Netherlands - Ministry of Economic Affairs - The Hague

5.0221, LIQUIFIED PETROLEUM GAS FUELLED STANDARD CITY BUS

J. VANDERWEIDE, Central Org. Adv. Appl. Res., Res. Inst. for Road Vehicles, *Delft, Netherlands*

The scope of this research project is to redesign a standard DAF diesel city bus into a standard, liquified petroleum gas fuelled city bus, in order to have the possibility of using an alternative fuel.

For this project, the diesel engine has to be changed into a spark ignition engine. The diesel injection equipment of the engine has been removed, the compression ratio has been lowered, and a special LPG carburation device and ignition system have to be developed and mounted in the engine. Also, the governing system has to be changed.

The diesel fuel tank of the city bus has to be replaced by especially developed LPG tanks mounted under the vehicles.

The engine will be developed for optimal results, without changing the operation characteristics of the original engine, so the power rating of the gas engine will be the same as for the diesel engine.

There will hardly be a change in the specific fuel consumption. On the other hand, the smoke reduction is 100%, and the emission characteristics for carbon monoxide, hydrocarbons, and nitrogen oxides will show a significant reduction, measured according to the EPA 13-mode cycle.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

5.0222, FUEL CONSUMPTION AND EXHAUST EMISSION OF SMALL TWO-STROKE ENGINES

J.A. VANLING, Central Org. Adv. Appl. Res., Res. Inst. for Road Vehicles, *Delft, Netherlands*

The research project refers to small two-stroke engines with crankcase scavenging. Investigation of the exhaust emission learned that both the mixture preparation and the scavenging process leave much to be desired. The mixture strength of the mixture supplied to the engine is far removed from the value at which the exhaust gas emission and specific fuel consumption are minimum, especially so under part-load condition. At the same time the engine construction is such that 25 to 40 percent of the ingoing mixture escapes to the exhaust pipe without participating in the combustion process. Although usually the contrary is claimed, we have shown that small two-stroke engines will accept a stoichiometric mixture as good as bigger ones. Further investigation concerns optimalization of the carburation by which it is possible to reduce the CO emission, which is coming from the burned mixture to less than 1 percent by volume and the C6H14 (f.i.d.) emission, primarily resulting from the scavenging losses to less than 0.7 percent by volume, at the same time the specific fuel consumption decreases strongly, especially at part-load.

Further research will be directed to reduce the scavenging losses.

Addenda: Supporting agency: Nijverheidsorganisatie TNO.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

5.0223, IMPROVEMENT OF THE EFFICIENCY OF GAS TURBINES AND DIESEL ENGINES

P. VANSTAVEREN, Central Org. Adv. Appl. Res., *Delft, Netherlands*

The project concerns two subjects in the field of improving the efficiency of the conversion of fossile fuel energy into mechanical or electrical energy: 1. Gas turbines: 1.1. Application of heat-exchanger and steam cycle; 1.2. Combination with MHD-system; 1.3. Raising the inlet temperature of the turbine, applying new construction materials. The studies concern technological and economical aspects. 2. Diesel engine: This investigation regards the application of new construction materials and the modification of the thermodynamical cycle. The project is developed in cooperation with Dutch industries and institutions.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

5.0224, ENERGY STORAGE BY MEANS OF LIQUID AIR

P. VANSTAVEREN, Central Org. Adv. Appl. Res., *Delft, Netherlands*

Feasibility studies regarding the possibilities of energy storage utilizing liquid air: a) Industrial processes for liquefying air; b) Handling and transport methods for liquid air.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

5.0225, BASIC RESEARCH ON THE APPLICATION OF HYDRAULIC SMALL SCALE MODELS IN STUDIES ON COOLING WATER CIRCUITS

G. ABRAHAM, Delft Hydraulics Laboratory, *Delft, Netherlands*

Near field reproduction in the model: For the reproduction of the mixing capacity of outlet structures, the model has to be geometrically similar to the prototype. Models representing the far field region, however, have to be distorted (scale of vertical dimensions larger than scale of horizontal dimensions) in order to achieve a proper reproduction of the phenomena of interest. The study deals with the effect of model distortion on the mixing capacity of the outlet structures and aims at establishing techniques to reproduce the mixing in a distorted model.

Far field reproduction in the model: A major problem in a hydraulic model is the reproduction of heat exchange to the atmosphere. Requirements are being established with respect to the control of atmospheric conditions in the model in order to improve the reproduction of a wide variety of natural climatological conditions.

SUPPORTED BY Netherlands - Delft Hydraulics Laboratory - Delft

5.0226, APPLIED RESEARCH ON EXTERNAL COOLING WATER CIRCUITS

G. ABRAHAM, Delft Hydraulics Laboratory, *Delft, Netherlands*

The studies generally deal with: Recirculation of cooling water in relation to temperature increase at the water-intake structure. Distribution of discharged cooling water in the ambient receiving water, in order to satisfy environmental criteria.

The problem areas comprise: rivers, tidal seas and estuaries, lakes and stagnant seas. The hydraulic conditions in the problem area are to a large extent determinative for the methods applied in the investigation. In general these methods are: for near field studies: 1. hydraulic small scale model (vicinity of intake); 2. mathematical model (for strongly schematized situations and outlet structures): for far field studies: 1. mathematical model; 2. hydraulic small scale model (dependent on conditions at the site under consideration). Field surveys are made to collect the basic data.

To achieve optimal solutions in this respect, detailed studies are often performed on: initial mixing at the outlet structure; selective withdrawal at the intake structure.

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

5.0227, TECHNOLOGICAL AND ECONOMICAL OPTIMALIZATION OF ELECTRIC POWER STATIONS AND HEAT/POWER GENERATING PLANTS

J.A. MIEDEMA, Delft Univ. of Technology, Lab. for Thermal Power Engin., *Delft, Netherlands*

The objectives are: a) Thermodynamical and economical optimalization of energy conversion systems in electric power stations and heat/power generating plants. b) Studying interdisciplinary problems regarding the design and management and control of these types of power stations. c) Performing desk studies on thermodynamics regarding heat and power generation. (Research on new methods to produce heat and electric power.) d) Follow up studies concerning category c).

Co-operation: a) Exchange with KEMA (Dutch Electricity Generating Board) of computer programs for the design of power stations. b) The Delft Hydraulics Laboratory coaches students concerning the research on water-hammer subjects.

Modern power stations are complicated systems. The adjustment and harmonization of the many sub-processes (by means of calculation and process analysis) is necessary to realize an optimal operation of the power generating units.

Addenda: Supporting agency and performing organization: Technische Hogeschool Delft.

SUPPORTED BY Netherlands - Delft University of Technology

5.0228, CONTROLLABLE, SUBMINIATURIZED FOUR QUADRANT ALTERNATING CURRENT TO DIRECT CURRENT CONVERTER UP TO THE MEGAWATT RANGE

F.C. SCHWARZ, Delft Univ. of Technology, Lab. for Power Electronics, *Delft, Netherlands*

Objective: To develop the technology for reliable, highly efficient and low cost, controllable, four quadrant multiphase a.c. to d.c. converter in the megawatt range which cause a minimal network pollution.

5. CONVERSION TECHNOLOGY

Approach: Direct conversion of low frequency (50 Hz) power to approximately 10 kHz internal oscillations without interposition of a d.c. link and vice versa. Otherwise, analogous with technology of project No. 1.

Applications: Linkage of primary or secondary sources of d.c. energy, such as solar cell batteries, fuel cells, batteries, or high or low voltage d.c. transmission lines to single or multiphase a.c. power system, or where applicable, the inverse. Furthermore, same as project 1, when requiring controlled a.c. to d.c. conversion.

Advantages over state-of-the-art: Same as project 1 with emphasis on comparable high efficiency of conversion approximately 96 percent; low cost; electric invulnerability for the converter and its interaction with source and load due to inherent voltage and current limiting property; virtual absence of a.c. network pollution due to 200:1 ratio in the fist harmonic component of distortion.

Present state: Studies to utilize the basic high frequency conversion techniques resulting from project 1 and adapt these for direct a.c./a.c./d.c. conversion are in progress.

SUPPORTED BY Netherlands - Ministry of Education and Science - The Hague

5.0229, CONTROLLABLE, SUBMINIATURIZED FOUR QUADRANT DIRECT CURRENT TO DIRECT CURRENT CONVERTERS UP TO THE MEGAWATT RANGE

F.C. SCHWARZ, Delft Univ. of Technology, Lab. for Power Electronics, *Delft, Netherlands*

Objective: To develop the technology for highly reliable, efficient, and low cost, controllable, four quadrant d.c. to d.c. converters with size of single modules in the submegawatt range for construction of converters in the megawatt range which cause a minimal network pollution.

Approach: Use of high internal freqencies (10 kHz) within resonant circuits (a) reduces the physical size of otherwise heavy electric components including transformers and filters and (b) limits the electric stresses on semiconductor components to unconditionally predictible limits even under conditions of short circuited output terminals. This approach constitutes a reduction of space power technology to the industrial sphere.

Applications: Four quadrant d.c. motor control for hoists, elevators, control systems, electric trains and road vehicles; also as voltage stabilizing d.c. transformer for d.c. distribution systems.

Advantages over state-of-the-art: High speed of response, invulnerability to violent transients and short circuits, virtual absence of network pollution, and low cost due to light weight (1:10) and high efficiency.

Present state: A 10 kW one quadrant scalable model was constructed and tested. Operation from a 520 V.D.C. source (rectified 3 phase 220/380 VAC line) with output of 0-220 VDC with independent control of current and voltage respectively was attained at 96 percent d.c./d.c. conversion efficiency at full power, and a measured minimum power factor p.f greater than 0.94 in the feeding a.c. system for all conditions of operation, component weight is approximately 30 kg. Development of four quadrant operation is in progress.

SUPPORTED BY Netherlands - Ministry of Education and Science - The Hague

5.0230, COMPACT SUBMINIATURIZATION OF FOUR QUADRANT STATIC POWER CONVERTERS

F.C. SCHWARZ, Delft Univ. of Technology, Lab. for Power Electronics, *Delft, Netherlands*

Objective: To (a) increase the reaction speed capability of the converters cited in projects 1, 2, and 3; (b) lower their cost substantially by reduction of the size of components (10:1), both without impairment of the efficiency of operation.

Approach: Increase the internal operating efficiency of the converters by an order of magnitude of 100 kHz and if possible beyond by use of power transistors in series resonant circuits with natural switch current termination.

Application: (a) Same as projects 1 through 3, enhanced by lower cost and lower weight in vehicular applications; (b) power amplifiers.

Advantages over state-of-the-art: Further amplification of advantages cited in projects 1 through 3 by one order of magnitude.

Present state: Feasibility has been experimentally verified on a very small scale level (100 watts). Usefulness for converters to power instrumentation, computers, etc. appears proven. Attack on multikilowatt power level is subject to test and availability of components.

SUPPORTED BY Netherlands - Ministry of Education and Science - The Hague

5.0231, CONTROLLABLE SUBMINIATURIZED FOUR QUADRANT D.C. AND A.C. TO A.C. CONVERTER UP TO THE MEGAWATT RANGE

F.C. SCHWARZ, Delft Univ. of Technology, Lab. for Power Electronics, *Delft, Netherlands*

Objective: To develop the technology for reliable, efficient and low cost, controllable, four quadrant solid state systems which converts d.c. or multiphase, fixed or variable voltage or frequency a.c. power of one kind to the same type a.c. power of another kind. These megawatt range converters cause only a minimal network pollution.

Approach: The power contained in the internal high frequency oscillations described in projects 1 and 2 is decomposed in the three or more components of multiphase a.c. power with variable voltage and frequency respectively. The almost ripple free transfer of energy throughout the system is, therefore, maintained for all conditions of operation; it is the fundamental cause of minimal network pollution.

Applications: A.C. motor drives with independent control of current (torque) and frequency (rotary speed) powered from fixed or variable d.c. or a.c. sources of energy; such as general a.c. motor drives for industry, vehicular drives including the asynchronous or synchronous linear motors, storage in variable speed flywheels, linkage of windmill drives generators to the utility grid, and similar applications.

Advantages of the state-of-the-art: Current technology relies on (a) programmed forward drive for inversion and lacks, therefore, the flexibility for almost instantanous (sub-millisec.) reconciliation of converter and utility grid requirements; (b) a.c. to controlled d.c. to a.c. conversion involving triple power processing with the disadvantages of complexity and thus lowered reliability and efficiency; (c) low frequency pulse modulation techniques (1 kHz maximum vs. 10 kHz) entailing heavy circuit components; and (d) considerable network pollution translated into transmission losses due to the conventional process of phase angle modulation (200:1 ratio of the fundamental frequency of distortion).

Present state: Single phase d.c. to a.c. inversion at 4-6 kHz and 12 kVA at 97 percent efficiency experimentally verified. Concepts for application of technology described in projects 1 and 2 are formulated.

SUPPORTED BY Netherlands - Ministry of Education and Science - The Hague

5.0232, COMPUTER PROGRAM SYSTEMS FOR THE SOLUTION OF STRESS ANALYSIS AND VIBRATION PROBLEMS IN PROCESS EQUIPMENT

H.A. SPAAS, Delft Univ. of Technology, Lab. for Thermal Power Engin., *Delft, Netherlands*

By participating in the Association PROGEL and in other activities, and by own developments, the Research Team has the disposal of the necessary computer programs, which are based on the finite element method. This method is increasingly applied in practical structural problems and there is a need for trained engineers in this field.

An important part of the investigations is carried out within PROGEL-working groups consisting of representatives of the cooperating institutes. For the near future the most important subjects are: a) Implementation of special options and of new elements in the ASKA program system e.g. elements for the calculation of nonstationary temperature distributions in solid bodies. b) Testing of the recently acquired MARC program system particularly suited for non-linear problems). c) Development of pre- and postprocesses for problems to be handled with the ASKA and

MARC systems. d) Practical application of program systems in the fields of linear-elastic and elasto-plastic fracture mechanics.

Addenda: Supporting agency and Performing organization: Technische Hogeschool Delft.

SUPPORTED BY Netherlands - Delft University of Technology

5.0233, ATOMIZING TYPE STEAM COOLERS FOR POWER STATIONS

C.A. VANPAASSEN, Delft Univ. of Technology, Lab. for Thermal Power Engin., *Delft, Netherlands*

Objective: The framing of regulations regarding the design of compact, economic, reliable and in particular well controllable atomizing type steam coolers. Theoretical as well as experimental investigations will be carried out to acquire basic information for this project. The modern power stations are nearly all equipped with several coolant atomizing steam coolers. Practical experience shows that the reliability has to be improved.

Extensive research on atomizing processes and atomizers is also of substantial importance for the reliability. The application of improved coolers will result in considerable savings of capital outlay (about Dfl. 500,000 for a 400 MW unit).

The investigation will lead to a better understanding of combined atomizing and evaporating processes by means of the application of recently developed apparatus (droplet detection thermocouples).

Experimental: a) In a low-pressure unit experiments are being performed to study primary and secondary atomizing processes, stratified flow patterns and scale effects. b) In a 8' high-pressure unit experiments are being carried out to study the atomizing cooling process at high steam pressures and low flow rates, but also at higher rates combined with lower pressures, utilizing a recently constructed steam plant. c) With a 2' high-pressure unit experiments are being performed to study scale effects, and primary and secondary atomizing processes.

Measurements are carried out with atomizers, and calculations are made regarding the heat transfer and flow processes in coolant atomizing steam coolers.

Addenda: Supporting agency and Performing organization: Technische Hogeschool Delft.

SUPPORTED BY Netherlands - Delft University of Technology

5.0234, DEVELOPMENT OF A NEW DIESEL ENGINE FOR AUTOMOTIVE PURPOSES

UNKNOWN, D A F Truck B.V., *Eindhoven, Netherlands*

Consequent on the anti-pollution and low-noise demands for vehicle engines there is a trend towards higher fuel consumption. In addition there are increasing fuel costs.

This project comprises the development of a new diesel engine that meets the requirements on emission and noise demands with an optimum low fuel consumption.

SUPPORTED BY Netherlands - D A F Truck B.V. - Eindhoven

5.0235, URBAN BUS, EQUIPPED WITH STIRLING ENGINE

UNKNOWN, D A F Truck B.V., *Eindhoven, Netherlands*

A study will be made of the possibilities of using a Stirling engine as a power unit in urban buses, in relation to a diesel powered bus.

First there will be taken into account all the technical aspects: emission control, noise radiation, specific fuel consumption, design and construction, etc.

This will take one year of study: estimated costs about Dfl. 900,000. Depending on the results of this study it will be decided if there is occasion to manufacture several prototypes of an urban Stirling bus, to estimate production and maintenance costs, durability, etc. This will take another 5 years.

SUPPORTED BY Netherlands - Ministry of Pub. Hlth. & Envir. - Leidshendam

5.0236, FORMATION OF GAS BUBBLES DURING THE ELECTROLYSIS OF WATER TO PRODUCE HYDROGEN AND OXYGEN

E. BARENDRECHT, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

Addenda: Supporting agency and Performing organization: Technische Hogeschool Eindhoven.

SUPPORTED BY Netherlands - Eindhoven University of Technology

5.0237, THE HYDROGEN/OXYGEN FUEL CELL

E. BARENDRECHT, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

Subprojects: a) Electrocatalytic and mass transport phenomena in the hydrogen/oxygen fuel cell. b) Use of special metal alloys for the hydrogen/oxygen fuel cell.

Addenda: Supporting agency and Performing organization: Technische Hogeschool Eindhoven.

SUPPORTED BY Netherlands - Eindhoven University of Technology

5.0238, SHOCKTUBE MHD-GENERATOR EG 3

J.H. BLOM, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

The project concerns the development of a model MHD-generator. The objective of this research is to prove the capability of the magnetohydrodynamic energy conversion for short test runs and to elucidate the measured data by means of calculations.

For this project MHD-channels up to 10 l. volume have been tested. Power densities of 80 MWe/m3, electric powers up to 750 kWe and enthalpy-extractions up to 15% were obtained.

The objective of this stage of the project is to reach the levels of 1000 kWe and 20% enthalpy-extraction.

Addenda: Performing organization: Technische Hogeschool Eindhoven.

SUPPORTED BY Netherlands - Ministry of Education and Science - The Hague

5.0239, MHD-GENERATOR, DESIGN STAGE EG 7

J.H. BLOM, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

The results of experiments with the shocktube MHD-generator (EG 3) and the interest of Dutch industrial organizations have been stimulating for the design of an MHD-apparatus, able to generate 1 MWe power during one minute. The project EG 7 comprises the detailed design of the generator, all the essential parts of a continuously operating generator included. It is expected that this design-stage will result in a proposal to construct a 1 MWe MHD-generator.

SUPPORTED BY Netherlands - Ministry of Education and Science - The Hague

5.0240, HYBRID VEHICLE PROPULSION

W.A. KOUMANS, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

Research on and design of a vehicle propulsion, in which a small internal combustion engine is rather uniformly loaded, while the power fluctuations at the demand side are buffered by applying an energy storage system coupled with the propulsion mechanism. Due to the uniform loading at the most favourable conditions the I.C. engine has good overall efficiency and exhaust gas emissions as well as sound level can be kept low. During slowing down the greater part of the kinetic energy can be accumulated in the buffer system. A flywheel is being studied as a buffer.

5. CONVERSION TECHNOLOGY

SUPPORTED BY Netherlands - Eindhoven University of Technology

5.0241, BATTERIES
V.D. GIESSEN, Philips Research Laboratories, *Eindhoven, Netherlands*
Electrochemical energy sources.

SUPPORTED BY Netherlands - Philips Research Laboratories

5.0242, LIFE (DURABILITY)
MUIJDERMAN, Philips Research Laboratories, *Eindhoven, Netherlands*
Mechanical aspects of reliability.

SUPPORTED BY Netherlands - Philips Research Laboratories

5.0243, HYDROGEN ECONOMY
PRAST, Philips Research Laboratories, *Eindhoven, Netherlands*
Cryogenic engineering aspects of hydrogen economy.

SUPPORTED BY Netherlands - Philips Research Laboratories

5.0244, STIRLING MOTOR
VANBEUKERING, Philips Research Laboratories, *Eindhoven, Netherlands*
Prime movers of high efficiency and flexibility and related subjects such as heat pipes, heat exchangers and burners.

SUPPORTED BY Netherlands - Philips Research Laboratories

5.0245, GAS TURBINES
UNKNOWN, Dutch State Mines, Netherlands Res. & Pat. Dept., *Geleen, Netherlands*
Studies on the implication of the use of gas turbines (combined cycles) in power generation. Flexibility as to energy raw materials (coal I).

SUPPORTED BY Netherlands - Dutch State Mines - Heerlen

5.0246, NEW GENERATION OF HEATING EQUIPMENT 'HEAT PIPE'
J.P. VANDENBERG, Netherlands Gas Union N.V., *Groningen, Netherlands*
The objectives are: a) Studying the very favourable heat exchange in the evaporating and condensing zones in this new type of stove. b) Investigating the advantages of the design: good control; homogeneous dispersion of heat; possibilities of discharging combustion products; preventing the formation of boiler-scale.

SUPPORTED BY Netherlands - Netherlands Gas Union N.V. - Groningen

5.0247, THE PREDICTION OF FURNACE PERFORMANCE BY MATHEMATICAL MODELS TO INCREASE FURNACE EFFICIENCY
S. MICHELFELDER, Internat. Flame Res. Found., *Ijmuiden, Netherlands*
By the support of experimental work--two major furnace trials M1 plus M2--the available mathematical modelling techniques known as: well stirred-plug flow concept; Zone method after Hottel/Cohen/Sarofim; simultaneous numerical solution of the differential equations for flow, chemical kinetics and heat transfer (after Spalding) have been tested and further developed. The work up to now was confined to two dimensional situations and has indicated that: crude models can give acceptable heat flux and temperature predictions when applied with experience to a specific furnace; the Zone method can produce acceptable heat flux and temperature predictions in most furnaces providing physical modelling techniques can be developed to provide information on flow, chemical heat release pattern and emission characteristics; the Spalding model with the inclusion of specially developed individual models for the kinetics, mixing and radiation exchange is potentially the most suitable model due to the simultaneous prediction of flow, heat release and resulting heat flux distribution.

Future work will concentrate on the prediction of 3D furnace situations. To enable the testing and development of the prediction procedures a special trial was carried out (M-3 Trial) from December 1974 until February 1975.

The objectives of the M-3 trials will be to: a. Produce information on the effect on heat transfer to a furnace hearth of: thermal input; fuel and flame type; air preheat and oxygen addition; furnace and hearth temperature; b. Generalisation of this information in combination with an extension of simple modeling techniques to aid in the conversion of furnaces to other fuels, or to assess the economic advantages of increased preheat or oxygen addition; and c. Development of 'Flux' modelling techniques (6) to predict the spatial distribution of heat flux in any 3D system. This work is of a longer term nature and has its eventual extension to transient state and on line process control, via computer techniques.

The experimental work will be carried out in the No. 1 furnace of the Research Station.

A specially designed water cooled hearth, covered with a refractory layer will be constructed in the furnace. The design will enable the spatial distribution of heat flux to be measured. The surface temperature of the refractory will be varied. (Text Abridged.)

SUPPORTED BY Netherlands - International Flame Research Found. - Ijmuiden

5.0248, EFFECT OF MULTIPLE BURNERS ON HEAT TRANSFER, FLAME STABILITY, POLLUTANTS, AND NOISE (ABBREV)
B.R. PAI, Internat. Flame Res. Found., *Ijmuiden, Netherlands*
The main objectives of this project are to investigate the characteristics of a three-burner system (each burner 1 MW thermal input) using natural gas and fuel oil (medium) and to compare the three-burner system with a single burner which is a square-root-of-3 scale version of the smaller burners, operated at 3 MW thermal input. The influence of burner spacing, burner configuration (in line or triangular array), flame type and fuel type on: heat flux distribution; nitric oxide emission; combustion generated noise; particulates emission; SO3-emission.

By using the same burners and configuration in two furnaces of different dimensions (2 x 2 m cross section, and 0.90 m phi), the influence of furnace shape and confinement on the combustion pattern, the heat flux, and emission characteristics will be investigated.

SUPPORTED BY Netherlands - International Flame Research Found. - Ijmuiden

5.0249, IMPROVEMENT OF ENERGY GENERATION PLANTS BY USING TOTAL ENERGY SYSTEMS
P. CROOCKEWIT, Rijn Schelde Verolme N.V., *Rotterdam, Netherlands*
Objectives: a) combined cycle installation engineering; b) total energy systems; c) offgas energy recovery systems.

SUPPORTED BY Netherlands - Rijn Schelde Verolme N.V. - Rotterdam

5.0250, DEVELOPMENT OF MANUFACTURING TECHNIQUES FOR FILAMENTS OF SUPERCONDUCTING MATERIAL
J.D. ELEN, Reactor Center, *The Hague, Netherlands*
Though the materials of A 15 structure show advantage in the way of critical current and critical temperature when used as superconductor they are difficult to fabricate into wires and filaments because of their brittle composition. RCN is developing special manufacturing techniques for these types of superconductors notably Nb3Sn, V3Ga and Nb3Ga. These techniques are being developed further on pilot plant scale. The superconducting qualities of the samples that are prepared are being measured at the Kamerling Onnes Institute of the University of Leiden.

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

5.0251, FLYWHEELS AS ENERGY STORAGE METHOD
UNKNOWN, Reactor Center, *The Hague, Netherlands*

Evaluation of the use of flywheels as energy storage method for electricity power plants, automobiles and wind energy power plants.

The evaluation will be carried out by several industries, RCN and TNO.

After the preliminary study has shown that flywheels can be economically used in one or more of the above mentioned applications, research will be continued.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

5.0252, ELECTROCHEMICAL PROPERTIES OF SOLIDS AND LIQUIDS RELATING TO STORAGE & CONVERSION OF CHEMICAL ENERGY INTO ELECTRICAL ENERGY
W. VANGOOL, State University at Utrecht, *Utrecht, Netherlands*

Study of predominantly electrolytical and electrochemical processes occurring in solid/solid and solid/liquid systems and in gas electrodes, in relation to production, storage and conservation of electrical and chemical energy with respect to fuel cells, secondary solid state cells and electrolytical apparatus (H2-O2 cells).

The research within the frame work of this investigation has a fundamental character. Technological aspects are not considered. The study focusses on a better understanding of the phenomena in this field and broadening of the subject area.

Pure solid state research is carried out as a backing of this and other projects (catalysis), studied by the Group Solid State Chemistry.

Activities: 1) Electrochemical separation of nitrogen from air, Dr. J.M. de Jong (Thesis). 2) Ion conduction in solids, based on Na2W(Mo) O4, Dr. P.H. Bottelberghs (Thesis). 3) Semiconductors as oxygen electrodes (based on LaCoO3), Dr. F. van Buren. 4) Electrical conduction in mixed ion/ electron solids, Dr. B. Scholtens. 5) Semiconductor properties of In2O3 and V2O5, as catalysts for the oxidation of carbon monoxide to carbon dioxide, Dr. J.H. de Wit (Thesis). 6) Study of ion conductors based on structural properties and solid phase transitions, Dr. R. Harwig.

In planning: a) Electro-catalytical properties of noble/semi-noble metals alloys. b) Extension of the research in the field of ion conduction (interaction with electronic-electrocatalytical semiconductors). c) Extension of the research on solid state conduction phenomena.

Addenda: Supporting agency and Performing organization: Rijksuniversiteit Utrecht.

SUPPORTED BY Netherlands - State University at Utrecht

5.0253, SYNTHESIS OF SUPERCONDUCTIVE CHAIN COMPOUNDS FOR PURPOSES SUCH AS ELECTRICAL CONDUCTIONS AND ENERGY STORAGE
W. VANGOOL, State University at Utrecht, *Utrecht, Netherlands*

Synthesis of metal organic and coordination compounds, in which the metal ions are part of a linear molecular structure. Such compounds might exhibit the phenomenon of superconductivity at transition temperatures considerably higher than for metals and alloys. Should the mentioned transition temperature be higher than the boiling point of nitrogen, then applications such as superconductive (subsoil) electric cables might be possible.

Addenda: Supporting agency and performing organization: Rijksuniversiteit Utrecht.

SUPPORTED BY Netherlands - State University at Utrecht

5.0254, AEROBIC NITROGEN REDUCTION & AEROBIC & ANAEROBIC AMMONIA FORMATION IN AZOTOBACTER VINELANDII & OTHER MICROORGANISMS (ABBREV)
C. VEEGER, Wageningen Ctr. of Agric. Sci., *Wageningen, Netherlands*

The nitrogen molecule fixation process in anaerobic bacteria is known. But as regards the aerobic species, such as the Azotobacter vinelandii, the electron transport mechanism and the relation with the respiration have still to be elucidated. The aerobic molecular nitrogen fixation, as effected by Azotobacter and several Rhizobium-types, is of enormous importance for the biological nitrogen cycle. Perhaps an alternative route to the synthesis of fertilizers and fuels may be found.

There is an exchange of information between the Free University, Prof. dr. A.H. Southammer (Laboratory for Microbiology), Amsterdam, The Netherlands, and the Research Team on Microbiology of the University of Wageningen, The Netherlands.

SUPPORTED BY Netherlands - Agricultural University at Wageningen

5.0255, SPECIAL FOREIGN CURRENCY AWARD - HEAT TRANSFER AND STABILITY OF WATER FILM EXPOSED TO HIGH VELOCITY WET STEAM FLOW
J. KRZYZANOWSKI, Fluid Flow Machinery Institute, *80 952 Gdansk, Poland*

This proposal is concerned with the problem of flow of liquid on surfaces of stator blades in large steam turbines. Among specific objectives are the determination of the mechanism of film break-up into rivulets and dry-spot formation, as well as investigation of the stability of the film under realistic conditions involving surface irregularities, effects of wetting properties and near- and transonic flow of steam outside the film. Also the heat transfer from the film and rivulets under these conditions is to be investigated. The ultimate objective is to achieve predictable means of film removal by heating, thus reducing large drop formations which lead to severe erosion problems in turbines in excess of 600 MW. The problem is of considerable practical interest to both the USA and Poland since turbine sizes continue to grow and 2000 MW sizes are beginning to be discussed. Film flow, stability and break-up is of great interest in many other areas such as nuclear reactors, film evaporators, film-cooled gas turbine blades, etc.

The proposed work is an outgrowth of experimental work by Professor Moszynski and Professor Krzyzanowski which demonstrated the feasibility of film flow machines in Gdansk where also most of the analytical work on heat transfer would be performed. The remaining analytical work would be done at the University of Delaware.

SUPPORTED BY U.S. Natl. Science Foundation, Div. of International Programs

5.0256, CONTROL SYSTEM FOR CONVERTING DIESEL ENGINES FOR OPERATION WITH SOLID FUELS
J. ABOM, Unknown Inst. or Indiv. Grant, *Sweden*

By pulverizing solid fuels down to 0.1 mm particles, it is possible to obtain a fast enough combustion process to operate diesel engines. As energy density is fairly high, 0.3 - 0.5 kW h/kg, the use of solid fuels instead of oil may well prove profitable. The difficulty lies in adding the right quantity of fuel to the process fast enough. Through application of a vacuum acceleration system, a good control of the diesel engine is likely to be feasible.

By test running a diesel engine, with and without a precombustion chamber, the proper particle size will be determined for peat, wood, paper, bark, straw, brown coal and pit coal. Grinding and sifting equipment will be bought for this purpose. The experiments will be carried out at Chalmers University of Technology. A fuel mechanism has been constructed and control of powder injections with 0.00125 sec. injection time has been achieved by variable vacuum.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0257, SEALING ELEMENTS FOR DIESEL ENGINES OPERATING ON PULVERIZED SOLID FUEL
J. ABOM, Unknown Inst. or Indiv. Grant, *Sweden*

By hot-air drying of renewable fuels like wood, peat, straw, and reed, through the application of sun collectors, it is possible to pulverize solid fuels into powder at about Skr 0.20/kg. Diesel

engines can be driven by such powder, provided that sufficiently durable sealing elements can be produced and a durable oil film separates the sealing elements from the mobile combustion chamber disc.

There is need for very good sealing, as the channel, in which there is a pressure of 20 MPa, has to be sealed so well that no air will penetrate into an adjacent channel and blow away the fuel powder. A special device for testing sealing elements as well as suitable lubricants will be developed.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0258, AIR/AIR HEAT EXCHANGER WITH ROTARY DISCS
K. BERGDAHL, Unknown Inst. or Indiv. Grant, *Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0259, BURNER FOR LIQUID FUEL WITH PREHEATING
H. LUNDBERG, Unknown Inst. or Indiv. Grant, *Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0260, DEVICE FOR GENERATING SHOCK WAVES AND TURBULENCE IN THE GAS MIXTURE IN THE COMBUSTION CHAMBER OF AN INTERNAL COMBUSTION ENGINE
A. NIELSEN, Unknown Inst. or Indiv. Grant, *Sweden*

The aim of the project is to obtain a rapid and homogeneous mixture of the gas particles in an engine's combustion chamber, in order to achieve a more advantageous combustion process, the result being reduced fuel consumption as well as a reduced content of poisonous exhaust fumes.

Through the application of an auxiliary piston, the diameter of which is small compared to that of the main piston, a very high pressure is generated in a small antechamber connected with the cylinder top, during the final stage of the compression stroke. The gas mixture in the antechamber is then very much compressed and, via a narrow slot, forced out, at great speed, into the compressed gas mixture in the main cylinder, hereby giving rise to shock-like turbulence.

The value of this method has been verified in a number of test engines and is now ready for application and demonstration in a more advanced prototype, involved in a more extensive project.

This is a comparatively simple device, which at a later stage and reasonable costs is expected to be fitted to new or existing engines, in order to achieve better fuel economy as well as less poisonous exhaust fumes.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0261, ANTECHAMBER CONTAINING AN ULTRASONIC DEVICE FOR USE IN INTERNAL COMBUSTION ENGINES
A. NILSSON, Unknown Inst. or Indiv. Grant, *Sweden*

The object of the project is to produce, in a simple way, cleaner exhaust fumes, simultaneously reducing fuel losses, which means good energy economy. This can be achieved by use of ultrasonics.

The aim is to develop a prototype cylinder head which fits a Volvo B20 engine, where the cylinder head has been furnished with an antechamber replacing the combustion chamber. The antechamber contains an ultrasonic generator in which intensive vibrations are produced, intimately disintegrating the hydrocarbon-air molecules, the result of which is clean combustion.

Practically this may mean that the exhaust fumes of existing cars can be purified from poisonous ingredients simply by changing cylinder heads.

The manufacture of engine cylinder heads is done by casting but the shaping of these heads must be done by welding.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0262, MANUFACTURE AND TESTING OF REGENERATIVE HEAT EXCHANGER
K.R. OSTBO, Unknown Inst. or Indiv. Grant, *Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0263, IMPROVEMENT OF THE OPERATING ECONOMY OF A WANKEL ENGINE BY COOLANT INJECTIONS - TEST RUNNING
P. STEINWALL, Unknown Inst. or Indiv. Grant, *Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0264, HEAT PUMP PROCESS
S. ZEILON, Unknown Inst. or Indiv. Grant, *Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0265, ENERGY ACCUMULATION SYSTEM
S.G. OSKARSSON, Ab Thermia Verken, *Arvika 1, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0266, DEVELOPMENT OF A NEW COMPRESSED-AIR BURNER
K. SKOOG, Svenska Nu Way Ab, *Bandhagen, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0267, DEVELOPMENT OF THE HEATING TRANSFORMER
S. ZEILON, Utvecklings Ab Tales, *Billeberga, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0268, METHODS FOR CALCULATING AND DESIGNING MEDIUM-AIR HEAT EXCHANGES AND INTERMEDIATE ENERGY CARRIER SYSTEMS
D. AURENIUS, Bahco Ventilation Ab, *Enkoping 1, Sweden*

This project aims at developing a calculation method which permits the design of an entire system consisting of the following main parts: 1. The design data for each heat exchanger. 2. The design data for the energy carrier included in the system. 3. The enthalpy efficiency of the system.

SUPPORTED BY Sweden - Council for Building Research

5.0269, HETEROGENEOUS CATALYSIS AND COMBUSTION (THE ENERGY RESEARCH PROGRAMME)
T. HOGBERG, Volvo Ab, *Gothenburg, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0270, GAS-OPERATED AND OIL-OPERATED HEAT PUMPS

K. BECKER, Chalmers Univ. of Technology, School of Mech. Engineering, *Gothenburg 5, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0271, CITY-WEEKEND CAR MACHINERY 1, 11, 111. TOLERANCE TOWARDS ALC. AND HEAVIER HYDROCARBONS - 111 HYBRID SYST.

L. COLLIN, Chalmers Univ. of Technology, School of Mech. Engineering, *Gothenburg 5, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0272, THE EFFECT OF CONTROL FUNCTIONS ON DRIVE PROPERTIES AND EXHAUST FUMES

L. COLLIN, Chalmers Univ. of Technology, School of Mech. Engineering, *Gothenburg 5, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0273, INVESTIGATION OF COMBINING RECIRCULATING EXHAUST FUMES, UNUSUALLY HEAVY FUEL, AND SPECIAL STARTER DEVICES FOR CARBURETOR ENGINES

L. COLLIN, Chalmers Univ. of Technology, School of Mech. Engineering, *Gothenburg 5, Sweden*

This project is a further development and follow-up of a project sponsored by the National Swedish Board for Technical Development for some time. Work is progressing according to plan, and the mathematical model of the heating of the fuel feed system can imitate reality within a satisfactory framework.

The next item on the working programme is to complete the multiplex unit concerned with utilizing the programme which has been prepared for predicting heating routines at different base temperatures and with various fuel gas additives, the computed results of which can then be compared with the measurement results from relevant tests. In making these tests it is possible, within the limits of reason, to simulate room as well as air temperatures of different levels in the existing pilot installation. Fuels like engine paraffin with the initial boiling point of 150 as well as fractions with the initial boiling point of 100 will be used.

In parallel, equipment has been constructed and installed in a cold-storage room, where it is possible to reach down to temperatures of minus 45 degrees, primarily with a view to studying the cold-starting problem when petrol-methanol mixtures are used. Possibilities of applying additional loads of varying intensity have also been designed and added to this equipment, which thus allows the same installations to be used for studying cold starting problems and making driveability tests at low temperatures.

An ignition failure indicator, working electronically, has been designed for determining the occurrence of disturbances due to such failures. It will be employed for the tests outlined above.

As far as time permits, the studies will also involve less complex fuels like methanol, isopropanol, and isobutanol.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0274, THE EFFECT OF FUEL QUALITY ON ENERGY RELEASE PROCESSES IN INTERNAL COMBUSTION ENGINES, MAINLY DIESEL ENGINES

L. COLLIN, Chalmers Univ. of Technology, School of Mech. Engineering, *Gothenburg 5, Sweden*

The National Swedish Board for Technical Development supported work concerning the thermodynamics of internal combustion engines has resulted in knowledge and equipment which will now be utilized with a view to making a more detailed study of the energy release process as function of fuel quality. The Division has at its disposal an engine which operates with all existing qualities of marine fuels, at least for shorter periods. This engine can be connected with the data log installation which is also at the Division's disposal. It would thus be possible to make studies of the way different qualities - and by this concept is meant the petrochemical composition of the fuel - may affect the energy release routine.

The project is meant to extend over a 2-year period, involving efforts to accomplish standardized test routines and determine the correlation between combustion routines and quality compositions, so as to allow classification of the effects of the heavier components.

The project is meant to run parallel with another project involving a study of fuel treatment and fuel additives. Basic resources including equipment and skilled personnel are available within the Division.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0275, SALINITY GRADIENTS

A. EMREN, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

OBJECTIVE: A preliminary survey of the field salinity gradients energy conversion.

APPROACH: The relevant literature will be studied, estimates will be done on resulting energy prices. Membranes will be studied and some experiments conducted regarding revised electrodialyses.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

5.0276, THEORETICAL CALCULATION OF FREESTREAM TURBULENCE EFFECTS ON FLOW AND HEAT TRANSFER IN THE CASE OF BODIES IN THE FLOW

N. FROSSLING, Chalmers Univ. of Technology, School of Mech. Engineering, *Gothenburg 5, Sweden*

In a number of experimental investigations, concerning e.g. a cylinder perpendicular to the flow, large increases in heat transfer have been observed merely by changing the turbulent structure of the flowing medium. The calculations reported in the literature only apply to the stagnation area, and additional theoretical studies are necessary. The object of this project is to study numerically the effect of freestream turbulence on velocity distribution and the local heat transfer on the front side of a cylinder which is perpendicular to the flow.

The results of the project are expected to be applicable in the case e.g. of heat exchanger design. Owing to the analogy between heat transfer and mass transfer, the results will also have application in the latter field.

This project is the theoretical equivalent to an National Swedish Board for Technical Development supported experimental project: 'The effects of turbulence structure on heat transfer and pressure drop in the case of heat exchange.' (Project number 75-3549).

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0277, INVESTIGATION CONCERNING CONVECTIVE HEAT TRANSFER FROM BODIES WITH LIMITED HEAT CONDUCTIVITY

N. FROSSLING, Chalmers Univ. of Technology, School of Mech. Engineering, *Gothenburg 5, Sweden*

In many important energy technical connections there is a flowing medium (gas or fluid) outside or inside a solid body with often limited heat conductivity (e.g. heat exchangers, cooling fins). The ability to optimize the heat transfer which, in the case of temperature differences, will arise between the flowing medium and the solid body, is often of vital importance.

5. CONVERSION TECHNOLOGY

The object of this project is to study the heat transfer process with regard to bodies with limited heat conductivity. This means that we will study heat transfer as a 'coupled' problem, where regard is had to the heat transport both by heat conduction in the solid body and by convection in the flowing medium.

The investigation comprises theoretical calculations as well as experimental studies with application of e.g. infra-red technique. In order to study the mechanism in the case of a 'coupled' heat transfer problem, we will begin by studying a wedge-type body of iron surrounded by flowing air. Within the scope of the project, an AGA thermovision set modified by us will be tested. The system will have application in many energy saving connections, e.g. optimization of heat exchanging surfaces and checking of thermal leakage from buildings and industrial processes.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0278, THERMOELECTRIC PROPERTIES OF SOLID ELECTROLYTES

A. LUNDEN, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

OBJECTIVE: A preliminary study of energy storage systems, based on solid electrolytes with special emphasis on the economy of such systems.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

5.0279, INVESTIGATION OF THERMAL STORAGE OF ENERGY BY IONIC COMPOUNDS

A. LUNDEN, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

OBJECTIVE: The determination of heat capacity, latent heat of phase transformations and melting heat for some salts.

INTENDED USE OF RESULTS: The investigation is necessary in order to determine which salts could be used in thermal storage of energy.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

5.0280, SOLID ELECTROLYTES; PROPERTIES AND APPLICATIONS

A. LUNDEN, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

By solid electrolytes are meant materials for which electronic conduction is negligible in comparison with ionic conduction. Such electrolytes are likely to prove useful for application within the power-supply field (batteries, fuel cells, capacitors) as well as for other applications (measuring and control techniques etc.).

In the course of work several new electrolytes have been developed and tested in cells. This applies to electrolytes for increased temperatures as well as room operating temperatures. The performance characteristics can be compared with other known development alternatives.

The following action programme has been framed: A. A primary battery for room temperatures. (Cells connected in series; investigation concerning current, energy and power densities, self-discharge, storability.) B. Thermally-activated battery for increased temperatures (300-600 degrees Celsius). C. A preliminary study of storing properties; a preliminary investigation to find out whether a project concerning secondary batteries should be initiated.

D. Preliminary investigation concerning other applications.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0281, INVESTIGATION OF THERMAL TRANSIENTS IN HEATWATER SYSTEMS

B. MCHUGH, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

The objectives of the project are to create a knowledge for improved dimensioning of different heatwater systems, considering the safety point of view in particular, and to increase the knowledge about the dynamic character of such systems in general.

The whole project has been split in four stages, and this first stage consists of a review and presentation of published literature about thermal transients in steam systems in generally, thermodynamic models of the boiling process and transients in heat exchangers and pressure vessels.

Future stages include: development of calculation methods for transients in different parts of the system; digital simulation and preparation for experimental investigations; experiments or full scale measurements.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

5.0282, EXPERIMENTS AND STUDIES CONCERNING THE SOOT FORMING MECHANISMS WHEN BURNING SOLID FUEL IN DIFFERENT COMBUSTION CHAMBERS

B. MCHUGH, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

OBJECTIVE: To obtain a better understanding of heat transfer and end-products in flames by studying the soot-formation mechanism when different types of fuels are burnt in different combustion chambers.

The current phase of the project is stage 1 and it has the research project No. 53 3066 071.

APPROACH: A theoretical study of the formation of soot is carried out and the soot concentration in several full-scale experimental installations are measured.

PROGRESS: In a future stage the function of the soot-formation in a flame is to be related to some other combustion parameters.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

5.0283, METHOD AND DEVICE FOR MEASURING THE OVERALL EFFICIENCY OF AN OIL-FIRED BOILER

T. EKENBERG, Ture Ekenberg Ab, *Handen, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0284, PROTOTYPE HEAT PUMP SUITABLE FOR USE IN STABLES

A.G. MARTENSSON, Agricultural College of Sweden, *Lund 6, Sweden*

This project embraces the construction of a prototype heat pump to be used in stables.

At the Department of Farm Buildings, with a grant of SKr 250,000, the project 'Saving of energy by use of heat pumps in farm buildings' is being carried out over the three-year period 1974/77. Calculations show that the heat present in the air discharged from stables can be utilized for heating purposes. A stable for 20 cows, for instance, provides 14,000 kWh/year. However, the air discharged from stables contains large quantities of dust, 1-5 mg/cubic meter. This places unusually great demands on the engineering construction of the heat pump, and this is the reason why the equipment now available commercially does not work satisfactorily.

In order to develop the heat pump for the specialized use in stables, a draft programme has been drawn up which requires testing, at full scale, of specially developed equipment.

Development work is done in collaboration with Klimatkyla AB.

The construction of a prototype and prototype tests are expected to be accomplished during 1975/76.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0285, CATALYST FOR OXYGEN ELECTRODES

R. LARSSON, Univ. of Lund, School of Technology, *Lund 7, Sweden*

OBJECTIVE: To develop efficient catalysts for oxygen electrodes covering acid, neutral and alkaline environments. The catalysts are of the polymeric phthalocyanine complex type, e.g. iron and cobalt.

APPROACH: The project was started in 1974 under STU's direction.

PROGRESS: In stage 1 the research is continued and expanded by: Improving the life of the electrodes in acid environments. Adapting a suitable buffer system for optimum operation at pH approximately 8. Improving the catalyst effect when operating in alkaline environments. Examining the dependence of temperature. Carrying out development work to obtain a cheaper porous film for gas absorption. Using other MN4 complexes, e.g. cobalt tetra-aza annulene.

INTENDED USE OF RESULTS: The following areas of application are possible: Alkaline environment - Metal-air batteries; Neutral environment - In combination with enzyme-regulated anodes; Acid environment - Electro-chemical fuel cell systems.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

5.0286, METALLIC OXIDE CATALYSIS FOR AIR ELECTRODES

R. LARSSON, Univ. of Lund, Chemical Center, *Lund 7, Sweden*

The object of the project is to investigate the electrocatalytic effect of certain oxide materials as to their capability of reducing oxygen at an electrode. An important demand on the electrode thus developed is for it to work even with the opposite polarization, that is when oxygen is generated.

A characteristic feature of oxide materials is that they are mixed oxides of transition metals possessing paramagnetic of ferromagnetic properties. Hereby it is assumed that a 'side-on' accumulation of the oxygen molecule on the electrode surface is favoured, which in its turn facilitates the homolytical breaking of the O2 molecule at or before the first stages of electron transition. Hereby the electrode process is not complicated by the generation of intermediate hydrogen peroxide.

Primarily a study will be carried out concerning perovskite and spinel oxides, the magnetic data (and electrical conductivity) of which are well-known.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0287, HEATING TECHNOLOGY R AND D

T. TORISSON, Univ. of Lund, School of Technology, *Lund 7, Sweden*

OBJECTIVE: Definition of possible R and D activities within the field of heat roduction and distribution.

APPROACH: The present structure of the research inside and outside Sweden will be investigated. Priority projects will be specified and the possibilities of research within Sweden analysed.

INTENDED USE OF RESULTS: The findings will be used in the Board's R and D planning and decision making.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

5.0288, EVALUATION OF THE SAAB-SCANIA STEAM ENGINE - PILOT STUDY

S. CARLQVIST, K B United Stirling Ab & Co., *Malmo 1, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0289, ELECTRIC POWER SYSTEM WITH STIRLING-ENGINE DRIVEN CHARGING GENERATOR (SYSTEM STUDY)

B. HALLARE, K B United Stirling Ab & Co., *Malmo 1, Sweden*

The object of the project is to show how well an electric propulsion system, with a stirling-engine driven charging generator installed in a small transport vehicle, will keep up with the competition of existing IC-engine vehicles, electrically powered vehicles with batteries only, as well as stirling-engine vehicles with direct and indirect heating. Comparisons as to performance characteristics, energy consumption, operational and total costs will be made.

It has been a condition that the different vehicles should possess the same loading capacity, that is to say that they should have the same grounds of capacity and profitability, which means varying total weight and engine sizes, in order to achieve similar performance characteristics as range, acceleration and maximum speed.

The project has been concluded and the results are as follows: The electric power system with stirling-engine charger will consume a somewhat larger amount of energy (at the source) and the total cost will be 8% higher than that of today's IC engines. In comparison with electrically powered vehicles, the energy consumption is approximately 25% lower and the total cost approximately 10% lower. A stirling engine with direct heating is the moot advantageous system from the viewpoint of energy and cost, while a stirling engine with indirect heating and energy stored in a thermal accumulator means large energy consumption (when electric power is used for charging) but lower total cost, compared to pure electric propulsion. Comparisons of costs are based on today's prices for petroleum products and electricity.

The combination of an electric power system and a stirling-engine driven charging generator seems to be very flexible, and the increase in energy and costs is reasonable compared to today's systems. It will be suitable for applications where extremely low pollution levels are required, i.e. indoor use and operations in areas with high traffic density.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0290, STIRLING ENGINE WITH INCREASED EFFICIENCY AND HIGH POWER DENSITY BY USE OF CERAMIC HIGH-TEMPERATURE COMPONENTS

T. LIA, K B United Stirling Ab & Co., *Malmo 1, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0291, HEAT PUMP INSTALLATION IN WHICH THE GROUND IS USED AS A HEAT STORE - WATER-WATER SYSTEM

K. NORBACK, Sydsvenska Kraft Ab, *Malmo 5, Sweden*

This project aims at studying how a system with a combination of heat pump-ground heat functions. Excellent contact has been established with all those who are studying this combination in Denmark. The intention is to purchase, install and thoroughly test the system in two private houses, one an existing house and one which is to be built this autumn.

The ground heat in these cases consists of solar heat which is transferred to the ground by means of radiation and convection. The working conditions will be simpler for a heat pump which uses the ground instead of the surrounding air as a heat store. The ground will act as a heat store for equalizing the heat production throughout the entire year. The thermodynamic conditions of the ground will be measured. The working conditions for the heat pump in a water-refrigerant-water system will be studied.

Two extra pipework systems will be installed in the ground in the case of one of the houses as a preparation for measuring the heat from solar panels, which will comprise a supplementary project later on.

SUPPORTED BY Sweden - Council for Building Research

5.0292, DEVELOPMENT OF ELECTRICAL STORAGE HEATER OF PLASTICS, USING NEW PRODUCTION TECHNOLOGY

P. MARGEN, Ab Atomenergi, *Nykoping 1, Sweden*

Storage heaters already play an important part in cutting down peak loads in the production of hot water. In the future energy supply system for this and similar applications, electrical energy will have increased significance. In the energy consumption curve there appears 'night valley'. By accumulation in storage heaters, it should be possible to make use of a larger pro-

portion of night power in a simple way, and thus reduce the night valley. Also in combination with solar or wind power, accumulation in storage heaters will be significant.

The object of the project is to launch on the market an optimized electrical storage heater of glass fiber reinforced plastics. By using plastics, the difficulties due to corrosion caused by oxygenated water in present storage heaters will be overcome.

In order to reduce considerably the costs of production, a new production technology, for which a patent is being applied, will be used. This permits a higher rate of production, lower tooling costs, and is in addition more environmentally favourable than techniques employed today.

ADDENDA: Performing organization: Atomenergi AB.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0293, INVESTIGATION OF THE POSSIBILITIES OF USING A DAM AS A LONG TIME HEAT STORAGE SYSTEM

P. MARGEN, Ab Atomenergi, *Nykoping 1, Sweden*

OBJECTIVE: A preliminary study of the possibilities of using a heat storage system based on a dam in a lake. Special emphasis will be put on a possible location in connection to planned district heating plants. The choice of material and problems in heat technology in estimating heat losses will be studied as well as biological effects.

ADDENDA: Performing organization: Aktiebolaget Atomenergie.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

5.0294, ENERGY ACCUMULATION WITH MODIFIED UTILIZATION OF SALT HYDRATES

P. MARGEN, Ab Atomenergi, *Nykoping 1, Sweden*

ENERGY ACCUMULATION I: This project covers heat accumulation in salt hydrates by means of an alternative method for storage in tanks. The salt hydrates are enclosed in a tank or in some form of container of a simple, cheap type which is provided with one or several heat exchange loops of plastic. The loop arrangement and the circulation for achieving uniform freezing and melting will be studied for the most optimum function possible. Suitable systems for thermostatic control will also be investigated. The project will be directed by experts in district heating engineering active within the company and the experimental part will be implemented by personnel from the materials department who are competent in the field of materials and chemistry.

ENERGY ACCUMULATION II: This project refers to the development of a method for accumulating energy by using salt hydrates. The salt hydrates ae incorporated in various types of stores and building elements or components such as self-adjustng radiators, in the form of micro-capsules. In addition to studies of the problems with reference to previous work carried out in this sector, the project will also include cost analysis, testing of industrially produced process material, chemical studies and the development and testing of integrable units. The project will be directed by experts in district heating engineering active within the company and the experimental part will be implemented by personnel from the materials department who are competent in the field of materials and chemistry.

ADDENDA: Performing organization: AB Atomenergi.

SUPPORTED BY Sweden - Council for Building Research

5.0295, FLUIDIZED-BED GRANULATION

N. TIBERG, Merox Granges, *Oxelosund, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0296, HEAT PUMPS WITH POWER EQUALIZATION SYSTEMS

R. LUNDEN, Vastbo Villan Smalandssten. Ab, *Smalandsstenar, Sweden*

The purpose of this project is to design, build and study under operating conditions a heat pump system with heat accumulation and capacity control. The heat accumulator, which consists of the ground beneath the house, is a central component of the project and will be analyzed theoretically during the design stage and practically during operation. A measurement system will provide the necessary data. A suitable compressor system with control equipment will be produced. The system is expected to have a high annual heat factor and a moderate maximum power requirement since the accumulator will provide power equalization. The system will be installed in a one-family house.

This project is expected to provide source material for continued development of the system to a commercial heating system.

The project is broken down into four stages and a report will be submitted to the Swedish Council for Building Research (BFR) after each stage.

SUPPORTED BY Sweden - Council for Building Research

5.0297, DESIGN AND CONSTRUCTION OF 4 TURBINE SETS RATED AT 5, 10, 15, AND 20 KW RESPECTIVELY

R. ADOLFSSON, Sodertalje Rostfria Ab, *Sodertalje, Sweden*

The turbine sets in question are designed to generate - in an easily accessible way - electric power from minor watercourses like streams and small rivers which, according to techniques known and applied up to now, are too small for such purposes.

The realization of the project is to be seen as a consequence of the oil crisis etc., which has made it an urgent problem to develop technical equipment that will allow exploitation of energy sources that have not been utilized in the past.

As regards the general characteristics of this project, one decisive advantage is that application of this turbine set will make available to this country a considerable quantity of electric power by particularly simple means and at extremely low costs. It will thus be unnecessary to build dams in the watercourses concerned in order that the turbine set may be employed. Furthermore, the set can be transported to the place of assembly by lightweight vehicles, even in country where there are no roads at all.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0298, FURTHER DEVELOPMENT OF PROTOTYPE ELECTRIC CAR - ELIS

R. JOHANSSON, Electrical Locomotion Ind. Co., *Stockholm, Sweden*

The object of the project is the further development of the propulsion system of an existing electric car (a converted VW Microbus) in order to obtain softer propulsion and reduce losses.

To achieve this, a new propulsion engine furnished with four layers of rotor winding as well as a special electric automatic gear box have been designed.

This gear box is in process of manufacture and is likely to be tested out in spring 1977. Gradually, the new engine will also be manufactured and tested out, together with the other components. The electric car, with its new propulsion system, is to be available and ready for the test bench as well as for test running by summer 1977.

The results are expected to prove valuable, primarily for the further development of light delivery vehicles for urban use.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0299, INCREASED RESTORATION OF PRIMARY STEAM CONDENSATE

T. WAHLBERG, Research Found. for Heat Engin, *Stockholm, Sweden*

The object of the project is to create conditions for restoration of all primary steam condensate to the steam power station. The rate of restoration varies considerably from plant to plant, largely owing to pollution risks. It is of vital importance to make an over-all assessment of economy possibilities in increased restoration and to tackle specific problems as regards the quality of the condensate.

The first phase of the project consists of an investigation which will elucidate present problems and survey the savings potential which lies in increased condensate restoration within the cellulose and paper industry. The investigation will also present various proposals for the solution of present problems.

Increased restoration of primary steam condensate will result in better economy and reduced consumption of excess water.

A latter phase will embrace studies, by means of experiments, of measures which should be taken in accordance with the recommendations obtained by the investigation, for instance methods for detecting undesirable impurities and purifying condensate.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0300, DEVELOPMENT OF A METHOD FOR MEASURING TRANSIT TIME IN COMBUSTION FURNACES

B. AHLING, Water & Air Pollution Lab., *Stockholm, Sweden*

The objective of the project is to develop a method for the direct measurement of transit time distribution and mean transit time of exhaust gas in the chambers of various types of combustion furnaces.

A more precise description of the objects of the present development work would be as follows: 1. to design equipment for transportation and handling of the gas-dose tracer 41Ar, in amounts up to a few c. 2. To design a device for controlled rapid injection of gaseous tracer elements, with electronic indication of the time of injection, for instance on a high-speed recorder. 3. To design a suitable device for the simultaneous screening and cooling of detectors. 4. To measure transit time at the Research Laboratory's pilot plant for destruction of special waste.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0301, R & D NEEDS IN THE FIELD OF ELECTRIC ENERGY PRODUCTION

J. BUBENKO, Royal Institute of Technology, *Stockholm 70, Sweden*

OBJECTIVE: Definition of possible R & D activities within the field of electric energy production, with special regard to system problems.

APPROACH: The present structure of the research inside and outside Sweden will be investigated. Priority projects will be specified and the possibilities of research within Sweden analysed.

INTENDED USE OF RESULTS: The findings will be used in the Board's R & D planning and decision making.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

5.0302, FLOW-MODEL TESTS - DEVELOPMENT OF METHODOLOGY

R. COLLIN, Royal Institute of Technology, *Stockholm 70, Sweden*

Flow-model tests have proved valuable when it comes to studying design alternations of furnaces and burners. Project objectives are the further development of model techniques: 1. So that the large data may be recorded and processed faster and at lower costs. 2. So that the results obtained may be demonstrated to customers by means of films or photos.

Objective 1 will be achieved by the automation of measurements. Measurement results will be recorded by a data log, computed and accounted for in the form of diagrams plotted by the computer. The project also involves the verification of the results obtained by comparative experiments in production furnaces.

In order to achieve objective 2, lighting and visualization techniques are to be studied. Prospects for utilizing laser will be explored as well as tracer and Pk-measurements, in order to study the mixture of fuel and oxidizing agents.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0303, DEVELOPMENT OF HYDROGEN GAS BURNER - PILOT STUDY

R. COLLIN, Royal Institute of Technology, *Stockholm 70, Sweden*

The use of hydrogen gas as a reducing agent within the steel industry may become a reality in the near future. In a wider perspective, hydrogen gas may also be used as a fuel for the various heat and heating processes within an integrated steelworks. The advantages appear to be considerable. The reducing agent/fuel is easy of access, heating processes are easily controlled; it is ideal from the viewpoint of environment, due to the fact that there is no waste, nor are there any impurities in exhaust fumes. Moreover, it should be possible to make use of waste heat by storing it, after simple transformation, in the form of oxygen-hydrogen (e.g. electrolysis of water).

The object of this project is to investigate the theoretical possibilities of developing an oxygen-hydrogen burner. This burner will have application in heating furnaces, holding furnaces, forging furnaces, and heat-treatment furnaces. Furthermore, the possibility of designing the reaction zone of the burner and generating steam for direct turbine drive will be studied.

This project is meant to result in another project, the object of which will be to produce and test the burner concerned at laboratory scale under operating conditions.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0304, MATERIALS AND METHODS FOR USE OF EQUILIBRIUM REACTIONS BETWEEN SOLID STATE AND GAS FOR STORING AND PUMPING OF LOW TEMPERATURE HEAT (ABBREV)

J.C. ERICKSSON, Royal Institute of Technology, *Stockholm 70, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0305, A DETACHED HOUSE HEAT PUMP WITH A REGENERATIVE EVAPORATION PROCESS

E. GRANRYD, Royal Institute of Technology, *Stockholm 70, Sweden*

The purpose of this project is primarily to study the characteristics of a heat pump of air-water type in which a new type of evaporation process (known as regenerative process) is used.

This process has been studied theoretically and certain introductory laboratory tests have also been carried out. The results obtained from these indicate that an increase in the available heat output for a given plant size - and in the heat factor - should be possible compared with the output from a conventional heat pump process.

The project will be primarily devoted to investigating the effects of the regenerative evaporation process in a heat pump of air-water type. A secondary objective will include tests with a simplified defrosting method and tests concerning the preparation of domestic hot water by means of a heat pump.

The project will include the construction of the heat pump, functional tests and capacity measurements in the laboratory and - if the results obtained here should favourable - field tests in which the heat pump will be installed in an existing house. During the latter part of the work, the major aim will be to compile practical experiments of this type of heating arrangement for detached houses.

SUPPORTED BY Sweden - Council for Building Research

5.0306, HEAT PUMPS FOR HEATING DWELLINGS - COMPONENT AND SYSTEM STUDIES

H. KRAFT, Royal Institute of Technology, *Stockholm 70, Sweden*

The purpose of this project is to study components and systems for heat pumps intended for heating dwellings. The study will be carried out under laboratory conditions. The experimental

equipment will consists of various types of heat pumps operating with a compressor-driven evaporation process and using R22 and R502 refrigerants. The project refers to heat pumps in which outdoor air is used as a heat source and with the heat emission side designed partly for direct and partly for indirect heating systems. The implementation of the project is intended to provide more detailed knowledge with regard to the thermodynamic and heat transfer process in heat pumps under various operational conditions. The work will be carried out in stages and will comprise: The production of experimental equipment. Introductory investigation of heat pumps in standard designs. The determination of heat emission and heat factors during a simulated heating season (air temperatures) and with various refrigerants.

Studies of components used, such as heat exchange surfaces, compressor and control equipment.

An investigation of various defrosting methods.

The project may also include a preliminary experiment using a combustion engine as a source of power.

SUPPORTED BY Sweden - Council for Building Research

5.0307, DEVELOPMENT OF ALKALINE FUEL CELLS

O. LINDSTROM, Royal Institute of Technology, *Stockholm 70, Sweden*

OBJECTIVE: The work consists of a preliminary study of a power plant station based on fuel cells with an alkaline electrolyte. The fuel cells could be useful in a future Swedish fuel system based on for example peat.

In a first state with project number 53 3560 011 fundamental studies of the electrodes have been performed. This has included life length tests of the cathode as well as studies of different ways of manufacturing the anode.

The present stage of the project includes the construction of a prototype set-up of a fuel-cell system, tests of the system as well as further development of the components.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

5.0308, METHANOL-AIR FUEL CELL BATTERY RATED AT 50 W

C. SYLWAN, Royal Institute of Technology, *Stockholm 70, Sweden*

A 12-volt methanol-air fuel cell battery has been constructed at the Department of Chemical Technology, the Royal Institute of Technology.

The objectives of this work were development of methanol electrodes as well as identification of problems connected with the actual operation of a pile.

Experience thus gained, together with the air electrodes for low differential pressure and the pile construction technique now being developed within the hydrogen-air fuel cell project, which is now in progress at the Department, will serve as a suitable basis for the construction of a new pile which can be fitted to an electrically driven wheel-chair. The pile will develop 50 W and, fitted to a wheel-chair, it can serve as a charging device for a lead-acid accumulator.

Moreover, the pile will facilitate R & D work concerned with the carbonization problem and electrode materials as well as it may make further development towards a prototype system easier.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0309, SOOT-FREE COMBUSTION MECHANISMS

J. VADAVINEK, Royal Institute of Technology, *Stockholm 70, Sweden*

The development of the 'blue'-flame burner has now reached so far that performance characteristics are well documented. Development of burner for industrial use is in progress.

As regards applications, for which, for various reasons, the present design is unsuitable, or installations where the exchange of existing burners is out of the question, awareness of the combustion mechanisms in soot-free combustion is, however, of great value.

Project objectives are: To acquire such awareness. To try various ways and means of influencing combustion, for instance by oxygen enrichment and electromagnetic fields.

The project will also include a survey of the proportions of nitric oxides, soot, and incompletely burnt components in the flames, which will be much more accurate than those presented by earlier projects. close theoretical study has also been planned.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0310, HEAT TRANSFER IN FURNACE CHAMBERS - COMPARISON BETWEEN LUMINOUS AND NON-LUMINOUS FLAMES

J. VADAVINEK, Royal Institute of Technology, *Stockholm 70, Sweden*

Combustion of oil without soot deposits means a number of environmental advantages. The exhaust fumes are free from soot, and nitric oxide and sulphur trioxide contents are low. Contrary to earlier conceptions, both our own and other measurements indicate that the soot-free flame produces more efficient heat transfer in the furnace chamber - higher efficiency - than does the 'luminous' flame.

The object of the project is to compare, both in theory and by experimental means, the heat transfer from luminous and non-luminous flames, and to clarify the effect of different heat transfer mechanisms. Comparative experiments will be carried out in calorimetric furnace and flow models.

The results will be computed and used for studying a number of production furnace types.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0311, SYSTEM FOR MIXED FUELS (MIFUS 1121) - MIXING DEVICE AND REACTOR FOR COMBINATION FUELS

A. BOTHVIDSON, Sedico Energi Ab, *Strangnas 2, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0312, ULTRASONIC DEVICE IN INTERNAL COMBUSTION ENGINES

S. HANDEL, Univ. of Uppsala, School of Science & Math., *Uppsala, Sweden*

The project describes the construction of a simple experimental model, in principle composed of a piston and a cylinder, with which it could be possible to obtain, by use of an ultrasonic field, better distribution of fuel-air mixture to the advantage of energy consumption as well as environment.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

5.0313, CONTROLLED INJECTION OF WATER INTO INTERNAL COMBUSTION ENGINES

P.E. LJUNG, U F A B, *Vallentuna, Sweden*

Investigation concerning the effect of water injections into internal combustion engines and development of a basis for dimensioning.

Function tests with injection equipment, design and construction of a prototype in accordance with environmental conditions. Operational testing.

The following problems will be studied closely: Possibilities of saving fuel and using low-octane petrol as well as the effect of water injection on the composition of exhaust fumes.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

6. ENVIRONMENTAL ASPECTS OF ENERGY CONVERSION & USE

6.0001, TRANSFER OF PETROLEUM RESIDUES IN SARGASSUM COMMUNITIES AND THE WATERS OF THE SARGASSO SEA
J.N. BUTLER, Bermuda Biolog. Sta. for Res., *St. Georges, St. Georges West, Bermuda*

The Pollutant Transfer Program (PTP) is investigating processes which transfer pollutants from land sources to the oceans, as well as the movement and concentration of these pollutants in the oceans. The major areas of interest are the concentration and dispersal of pollutants at the air-sea interface; movement of pollutants through estuaries to continental shelf waters; deposition of pollutants in sediment; and the chemical form and degradation of these pollutants in the marine environment.

The most visible and easily studied oceanic pollutants are the solid pelagic tar lumps on the ocean surface. The fate of this material through physical disintegration, chemical degradation, and biological metabolism and uptake is still not well understood.

The origin of these tar lumps is primarily from the ballast discharge and washings of crude oil tankers. It is now well established that these residues are found in relatively high concentrations in the Sargasso Sea.

Since tar and Sargassum are often associated, the tar may cause stress to the community. The work proposed here includes: (1) laboratory studies of rates and pathways of petroleum residue degradation and dispersion; (2) efforts to further quantify the relative amounts of dissolved, particular and adsorbed hydrocarbon in the water column; (3) estimates of some poorly known fluxes of open-ocean hydrocarbons; and carbon content of Sargassum organisms (distinguishing between that absorbed in the tissues and that passing through the gut).

SUPPORTED BY U.S. Natl. Science Foundation, Div. of Ocean Sciences

6.0002, STUDY OF ANADROMOUS AND COASTAL FISH STOCKS WHICH MIGHT BE AFFECTED BY THE JAMES BAY HYDROELECTRIC PROJECT
R. BAXTER, Unknown Inst. or Indiv. Grant, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0003, DETERMINATION OF THE LEACHABILITY OF RADIOACTIVE PRODUCTS FROM URANIUM MINE TAILINGS
J. FITZGERALD, Unknown Inst. or Indiv. Grant, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0004, STUDY OF ANADROMOUS AND COASTAL FISH STOCKS WHICH MIGHT BE AFFECTED BY THE JAMES BAY HYDROELECTRIC PROJECT
R. GREENDALE, Unknown Inst. or Indiv. Grant, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0005, CONSULTANT AND ADVISORY SERVICES TO THE ATOMIC CONTROL BOARD RADIOACTIVE WASTE ADVISORY COMMITTEE (ABBREV)
K. KASIANCHUK, Unknown Inst. or Indiv. Grant, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0006, CONSULTANT AND ADVISORY SERVICES TO THE ATOMIC ENERGY CONTROL BOARD RADIOACTIVE WASTE SAFETY ADVISORY COMMITTEE (ABBREV)
O.R. LUNDELL, Unknown Inst. or Indiv. Grant, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0007, PARTICIPATION AS A MEMBER OF THE ATOMIC ENERGY CONTROL BOARD RADIOACTIVE WASTE SAFETY ADVISORY COMMITTEE (ABBREV)
C.A. MAWSON, Unknown Inst. or Indiv. Grant, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0008, HYDRAULIC RESEARCH FOR OIL SPILL CONTROL IN FLOWING WATERS INCLUDING STUDY OF INTERFACIAL FRICTION FACTORS FOR OIL SLICKS (ABBREV)
J. MOIR, Unknown Inst. or Indiv. Grant, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0009, PHYSIOLOGICAL ECOLOGY AND THE EFFECTS OF CRUDE OILS ON ARCTIC MARINE INVERTEBRATES TO INCLUDE ADDITIONAL RELATED STUDIES
T.C. MULLIN, Unknown Inst. or Indiv. Grant, *Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0010, WHITECOURT ENVIRONMENTAL STUDY GROUP
UNKNOWN, Amoco Canada Petrol. Co. Ltd., *Calgary, Alberta, Canada*

The objectives are these: a) to study the role of sulfur dioxide (SO_2) and sulfur compounds in vegetation stress preconditioning: b) to study the effects of sulfur compounds on biological and physical systems; c) and to determine the long term effects of sulfur compounds on these systems.

SUPPORTED BY Canada - Alberta Environmental Research Trust - Edmonton

6.0011, PREPARATION OF TECHNICAL GUIDELINES FOR ENVIRONMENTAL PROTECTION FOR OIL PIPELINES
UNKNOWN, Beak Consultants Limited, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0012, PILOT FILTER PROJECT AT MCINTYRE MINES LTD., FOR COAL MINE TAILINGS CLARIFICATION
UNKNOWN, Coal Association of Canada, *Calgary, Alberta, Canada*

The objective of the project is to determine if the filter press system can satisfy industry and government requirements for separating coal mine tailings, recycling process water and eliminating lagoons, and to establish the economics of the process.

SUPPORTED BY Canada - Alberta Environmental Research Trust - Edmonton

6.0013, EFFECTS OF THE SHELL WATERTON GAS PLANT ON SOILS, WATERS AND RAINFALL

M. NYBORG, McKinnon Allen & Assoc. Ltd., *Calgary, Alberta, Canada*

The proposal is to continue a case study of a major, identifiable pollution source in an on-going program begun by the applicants in 1972. The intention is to obtain emission effects data before a major modification (tail-gas cleanup) is made to the Waterton Gas Plant to reduce emissions which can then be compared to data collected from similar experiments after the modification becomes effective.

Tail-gas cleanup was scheduled for early 1975, but will not be operational until mid-1975.

The rates and conditions under which soil acidification occurs will be studied, as will the Gas Plant emission effects in a populated, agricultural area.

Monitoring stations will be set up at 17 to 20 sites, final locations of which will depend upon the results obtained from the 1974 work. At each site there will be canisters containing different kinds of soil (to check rates of acidification) and a rain gauge. The rain samples will be checked for pH, sulfur content, and other properties if found to be significant.

Weather data, such as wind speed, direction, temperatures, and relative humidity will be recorded at some sites.

SUPPORTED BY Canada - Alberta Environmental Research Trust - Edmonton

6.0014, ELECTROPHORETIC AND CENTRIFUGAL CLARIFICATION OF PROCESS WATER FROM ATHABASCA TAR SAND EXTRACTION

R.A. RITTER, Ritter Engin. Consultants Ltd., *Calgary, Alberta, Canada*

Extensive research indicated that clarification of the process water resulting from tar sand extraction could be effected through mild chemical conditioning of the suspension followed by electrophoretic flocculation and precipitation of the suspended clay in a specially designed cell.

The applicant subjected total slurry, after electrophoretic treatment, to a centrifugal force of about 220 g's and 1,000 g's and obtained about 20% and 35% solids, respectively, with a highly clarified supernatant. These were bench scale investigations.

SUPPORTED BY Canada - Alberta Environmental Research Trust - Edmonton

6.0015, EVALUATION OF OILS AND EXTRACTION OF PLANT TAILINGS IN POND WASTEWATER

G.W. HODGSON, Univ. of Calgary, Environmental Science Center, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0016, THE NATURE AND EXTENT OF EXHAUST EMISSION FROM CONTINUOUSLY OPERATED DIESEL ENGINES

G.A. KARIM, Univ. of Calgary, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

6.0017, STRESS EFFECTS OF SO2 ON VEGETATION - WHITECOURT ENVIRONMENTAL STUDY GROUP

A.H. LEGGE, Univ. of Calgary, Kananaskis Environ. Sci. Ctr., *Calgary, Alberta, Canada*

It is recognized that continuously-emitted SO2 will ultimately be assimilated by the ecosystem. Thus it is necessary to know what stress effects the emitted SO2 will have on the vegetation - both short and long term effects. The objective of the proposed research is to find out these effects.

SUPPORTED BY Canada - Alberta Environmental Research Trust - Edmonton

6.0018, NEUTRON SPECTRA AND DOSE MEASUREMENTS IN CRITICALITY ACCIDENTS

W.G. CROSS, Atomic Energy of Canada Ltd., *Chalk River, Ontario, Canada*

For the past three years we have used the 05R Monte Carlo code to calculate escape spectra of neutrons penetrating various materials. Source spectra include those of unmoderated fission neutrons, neutrons moderated by water and heavy water, Po-Be neutrons and 14-MeV neutrons. The geometrical arrangements treated include a point source at the centre of a sphere and a parallel beam penetrating a slab. During 1975 similar calculations will be made for transmission through Pb and Cu. Spectra of fission neutrons and 14-MeV neutrons reflected from concrete in various geometrical arrangements will also be studied. For all resulting spectra, mean cross sections of activation and damage track detector elements used in personal dosimetry will be obtained.

A compilation of neutron spectra of importance to the dosimetry of criticality accidents is being assembled in collaboration with Dr. S. Makra of KFKI, Budapest. This work will continue during 1975.

A third research project is to determine the variation of the sensitivity of damage track detectors with the angle between the incident neutron direction and the plane of the dosimeter. Recent measurements elsewhere suggest that the magnitude of this directional dependence is much larger than expected and could seriously affect the accuracy of dosimeter readings.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0019, PHYSICAL AND BIOLOGICAL EFFECTS ON THE ENVIRONMENT OF COOLING SYSTEMS AND THERMAL DISCHARGES FROM NUCLEAR POWER PLANTS

J.W. MCMAHON, Atomic Energy of Canada Ltd., *Chalk River, Ontario, Canada*

This study deals with sublethal effects of thermally enriched water on species composition and seasonal succession of freshwater plankton in a northern environment.

Field experiments are conducted in polyethylene enclosures (5 m dia. x 7 m deep) located in an oligotrophic lake. Heated water (max. delta T 12 degrees C) is pumped through a heat exchanger into the enclosure.

Carbon-14 primary productivity is determined for the natural plankton community. Species are identified and enumerated. Phosphorus, O2, CO2, temperature, light, pH and total carbon are monitored in both heated and non-heated enclosures.

Field operations during the winter dealt with problems in boiler and pumping maintenance and operation, discharge diffuser design, replacement of polyethylene columns and sampling techniques under subzero conditions.

Present studies concern the effect of depth of discharge of heated water into the lake on the plankton.

A winter experiment, at a discharge depth of 2 m provided an artificial thermocline at 3 m where H2O temperature above and below this boundary was 15 degrees C and 4.5 degrees C respectively.

Phytoplankton productivity and numbers increased several fold in the heated surface water compared to non-heated surface water. The algae, Synedra ulna, dominated the phytoplankton community in the heated column. This species usually occurs in open waters when the ice cover disappears from the lake.

Several species of filamentous algae appeared on the polyethylene curtain in the heated column. Studies are planned to assess the impact of thermal enrichment on these apiphytes.

Laboratory experiments, using pure alga cultures, are examining interactions of temperature and organic pollutants (PCBs) on algal growth. Similar field studies will be carried out using natural plankton in situ.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0020, PRELIMINARY INVESTIGATION INTO THE MAGNITUDE OF FOG OCCURRENCE AND ASSOCIATED PROBLEMS IN THE OIL SANDS AREA
UNKNOWN, Stanley Assoc. Engin. Limited, *Edmonton, Alberta, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0021, MATHEMATICAL MODELLER FOR INTER-DISCIPLINARY REVEGETATION STUDY OF ALBERTA OIL SANDS MINING AREA
P.R. GORHAM, Univ. of Alberta, *Edmonton, Alberta, Canada*

The proposal is to initiate an interdisciplinary research program using a mathematical-computer modeling system. It will involve integrated soil, environmental, and ecophysiological processes involved in the long-term revegetation of tailings or other disturbed surface areas in the oil sands mining area.

SUPPORTED BY Canada - Alberta Environmental Research Trust - Edmonton

6.0022, THE EFFECT OF THE MODIFIED TEMPERATURE REGIME ON THE BIOTA OF LAKE WABAMUN, ALBERTA
J.R. NURSALL, Univ. of Alberta, *Edmonton, Alberta, Canada*

This is a three phased project. The first phase outlined the biota of Lake Wabamun, and provided a general picture of the physical and chemical conditions of the lake.

The second phase investigated the primary and secondary productivity and aquatic macrophytes.

The third phase was detailed studies on specific topics, and included detailed temperature/current studies, benthos, and fish.

SUPPORTED BY Canada - Alberta Environmental Research Trust - Edmonton

6.0023, FATE OF EMITTED SULFUR DIOXIDE
M. NYBORG, Univ. of Alberta, *Edmonton, Alberta, Canada*

The pH of soils exposed to SO2 emissions for a three to four month period was depressed from 0.1 to 0.4 pH units. The effect of SO2 was from 1-15 cm deep in the soil. Effects of SO2 can be noted in soil as far as 200 miles downwind.

The findings indicate that average farm soils are decreased about 0.05 to 0.10 pH units/year, and that productivity of acidity sensitive crops will decrease in 10-15 years.

Indications are that while soils acquire large amounts of SO2 from the atmosphere, the amounts of sulfur deposited by rain and the subsequent increase in sulfate content in soils are both very poor measures of the quantity of sulfur actually taken up by soils.

Results confirm the opinion that soils, water and vegetation all absorb SO2 from the air and convert much of it (SO2) to sulfuric acid.

SUPPORTED BY Canada - Alberta Environmental Research Trust - Edmonton

6.0024, HYDRAULICS OF THERMAL DISCHARGES AND TURBULENT JETS
N. RAJARATNAM, Univ. of Alberta, School of Graduate Stu. & Res., *Edmonton, Alberta, Canada*

CURRENT RESEARCH AND OBJECTIVES: Hydraulics of Thermal Discharges: The aim of this project is to study the diffusion of surface hot water discharges into lakes and rivers and to develop a predictive method which will include the effects of ambient currents and wind stress and waves. Turbulent Jets: The aim of this project is to study the diffusion of free jets and wall jets in cross-flow, with particular application to effluent disposal. Studies are also conducted on the impingement of turbulent jets on erodible beds.

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

6.0025, INVESTIGATION OF MICROBIOLOGICAL ASPECTS OF OIL SPILLS ON NORTHERN TERRAIN
D.W. WESTLAKE, Univ. of Alberta, *Edmonton, Alberta, Canada*

SUPPORTED BY Canada - Department of Indian and Northern Affairs - Ottawa

6.0026, MODELING TERRAIN RELIEF EFFECTS ON STACK EFFLUENT DISPERSAL
D.J. WILSON, Univ. of Alberta, *Edmonton, Alberta, Canada*

Rolling terrain alters trajectory of smokestack plumes and causes higher concentrations at certain locations because of increased atmospheric turbulence.

The proposal is to examine and assess these effects with models of irregular terrain in a wind tunnel in order to simulate lower level atmospheric winds. Tracer gases will be injected into the wind tunnel to simulate the effluent from a stack. Corrective action studies will be made to allow government agencies to assess proposed plant operations and location. Result will be adjustment of allowable emission rates.

SUPPORTED BY Canada - Alberta Environmental Research Trust - Edmonton

6.0027, AIR POLLUTION DISPERSION, SNOW DRIFTING, AND TRANSFER
D.J. WILSON, Univ. of Alberta, School of Graduate Stu. & Res., *Edmonton, Alberta, Canada*

CURRENT RESEARCH OBJECTIVES: 1. Study air pollution dispersion near irregular terrain, hill and urban areas by wind tunnel and analytical modelling. 2. Lab modelling of snow drift accumulation near northern pipelines, roads and buildings. 3. Heat and mass transfer in gas turbine and combustion applications.

ADDENDA: This project is also supported by: American Society of Heat Vent Air Conditioning Engineers, and Alberta Department of Environment.

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

6.0028, NATIONAL INDIVIDUAL STANDING OFFER FOR PREPARATION OF CHEMICAL ANALYSES FOR URANIUM TAILING POLLUTION CONTROL PROJECT AT ELLIOT LAKE
UNKNOWN, Rio Algom Limited, *Elliot Lake, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

6.0029, RESEARCH ON THE SUBLETHAL TOXICITY OF PETROLEUM REFINERY EFFLUENTS
UNKNOWN, J.B. Sprague Associates Ltd., *Guelph, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0030, FORMULATION OF ENVIRONMENTAL PROTECTION GUIDELINES FOR OFFSHORE DRILLING, OFFSHORE GATHERING PIPELINES, AND PORTS
UNKNOWN, Canplan Oceanology Limited, *Halifax, Nova Scotia, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0031, INVESTIGATION INTO THE SOURCE CONTROL OF WASTE HEAT FROM STEAM ELECTRIC POWER PLANTS ON LARGE BODIES OF WATER
UNKNOWN, Internat. Envir. Consult. Ltd., *Islington, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0032, DEVELOPMENT OF METHODS AND TECHNIQUES TO RAPIDLY TRENCH SEA-ICE FOR THE CONTAINMENT OF OIL
UNKNOWN, Mining Resources Engin. Ltd., *Kingston, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0033, DEVELOPMENT OF INNOVATIVE TECHNIQUES FOR THE IMMEDIATE CONTAINMENT OR DISPOSAL OF OIL FROM AN UNDERWATER WELL BLOWOUT IN THE BEAUFORT SEA
UNKNOWN, Arctec Canada Limited, *Montreal Quebec, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0034, STUDY OF CANCER OCCURRENCE RATE AMONG URANIUM WORKERS
UNKNOWN, Montreal Cancer Institute, *Montreal, Quebec, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0035, LITERATURE ON PENETRATING SEA-ICE, AND RECOVERY, TRANSFERRAL, SEPARATION AND DISPOSAL OF OIL SPILLED UNDER ARCTIC ICE (ABBREV)
UNKNOWN, Montreal Engin. Company Ltd., *Montreal, Quebec, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0036, METHODS AND TECHNIQUES FOR RECOVERY AND DISPOSAL OF CRUDE OIL SPILLED UNDER ARCTIC ICE
UNKNOWN, Montreal Engin. Company Ltd., *Montreal, Quebec, Canada*

The review of methods and techniques of penetration of ice, recovery, transferral, separation and disposal of crude oil spilled under Arctic ice to include containment of oil, and shoreline protection and clean-up.

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0037, STUDY OF THE USE OF TAILINGS AS BACKFILL IN URANIUM MINES
UNKNOWN, Acres Consulting Services Ltd., *Niagara Falls, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0038, URANIUM ANALYSES OF LAKE AND STREAM SEDIMENTS BY NEUTRON ACTIVATION ANALYSIS
UNKNOWN, Atomic Energy of Canada Ltd., *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

6.0039, REPORT ON EMISSIONS FROM THE PETROLEUM REFINING INDUSTRY
UNKNOWN, Western Research & Devel. Ltd., *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0040, MINE AIR ANALYSIS
R.G. DRAPER, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

The objective is to improve current methods of sampling and analysis of mine air and diesel exhaust.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

6.0041, HYDROCARBON POLLUTION OF AIR AND WATER
R.G. DRAPER, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

To expand information on characteristic types of petroleum products, the influence of oxidation, migration and solubility in water, and to interpret data acquired on contaminated samples received.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

6.0042, SURVEYS OF SULPHUR CONTENT OF CANADIAN COMMERCIAL FUELS
R.G. DRAPER, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

This project is designed to provide a basis for evaluating the total air pollution generated in the major centres of Canada. It will fit in with detailed studies of plume dispersion from the stacks of major power stations, in that it will provide an estimate of the background contamination.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

6.0043, SEDIMENTARY PROCESSES AND SEDIMENTS, BABBAGE RIVER DELTA, YUKON COAST
D.L. FORBES, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To develop integrated sedimentation models applicable to an estuarine delta in a tundra and permafrost environment; to consider the stability of the system and its potential response to artificial changes resulting from pipeline construction or oil spills; to consider the utility of the Babbage River delta as a small scale research analogue for the Mackenzie delta.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

6.0044, SUBSURFACE CONTAINMENT OF SOLID RADIOACTIVE WASTES
J.E. GALE, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To determine the best host rock in the Precambrian Shield area of Ontario for containing radioactive solid wastes.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

6.0045, COASTAL EROSION-SEDIMENTATION, SOUTHEAST MELVILLE ISLAND
P. MCLAREN, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: 1) To map the modern sedimentary environments of the coast of eastern Melville and Byam Martin Island and to study the rates of the various active sedimentary processes with particular reference to the role of permafrost and sea ice movement in the shore and nearshore zones; 2) to provide basic data to assess the impact of various human activities on the natural balance of processes with particular reference to gas pipeline concerns; 3) to gather data that will elucidate the geological history of the area.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

6.0046, COASTAL EROSION-SEDIMENTATION, BARROW STRAIT REGION
R.B. TAYLOR, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To map the modern sedimentary environments of the coasts of northern Somerset Island and adjacent islands with particular reference to the processes controlling erosion, transportation, and deposition of sediments and the role of permafrost and sea ice movement. To provide basic data that will help assess the impact of the various human activities on the natural balance of processes with particular reference to gas pipeline concerns.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

6.0047, TERRAIN STUDIES, JAMES BAY POWER DEVELOPMENT AREA
J.S. VINCENT, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To map, describe and explain the unconsolidated deposits and associated landforms to provide information on the nature and thickness of materials, their properties and inferred performance, groundwater occurrence, nature and rate of landscape processes, organic cover and permafrost and ground ice. To investigate the modern erosional and sedimentological processes in and along rivers, estuaries and coasts to document the rate and controls of erosion and sedimentation under natural conditions, to predict the changes that may result from artificial control of river flow and to provide geological information concerning the varied environmental hazards and impacts that may result from hydroelectric and other developments.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

6.0048, ENVIRONMENTAL IMPACT OF THE MINERALS INDUSTRY IN CANADA
E.A. RIPLEY, Univ. of Saskatchewan, *Saskatoon, Saskatchewan, Canada*

OBJECTIVES: 1. Identification of the quantity and quality of the outputs, having environmental impact, of the important branches of the minerals industry in Canada. Coal is included, but petroleum and natural gas are not. 2. Review of the actual and potential effects of these emissions on terrestrial and aquatic ecosystems and on man. 3. Assessment of the capacity of the environment (on local, regional and national bases) to absorb and dissipate these emissions. 4. Review of the extent and impact of surface disturbance resulting from activities in the minerals industries and assembly of information on the problems involved in reclamation.

CURRENT PLANS: The objectives will be achieved by reviewing existing information. No new research will be carried out. Results of the review will identify problem areas and instances where further information will be required.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

6.0049, PARAMETERS NECESSARY OR THE REGULATORY ASSESSMENT OF THE SUITABILITY OF CANADIAN ROCK FORMATIONS FOR DISPOSAL OF RADIOACTIVE WASTE (ABBREV)
UNKNOWN, Dames & Moore, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

6.0050, EXPERIMENTAL & ANALYTICAL ANALYSIS FOR THE CONFIRMATION OF A TEST METHOD OF TYPE B CONTAINERS USED IN THE TRANSPORT OF RADIOACTIVE MATERIALS
UNKNOWN, Dilworth Secord Meagher Assoc., *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0051, STUDY TO INVESTIGATE THE PROCESS OF RISK ASSESSMENT IN NATIONAL, PROVINCIAL AND LOCAL POLICY DECISIONS ON NUCLEAR POWER
I. BURTON, Univ. of Toronto, Inst. for Environmental Stud., *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0052, THERMAL EFFECTS OF GENTILLY-LAPRADE QUEBEC NUCLEAR PLANTS ON MIGRATORY BIRDS AND MARSH VEGETATION OF ST. LAWRENCE RIVER (ABBREV)
G. VAILLANCOURT, Univ. of Quebec, *Trois Rivieres, Quebec, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0053, PRELIMINARY STUDY OF THE ENVIRONMENTAL EFFECTS OF VARIOUS SEA BED EXPLOITATION SCHEMES
UNKNOWN, Envirocon Limited, *Vancouver, British Columbia, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

6.0054, FORMULATION OF ENVIRONMENTAL PROTECTION GUIDELINES FOR STRIP MINING
UNKNOWN, Envirocon Limited, *Vancouver, British Columbia, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0055, STUDY OF THE RELATIONSHIP BETWEEN MATERNAL IRRADIATION AND DOWN'S SYNDROME
B.K. TRIMBLE, Univ. of British Columbia, *Vancouver, British Columbia, Canada*

The proposed project is designed to retrieve human epidemiological data which might help to indicate the magnitude of the problem of genetic risks to man due to ionizing radiation. Large numbers of relevant observations pertaining to the question of whether maternal irradiation is a significant cause of human non-disjunction leading to the birth of a child with Down's syndrome will be obtained through computer and manual linkages of

existing vital, health and radiology clinic records. This study would be unique both in terms of the numbers of cases of Down's syndrome ascertained--approximately 1,000--and the fact that histories of maternal irradiations would be obtained from existing vital and clinical records rather than relying solely on a mother's ability to recall irradiations that she might have received ten or more years previously.

The proposed study would be designed to harmonize as closely as possible with an experimental protocol recommended by an Expert Group of the Nuclear Energy Agency of the Organization for Economic and Cooperative Development. This protocol has been suggested for a proposed cooperative international programme relating to human epidemiological studies which might help to clarify the extent to which exposures to small doses of ionizing radiation may lead to the births of abnormal children. This proposed study would constitute a Canadian contribution to this cooperative international programme.

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

6.0056, STUDIES OF GEOCHEMICAL RETARDATION OF RADIONUCLIDE IN REPRESENTATIVE UNCONSOLIDATED CANADIAN GEOLOGIC MATERIAL

J.A. CHERRY, Univ. of Waterloo, *Waterloo, Ontario, Canada*

Undertake a research program to resolve specific problems related to the transport of trace quantities of radionuclides through porous geologic materials as outlined in Document dated May, 1974 and entitled 'Studies of Geochemical Retardation of Radionuclides in Representative Unconsolidated Canadian Geologic Materials'.

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

6.0057, INVESTIGATION OF THE TECHNICAL AND ECONOMIC FACTORS RELATED TO THE CLEANUP OF RADIOACTIVE CONTAMINATION AT PORT HOPE, ONTARIO

UNKNOWN, James F. Maclaren & Assoc. Ltd, *Willowdale, Ontario, Canada*

SUPPORTED BY Canada - Atomic Energy Control Board - Ottawa, Ontario

6.0058, PRESENTATION OF A REPORT ON ENVIRONMENTAL PROTECTION ACTIVITIES RELATED TO THE PROPOSED MACKENZIE VALLEY GAS PIPELINE

UNKNOWN, Templeton Engineering Co., *Winnipeg, Manitoba, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0059, STUDY ENTRAINMENT AND EMULSIFICATION OF CRUDE OIL IN ARCTIC SEA ICE INCLUDING RECOVERY AND REMOVAL OF BALAENA BAY (ABBREV)

UNKNOWN, Norcor Engin. & Res. Limited, *Yellowknife, North West Terr., Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

6.0060, ENVIRONMENTAL RADIOACTIVITY MONITORING

H.M. ZUNIGA, Natl. University, *Heredia, Costa Rica*

SUMMARY OF PROJECT: Studies on the food chain, under local environmental conditions: a) Establish/determine the critical radionuclides; pathways and groups of the population. 1) Plant life-uptake studies of certain radionuclides from continuous discharges and from foliar contamination. 2) Animal life (molluscs, fish and crustaceans in streams) studies on uptake, whether activity reconcentrates in meat, shells or bones. 3) Studies of possible reconcentration. 4) Studies on eating habits of groups of population likely to be affected most. b) Determine radioactivity in certain items of diet available to population in order to establish dose commitments. 1) Analyses of locally produced meat, poultry, vegetables, fish, milk, etc. 2) Analyses of imported foodstuffs, including canned products. Establishment of basic requirements of environmental monitoring programme in the vicinity of nuclear installations: a) Local measurement and analysis of the amount, variation and nature of radioactivity on the surface, relations with geological formation. b) Collection, review and evaluation of the different environmental monitoring programmes under normal conditions and accident conditions.

ADDENDA: Performing organization: Universidad Nacional.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0061, STUDIES OF MIGRATION AND DISPERSION OF RADIONUCLIDES FROM THE STORAGE OF RADIOACTIVE WASTES

Z. DLOUHY, Nuclear Research Institute, *Prague, Czechoslovakia*

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0062, RESEARCH INTO THE BEHAVIOUR AND TRANSPORT OF RADIONUCLIDES IN WATERS

A. MANSFELD, Water Research Institute, *Prague 6, Czechoslovakia* 16062

Treatment of available data on the transport of radionuclides in receiving waters with special regard to the study of the sorption effect on bottom sediments.

Evaluation of work done up to present - proposal and testing of a work procedure permitting appraisal of sorption characteristics of sediments under static or dynamic conditions.

Discussion and evaluation of results obtained.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0063, AIR CONTAMINATION FROM AUTOMOBILES

UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

Aim of the project is to set up models for computing the contamination from, and consumption by, cars for use in the subsequent calculation of possible legislative influence.

SUPPORTED BY Denmark - Danish Government - Copenhagen

6.0064, THE NARSSAQ PROJECT -- AN ENVIRONMENTAL-GEOCHEMICAL-ECOLOGICAL RESEARCH PROJECT

UNKNOWN, Univ. of Copenhagen, Inst. of Petrology, *Copenhagen, Denmark* 1168

Initiative by professor H. Sorensen, Institute of Petrology, director K. ELLITSGAARD RASMUSSEN, Greenland Geological Survey and state Council for Natural Sciences. A geochemical-ecological environment study is being conducted in the NARSSAQ region of southern Greenland in order to known the natural background in the important ecosystems of the region for a possible utilization of the uranium and zirconium deposits. Besides uranium and zirconium, the area is rich in other rare elements such as niobium, tantalum, lithium, rubidium, rare-earth metals, etc., elements whose toxicology is very little known. The investigations include rock, soil, water, plants and animals.

SUPPORTED BY Denmark - Danish Government - Copenhagen

6.0065, METEOROLOGY

UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

The purpose of the project is to establish both the expertise and the data base for meteorological-climatological evaluation of the environmental problems in connection with nuclear plants.

The project includes 1) border meteorology; 2) climatology; 3) technological development of meteorological measuring instruments, etc.; 4) applied meteorology, including meteorology of dispersion, dynamic wind load, etc.

SUPPORTED BY Denmark - Danish Government - Copenhagen

6.0066, RADIOECOLOGY
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

The radioactive contamination from nuclear weapon research and the THULE accident with plutonium in 1968 provide the essential basis for this research, which at the same time serves as a routine review of the radioactivity levels in our environment.

The aim of the project is to describe the radioactive material presence in nature, so that the possible consequences of radioactive escape into the environment can be predicted and, where possible, countered.

SUPPORTED BY Denmark - Danish Government - Copenhagen

6.0067, HANDLING AND STORING RADIOACTIVE WASTE
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

This is an AEC project that leads naturally into the development work and planning that provide a background for possible use of atomic power in Denmark. Some of the experience with the handling of low-activity waste is gained from RISO's daily operation. Basic information is also available from the various departments of the research station.

The aim of the project is to demonstrate methods of safe handling and storage of various types of radioactive waste. Emphasis is put on various types of cleaning processes, burning of the combustible materials, and evaluation of the rate of spread of the released radioactive material in the ground under the influence of flowing underground water.

SUPPORTED BY Denmark - Danish Government - Copenhagen

6.0068, CONSEQUENCES OF RELEASE OF CONTAMINANTS INTO THE ATMOSPHERE
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

On the initiative of the Physical Health Department, the Group for General Safety has begun to work out a basis on which the authorities and the electric power plants can appraise the health consequences of the erection of atomic power plants in the vicinity of Denmark.

The purpose of the project is to devise and use methods of computing the spreading in the atmosphere of the radioactive and other materials emitted from a source such as a nuclear power plant. Short-lived concentrations as well as general and radiation effects on humans are being computed for the area within the boiler room or near it as a result of direct radiation from the cloud, from inhalation, or from the depositing of the material on the surface of the earth. The method makes possible a computing of both individual and community doses. The community doses are based on a mapping of the population distribution in Denmark in 1970 and 1985.

SUPPORTED BY Denmark - Danish Government - Copenhagen

6.0069, PERSONAL DOSIMETRY AND AREA DOSIMETRY
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

For several years the Physical Health Department has been occupied, within its Dosimetry Group, with the study and development of dosimetry, primarily thermoluminescence dosimetry (TLD). Among other things this work has provided a basis for providing personnel dosimetry at RISO.

A complete TLD system has been developed which is used both at RISO and at Swedish nuclear power plants through a joint project with AB Atomenergi at Studsvik.

The purpose of the project is to further develop TL-dosimetry through research on various TL-phosphors and their properties with a view toward developing better dosimeters for use in mixed radiation fields which appear at nuclear power plants and during the medical use of radiation and for area dosimetry (weak radiation doses).

SUPPORTED BY Denmark - Danish Government - Copenhagen

6.0070, SOURCE IDENTIFICATON IN URBAN AREAS
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

The burning of fossil fuels produces SO2, which, among other things, is converted to sulfuric acid in the atmosphere. The resultant contamination can be limited by the use of high chimneys. Dissemination in urban areas has, however, not been studied thoroughly enough to make possible a quantitative estimate of the effect.

The project was initiated by the RISO Meteorological and Aerosol Laboratory with support by the Ministry of the Environment.

SUPPORTED BY Denmark - Danish Government - Copenhagen

6.0071, PHYSICAL AND CHEMICAL BEHAVIOR OF SULFUR DIOXIDE IN THE ATMOSPHERE
UNKNOWN, Atomic Energy Commission, Aerosol Laboratory, *Roskilde, Denmark*

The burning of fossil fuels produces SO2, which, among other things, is converted to sulfuric acid in the atmosphere. The resultant contamination can be limited by the use of low-sulfur oil and high chimneys. In order to determine whether such methods are satisfactory, a project under the 'European Cooperation in the Field of Scientific and Technical Research (COST)' has been initiated, in which nine European countries are taking part with independent partial projects.

The purpose of the Danish partial project is the investigation of the conversion reactions of sulfur dioxide in the atmosphere, with special attention on contamination from oil-fired power plants.

SUPPORTED BY Denmark - Danish Government - Copenhagen

6.0072, DEVELOPMENT PROBLEMS FOR THE INSERTION OF ORBITAL SYSTEMS FOR ENERGY PRODUCTION WITH RESPECT TO ENERGY TRANSMISSION AND THE ENVIRONMENT
D. KUEHN, A E G Telefunken AG, *Backnang, Federal Republic of Germany* 7150

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0073, SOLIDIFYING FISSION PRODUCTS IN CERAMIC MATTER
H.W. LEVI, Hahn Meitner Inst. Nuc. Res., *Berlin 39, Berlin, Federal Republic of Germany* 1000

ADDENDA: Performing organization: Hahn Meitner Inst. Fur Kernforschung GMBH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0074, SYSTEMS ANALYSIS OF RADIOACTIVE WASTE MANAGEMENT
H.W. LEVI, Hahn Meitner Inst. Nuc. Res., *Berlin 39, Berlin, Federal Republic of Germany* 1000

ADDENDA: Performing organization: Hahn Meitner Inst. Fur Kernforschung GMBH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0075, ESTABLISHMENT OF WASTE DUMPS MEETING THE STANDARDS OF ENVIRONMENTAL CONSERVATION & ALLOWING FOR LANDSCAPE CONSERVATION & AREA PLANNING
R. KOHLING, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECT: Mining technology and coal preparation.

FIELD: Development of new process techniques.

OBJECTIVE: Dumping the large quantities of washing waste generated as a result of the increased utilization of the caving method becomes increasingly difficult. Consequently, this investigation is aimed at determining the feasibility of dumping the generated waste material in way to meet the standards of environmental conservation.

WORK PROGRAM: 1. Evaluation of experience acquired in other industries. 2. Development of model situations. 3. Establishment of model waste dumps.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

6.0076, PRODUCING ENVIRONMENTALLY HARMLESS FUELS
SCHINZEL, Mining Research Gmbh, *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0077, STUDY CONCERNING THE EFFECTS OF THE STORAGE OF LIQUID RADIOACTIVE WASTES IN SALT BEDS
B. OBERBACHER, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0078, SYSTEMS ANALYSIS OF RADIOACTIVE WASTE MANAGEMENT
H. DYROFF, Nukem Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0079, DEVELOPMENT OF SHIPPING CONTAINERS FOR RADIOACTIVE SUBSTANCES
R. CHRIST, Transnuklear Gmbh, *Hanau 11, Hessen, Federal Republic of Germany* 6450

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0080, PRODUCING ENVIRONMENTALLY HARMLESS FUELS
W. HARMANN, Eschweiler Mining Union Co., *Herzogenrath-kohlscheid, Federal Republic of Germany* 5120

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0081, PRODUCING ENVIRONMENTALLY HARMLESS FUELS
A. FUCHS, Sophia Jacoba Trade Union, *Huckelhoven, Federal Republic of Germany* 5142

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0082, PRODUCING ENVIRONMENTALLY HARMLESS FUELS
KROENER, Preussag Coal AG, *Ibbenburen, Federal Republic of Germany* 4530

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0083, SYSTEMS ANALYSIS FOR RADIOACTIVE WASTES IN THE GERMAN FEDERAL REPUBLIC
E. MERZ, Juelich Nuclear Res. Ctr., *Juelich 1, Nordrhein Westfalen, Federal Republic of Germany* 5170

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0084, EXPANDING THE STORAGE CAPACITY OF MODERATELY ACTIVE WASTE SOLUTIONS AT THE KARLSRUHE REPROCESSING INSTALLATION (WAK)
G. ENGELHARDT, Soc. for Nuc. Research, *Karlsruhe 1, Baden Wuerttem., Federal Republic of Germany* 7500

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0085, CONSTRUCTING A SITE FOR SOLIDIFYING MODERATELY RADIOACTIVE WASTE
G. ENGELHARDT, Soc. for Nuc. Research, *Karlsruhe 1, Baden Wuerttem., Federal Republic of Germany* 7500

ADDENDA: Performing organization: Gesellschaft fur Kernforschung MBH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0086, STORAGE AND EVAPORATION OF HIGHLY RADIOACTIVE LIQUID WASTE (LAVA), SUPPLYING POWER PLANTS
G. ENGELHARDT, Soc. for Nuc. Research, *Karlsruhe 1, Baden Wuerttem., Federal Republic of Germany* 7500

ADDENDA: Performing organization: Gesellschaft fur Kernforschung MBH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0087, HAZARD EVALUATION OF ACTINIDE-BEARING WASTES FROM POST-FISSION OPERATIONS IN THE U/PU FUEL CYCLE AND WASTE MANAGEMENT ALTERNATIVES
H.O. HAUG, Soc. for Nuc. Research, High Temperature Chem. Inst., *Karlsruhe 1, Baden Wuerttem., Federal Republic of Germany* 7500

It has been claimed that the long-term problems associated with the final disposal of high-level wastes (HLW) might be reduced by separation and nuclear incineration of the long-lived radionuclides. Presently neither chemical separation nor physical elimination processes are available on a technical scale. Because the advantages of such an expansion of the nuclear fuel cycles to a partitioning and transmutation cycle is by no means demonstrated, we see the need to first evaluate whether there is a real necessity, and a real benefit of such a procedure.

According to the evaluations we have so far carried out there is indeed no need for actinide partitioning from HLW. This consideration should be confirmed by evaluation of lacking data and comparative risk assessment of alternative waste management concepts.

Contributions are proposed to reference fuel reprocessing flow sheets and waste balance, properties and amounts of actinide

bearing wastes, hazard criteria, and assessment of potential hazards of actinide bearing wastes in the proposed fuel cycle and alternative processing and recycle flowsheets.

ADDENDA: Performing organization: Institut fur Heisse Chemie.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0088, SYSTEMS ANALYSIS OF RADIOACTIVE WASTE MANAGEMENT

R. KOEBEL, Soc. for Nuc. Research, *Karlsruhe 1, Baden Wuerttem., Federal Republic of Germany* 7500

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0089, INVESTIGATION OF TRITIUM LEVEL IN THE ENVIRONMENT OF THE KARLSRUHE NUCLEAR RESEARCH CENTER

L.A. KONIG, Soc. for Nuc. Research, *Karlsruhe 1, Baden Wuerttem., Federal Republic of Germany* 7500

The tritium level is investigated of the immediate and more distant environment of the Karlsruhe Nuclear Research Center. In the Upper Rhine Valley between Kehl and Mannheim samples of surface water and drinking water are taken while additional samples of precipitation and plants are collected in the immediate vicinity of the Karlsruhe Nuclear Research Center.

The main objectives of the program consist of the determination of the environmental burden caused by tritium released from the Nuclear Research Center as well as in the study of the radioecological behaviour of tritium. The tritium concentration of the water samples is determined using liquid scintillation technique.

BIBLIOGRAPHIC REFERENCES: (1) L.A. Konig, M. Winter, H. Schuler, W. Tachlinski. Investigation of the Tritium Level in the Environment of the Karlsruhe Nuclear Research Center, KFK-Ext. 20/76-1 (1976).

ADDENDA: Performing organization: Gesellschaft fur Kernforschung mbH.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0090, RADIOACTIVE WASTE MANAGEMENT IN THE FEDERAL REPUBLIC OF GERMANY

R. KROEBEL, Soc. for Nuc. Research, *Karlsruhe 1, Baden Wuerttem., Federal Republic of Germany* 7500

ADDENDA: Performing organization: Gesellschaft fur Kernforschung MBH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0091, COORDINATED RESEARCH PROGRAMME IN THE FIELD OF NUCLEAR ACCIDENT DOSIMETRY

E. PIESCH, Soc. for Nuc. Research, *Karlsruhe 1, Baden Wuerttem., Federal Republic of Germany* 7500

The object of the coordinated programme is to carry out a systematic study of the characteristics of radiation detectors currently in use or being developed for use in nuclear accident dosimetry. The Karlsruhe Nuclear Research Center will participate on an international intercomparison of nuclear dosimetry systems with the routine personnel dosimeter, the phosphate glass dosimeter and threshold detectors. Additional detectors are a belt of polycarbonate foil using the neutron induced recoils and (n,alpha) reaction in the plastic foil for a detection of neutrons greater than 1 MeV, and a new developed LiF albedo dosimeter. Once more the effect of fission neutrons on the reading of gamma dosimeters will be studied on different phosphate glass and LiF dosimeters.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0092, INVESTIGATIONS OF EFFECTS OF THERMAL DISCHARGES INTO RIVER WATERS

W. SCHIKARSKI, Soc. for Nuc. Research, *Karlsruhe 1, Baden Wuerttem., Federal Republic of Germany* 7500

Operation of a hydrological and meteorological data gathering station in the river Rhine near Rheinhausen/Speyer downstream from the nuclear power plant in Philippsburg; measurement of heat exchange data between water and atmosphere; measurement of visibility and oxygen content in the river water as a function of hydrological and meteorological conditions; correlation of heat fluxes to general available meteorological parameters; evaluation of measured data to provide input for cooling-off models.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0093, SPECIAL ASSIGNMENT FOR HANDLING AND DISPOSAL OF RADIOACTIVE WASTES

K. KUEHN, Soc. for Radiation & Env. Res., *Neuherberg, Bayern, Federal Republic of Germany* 8042

ADDENDA: Performing organization: Gesellschaft Fur Strahlen und Umweltforschung MBH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0094, SYSTEMS ANALYSIS OF RADIOACTIVE WASTE MANAGEMENT

K. KUEHN, Soc. for Radiation & Env. Res., *Neuherberg, Bayern, Federal Republic of Germany* 8042

ADDENDA: Performing organization: Gesellschaft Fur Strahlen und Umweltforschung MBH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0095, EVALUATION OF THE KONRAD SHAFT FOR SUITABILITY FOR THE STORAGE OF RADIOACTIVE WASTES

K. KUEHN, Soc. for Radiation & Env. Res., *Neuherberg, Bayern, Federal Republic of Germany* 8042

ADDENDA: Performing organization: Gesellschaft Fur Strahlen und Umweltforschung MBH (GSF).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0096, STUDY CONCERNING THE CIRCULATION OF ALPHA RADIATION IN THE SELF-DEVELOPED NUCLEAR ENERGY ECONOMY OF THE GERMAN FEDERAL REPUBLIC

W. MEYERJUNGNICK, Systec Sys. Plan. Consult. Co., *4000 Dusseldorf, Nordrhein We., Federal Republic of Germany*

ADDENDA: Performing organization: System Planung und Industrieberatung.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0097, PRODUCING ENVIRONMENTALLY HARMLESS FUEL

H. BECKER, Ruhr Coal AG, *4102 Homberg, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0098, SOLIDIFYING HIGHLY RADIOACTIVE WASTE SOLUTIONS BY METALENCASING HIGHLY RADIOACTIVE GLASS PRODUCTS
W. HEIMERL, Gelsenberg AG, *4300 Essen 1, Nordrhein Westf., Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0099, FUTURE TRANSPORT CAPACITY FOR RADIOACTIVE MATERIAL AND POSSIBLE CONSEQUENCES
H. BONNENBERG, Bonnenberg & Drescher Gmbh, *5173 Aldenhoven Schleiden, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0100, SYSTEMS ANALYSIS OF RADIOACTIVE WASTE MANAGEMENT
W. HEINZ, Soc. for Nuc. Fuel Reproc., *7501 Leopoldshafen, Baden Wue., Federal Republic of Germany*
ADDENDA: Performing organization: Kernbrennstaff Wiederaufarbeitungs Gesellschaft.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

6.0101, TRITIUM EXPERIMENTS IN ARCTIC AND SUBARCTIC ECOSYSTEMS
J.K. MIETTINEN, Univ. of Helsinki, *Helsinki, Finland*
In August 1972, 3 forest plots were labelled with tritium by simulated rain (about 500 microcuries/l) at the Ruotsinkyl a Forest Research Station near Helsinki, employing 41 square meters containing mCi H3 per liter and two similar plots were labelled in September 1972 at the Muddusniemi Agricultural Research Station at Kaamanen.
New forest plots (70 square meters about 5 nCi 3H/m2) were labelled in July 1973 both in Ruotsinkyla and in Kaamanen. Analysis of these plots has been continued to this date and will be performed for at least one more year because the maximum of the tritium pulse in the soil is still at the depth of about 1 m and the tritium activities are measurable.
In addition to cellular water, protein and nucleic acid fractions of the plants will be studied for the possible incorporation of tritium. The purified fractions are oxidized to water in a quartz tube and thereafter measured for tritium. Background determinations for specific labelling of free aminoacids and DNA in pea plant grown 2 to 5 weeks in HTO are determined after chromatographic separation and purification.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0102, TREATING WASTE WATER FROM SECONDARY CIRCUITS
PASQUINI, Atomic Energy Commission, Cadarache Nuclear Res. Center, *Cadarache, France*
ADDENDA: SUPPORTING AGENCY: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Cadarache, Division de Chimie.

SUPPORTED BY France - Atomic Energy Commission - Paris

6.0103, BEHAVIOR OF NUCLEAR WASTES IN SEA WATER
P. BOVARD, Atomic Energy Commission, *Paris, France*
Research concerning the products of activation (particularly cobalt, zinc, and manganese) continues, with special emphasis on the physicochemical behavior of cobalt in sea water.
Clarification of experimental techiques concerning plutonium (in particular equipment for protection of personnel) will soon be completed; these techniques will be applied in the months to come.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0104, RESEARCH WITHIN THE FRAMEWORK OF A COORDINATED PROGRAMME ON NUCLEAR ACCIDENT DOSIMETRY
B. MICHEL, Atomic Energy Commission, *Paris, France*
The SNAC spectrometer, which constitutes the basis of the French system of nuclear accident dosimetry, is not sufficient in the particular case in which the high fission sources are located behind heavy metal screens.
For sources rich in neutrons of intermediate energy it is necessary, in order to define the spectra, to use a very large number of detectors.
SESR/DSN studies: Development of new detectors and clarification of corresponding measurements; standardization of the detectors at the STIRCA irradiation station or Cadarache; an attempt to compare the detectors with corresponding reactors (SILENE reactor behind a steel screen, VIPER reactor, CALIBAN reactor); and an adaptation of computer program SESR 1590 to use the detector system and determine corresponding linear formulas for routine use in standardized measurement.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0105, TURBULENT ATMOSPHERIC DIFFUSION PHENOMENA ASSOCIATED WITH GASEOUS WASTES FROM NUCLEAR THERMAL POWER STATIONS
UNKNOWN, Electricite de France, *Paris, France* 76008
Perfecting techniques for in situ examination allowing us to follow the development of clouds or plumes of gaseous effluents in the air and to measure the characteristic parameters of this development.
Perfecting a group of methods for calculating the atmospheric diffusion of gaseous effluents, adapted to various types of nuclear thermal power station wastes (continuous, discontinuous) to the existing meteorological infrastructure and to different space and time scales.
Validating the theoretical results of numerical models, using corresponding measurements obtained on location.
Adapting in situ measurement techniques and computation methods so that they will be able to take into account local meteorological phenomena (seaside location, valley location, etc.)
ADDENDA: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

6.0106, AIR POLLUTION RELATED TO THE OPERATION OF COOLING SYSTEMS
UNKNOWN, Electricite de France, *Paris, France* 76008
Study of the formative conditions of plumes from air cooling towers ('wet', 'wet/dry' coolants), local climatic changes, precipitation in the neighboring areas - examining methods of counteracting water intake and the reduction of vaporization in wet coolants. Study of evaporation mists related to the operation of open circuit cooling systems.
ADDENDA: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

6.0107, ESTIMATING AND CONTROLLING THE HEATING OF WATER
UNKNOWN, Electricite de France, *Paris, France* 76008
Developing techniques of measuring and controlling temperatures in aquatic areas receiving or likely to receive hot water ejected by thermal power stations (especially developing infrared air teledetection techniques).

ADDENDA: SUPPORTING AGENCY AND PERFORMING ORGANIZATION: Electricite de France, Direction des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

6.0108, PHYSICAL STUDY OF THE PHENOMENA OF ENERGY EXCHANGE BETWEEN WATER AND THE ATMOSPHERE
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Study of the mechanism of energy exchange between water and the atmosphere.

Our goal is to perfect a method of rapidly determining the coefficients of exchange needed for studying the behavior of hot water pumped into streams, lakes, estuaries, and the sea by thermal power stations. We must simultaneously perfect corresponding measurement techniques. This program includes the study of stratification in reservoirs related to energy exchanges.

ADDENDA: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

6.0109, DRY AIR COOLANTS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

We will study a dry coolant characterized by: a. An exchange surface consisting of flat plates reducing the loss of charge in the thermal exchange zone and simplifying construction; b. A natural circulation of air; and c. An intake stack of a height limited to 30 M, for limiting esthetic problems.

The program anticipates: a. Laboratory tests on assemblies of approximately 60 plates; b. The creation of a 3.5 MW prototype coolant and of the corresponding testing station in 1975; c. Retiming thermal stress codes; and d. Testing models in wind tunnels to study the effects of wind on the performance of air coolants.

ADDENDA: Supporting agency and Performing Organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

6.0110, POWER STATION LOCATIONS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

In addition to actual studies of sites, this project includes a certain number of developmental studies. These are: A. Theoretical and experimental study of the dispersal of 'thermal smears' by tides, wind, and the swell; B. Perfecting a 2-dimensional code for calculating stratified flow; C. Establishing a code for calculating currents created by steady or varying winds; D. Establishing a computation code for predicting the formation of plumes visible in the adjacent area; E. Establishing a computation code for a jet under a cross current; and F. Perfecting and extending computation codes for flow in a 2-dimensional area.

ADDENDA: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

6.0111, PHYSICAL-CHEMICAL AND BIOLOGICAL STUDIES ON LOCATION, PRIOR ESTIMATES AND CONTROL
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Using the ecology 'laboratory on wheels' for in situ measurements.

Defining methods of measurement and organization of campaigns; studying water pollutants in coolant water circuits of power stations; in situ study of eutrophication caused by organic pollution (primary production-photosynthesis-self-purification).

ADDENDA: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

6.0112, ECOLOGICAL EFFECTS OF THE HEATING OF WATER BY THERMAL AND NUCLEAR POWER STATIONS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Study of the effect of hot water effluent from power stations on land and water flora and fauna: a. Studying bibliographical summaries; b. Laboratory studies (Montereau University hydrobiology laboratory). This problem has become more serious because of the increasing size of production units.

ADDENDA: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

6.0113, PHYSICAL-CHEMICAL BEHAVIOR AND PROCESSING OF POLLUTED WATER
UNKNOWN, Electricite de France, *Paris*, *France* 76008

We must determine the physical-chemical and chemical parameters characterizing an area of polluted water in order to understand the processes of self-purification and photosynthesis which take place in such an area. This presupposes the perfection of quantitative methods of determining the amounts of the various pollutants and dissolved oxygen present completed by an in-depth study of the measurement apparatus and its reliability. The oxygen-reduction properties of certain compounds capable of reacting with oxygen, depending on the dynamics of temperature and the presence or absence of catalysts, have direct effect on self-purification capacity and should be studied. This product also includes studies concerning the prevention and processing of wastes from thermal power stations, as well as methods of electrochemically purifying water in relation to the development of applications of electricity.

SUPPORTED BY France - Electricite de France - Paris

6.0114, ANALYZING THE COST OF SOUNDPROOFING PRODUCTION AND TRANSFORMATION PLANTS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

We plan to: a. Gather economic data pertaining to the fight against noise in EDF equipment (especially production units); b. Show the economic advantages of a modified conception of the choice and lay of the land of a site, of the orientation of the production unit. This concerns the fight against noise pollution.

ADDENDA: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

6.0115, ACOUSTIC ENGINEERING METHODOLOGY
UNKNOWN, Electricite de France, *Paris*, *France* 76008

Acoustic engineering of major production units: 1. Perfect computation codes for defining the internal and external noise levels of units in a given plant; 2. Study typical power stations in order to optimize action to be taken to ensure protection of their surroundings, and operating and maintenance personnel from noise.

ADDENDA: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

6.0116, PERFECTING AND CONSTRUCTING AN ISOTHERMIC DIFFUSION WIND TUNNEL ADAPTED FOR STUDYING SPECIAL PROBLEMS OF NUCLEAR POWER STATIONS
UNKNOWN, Electricite de France, *Paris*, *France* 76008

The objective determination of local atmospheric diffusion conditions in nuclear power station locales necessitates perfecting and making available techniques of physical simulation in the locations concerned. Thanks to former studies since 1965 related to the large thermal diffusion wind tunnel project, we can develop in a short time a simple wind tunnel which is well adapted to the special problems of nuclear stations (in view of the objective termination of local atmospheric diffusion conditions). This wind tunnel will be achieved through universty-industry cooperation. This has 2 advantages: a. It guarantees outsiders the information acquired on this type of structure; b. It minimizes operating costs (university personnel).

ADDENDA: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

6.0117, PROPOSED NUCLEAR PLANTS STUDIED FROM THE POINT OF VIEW OF ATMOSPHERIC DISPERSAL OF GASEOUS EFFLUENTS

UNKNOWN, Electricite de France, *Paris*, *France* 76008

Take into account relatively low emission levels and the existence of various structures within the area (buildings, air cooling installations, etc.). Study of each location's condition of diffusion in the neighborhood of the source of emission is useful. Define a method of studying locations where aerodynamic effects are caused by obstacles such as buildings and cliffs, especially the wind flow structure and its dispersive properties as regards wastes. Study interactions between various types of gaseous effluent plumes (plumes caused by condensation of air coolants, radioactive waste plumes). Include these phenomena in a more general computation model.

ADDENDA: Supporting agency and Performing organization: Electricite De France Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

6.0118, SYSTEMATIC CONTROL OF EQUIPMENT NOISE

UNKNOWN, Electricite de France, *Paris*, *France* 76008

Characterize each new unit from the point of view of noise from the day it begins to operate, using a systematic and global study of the noise levels present in all areas of plants accessible to operating personnel and to areas adjoining the location. Compare the various technologies and concepts of production, transportation, and transformation units from the point of view of noise. See that the 'noise' clauses of the CPT and CSCT of equipment used in production units is respected.

ADDENDA: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

6.0119, NOISE AND OTHER TYPES OF POLLUTION CREATED BY INSTALLATIONS

UNKNOWN, Electricite de France, *Paris*, *France* 76008

This project has 3 main goals: Development of pollution in neighboring areas; Personnel safety; Continuous monitoring of noise levels in neighboring areas and estimating the equivalent level.

ADDENDA: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

6.0120, A PRIORI AND A POSTERIORI STUDIES OF THE RISK OF AIR POLLUTION IN ORDINARY THERMAL POWER STATION LOCATIONS

UNKNOWN, Electricite de France, *Paris*, *France* 76008

Perfecting a group of in situ examination techniques for following the development of gaseous effluent plumes in the atmosphere and for measuring the characteristic parameters of this development. Perfecting air pollution estimation methods adapted for ordinary thermal power stations and for the different space and time scales of this phenomenon (short, long distance pollution). Developing techniques for identifying the effect of a power station on observed pollution levels. Developing a methodology for the best organization of an air pollution control network. This project has an obvious bearing on perfecting a priori air pollution estimation techniques in locations being developed and equipped. For stations already in operation, it establishes objective criteria for forseeing the risks of pollution and thus modifying the conditions under which a power station operates; these criteria have been noted case by case according to the meteorological characteristics of the locations (a posteriori studies).

SUPPORTED BY France - Electricite de France - Paris

6.0121, EXAMINING THERMAL POWER STATION SITES USING AIR TECHNIQUES AND METEOROLOGICAL DATA

UNKNOWN, Electricite de France, *Paris*, *France* 76008

Designing and studying techniques to be utilized in ordinary and nuclear power station locations in order to obtain meteorological data characterizing local conditions of gaseous effluent diffusion. Analyzing and foreseeing the development (space and time) of atmospheric phenomena which limit the dispersal of gaseous effluents. Studying special meteorological conditions of certain types of locations (example: ocean breeze for seaboard locations).

ADDENDA: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

6.0122, HABITAT AND ECOLOGY

UNKNOWN, Electricite de France, *Paris*, *France* 76008

This project studies the harmonious insertion of different existing methods tending to make the best possible use of free energy and to reduce individual pollution.

Our basic task is to prepare the following types of products: a. Fully electric-solar energy. b. Fully electric-geothermal energy. c. Fully existing electric-other types of free energy. d. Fully electric-ecology.

ADDENDA: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

6.0123, HYDROCARBON ACCUMULATION IN SOILS

P. DEGRANGE, Ministry of Industry & Res., Bureau of Geol. Mining Res., *Paris 15E*, *France*

We worked with the Ministry of the Quality of Life to study hydrocarbon accumulation in soils. This study is part of the extension of our previous studies on the biodegradability of hydrocarbons (1974, RS 200).

The product selected was used oil discharged by automobiles, which although very difficult to follow as to biodegradation, is one of the most pervasive petroleum pollutants of soils.

Experiments were conducted in situ: we distributed a predetermined amount of oil on a small area of soil and followed it through the course of time and compared it with a control soil: oil penetration; physical and chemical changes of the soil, particularly in water and heavy metal content; microbiological changes.

ADDENDA: Joint project with Ministere de la Qualite de la Vie No. 7s/36. Supporting Agency and performing organization: Ministere de L'Industrie et de la Recherche Bureau de Recherches Geologiques et Minieres Service Geologique National.

SUPPORTED BY France - Ministry of Industry & Research - Paris

6.0124, STUDY OF THE MECHANISMS OF FORMATION OF NITRIC OXIDE IN FLAMES

G.G. DESOETE, Petroleum Institute, *Rueil Malmaison*, *France* 92502

SUMMARY OF PROJECT: NO emission from applied combustion is due to a double nitrogen source: 1) molecular nitrogen from the air and 2) organically bound nitrogen present in fossil fuels. Scope of the present study is to provide better information on the overall kinetics of NO formation from atmospheric and fuel nitrogen and to elucidate the implication of those mechanisms in practical industrial flames.

Experiments are made on premixed hydrocarbon/oxygen/nitrogen flames for the study of NO from N2 and on premixed hydrocarbon/oxygen/argon flames doped with small amounts of different organic nitrogen compounds (ammonia, amines, hydrocyanic acid, cyanogen), stabilized on water-cooled porous disc burners. From the profiles of the combustion products, nitrogen compounds and temperature, overall reaction

rates involving nitrogen compounds as reactants or as products are determined. The study covers the three main mechanisms of NO formation: 1) the thermal mechanism (prevailing the combustion products when N2 is the nitrogen source), 2) the so-called prompt-NO mechanism (prevailing in the flame front when N2 is the nitrogen source) and 3) the fuel-NO mechanism (formation of NO from fuel-nitrogen).

A systematical study is made on the effect of different modes of charge stratification on NO emission either from stationary or from non-stationary flames, including the effect of natural stratification realized in the diffusion flame.

ADDENDA: Supporting agency: Ministere de la Qualite de la Vie et de L'Environnement. Performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Ministry for The Quality of Life & Environ. - Paris

6.0125, AUTOMATIC POLLUTION DETECTION
UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

OBJECTIVE: Detect and evaluate pollution of the ocean.

SUMMARY: Try to determine the thickness of a layer of hydrocarbons on the ocean by using extremely-high frequency and super-high frequency waves; Eliminate the ambiguity of hydrocarbon detection by using UV lasers to excite the fluorescence of oil.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

6.0126, PURIFYING SULFUR FUEL EMISSIONS
UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

SUMMARY: Fuel oil, coal, and other fossil fuels will continue for a long time to be important in the world production of primary energy. For many such fuels, highly contaminated by sulfur in particular, preliminary treatment before combustion is difficult or economically unfeasible; we must therefore purify the combustion products. This project will develop a technique that will filter the sulfur compounds in exhaust gases, recover them in the form of elementary sulfur and prevent all significant subsequent gaseous, liquid, or solid wastes that are pollutants.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

6.0127, PROTECTING SEA WATER
UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

This project will enable IFF to participate with many non-French institutions in research within the national context of France that will identify, evaluate, and reduce the pollution of the ocean and will enable us to develop petroleum activities without destroying marine ecology.

ADDENDA: Supporting agency and performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

6.0128, FIGHT AGAINST POLLUTION - SPREAD OF HYDROCARBON LAYERS IN OCEANS
UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

OBJECTIVE: Estimate the spread of hydrocarbon layers in oceans under the effect of winds and currents, using mathematical models.

SUMMARY: An oil spring, considered the equivalent of a gushing well, yields a given quantity of crude oil. The pollutant thus accumulated spreads very rapidly to the surface of the water, and winds and currents carry it in one or more directions.

This study describes the spread of the layer of the spreading hydrocarbons; represents the transport and spreading of hydrocarbon layers through the action of wind and currents with horizontal speed, without including its vertical components of speeds and accelerations.

ADDENDA: Supporting agency and performing organization: Institute Francais du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

6.0129, FORMATION OF NITROGEN OXIDES BY A SPRAY BURNER FED WITH LIQUID FUEL CONTAINING NITROGEN PRODUCTS
A. WALBOTT, Petroleum Institute, *Rueil Malmaison, France* 92502

Research is being done with an experimental furnace with cold walls so that samples can be taken from within the flames. The furnace is equipped with an experimental burner so that all possible aerodynamic conditions can be created to simulate the ones found in operational fuel oil burners. The project includes the study of NO formation as a function of: 1) the aerodynamic conditions of the burner, 2) the volatility of the fuel, 3) the concentration and volatility of nitrogen additives, 4) the mass and temperature of the air.

An effort is made to apply theoretical data obtained in the IFP fundamental aerothermy laboratory, headed by Gerard De Soete, to industrial type diffusion flames.

ADDENDA: Supporting agency: Ministere de la Qualite de la Vie. Performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Ministry for The Quality of Life & Environ. - Paris

6.0130, JOINT CEA-GGA PROGRAM FOR TRANSPORTING FISSION PRODUCTS
UNKNOWN, Atomic Energy Commission, Grenoble Nuclear Res. Center, *38 Grenoble, France* 38000

ADDENDA: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Grenoble, Division de Metallurgie et d'Etude des Combustibles.

SUPPORTED BY France - Atomic Energy Commission - Paris

6.0131, WASTES - TRANSMUTATION
BOUCHARD, Atomic Energy Commission, Fontenay aux Roses Nuclear Res, *92 Fontenay aux Roses, France* 92260

ADDENDA: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Fontenay-aux-Roses, Division d'Etude et de Developpement des Reacteurs.

SUPPORTED BY France - Atomic Energy Commission - Paris

6.0132, BEHAVIOR OF RADIONUCLIDES IN THE MARINE ENVIRONMENT
P. BOVARD, Atomic Energy Commission, Dept. of Protection, *92 Fontenay aux Roses, France* 92260

In 1976 emphasis will be placed on the problems posed by the rejection of Surre generators and by the factory treatment of irradiated fuels. This is why the behavior of plutonium will be studied in particular.

The work carried out in 1975 has already revealed concentrations of plutonium through algae and the least evolved of marine organisms.

The objectives of the subsequent program will be: To define with precision the valences of Pu 239, starting with the production of aerosols under various physical and chemical molds. To study the evolution of Pu in the environment of various molds, as well as the possibilities of removal or transference in the alimentary canal.

ADDENDA: Performing organization: Commissariat a l'Energie Atomique.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0133, LEACHING KINETICS OF IONS FROM SOLIDIFIED RADIOACTIVE WASTES (LABORATORY STUDIES)

S. AMARANTOS, Nuclear Research Center, *Athens, Greece*

Our studies are concerned with the development of the proper theoretical and experimental background necessary to permit long-term prediction of the loss of various ions from solids, such as bitumen or concrete when in contact with water. The ions of interest (Cs ion, Sr ions) are incorporated in solid blocks in the form of properly selected salts (Cs2CO3, Cs2SO4, SrCO3, SrSO4, SrI2, Sr(NO3)2).

The establishment of reliable methods for making predictions of the kind referred to above is of great importance for solidified radioactive wastes disposed of in the soil or in a water body, since estimates of the potential release of radioactivity to the environment are needed for safety evaluation reasons.

During the past decade several workers have suggested that the simple Fick law of diffusion is appropriate for estimating the loss of ions from bitumen blocks when in contact with water. In our earlier work we have proposed an extension of Fick's equation to take into account the dissolution of salt in water contained in the block which precedes diffusion to the outside. Our theoretical analysis supported by experimental data has shown that the simple Fick equation is applicable to ions in the form of a very soluble salt (Na ion) but not to ions present in the form of very sparingly soluble salts (Ca ions as the carbonate). In the latter case another simple law is appropriate.

The object of the present work is to confirm and expand our previous conclusions by: (a) Studying less complicated systems (e.g. solids containing simpler salt mixtures), and (b) Extending the work to other systems (e.g. other embedding materials such as concrete). In our experiments we use non-radioactive materials and apply commonly used methods for 'leaching studies.'

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0134, DEVELOPMENT OF AN INTEGRATED LIQUID RADIOACTIVE WASTE MANAGEMENT SYSTEM

O. PAVLIK, Hungarian Academy of Sciences, *Budapest 114, Hungary*

The purpose of the research projects is to develop an integrated, high salt content low and intermediate-level radioactive liquid waste management system. The experiments will be carried out in a 300-l evaporator tank. The waste water treatment consists of a simultaneous non-boiling evaporation and solidification process.

The evaporator system consist of a doublewalled tank filled up with high salt content radioactive wastes. Hot air is blown into the top of the tank. The heat is transferred from the air-stream by convection to the water and vapour is dragged from the water surface. The air leaving the vapour-space circulates in a helical channel between the double walls and heats the tank. After that the vapour is condensated, the air is heated again in a heat-exchanger and is recirculated by a centrifugal fan into the tank.

During the long term evaporation, the liquid wastes become saturated, an incrustation is started on the bottom of the tank. Finishing the evaporation the residue in the tank is corresponded to a dry salt concentration of 800 g/l. During the evaporation cement is simultaneously added to the tank, where the cement sludge and the crystallised salt mix and create deposits in the tank, and concrete block is formed of it.

We shall determine the yield evaporation and the decontamination factor as a function of inlet air flow, inlet air temperature, and moisture and the leaching rate of Sr90 and Cs137 isotopes of the concrete block formed in the evaporator tank.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0135, THERMAL EFFECTS ON LAKE MICHIGAN FISHES

S.A. SPIGARELLI, Argonne National Laboratory, *Argonne, Illinois* 60439

OBJECTIVES: 1. To define actual thermal plume residence times and temperature orientation of important Lake Michigan fishes. 2. To determine the physiological effects of observed exposures and investigate the behavioral responses controlling exposure.

APPROACH AND PROGRESS: Residence and migratory behavior are determined by means of temperature-sensitive dart tags (thermoluminescent) and multichannel radiotelemetry. Population, densities and spatial distribution in thermal plumes are defined by combined sonar (echo-location) and plume mapping. Temperature preference, physiological effects and behavioral mechanisms are investigated in laboratory experiments based on field information.

Residence and migratory behavior has been well defined for trout and salmon species. Extensive distribution mapping has quantified the extent of attraction and avoidance. Preliminary effects work suggests stimulated growth and increased uptake of fallout radionuclides as a result of limited residence in warmed waters.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0136, CRITICAL PATHWAY STUDIES FOR SELECTED RADIONUCLIDES

I.S. BHAT, Bhabha Atomic Research Centre, *Bombay, Maharashtra, India*

The project shall carry out studies on the critical pathway for selected radionuclides: 60Co, 63Ni, 51Cr, 55Fe, 54Mn, 113Sn, 141Ce, 144Ce, 106Ru in the environment of Tarapur Atomic Power Station.

The uptake, transfer and concentration factors for these radionuclides will be determined in various food products from both marine and terrestrial environment. This will be carried out by the radiochemical and gamma spectrometric estimations of these radionuclides concentration in the food products, the medium where they grow and the intermediate matrices.

The concentration factor of these nuclides will also be estimated by the determination of non-radioactive nuclide content by atomic absorption spectrophotometric analysis of various matrices.

A demographic study in the area will be carried out to find the dietary habits and the data on consumption of food products which leads to the maximum intake of the particular nuclide.

From the information of nuclide concentration process and population habits in the environment, the critical exposure pathway for the nuclide will be determined.

The knowledge of critical exposure pathway in the environment of nuclear installation is of great help in evaluation of population exposure and in environmental surveillance programme.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0137, THERMAL POLLUTION STUDIES NEAR NUCLEAR POWER STATIONS IN INDIA

P.R. KAMATH, Bhabha Atomic Research Centre, Health Physics Division, *Bombay, Maharashtra, India*

The program this year is a renewed study of variations in plume dispersion and temperature scanning. The E S Lab attached to Rajasthan Atomic Power Station is well equipped with a boat and in situ measurement instruments supplied by IAEA. This is very important because climatic varitations appear to affect stratification and thermocline significantly. Depth monitoring for temperatures and light penetration will be pursued.

We have established that impingement losses could be monitored by O D measurements in discharged effluents. The presence of fish tissue by scrubbing across the screens can be detected by C O D value. We have also observed gas bubbles escape at the outfall indicating supersaturation. The identification will be carried out to check if it is enriched in nitrogen content.

The lake is young and a first estimate of fish population and varieties has become available. No fish kill has been observed, and a rigorous check will be kept on water quality and activity vigilance. Last year a wooden nylon cloth cage was placed in the lake, containing about 50 fingerlings. This was lost in a gale. This is being replaced by a steel cage and nylon lining. The experiment will be started this month or so.

Organic productivity by chlorophyll measurements has been established with respect to methodology and pursued in the course of the year. Vegetation sometimes appears close to the banks but it is not a trend of algal growth. The evidence of degradation of organic matter by waste heat is being looked for to study synergistic effects.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0138, CHARACTERIZATION OF RADIATION AEROSOLS PRODUCED BY ATOMIC ENERGY INDUSTRIES AND ITS APPLICATION IN MONITORING AND HAZARDS EVALUATION

P. KOTRAPPA, Bhabha Atomic Research Centre, *Bombay, Maharashtra, India*

It is proposed to measure the aerodynamic particle size distribution of aerosols encountered in a typical reactor fuel of fabrication plant. Measurements will be done using a standardized two stage cyclone sampler. Similar study in uranium mining and milling plants will be completed during this year.

Radon and thoron decay products attach themselves to aerosol particles. Attachment processes as a function of particle sizes will be studied using an aerosol spectrometer (Lovelace Aerosol Particle Separator).

Radioactive aerosols can acquire electrostatic charge by virtue of their decay/recoil. Preliminary studies are planned for studying this phenomenon using a charge spectrometer.

Solubility of aerosols in lung serum simulant is an important parameter governing their post-deposition behavior in lungs. Several samples collected in different areas will be subjected to this study.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0139, MARINE RADIOECOLOGY RESEARCH

B. SCHREIBER, Univ. of Parma, *Parma, Italy*

In the frame of the radioecological investigations planned by CNEN in the Gulf of Taranto to determine its radiological receptivity, the Zoology Department of Parma University has already determined the main artificial radionuclides in samples of sediment, water and plankton.

With the aim of completing such an investigation, in the past year the content of alpha emitters (naturally occurring U and Th, Pu239) in sediment samples were determined by means of radiochemical analyses. The elaboration of the relevant data is in progress.

Our present program foresees the determination of the same transuranic elements, mainly Pu239, in sea water, plankton and benthic organisms.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0140, TRACE ELEMENT CONTENT IN THE DIETS AND IN THE POPULATION OF ITALY

G.F. CLEMENTE, Atomic Energy Commission, Lab. of Radiation Toxicology, *Rome, Italy* 00100

The greatest problem regarding trace elements consists in defining the environmental levels which are adequate for the well being of humans. Such environmental levels could be heavily influenced by the pollution due to the human activities: therefore great efforts should be made to study the geographical distribution of trace elements in the environment and to determine their natural level. Furthermore search data are available on the relationship between the trace element levels in man and those in the dietary intakes, which are for the most part the main trace element pathways from environment to man.

Ag, Co, Cr, Cs, Fe, Hg, Ni, Rb, Sb, Sc, Se and Zn will then be measured in diets, human blood, excreta (urines and feces), human and cow's milk.

The diets, human blood and excreta will be collected from different groups of subjects, each one representative of the adult population living in a well defined community. The cow's milk samples will be collected from the milk factories of the main town in Italy and from some local farms dislocated in rural area. The human milk will be collected either as a single sample of small quantity or as a large sample pooled with long collection period on various individuals in order to evaluate the average trace element content given to the infants.

All samples will be analyzed by instrumental neutron activation analysis.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0141, ENVIRONMENTAL EVALUATION AND HAZARD ASSESSMENT OF THE SEPARATION OF THE ACTINIDES FROM HIGH LEVEL WASTE FROM FUEL REPROCESSING

L. TONDINELLI, Atomic Energy Commission, *Rome, Italy* 00198

In progress studies on the sensitivity of transuranium elements (TRU) inventories in spent fuel and solidified wastes with respect to N.D. The studies will be extended to the transcurium nuclides.

Processing basic TRU N.D. to generate multipurpose group cross-section libraries. Calculation of integral sample irradiation measurements in fast reactor with basic TRU N.D. Adjustment of multigroup cross-sections libraries status. Advanced or tailored high flux fast reactor conception for the irradiation of special fuel elements containing TRU.

Estimation of the risk associated with partitioning and transmutation of TRU; we plan to borrow the approach used in the Rasmussen Report.

In the case of geologic disposal we intend to proceed with studies on long term hazard with reference to a specific site in Southern Italy.

ADDENDA: Performing organization: C.N.E.N. Casaccia.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0142, NUCLEAR ACCIDENT DOSIMETRY

I. MIYANAGA, Atomic Energy Research Inst., *Tokai Mura, Ibaraki Ken, Japan*

Nuclear accident dosimetry system in JAERI consists of three pieces of natural uranium doped glass (size 10 X 10 X 1 in mm), pieces of slightly enriched uranium doped glass, two pieces of thorium doped glass and a sulphur disc (20 g). After irradiation, the glass is etched in NaOH solution and fission tracks on the surface of glass are counted. Neutron spectrum in nuclear accident is assumed to be shown as the square root of E exp (-aE) for fast neutrons and En for intermediate neutrons. The unknown parameters a and n are determined using the detectors.

This detector system has been tested on the critical assembly at Vinca (1973) and HPRR at ORNL (1968), and estimated doses were agreed with that of other laboratories. But this system has not been tested in a field of fast neutron reactor whose fast neutron spectrum parameter is more than 2. As the effective cross sections of Th and S for neutrons from fast neutron reactor are very small, NP237 is added to our system. The new detector system will be exposed in the field of FCA (Fast neutron Critical Assembly) at JAERI and VIPER at AWRE in England.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0143, INVESTIGATION ON COOLING WATER DISCHARGES - BIOLOGICAL

F.B. KOOPS, N.V. K E M A, *Arnhem, Netherlands*

Investigation of the influence of thermal discharges on aquatic organisms at both existing power plants and future plant sites.

Study of plankton, macrofauna and fish; Periodic sampling; no laboratory studies. Study of influence on spawning habits of fish.

SUPPORTED BY Netherlands - N.V. Kema - Arnhem

6.0144, AIR POLLUTION

UNKNOWN, N.V. K E M A, *Arnhem, Netherlands*

The project is concerned with: a. Measurements of emission of both SO2 and NOx at power works; b. Measurements of the same in the national measurement system; c. Development of methods of measurements; d. Methods of reducing the emission of NOx at the source; e. Reactions of pollutants in the atmosphere, especially the SO2 yields H2SO4 transformation.

The objectives being: a. The surveillance of pollution levels: b. The reduction of especially NOx emissions.

It was shown that the NOx emission from power works using natural gas can be considerably decreased by controlling the feed rates to the burners and the quantity of air used.

With this project are classified studies of the possibilities of production of sulfur-free gas from heavy fuel oil or coal.

SUPPORTED BY Netherlands - N.V. Kema - Arnhem

6.0145, UNDERGROUND DISPOSAL OF INDUSTRIAL WASTE IN THE NETHERLANDS

W.A. VISSER, Central Org. Adv. Appl. Res., *Delft, Netherlands*

The research concerns an evaluation of the possibilities of underground disposal of liquid wastes in reservoir rocks. The disposal of radioactive and other types of solid or liquid wastes in deep rock salt formations has been found to be technically possible in Dutch territory in artificial cavities. These are suitable either for waste disposal or for the storage of crude oil, fuel gas, compressed air, etc.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

6.0146, MIXING OF WARM COOLING WATER WITH HOLLAND'S DIEP WATER

H. LIGTERINGEN, Delft Hydraulics Laboratory, *Delft, Netherlands*

The objective of this investigation is to determine the maximum cooling capacity of the water body of the Holland's Diep concerning the settlement of industry at the border of this waterway.

SUPPORTED BY Netherlands - Port & Industrial Shipment - Moerdijk

6.0147, THE REMOVAL OF NOX FROM FLUE GASES

C.M. VANDENBLEEK, Delft Univ. of Technology, *Delft, Netherlands*

In order to remove NOx from flue gases by means of SO2, which is present in the flue gases of power stations and sulphuric acid plants, the following processes are being investigated: Combined removal of NOx and SOx in the form of solid complexes of the type NOHSO4. Not only are the products formed valuable but furthermore the reaction speed of NOx increases due to the presence of O2 and H2O. These components, which are usually present in excess of NOx in most flue gases, are often detrimental to the reductive removal of NOx.

The problems concerning the process variables have been practically solved. The technological problems concerning the solids handling are being further studied. Non-selective catalytic reduction of NOx to N2 in the flue gases of HNO3 factories by means of integration of the HNO3 plant with a H2SO4 plant. The problems concerning the process conditions and the catalyst choice have been more or less solved. Economic questions, however, require further study. Selective catalytic reduction of NOx with SO2 and other reducing agents: by means of a semi-empirical approach requirements have been proposed which a catalyst must meet in order for it to selectively reduce NOx in the presence of O2.

Presently the value of these rules is being experimentally verified.

SUPPORTED BY Netherlands - Delft University of Technology

6.0148, DEVELOPMENT AND MATHEMATICAL MODELLING OF A DRY, ISOTHERMAL AND REGENERATIVE FIXED-BED PROCESS

P.J. VANDENBOSCH, Delft Univ. of Technology, *Delft, Netherlands*

Fixed-bed reactors are applied extensively in industry in regenerative operations such as gas purification by adsorption. Their design is usually based on empirical relations. A rigorous mathematical approach to the design of such non-stationary reactors, which is possible since the introduction of large computer systems, is advantageous when dealing with relatively simple chemical or physical processes and necessary with very complex chemical processes.

Mathematical modelling of non-stationary reactors is being applied to fixed beds of a solid sorbent used for the removal of sulphur dioxide from waste gases. The sorbent, MnOx on gamma alumina, removes SO2 efficiently and can be regenerated by reduction of the sulphate formed from the SO2 and oxygen present in the flue gas, a concentrated product gas containing 20-50 vol% SO2 being obtained.

The specially developed sorbent has been tested rigorously since its good performance, in particular its stability, is the key to successful and economic operation of the process. In the reactor models tested to date kinetic data of the chemical reactions occurring in the fixed bed as well as data on its hydrodynamic behavior, which were obtained in separate investigations, are incorporated. Agreement between experimental results and model calculations is fair; the deviations observed are believed to be due to the complexity of the chemical system, the details of which are not yet known with sufficient accuracy.

SUPPORTED BY Netherlands - Delft University of Technology

6.0149, RESEARCH ON THE APPLICATIONS OF INFRARED LINE SCANNING TECHNIQUE (IRLS)

M. GEVERS, N I W A R S, *Delft, Netherlands*

The research on applications of IRLS focusses on the field of geosciences (geological, pedological, and hydrological survey), the agriculture (cultivating technological and water-management), and water flow (thermal pollution, water movements near estuaries). The interpretation concerns parameters regarding soil, vegetation, or water, and influencing the temperature of the surface. The physical relationships between these parameters and the surface temperature are investigated, and if necessary, a model will be designed. Possible applications with respect to the subject 'energy' for the Netherlands are: a) Thermal pollution of water; Determination of the surface temperature of used cooling water and tracing the extension of the thermal plume in the aquatic environment. b) Tidal movements, tidal power stations. River and sea water do mix badly and exhibit an evident temperature difference. The observation of this thermal front provides information about the water movement. c) Heat losses. IRLS records directly the radiational heat losses of objects (dwellings, green houses, etc.) The amount of convectional heat losses can be estimated.

ADDENDA: PERFORMING ORGANIZATION: Nederlandse Interdepartementale Werkgemeenschap voor het Applicatie-ondersoek van Remote Sensing Technieken NIWARS.

SUPPORTED BY Netherlands - Ministry of Transportation & Public Works

6.0150, MAPPING OF THERMAL POLLUTION BY IRLS OF COOLING WATER

H.W. VANHULTEN, N I W A R S, *Delft, Netherlands*

PROBLEM AND OBJECTIVE: The discharge of warm cooling water to surface water results in a rise of temperature that may have serious consequences for the aquatic environment and for navigation. The coolant is discharged by power stations or by chemical industries. The excess-temperature is prescribed by preliminary regulations. The dispersion of heat both in horizontal and vertical direction depends on factors such as water currents, wind, heat transmission to the air and turbulent diffusion. With the aid of measurements and computer models an attempt is made to formulate meaningful statements concerning acceptable excess-temperatures, depending on conditions of the surface water into which the coolant discharges. The objective is to determine the temperature distribution at the surface and if possible below the surface of a waterbody by means of infrared recordings (IRLS) from an aeroplane. In this way illegal discharges of coolant can also be traced. A combination of these data with mea-

surements from temperature sensors fixed in the water at several depths can result in a classification of the condition of a water body (types of stratification or homogeneous temperature distribution).

EXPERIMENTAL: Infrared recordings are performed over power stations. At some points in this area the vertical temperature distribution is determined by means of sensors. Besides, a radiational thermometer at the surface of the water is utilized for the calibration of the infrared recordings. These observations are 'translated' into temperatures. Corrections are made regarding the geothermal distortions. This results in maps of absolute isotherms. Relative isotherm maps are also of substantial importance for an interpretation of the heat distribution.

ADDENDA: Performing organization: Nederlandse Interdepartementale Werkgemeenschap voor het Applicatie-onderzoek van Remote Sensing Technieken NIWARS.

SUPPORTED BY Netherlands - Ministry of Transportation & Public Works

6.0151, MAPPING OF THE CIRCULATION COASTAL WATER IN CONNECTION WITH COASTAL-SITUATED POWER STATIONS

H.W. VANHULTEN, N I W A R S, *Delft, Netherlands*

Problem and objective: The relatively fresh river water does not mix very easily with sea water, due to temperature and specific gravity differences. For a better understanding of this complex process, in relation with the tidal movements and the direction of the wind, temperature and salt concentration measurements are performed every year in the spring at the surface of the water and in vertical direction. Complementary to this, IRLS recordings are carried out from an aeroplane. During the spring there is a significant correlation between the temperature and the salt concentration, so an extrapolation can be made for the temperature at the surface of the water. The objective of the infrared observations is to identify water bodies by their temperature as a means to describe the complex moving and mixing pattern of coastal waters. Maps of both absolute and relative isotherms can be used for this purpose.

ADDENDA: Performing organization: Nederlandse Interdepartementale Werkgemeenschap voor her Applicatie-onderzoek van Remote Sensing Technieken NIWARS.

SUPPORTED BY Netherlands - Ministry of Transportation & Public Works

6.0152, STORAGE OF RADIOACTIVE WASTE MATERIALS IN ROCK SALT FORMATIONS

E.A. DEWIT, A K Z O, *Hengelo, Netherlands*

In case of a study induced by the Dutch Government concerning the disposal of radioactive waste, Akzo is willing to cooperate and to provide the specific acquired information. The disposal problem of radioactive waste will become urgent about 1980.

SUPPORTED BY Netherlands - A K Z O N.V. - Arnhem

6.0153, CHARACTERISTICS OF NOISE AND CHEMICAL POLLUTANT EMISSION FROM INDUSTRIAL DIFFUSION FLAME

C. BERTRAND, Internat. Flame Res. Found., *Ijmuiden, Netherlands*

Recent legislation has limited the accepted noise levels for personnel in most countries. Combustion is frequently a major source of noise, although noise from associated equipment can also be important. As both the combustion roar and the formation of chemical pollutants are flame front phenomena it could be possible that the emission of chemical pollutants is increased whilst the burner is modified to increase its level of noise emission. Therefore both pollutants have to be investigated together. Two trial series are planned. The AP-4 trials have been executed in May/June 1974, the main objectives were: a. The investigation of the effect of a number of variables on combustion roar from: fuel/air diffusion flames; natural gas/oxygen diffusion flames; The variables will be: upstream conditions; acoustic absorbers; turbulence promotors and inhibitors; flame parameters: load, stoichiometry, gas or air velocity, preheat, fuel type, oxygen enrichment; burner design: swirl, type of swirl, fuel injection method, quarl angle. b. The development of scaling laws for the effect of flame parameters on noise and provide information on the deviations from this law caused by variations in upstream conditions and burner design. c. To indicate any features of noise control which appears to increase or decrease chemical pollutants.

The AP-5 trials (Sept. 1975) will use the information generated in the AP-4 trials and expand it so that it can be more readily used in industry. The objectives will be: 1. Further investigation of areas which have arisen from the AP-4 trials that merit a more detailed study, e.g. turbulence inhibitors. 2. Extension of the generalizations of the AP-4 trials on combustion roar to industrial burners by testing a range of commercial burners. These burners will be chosen to cover a range of potential applications as studies will be made on systems which require low, medium and high air pressures and can use different fuels. 3. Reduction of noise level in these commercial burners by modifications suggested from an analysis of the AP-4 trials. Quantification of the effect of this reduction of flame stability, flame length and chemical pollutant emission. 4. Generalization of the results of the AP-4 and AP-5 trials in a form in which they can be practically used.

SUPPORTED BY Netherlands - International Flame Research Found. - Ijmuiden

6.0154, BURNER DESIGN OPTIMIZATION FOR THE CONTROL OF NOX EMISSIONS FROM BOILERS AND FURNACES

M.P. HEAP, Internat. Flame Res. Found., *Ijmuiden, Netherlands*

The project is aiming for the supply of detailed information of the influence of following burner parameters on the emission of nitrogen oxides from large turbulent diffusion flames (3 MW): degree of swirl; type of fuel injector and velocity of fuel jet; angle of quarl divergent; position of the fuel injector; velocity of the secondary air; percentage excess air; primary air percentage for liquid and pulverised fuel flames.

The investigations are carried out with a range of different fuels as: Dutch natural gas (14% N2) (NG); medium and heavy fuel oil (800 and 3500 sec.); pulverised coal (30% volatiles) with different amounts of nitrogen compounds in the fuel (P.F); blast furnace gas (1250 Kcal over Nm3 (BFG); petroleum coke; dual fuel firing, NG/BFG, P.F/NG and P.F/BFG.

Furthermore the influence of: preheat of the combustion air (150 degrees plus 300 degrees C); heat extraction within the furnace (between 5 and 60% of thermal input); staged combustion for fuel oil and pulverised fuel flames are investigated.

By only varying the burner parameters for otherwise identical conditions, initial studies have indicated that is is possible to change the nitric oxide emission by 4:1 for P.F, 2.5:1 for oil, and 3.5:1 for NG flames.

SUPPORTED BY Netherlands - International Flame Research Found. - Ijmuiden

6.0155, STUDY ON THE LATE EFFECTS OF RADIATION PRODUCED BY NUCLEAR FISSION PROCESSES WITH EMPHASIS ON CARCINOGENESIS

D.W. VANBEKKUM, Cental Org. Adv. Appl. Res., Radiobiological Institute, *Rijswijk, Netherlands*

An extensive project of studies on the hazards of carcinogenesis by ionizing radiation is in progress. The studies range from carcinogenesis in vitro to dose effect relationships in vivo. Interactions with immune system, viral agents and hormones are part of the study.

SUPPORTED BY Netherlands - Organization of Health Research - The Hague

6.0156, RADIOISOTOPE TOXICITY AND METABOLISM

D.W. VANBEKKUM, Cental Org. Adv. Appl. Res., Radiobiological Institute, *Rijswijk, Netherlands*

A program for evaluating the hazards of internal contamination with radioactive isotopes is in progress. In addition to studies

on the distribution and excretion of radioactive isotopes in different chemical form, ad hoc studies are made of radiation dose distribution in man after application of, or contamination with radioactive substances. The program is extended periodically into the field of isotope toxicity studies in rodents.

SUPPORTED BY Netherlands - Organization of Health Research - The Hague

6.0157, TOXICITY OF IODINE ISOTOPES PRODUCED BY NUCLEAR FISSION PROCESSES
L.M. VANPUTTEN, Cental Org. Adv. Appl. Res., Radiobiological Institute, *Rijswijk, Netherlands*

Determination of relative tumor-inducing effectiveness of iodine-125 and iodine-131. The study is carried out in rats. Five dose levels of each of the isotopes were administered to 40 rats, and 80 animals serve as controls. Tumor induction, thyroid gland morphology and function are the end-points.

SUPPORTED BY Netherlands - J.A. Cohen Institute - Leiden

6.0158, INFLUENCE OF FUEL GASES ON THE ENVIRONMENT
W. TAKENS, V E G Gas Institute N.V., *Rijswijk 2100, Netherlands*

The estimation of NOx in the environment of houses (micro meteorological).

ADDENDA: Supporting agency and performing organization: VEG Gasinstituut N.V.

SUPPORTED BY Netherlands - V E G Gas Institute N.V. - Rijswijk

6.0159, NUCLEAR POWER STATION BORSSELE, MIXING OF COOLING WATER WITH THE TIDAL STREAM OF THE RIVER SCHELDT (WESTERN) ESTUARY
H. LIGTERINGEN, Erasmus Univ. of Rotterdam, *Rotterdam, Netherlands*

The research concerns the horizontal and vertical dispersion of heat from warm cooling water in a cold tidal water body.

The objective is to use the information to calculate the chance of recirculation (the unwanted recycle of warm cooling water).

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

6.0160, DEVELOPMENT OF OVERGROUND STORAGE SYSTEMS OF RADIOACTIVE NUCLEAR WASTE
P. CROOCKEWIT, Rijn Schelde Verolme N.V., *Rotterdam, Netherlands*

SUPPORTED BY Netherlands - Rijn Schelde Verolme N.V. - Rotterdam

6.0161, DEVELOPMENT OF SYSTEMS FOR SOLID AS WELL AS LIQUID SEPARATING WASTE DISPOSAL
P. CROOCKEWIT, Rijn Schelde Verolme N.V., *Rotterdam, Netherlands*

SUPPORTED BY Netherlands - Rijn Schelde Verolme N.V. - Rotterdam

6.0162, STORA-PROJECT (DISPOSAL OF RADIOACTIVE WASTE IN A SALT FORMATION)
J. HAMSTRA, Reactor Center, *The Hague, Netherlands*

In the northeastern part of the Netherlands and northwestern Germany many salt deposits are present, both salt beds at great depths and a number of salt domes reaching to a few hundred meters below the surface. In 1972 work was initiated to study the use of one of these salt domes as a waste disposal site. First the work was directed towards a cavity, to be formed by solution mining, as a facility for disposal of low and medium level wastes. Later also the future construction of a disposal mine for solidified reprocessing waste was added to the programme. At present a general safety evaluation of the disposal of high-level waste in a salt dome is in progress. The fact that in a geologic sense a salt dome is not a completely stable formation is extensively taken into account therein.

In the meantime a number of salt domes have been identified as potential sites. A selection is now being made also with regard to the above ground situations. This study will be followed by exploratory drilling to establish the precise data on the salt and the overlaying sediments for the selected salt dome. Using soil samples from other exploratory drillings chemical work on soil retention of radionuclides was also started.

SUPPORTED BY Netherlands - The Netherlands Government The Hague

6.0163, TRANSFER CHARACTERISTICS OF HT AND HTO IN BIOLOGICAL SYSTEMS
G.B. MORGAN, U.S. Environ. Protection Agcy., Env. Monitoring & Support Lab., *Las Vegas, Nevada* 89114

Tritium is one of the primary pollutants released during the operation of nuclear power plants and fuel reprocessing facilities and, because of its incorporation in water, becomes widely distributed in ecological systems. The forecasted increase in this industry intensifies the need for environmental tritium research. The project underway at the Laboratory in Las Vegas is primarily aimed at defining the pathways of tritium movement within various ecological systems. Portions of this project are designed to evaluate the possibility of concentrations of tritium either because of preferential transfer or because of discriminatory residue. Other portions will investigate the T2 to HTO conversions and differences which may exist in their transport and distribution. Laboratory, glasshouse and field studies will yield data on gaseous tritium exchange and the effect of vegetation and environmental variables on this exchange; absorption kinetics, exchange rates of HT with HTO, and organic fixation in desert and semi-arid plant species; specific activity of tritium in tissues from several species of fish raised under both laboratory and field conditions; and soil-to-plant and evapotranspiration transfer characteristics. In addition, plant material will be labeled in vivo with tritium to produce standard reference materials that will be used by the IAEA in a laboratory cross-check program.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0164, STUDY ON THE CONDITIONS OF BITUMINIZATION OF RADIOACTIVE WASTES AND THEIR INFLUENCE ON THE STABILITY OF STORED PRODUCTS
M. GOLINSKI, Nuclear Research Institute, *Swierk, Poland*

The process of incorporation of low- and intermediate level radioactive wastes into bitumen is one of the most useful methods of solidification especially from the economical and the radioprotection points of view. Owing to the resistance of such products against external conditions their storage need not require very expensive equipment. The objective of this research work is the determination and examination of conditions of the bituminization process for residues obtained from Nuclear Research at Swierk and estimation of the possibilities of storage of solidified products directly in the ground. The results of the investigation allow also the evaluation of the stability of final products towards aggressive agents, especially leaching by water. As a binding material, Polish bitumens are commonly used for road and industry purposes. As waste materials are used radioactive low-activity residues from isotope production, reactor exploitation and radiochemical activities. The basic equipment comprises a Belgium installation for bituminization of a capacity 25 l/h of evaporated water. Results of laboratory investigation concerning optimum conditions of the process, physicochemical properties of the products and the stability towards aggressive agents are given. It has been also examined the leach rate of bituminous products under static and dynamic conditions using Sr-90, Cs-137 and Co-60. The program of the contract comprises also examination of the effect of various additives on the leach rate, determination of sorption capacity of the soil samples from the site and leaching experiments with bituminous blocks in the field conditions. Hydrological characteristics of the storage site and estimation the

possibility of disposal of solidified radioactive wastes directly in the ground and economical evaluation of the method are also given.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0165, THE BITUMINIZATION PROCESS OF RADIOACTIVE LIQUID WASTES BY DOMESTIC BITUMEN

S.H. LEE, Atomic Energy Research Inst., Radioactive Waste Mgmt. Div., *Seoul, Republic of Korea*

This study is needed to implement the experiment of various types of waste suitable for incorporation into domestic bitumen and preliminary design for the construction of pilot plant scale (15L/hr).

During the third year, work on the scope of the project will include as follows: 1) The study on physico-chemical properties of the waste-asphalt products (ductility, flash point, softening point etc.) and on influence of leaching rate by using domestic clay for improving the properties of the waste-asphalt products. 2) The modification and review of current evaporator characteristics including structure, equipment and instrumentation for the studies of bituminization pilot plant construction. 3) Design studies of the bituminization pilot plant for cold run. 4) To study the economics of the bituminization process related to local conditions.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0166, ENVIRONMENTAL MONITORING - SEWER DISPOSAL OF RADIOACTIVE WASTE

C. STARKEY, Univ. of Singapore, *Singapore, Republic of Singapore*

Derivation of limits and requirements for present and future sewer disposal of radioactive wastes taking into account plans to recycle processed sewerage water for eventual potable use.

Work will involve establishing the proposed system of sewerage flow, effluent entry points, retention times, dispersion volumes. This will be followed by practical measurements of concentration patterns, sewage sludge retention factors, nuclide reconcentration and such parameters as inactive carrier concentrations.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0167, EFFICIENT & ECONOMICAL SMALL SCALE MANAGEMENT SCHEME FOR LOW & INTERMEDIATE LEVEL RADIOACTIVE WASTES & ENVIRONMENTAL IMPACT (ABBREV)

Z.M. BARTOLOME, Philippine Atomic Energy Comm., *Quezon City, Republic of The Philippines*

After extensive laboratory studies on the different waste processing methods for low and intermediate liquid wastes are completed, to determine the chemical waste treatment process or combination of processes that is most suitable for the waste requirements of the Philippine Atomic Research Center, the performance of the pilot treatment plant shall be tested to establish values of operational conditions, i.e., a) optimum flask mixing; b) optimum retention time in the settling tank; c) average DF's to be expected from each of the processing set-ups and the effective DF of the combined processes; d) sludge moisture content.

Studies on the methods of sludge treatment by insolubilization and bituminization of the resulting waste concentrates for final storage and/or disposal.

Evaluation of the economics and environmental impact of the waste management system will be done. Emphasis will be made on the assessment of the capacity of the environment (soil and water) to receive the radioactivity from the proposed treatment plant waste.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0168, BEHAVIOUR OF TRITIUM IN VARIOUS ECOSYSTEMS

N. BUSTAMANTEJUAN, Philippine Atomic Energy Comm., *Quezon City, Republic of The Philippines*

Different types of commonly eaten crops will be exposed to HTO and the uptake of trituim will be determined by sampling the leaves at regular intervals. The samples will be freeze-dried for 5 hours and the tritium counted using liquid scintillation counting system.

The excretion-rate of tritium in milk and urine from goats will also be studied. Goats will be given a single dose of tritiated water and the milk and urine assayed for tritium.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0169, THE CHEMICAL BEHAVIOUR AND ECOLOGICAL TRANSFER IN THE HUMAN FOOD CHAIN OF SOME RADIONUCLIDES IN AQUEOUS ECOSYSTEMS

F. GHEORGHE, Academy of Medical Sciences, Inst. of Hygiene & Pub. Health, *Bucharest, Rumania*

The main indicators which can characterize natural waters radioactive pollution were defined, estimating the value of the indicators of radionuclides transfer to the human nutritive chain, as milk, fish, drinking water a.s.o.

The marine studies were compared with the in situ studies, finding that in the last case the competition phenomenon does highly complicate the findings interpretation.

Both the comprehensive Sr-90, Cs-137, H-3, Ra-226, U,Th a.s.o. radioactive determinations and of the contents ones, carried out on Danube Waters, sediments mollusca a.s.o. do not rise special problems of radioactive pollution for 1976 year for the whole Romanian course of the river. Thus the contents variations are wide as for example: 0.16-1.81 pCi Sr-90/l water; 0.09-1.71 pCi Cs-137/l water; 0.24-0.50 pCi Ra/l water; 0.08-1.88 pCi Sr-90/g sediment; 0.02-1.20 pCi Cs-137/g sediment; 0.5-0.95 pCi Ra/g sediment.

The presence of some radionuclides specific to radioactive pollution through nuclear industry had been identified, e.g. 0.2 nCi Co-60/l water; 0.5 nCi Mn-54/kg sediment; 2.5 nCi-I-131/kg sediment a.s.o.

The presence of 84 pCi I-131/l in milk and 87 pCi I-131/14g in cow thyroid at the 679 km indicates a radioactive pollution process but is found to be under the maximum allowable limits.

The in situ findings obtained at levels close to the minimum detectable limits, raise numerous questions regarding the methodology used and the errors which can be introduced.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0170, RADIONUCLIDES IN THE DANUBE - DETERMINATION OF RADIONUCLIDES AND TRACE CONSTITUENTS OF AQUATIC ENVIRONMENT OF THE DANUBE RIVER IN YUGOSLAVIA

T. TASOVAC, Boris Kidric Institue. *Belgrade, Soc. Fed. Rep. of Yugoslavia* 11001

The behavior of radioactive and nonradioactive pollutants introduced in biosphere and their influence on existing natural equilibria depends on specific characteristics of our environment.

As a part of the program for studying the environmental characteristics of some fresh water systems in Yugoslavia, especially of the Danube river system, on which are located and will be located in the future many nuclear facilities including nuclear power stations, and for evaluating and defining the environmental capacity of this system for receiving radioactive and non-radioactive pollutants, as well as for evaluating the possible consequences of releases of radioactive materials to this big international river, systematic long term investigations of the radioactivity and concentration processes have been performed in the Boris Kidric Institute of Nuclear Sciences since 1958. materials, bottom sediments, bottom biota etc. and the characterization of the microconstituents of different parts of the aquatic ecosystem by

activation analysis. The investigations are performed on the samples of aquatic media collected in the previous period before the construction of the Djerdap dam as well as on the new samples.

According to the programme of work in the forthcoming period, the investigations and characterization of microconstituents of different parts of the ecosystem (fishes, plankton, bottom biota, sediments etc.) will be continued.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0171, REMOVAL OF RADIOIODINE SPECIES FROM GASEOUS STREAM ON INORGANIC ADSORBENTS

L. VUJISIC, Boris Kidric Institue, Chemical Laboratory, *Belgrade, Soc. Fed. Rep. of Yugoslavia* 11001

The objective of the work is the development of an inexpensive and efficient inorganic adsorbent for volatile radioiodine species which could be used as a filter material for the off-gas stream in nuclear reactor and/or fuel-reprocessing plants. Such an adsorbent must have the following advantages compared with the carbon filters now in use: 1) non-flammability (no fire hazard to the highly radioactive material), 2) no release of radioiodine at higher temperature, and 3) the inorganic sorbent due to the strong chemical bonding of iodine should be a convenient material for the ultimate waste storage.

Our approach to the above objective is to impregnate commercial activated alumina with various metal salts capable of bonding radioiodine chemically, removal in a stream of air containing labelled methyl iodide.

We have the following plans for experimental work: (a) Preparation of alumina samples impregnated with silver, lead and cadmium nitrate as well as with TEDA. These materials have been most promising in preliminary screening test. (b) Testing the impregnated alumina samples on radioactive methyl iodide retention from a stream of air, in dependence of (1) the concentration of impregnated salts in the adsorbent, (2) the flow-rate of gaseous stream, (3) humidity of gaseous stream, and (4) temperature.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0172, THE INFLUENCE OF WATER POLLUTION OF THE SAVA RIVER ON THE RANNEY-TYPE WELLS IN BELGRADE

F. BORELI, Univ. of Belgrade, School of Electrical Engin., *Belgrade, Soc. Fed. Rep. of Yugoslavia* 11000

The study of environmental isotopes facilitates and completes the conventional hydrological investigations. Ranney-type wells on the Sava River supply part of the drinking water for the city of Belgrade. It is believed that part of this water comes directly from other underground waters. Some of the ranney-wells are situated under the artificial accumulative lake through which a branch of the Sava flows. By measuring D, O18, C13, C14 and T contents of the samples of water from the lake and Ranney-well waters, as well as the temperature, chemical composition and water level, we intend to determine the influence of different impurities of the Sava water on the water from ranney-wells, the time delay of this effect and the percentage of other underground water. The new, nuclear power plant under construction at Krsko uses water from the Sava as a cooling agent, providing another reason for such an investigation.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0173, IMPROVEMENT OF WORKING ENVIRONMENT THROUGH APPLICATION OF PROPELLER NOZZLE

V. LARSSON, Unknown Inst. or Indiv. Grant, *Sweden*

The objective of the project is the application of a propeller nozzle for a fishing vessel. This is a device aimed at reducing noise and vibration as well as energy consumption. According to foreign test reports available, fuel for trawling may be reduced, at a low estimate, by 20%. However, small-scale tests have been made within the merchant navy. Unfortunately, these are not applicable to fishing craft, which are operated under quite different conditions, including towing of heavy equipment.

Through the application of the propeller nozzle mentioned above, the crew's working environment will improve substantially. Accomodation is far astern, i.e. above the propeller and propeller shaft, which is the reason why there is considerable noise and vibration in the crew's quarters. This is a difficult problem in all fishing vessels of this type. By means of the device concerned, it would be possible to overcome this difficulty to a great extent. The tests will be carried out in collaboration with Chalmers University of Technology, Gothenburg.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

6.0174, ENVIRONMENTAL EFFECT FROM URBAN TRAFFIC

B. PERSSON, Northern Plan. Consulting Inc., *Goteborg, Sweden* (086845 (HRB NO.))

The purposes of this project are: determination of environmental impact from urban traffic in terms of air pollution, noise, and energy consumption. Design of a computer program that computes air pollutant levels and noise levels in the street environment. Evaluation of traffic planning with respect to the environment. Comparison of various planning alternatives.

ADDENDA: Document provided to S.S.I.E. by the H.R.I.S. Supporting agency and performing organization: Nordisk Planeringskonsult.

SUPPORTED BY Sweden - Northern Planning & Consulting - Goeteborg

6.0175, THE DETERMINATION OF SPECIFIC S-VALUES (S EQUALS SULPHUR) IN DIFFERENT TYPES OF FOSSIL FUELS

C. BROSSET, Water & Air Pollution Lab., *Gothenburg, Sweden*

OBJECTIVE: To compare the acidification effect of different fossil fuels on precipitation by determining the value (called the S-value) which characterizes that catalytic activity which is conveyed to the water from ash generated by combustion.

APPROACH: In stage 1, a sub-examination intended to develop the necessary instrumentation and practice is carried out by: Building an apparatus which enables ashes to be exposed to the contamination in question contained in the air. Refining the existing analysis used to determine S-values. Gas and leach non-fractional ash in order to determine the S-value of the leached solution.

PROGRESS: In a future stage 2, the variation of the S-value and its dependence on the size of the particles will be investigated.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

6.0176, EXAMINATION OF HEAVY METAL IN CONNECTION WITH THE HEATING OF COAL

G. LOVBLAD, Water & Air Pollution Lab., *Gothenburg, Sweden*

OBJECTIVE: To study the level of particular and heavy metal in discharging flue gases, in slag and in its disposal, etc., generated by the thermal utilization of coal.

APPROACH: In stage 1, the literature covering the emission of heavy metal and mass balance at coal-fired stations is studied. The different types of pit coal imported into Sweden are to be surveyed. Coal samples are to be collected and their heavy metal composition analysed.

PROGRESS: In a future stage 2, a mass balance regarding heavy metal at a coal-fired power station and slag examination in order to estimate the risk of the release of heavy metal will be carried out.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

6.0177, A METHOD FOR THE FINAL TREATMENT OF NUCLEAR FUEL WASTES

J.O. LILJENZIN, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

The current research project aims at the development of an improved method for the treatment of nuclear fuel wastes. An evaluation of the hazard indices of the various elements present in high level active waste (HAW) from purex reprocessing of spent nuclear fuel shows that the actinides and Cs plus Sr remaining in the HAW constitute the major hazard in any long time storage scheme. After removal of these elements the remaining bulk waste poses no greater hazard than natural uranium ores provided it is stored in the rock in a chemical form, which has low leachability. The actinides can probably be burnt in a fast reactor designed for this purpose and Cs plus Sr can be beneficially used as heat and radiation sources, e.g. for food sterilization. A separation scheme has been developed and partly tested in continuous operation on simulated HAW. Solvent extraction processes are used to achieve the necessary separations. Current effors are directed toward the development of an optimal procedure for separating trivalent actinides from coextracted lanthanides.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0178, THE FEASIBILITY OF EXTENDING SOCIO-ECONOMIC ENERGY STUDIES WITH MEASUREMENTS OF ENVIRONMENTAL EFFECTS

A. LUNDIN, Univ. of Stockholm, *Stockholm 50, Sweden*

OBJECTIVE: To make a survey of the methodology and results of studies where attempts to measure environmental effects have been made, especially air and water pollution resulting from oil refining and transportation, the production of electrical power and the use of energy in processing industries.

APPROACH: A thorough search of Swedish and international literature and a systematic tabulation of the state of the science.

PROGRESS: The results of the survey will be reported in March 1977.

INTENDED USE OF RESULTS: As a basis for decisions concerning future quantitative studies in Sweden of environmental effects of energy intensive production.

SUPPORTED BY Sweden - Energy Research & Develop. Commission - Stockholm

6.0179, STUDY OF INTEGRAL WASTE MANAGEMENT SYSTEMS AND THEIR EFFECT ON THE ENVIRONMENT IN THAILAND

P. KARASUDDHI, Atomic Energy for Peace Office, *Bangkok, Thailand*

The programme of this research project can be summarized as the following. 1. Study of the distribution and uptake of radionucleolated in the environment; 2. Determination of the concentration of radioactivity in the surrounding waterways and the environment. 3. Determination of Sr-90 and Co-137 in selected samples. 4. Study of the solidification of sludge from the OAEP waste treatment plant.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0180, CRITICALITY ACCIDENT DOSIMETRY

J.A. GIBSON, Atomic Energy Authority, Atomic Energy Research Estab., *Harwell, England, United Kingdom*

Reports have been published on the neutron capture probability for sodium activation in man phantoms, and on the UK measurements made at the third IAEA Nuclear Accident Dosimetry Intercomparison at Vinca, Yugoslavia.

Preparations are now being made to hold the Fourth Nuclear Accident Dosimetry Intercomparison at Harwell in April 1975. This joint intercomparison and coordination meeting is sponsored by the IAEA. Participants' dosimeters will be exposed at the VIPER reactor at AWRE Aldermaston. A joint programme of preparatory measurements has been started between Harwell and AWRE. Measurements are being made of the VIPER neutron flux spectrum, and of the special variations in the neutron and gamma-ray components of dose. Both active and passive methods of neutron spectrometry are being employed, together with ionization chambers and thermoluminescent dosimeters for the measurement of dose.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0181, EVALUATION AND TESTING OF RADIOACTIVE WASTE STORAGE GLASSES

J.A. MARPLES, Atomic Energy Authority, Atomic Energy Research Estab., *Harwell, England, United Kingdom*

We are going to continue our studies of glass compositions suitable for the vitrification of present and future highly active waste from the UK reprocessing plants. Topics that are being, or will be, covered include: (a) Selection of suitable glass compositions with appropriate formation temperatures. (b) Measurement of various properties of these, e.g. viscosity, thermal conductivity, thermal expansion, specific heat, etc. (c) Study of the crystallisation (devitrification) behavior of these glasses. (d) Determination of their leach rates at various temperatures in both distilled and natural waters e.g. sea water. (e) Studies of their stability to radiation, particularly the alpha-radiation from incorporated actinides.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0182, ENVIRONMENTAL EVALUATION AND HAZARD ASSESSMENT OF THE SEPARATION OF THE ACTINIDES FROM THE HIGH-LEVEL WASTE FROM FUEL REPROCESSING

F. MORLEY, Radiological Protection Board, *Harwell, England, United Kingdom*

The Board has a programme of research on the radiobiology of the actinide elements and carries out studies relating to present and future radioactive waste management policies and practices. Relevant reports on these aspects of the Board's work will be made available to the International Atomic Energy Agency as part of that Agency's programme.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0183, HAZARD ASSESSMENT OF ACTINIDE FROM HIGH-LEVEL WASTES FROM FUEL REPROCESSING FOLLOWED BY TRANSMUTATION OR SEPARATE DISPOSAL (ABBREV)

A.M. PLATT, Battelle Memorial Institute, *Richland, Washington* 99352

The objective of this project sponsored by IAEA is to exchange information being developed by various countries in this subject area. The other participating countries include the Federal Republic of Germany, Italy, Netherlands, Sweden and U.K. The principal goals of the current programs are to evaluate the benefit of actinide removal from radioactive wastes, and to investigate the process technology for actinide removal.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

6.0184, EFFECTS OF DISCHARGES FROM NUCLEAR POWER PLANTS ON FRESHWATER AND MARINE ECOSYSTEMS

W.L. TEMPLETON, Battelle Memorial Institute, *Richland, Washington* 99352

Areas of research are: 1. Effects of chlorine and heavy metals on aquatic organisms. 2. Impact of supersaturation of effluent waters from hydroelectric and nuclear power plants. 3. Combined effects of temperature and pollutants and of temperature and disease on fishes. 4. Effects of thermal discharages on aquatic biota. 5. Effects of modifications on aquatic ecosystems. 6. Bioenvironmental effects of effluent discharges from nuclear power plants to coastal waters. 7. Physiological effects of sudden thermal effluent disappearances: cold shock. 8. Fate and effects of pollutants from energy related plants on marine coastal ecosystems. 9. Suppression of immune capacity in rainbow trout by tritium irradiation during embryogenesis. 10. Effects of low-level chromium irradiation on embryonic development of marine fish and invertebrates.

6. ENVIRONMENTAL ASPECTS OF ENERGY CONVERSION & USE

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

7. TRANSPORT AND TRANSMISSION OF ENERGY

7.0001, TECHNOLOGY ASSESSMENT OF LONG-DISTANCE LIQUID NATURAL GAS PIPELINES
UNKNOWN, Canuck Engineering Limited, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

7.0002, STUDY ON MARINE TRANSPORTATION OF OIL AND LIQUID NATURAL GAS FROM THE ARCTIC ISLANDS TO SOUTHERN MARKETS
UNKNOWN, Albery Pullerits Dickson Ltd., *Don Mills, Ontario, Canada*

SUPPORTED BY Canada - Ministry of Transport - Ottawa, Ontario

7.0003, STUDY OF FLOW-RELATED PROBLEMS IN THE DISTRIBUTION OF WESTERN CANADIAN COALS
UNKNOWN, H.G. Engineering Limited, *Don Mills, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

7.0004, STUDY ON THE TRANSPORTATION, HANDLING AND STORAGE OF CRYOGENIC FUEL GASES
UNKNOWN, Union Carbide Canada Limited, *Don Mills, Ontario, Canada*

SUPPORTED BY Canada - Ministry of Transport - Ottawa, Ontario

7.0005, THE SOCIAL IMPACT OF ALTERNATIVE ENERGY TRANSPORTATION MODES IN THE MACKENZIE RIVER VALLEY, N.W.T.
G.J. BEAKHUST, York University, *Downsview, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

7.0006, STUDIES IN FREE AND FORCED CONVECTION HEAT TRANSFER UNDER ARCTIC ENVIRONMENT
K.C. CHENG, Univ. of Alberta, School of Graduate Stu. & Res., *Edmonton, Alberta, Canada*

CURRENT RESEARCH AND OBJECTIVES: (1) Laminar and turbulent convective heat transfer problems in arctic pipelines transporting natural gas, crude oil or water are formulated as thermal entrance region problem and solved by numerical methods for various possible arctic climatic conditions. The free convection, viscous dissipation and Joule-Thomson effects are considered in the study. (2) A study of the factors affecting ice formation in pipes and solidification of crude oil in large diameter pipes. (3) Thermal instability and free convection problems with maximum density effect in various channels are under investigation. (4) Experimental investigations on hydrodynamic instability in curved parallel-plate channel and entry flow in curved rectangular channels will be made. (5) Future investigations may include solidification problems in ducts or channels for laminar and turbulent flow conditions.

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

7.0007, SIMULATION OF TRANSITORY WAVES ON CONTINUOUS HIGH TENSION ENERGY TRANSPORT LINES
A.B. TURGEON, Univ. of Montreal, Polytechnic School, *Laval, Quebec, Canada*

An analysis of performance of high voltage direct current transmission systems in a specialized field of surge voltage and surge current.

ADDENDA: Performing organization: Ecole Polytechnique.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

7.0008, SLURRY PIPELINE RESEARCH PROJECT
W. SCHRIEK, Saskatchewan Research Council, *Montreal 3, Quebec, Canada* (104776 (HRB NO.))

The purpose is to supply engineering and associated data on slurry pipelining for the public domain. Data from experimental pipeline test loops will cover a wide range of slurry concentrations and particle sizes for such commodities as iron ore, coal, potash and sulphur. /RTAC/

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY Canada - Ministry of Transport - Ottawa, Ontario

7.0009, STUDY OF TERRAIN ALONG THE ALCAN PIPELINE ROUTE
UNKNOWN, Geo Analysis Limited, *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

7.0010, ECONOMIC IMPLICATIONS OF OPTIMAL BUILDING INSULATION ON DISTRICT CENTRAL HEATING SYSTEMS
I.E. EFFORD, Dept. Energy Mines & Resources, Office of Energy Conservation, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To study the economic and technical feasibility of utilizing power plants and industrial thermal discharges for district heating; to develop systems for using power plants as dual purpose supplying thermal energy and electricity, and to develop systems for use of municipal waste to produce thermal energy.

WORK: Examination of the effect of the proposed energy efficiency standards for commercial and residential construction on the economic viability of district heating using the district system studies for North Pickering with heat demands re-defined as the baseline. The impact heating lower load factor on the economic viability of a district heating scheme will also be examined. Reference: Report on the North Pickering District Central Heating System - District Heating Study, Ontario Ministry of Energy.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

7.0011, ASSESSMENT OF MAXIMUM POTENTIAL INDUSTRIAL MARKET FOR DISTRICT HEATING SYSTEMS
I.E. EFFORD, Dept. Energy Mines & Resources, Office of Energy Conservation, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To study the economic and technical feasibility of utilizing power plants and industrial thermal discharges for district heating; to develop systems for using power plants as dual purpose supplying thermal energy and electricity, and to develop systems for use of municipal waste to produce thermal energy.

Analysis of maximum industrial use of energy by temperature categories in order to assess how industrial consumption could increase the base load for district heating systems. The energy use in a stratified sample of 150 industries will be examined in detail. The nature and temperature of end use will be determined and the possible contribution of different district heating systems to satisfying these demands will be calculated. Reference: Puttagem-

ta, V.R., 'Temperature Distribution of The Energy Consumed as Heat in Canada', AECL 5235.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

7.0012, USE OF GAS TURBINES TO GENERATE ELECTRICITY & HEAT FOR DISTRICT HEATING SYSTEMS & VIABILITY OF DISTRICT HEATING FOR SMALL COMMUNITIES

I.E. EFFORD, Dept. Energy Mines & Resources, Office of Energy Conservation, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To study the economic and technical feasibility of utilizing power plants and industrial thermal discharges for district heating; to develop systems for using power plants as dual purpose devices for supplying thermal energy and electricity, and to develop systems for use of municipal waste to produce thermal energy.

WORK: Examination of the use of gas turbines to produce peaking electric power and recovery of the exhaust gas through heat exchangers. The hot water thus produced will be used in a district heating system. Determination of the economic and technical viability of district heating in new and established small communities including consideration of high and low energy density demands. Reference: ACRES LTD - District Heating Study.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

7.0013, TERRAIN SENSITIVITY EVALUATION AND MAPPING, MACKENZIE VALLEY TRANSPORTATION CORRIDOR

J.A. HEGINBOTTOM, Dept. Energy Mines & Resources, Terrain Sciences Division, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: (1) To investigate the response of various earth and rock materials in differing situations to various types of disturbance, both from natural and man-induced causes. (2) To develop and test a terrain sensitivity mapping system that will relate the performance or sensitivity of various terrain units to the activities of man, particularly those involved in the construction and operation of pipelines.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

7.0014, COAL IN OIL SLURRIES FOR LONG DISTANCE TRANSPORTATION

E. SMITH, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To improve the technology of preparation, separation and use of coal-oil and coal-water slurries made from Canadian coals.

WORK: Development of optimal methods of separation of specific Canadian coals from coal-oil slurries and determination of changes in combustion, coking and other coal properties resulting from slurrying which may affect utilization of the coals.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

7.0015, OFF-PEAK LOAD CONTROL

R.H. HARDY, Saskatchewan Power Corporation, *Regina, Saskatchewan, Canada*

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

7.0016, EFFECTS OF LIGHTNING ON THE TRANSMISSION AND DISTRIBUTION SYSTEM

R.H. HARDY, Saskatchewan Power Corporation, *Regina, Saskatchewan, Canada*

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

7.0017, CORROSION

E.B. TINKER, Univ. of Saskatchewan, *Regina, Saskatchewan, Canada*

CURRENT RESEARCH: (1) Corrosion - erosion in slurry pipe-lines. (2) Corrosion in concentrated aqueous solutions of neutral salts.

ADDENDA: This project is also supported by: Defence Research Board; Sask. Research Council.

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

7.0018, HYDRAULIC PROPERTIES OF COARSE PARTICLES OF METALLURGICAL COAL WHEN TRANSPORTED IN SLURRY FORM THROUGH PIPELINES OF VARIOUS DIAMETERS

UNKNOWN, Saskatchewan Research Council, *Saskatoon, Saskatchewan, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

7.0019, PIPELINE TRANSPORTATION OF SOLIDS IN SLURRY FORM

C.A. SHOOK, Univ. of Saskatchewan, School of Engineering, *Saskatoon, Saskatchewan, Canada*

OBJECTIVE: To assist in the development of this technique for the transportation of bulk solids.

APPROACH: (a) To conduct experimental studies of the factors governing energy consumption for typical materials in pipelines up to 12 inches in diameter; (b) to examine new materials or equipment proposed for such pipelines; (c) to study procedures or design changes which could reduce capital costs or improve pipeline reliability; (d) to examine the application of this new technique to new situations.

PROGRESS: 1. A thorough study of the pipeline behaviour of Western Canadian metallurgical coals in water: Studies of Manitoba limestone in water, Quebec iron ore in water, Saskatchewan potash in brine, and various sands in water have been completed. 2. A preliminary study of the preparation, pumping, separation and utilization of Western Canadian coal-oil slurries is being completed. 3. Various theoretical studies and research contract investigations for commercial clients are in progress. 4. Current plans include the study of mixtures containing coarse (one inch diameter and above) particles. The major application of such work will be in coal mining.

ADDENDA: This project is also supported by: Transportation Development Agency.

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

7.0020, THE FEASIBILITY OF USING GAS TURBINES IN DISTRICT HEATING SYSTEMS (ABBREV)

UNKNOWN, Acres Shawinigan Limited, *Toronto, Ontario, Canada*

Study to determine the feasibility of using gas turbines in district heating systems and the economic and technical feasibility of providing district heating to small communities with high, medium and low densities.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

7.0021, STUDY ON THE NORTHERN GAS PIPELINE COST OVER-RUNS

UNKNOWN, F E N C O Consultants Limited, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

7.0022, LONG DISTANCE ENERGY TRANSPORT BY TUNED ELECTRICAL LINES
W. JANISCHEWSKYJ, Univ. of Toronto, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

7.0023, A STUDY OF THE INDUSTRIAL USE OF DISTRICT HEATING
UNKNOWN, James F. Maclaren & Assoc. Ltd, *Willowdale, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

7.0024, ELECTROMAGNETIC CURRENT TRANSFORMER FOR AC AND DC SYSTEM
M.Z. TARNAWECKY, Manitoba Research Council, *Winnipeg, Manitoba, Canada*

PROGRAM OF RESEARCH OR STUDY: Phase 1 - 1972-74 - Development and testing of laboratory model; Phase 2 - 1975 - Testing a commercial prototype at the Manitoba Hydro LaVerendrye Station; Phase 3 -Production of commercial transformers by Carte Ltd; Phase 4 - Development of a prototype electromagnetic current transducer for high-voltage DC applications.

SUPPORTED BY Canada - University of Regina - Regina, Saskatchewan

7.0025, NATURAL GAS TRANSPORT
K. LUNDGREN, Aalborg University Center, Inst. of Indus. Struct. & Eng., *Aalborg, Denmark* 9100

In principle, natural gas can be transported in gaseous or liquid form. Preparation and transporting facilities for liquid natural gas have not been investigated in connection with drilling platforms for natural gas.

The purpose of the project investigation is to analyze the transportation of natural gas and to appraise the construction of the installation, economy, safety and possible ecological effects.

SUPPORTED BY Denmark - Danish Government - Copenhagen

7.0026, ECONOMIC DIMENSIONING OF CENTRAL HEATING PLANTS
UNKNOWN, Technical Univ. of Denmark, Heat. Eng. & Air Condit. Lab., *Copenhagen, Denmark*

A partial central heating network is being constructed here in Denmark. Earlier there was no rational approach to the fact that the dimensioning of these pipes must be done in accordance with an economically optimum method.

There is no doubt that in the next few years there will be an extensive expansion of the central heating network. The purpose of the project is to assure that this great economic expenditure shall be made in accordance with a technically reliable and economically optimum method.

SUPPORTED BY Denmark - Danish Government - Copenhagen

7.0027, SIMULATION MODEL FOR DETERMINING THE RATE OF CONSTRUCTION OF NATURAL GAS TRANSMISSION NETWORKS IN DENMARK (ABBREV)
UNKNOWN, Technical Univ. of Denmark, Lab. of Power Engineering, *Copenhagen, Denmark*

In 1971 an Energy Day was organized with the theme, 'Natural Gas in Denmark'. The results of this led to a thesis work with the title, 'Use of Natural Gas in Denmark'. Still another thesis work dealt with the natural gas problems, since an attempt was made to determine the potential natural gas consumption of various consumer groups, and a model was devised for the production of natural gas in the Danish part of the North Sea. The work, however, was long from completion, since may points had not been cleared up. First and foremost, potential gas consumption was supposed to divided geographically in order to provide basis for the rate of construction of gas supply installations. The decision was thus made to set up a simulation model that would provide the possibility of studying the importance of the factors effecting the natural gas problem, e.g., oil prices on the world market, investments in industry, political interference, etc.

SUPPORTED BY Denmark - Danish Government - Copenhagen

7.0028, ESTABLISHING LARGE CENTRAL HEATING PLANTS
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

The initial operational (establishment) phase for large central heating networks is studied on the basis of existing theoretical experiences in the establishment of natural gas pipelines.

SUPPORTED BY Denmark - Danish Government - Copenhagen

7.0029, INVESTIGATION OF EXISTING UNDERGROUND HEAT SUPPLY NETWORKS
UNKNOWN, Technological Inst., *Copenhagen, Denmark*

In connection with a heating plan for the entire nation, the Heating Methods Committee of the Housing Ministry is to establish a basis for a joint decision on what heating methods the future heat supply should be based on.

The purpose of the project is, accordingly, to obtain an overview of the condition of the existing underground heating network, including heat loss. Against this background a decision is to be made on to what extent a future heat supply utilizing waste heat from power plants and the like can be based on existing networks.

SUPPORTED BY Denmark - Danish Government - Copenhagen

7.0030, INVESTIGATION OF UNDERGROUND SUPPLY NETWORKS
UNKNOWN, Danish Boiler Society, *Hellerup, Denmark*

SUPPORTED BY Denmark - Danish Government - Copenhagen

7.0031, STANDARDS OF RELIABILITY OF URBAN ELECTRICITY SUPPLY
R.H. SHEEHAN, World Bank, *Washington, District of Columbia* 20433

This project was undertaken to determine whether significant reductions could be made in the cost of electricity without greatly reducing the benefits to the economy. Previous work for developing countries has been primarily related to questions of supply, e.g., the cost of various margins of reserve generation plant capacity and the cost of various levels of total system reliability.

This study will estimate the potential reduction in the cost of supply as well as the benefits foregone to the economy resulting from lowering of the standards of supply in urban areas. This will provide guidelines for assessing the standards of supply most appropriate to prevailing conditions.

The research effort comprises two components. The first is a review of the state of the art and an examination of the situation in Mexico, which have been completed. The second component entails case studies of large cities in developing countries, where proposed Bank loans would finance substantial investment in electricity distribution facilities. The first of these studies was executed early in 1975 for the distribution expansion programs of the cities of Guadalajara and Monterrey in Mexico; the report is now under preparation. The second case study is tentatively

planned for the city of Accra in Ghana during the autumn of 1975.

SUPPORTED BY World Bank - Washington, D.C., U.S.A.

7.0032, DOCUMENT AND PUBLICIZE THE TRANSPORT OF NUCLEAR FUEL
D. GOERKE, Unknown Inst. or Indiv. Grant, *Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0033, USES OF LONG-DISTANCE HEAT IN POWER STATIONS
R. SCHWEDLER, Unknown Inst. or Indiv. Grant, *Federal Republic of Germany*

DESCRIPTION OF PROJECT: OBJECTIVE: It is the aim of this project, proceeding from the state of the art technology and existing experiences, to test the possibilities of utilizing waste heat from thermal electric stations, and to compile forthcoming solutions. Through this project, it should become evident which of these possibilities for utilization would be worthy of an introduction, and therefore profit by an intensified further development.

WORK PROGRAM: There are 2 reports planned. The first will deal with material compilation, for example, of the projects planned, those being carried out and those that are completed. In addition a definition of the concept of 'Waste Heat' should be found. The most important results of a meeting concerned with long distance heating, held in Stuttgart, are analyzed. The second report deals with the possibilities of using long distance heat in a practical example.

STATUS: The first report is in printing. Work on the second report is in progress.

ADDENDA: Subcontractor: Prof. Dr.-Ing. H. Bach, Uni. Stuttgart.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0034, INTERLACING OF POLYETHYLENE WITH REGARD TO THE APPLICATION FOR CABLE INSULATION
G. MENGES, Technical Univ. of Aachen, Inst. for Plastic Moudling, *Aachen, Nordrhein Westfalen, Federal Republic of Germany* 5100

DESCRIPTION OF PROJECT OBJECTIVE: Polyethylene is suitable as insulating material due to its good mechanical and electrical properties. Its properties can be improved and its area of usage for medium and high voltage, as well as high frequency and communications cables can be enlarged by interlacing.

WORK PROGRAM; a) Design and construction of an experimental tool with tubular cartridges. b) Design and construction of the cable encasing tool. c) Investigations of the interlacing of polyethylene in the tube tool. d) Investigatons of the electrical and mechanical properties of the extracts. e) Verification of the best results on a cable encasing unit in continuous operation.

STATUS: This project was granted on November 22, 1975.

ADDENDA: Performing organization: Institut fur Kunststoffverarbeitung an der RWTH Aachen.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0035, UHV APPARATUS, TEST TRANSFORMERS FOR VERY HIGH VOLTAGES AND OUTPUTS
J. MOELLER, Messwandler Bau Gmbh, *Bamberg, Bayern, Federal Republic of Germany*

DESCRIPTION OF PROJECT: OBJECTIVE: Development and construction of test transformers for ultra-high AC voltages of up to 2.4 MV. In order to enable an economical development and testing of apparatus for future energy distribution schemes, the test transformers shall require little space, have low partial discharge intensity, and be relatively powerful and versatile.

WORK PROGRAM: a) Limits of output for test transformers with insulating shell design which require little laboratory space. b) Cascade circuit: steady-state and transient voltage distribution. Output of the exciting winding. c) Mechanical stability, production process to ensure low partial discharge and outdoor performance of insulating cylinders. d) AC voltage cascades for production of impulse shock potentials. e) Construction and testing of an 800 kV prototype which shall be one unit of a three-stage cascade.

STATUS: The testing, in particular for an 800 kV prototype test transformer, has been concluded with positive results. The compilation of the manufacturing specifications for such a test transformer and of an instruction manual with detailed load curves have been almost completed. The aim of development has been reached.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0036, ELECTRICAL STRENGTH OF POLYETHYLENE
K.E. BUSCHER, Felten & Guilleaume, *Cologne 80, Federal Republic of Germany* 5000

DESCRIPTION OF PROJECT: OBJECTIVE: An investigation of the fundamental processes of the conduction mechanism in technical polyethylene is to provide the basis for further development of plastic-insulated high-voltage cables. The studies are intended to serve as basis for the construction of polyethylene-insulated high-voltage cables which are reliable in service, even at higher voltages than used today.

WORK PROGRAM: a) Development of a theory for a.c. voltage aging of polyethylene. b) Production, purification and characterization of polyethylene. c) Production of specimens. d) Completion of study and test program. e) Study of aging phenomena.

STATUS: Activities in 1975 were centered firstly on the dielectric breakdown properties of special polyethylene preparations, and, secondly, on diagnostic measurements aimed at a better understanding of the processes occurring during aging of polyethylene under a.c. stress.

Using laboratory-produced polyethylenes varying in density and molecular weight distribution, it was found that neither of these parameters has a profound influence on the time-before-breakdown. Similar results pertain to both statistically distributed faults in the molecular structure and polar groups of low concentration.

The degradation of polyethylenes during aging was effectively monitored by measuring thermally stimulated currents. A dye-labelling method has been developed which permits a sensitive spectroscopy determination of functions in groups at the polymer surface which develop during aging.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0037, HIGH-POWER CABLE WITH INTERNAL WATER COOLING
RASQUIN, Rhine Cable Plant Company, *Cologne 80, Federal Republic of Germany* 5000

DESCRIPTION OF PROJECT: OBJECTIVE: Development of a cable with internal forced cooling by means of water for transmission of highest possible electrical power.

WORK PROGRAM: a) Construction and trial of a test cable with dimensions which can be achieved in practice with currently available production equipment. b) Development of components for a cable with large conductor diameter. c) Related system analysis for optimization of the complete system.

STATUS: While further studies are necessary on the reaction of aluminum cooling water pipes to corrosion, a reliable solution, which will soon be available, has been found by using stainless steel for the cooling water pipe. A longer trial length of 110 kV oil-filled cable with a stainless steel pipe of approximately 60 mm channel diameter has been produced. Tests carried out so far have been successful.

In addition to the resistance to corrosion and erosion, conductor-cooled high power cables with a cooling water pipe of stainless steel also feature low hydrodynamic coefficients of friction. Operating pressure up to 50 bar are permissible in the cooling water. This type of construction permits transmissible powers up to 2000 MVA in the 110 kV field. The present inner channel

diameter is thus considered capable of coping with all power requirements in future decades. This means that the cables with large conductor diameters for high transmissible powers mentioned in the R & D planning are also taken into account by this construction.

Good progress has also been made in the development of the relevant accessories.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0038, HIGH VOLTAGE DIRECT CURRENT TRANSMISSION AND AC-DC-CURRENT PRODUCTION (ABBREV)

R. JOETTEN, Technical Univ. of Darmstadt, *Darmstadt, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0039, FOUNDATION STUDIES FOR THE DEVELOPMENT OF ELECTRICAL APPARATUS FOR ENERGY TRANSMISSION INSTALLATIONS WITH THE HIGHEST VOLTAGES

G.F. LUXA, Siemens AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0040, INFLUENCE OF THE ENVIRONMENT ON THE RELIABILITY AND REGULATION OF ENERGY TRANSMISSION INSTALLATIONS

G.F. LUXA, Siemens AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0041, BASIC INVESTIGATIONS INTO THE INSULATION OF GAS-FILLED PIPES, ESPECIALLY SF6, FOR HIGH TENSION TRANSMISSION OF ELECTRICAL ENERGY

G.F. LUXA, Siemens AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

DESCRIPTION OF PROJECT: Objective: Determination of the long-term behaviour of insulating materials in SF6-insulated transmission lines. Conducting endurance tests of full-scale components.

WORK PROGRAM: a) Long-term tests on cast-resin insulators in SF6 to establish the limits of their long-term insulating strength. b) Measurement of partial discharges. c) Increasing the test voltage for all measurements from 500 kV intermittent up to approx. 1 MV continuous.

STATUS: In the high voltage hall of the Siemens Schaltwerk, Berlin, a test setup for determining the long-term insulating strength of insulators was erected. This setup enabled electric, thermal and mechanical stresses to be applied to the test objects.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0042, SUPERCONDUCTING CABLE FOR 3-PHASE CURRENT

F. SCHMIDT, Siemens AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

DESCRIPTION OF PROJECT: OBJECTIVE: Conclusion of the development of components and testing of a single-phase a.c. cable. Systematic mechanical and electrical tests of the cable, and intensive further investigations of the electrical insulation of superconducting 3-phase cables. Preparation of an effective and reliable dielectric.

WORK PROGRAM: a) Completing the construction of a 35 m long experimental cable, including sealing ends, and concluding the further investigations. b) Extensive investigations for the improvement of the electrical insulation of 3-phase cables. c) Studying the overcurrent behaviour of stabilized superconductors under conditions of forced cooling.

STATUS: Construction of the 30 m long testing facility for 100 kW and 10 kA is practically complete. The high-voltage and pressure tests on the sealing ends of this facility have been successfully completed. In order to ensure that the flexible cable cores meet the requirements set, a prototype section was made using aluminium cores, and this is available for cooling and heating tests and dielectric measurements in the testing facility. Production of the superconducting Nb-(Al) conductor and performance tests on it are almost complete. It is now available for the manufacture of the superconducting cable cores to be completed. The dielectric measurements (tg delta partial discharge and breakdown) are concentrated on the production data for the cable cores and their ends. Preparations for extending the scope of measurements (higher sensitivity, impulse voltage, response to changes in temperature and pressure) have been made in line with the work described above. The measuring and control equipment necessary for monitoring and recording the test data has been constructed. The external cooling devices for connecting the refrigerator such as pumps, transfer leads and cryodistributor have been assembled.

ADDENDA: Subcontractor: Leybold-Heraus, Koln; Haefely, Basel; GfK (IEKP), Karlsruhe.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0043, TEST SET-UPS FOR DEVELOPING H.V. CIRCUIT-BREAKERS FOR HIGH SHORT-CIRCUIT CAPACITIES

E. SLAMECKA, Siemens AG, *Erlangen 2, Bayern, Federal Republic of Germany* 8520

DESCRIPTION OF PROJECT: OBJECTIVE: To gather basic knowledge for an expansion of the existing testing and measuring facilities for the development of h.v. circuit-breakers with high short-circuit capacities. To develop new testing and measuring methods for this power range.

WORK PROGRAM: a) Investigations into extending the synthetic test circuits for testing circuit-breakers for short-circuit currents of 80 to 100 kA. b) Measuring the prospective transient recovery voltage in the test circuit. c) Measuring the post-arc current of circuit-breakers at the line potential. d) Synthetic test circuit for verifying the capacitative breaking capacity.

STATUS: The work started in accordance with the program in December 1975.

ADDENDA: Performing organization: Siemens AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0044, OPTIMUM DESIGN OF TRANSPORT SYSTEMS, COMBINED WITH THE DEVELOPMENT OF NEW TRANSPORT TECHNIQUES (ABBREV)

W.P. BETHE, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECT: Mining technology and coal preparation.

FIELD: Shipping systems.

OBJECTIVE: Investigation of the feasibility of modern transport techniques, optimization of in-plant, regional and national transport systems. Optimum structure of pit-fed rail terminals taking into consideration the transport functions to be assumed by other transport systems.

WORK PROGRAM: 1. Determination of investments and operating costs for different types and quantities of transported goods. 2. Investigation of the application potential of new transport systems. 3. Development of models for cargo handling systems. 4. Planning of prototype systems for pit-fed rail terminals and transport facilities. 5. Construction and operation of a prototype facility.

STATUS: Item 1 of the work program has been completed, and the results have been compiled in a project study.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

7.0045, TRANSMISSION OF STARTING CHARACTERISTICS
ESPEY, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Collection and processing of starting characteristics (current, voltage, wattage, speed, torque) of underground drive units difficult to start up, data transmission to pit control center, acquisition of information to help in dimensioning of drive units and layout of switchgear and network.

WORK PROGRAM: a) Project study on technical feasibility of the acquisition, transmission and processing of measured values. b) Development of data transmitters for underground operation. c) Fabrication and assembly of the equipment. d) Operational trials.

STATUS: The appropriate analysis having brought out the difficulties involved in operating the type of data-recording equipment envisaged - U, I, N - a list of specific requirements was drawn up for system with mining applications. This covers in particular questions relating to method of construction (robustness), system of protection, and recording procedure. After the metering apparatus for power output (U, I, N) and speed has been delivered, with pulse recorders and transition coils, a prototype of the metering equipment will be constructed. Particular attention has been paid to the choice of the current transformers, which are required to ensure linear transmission of up to twice the rated current.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

7.0046, TRACKLESS, DIESEL-OPERATED, SELF-DUMPING TRANSPORT SYSTEM (SHUTTLE CAR)
FLOREN, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECT: Mining technology and coal preparation.

FIELD: Conveyor equipment.

OBJECTIVE: Low-cost and high-performance transport of dirt from dinting and ripping points, and construction material, especially in gate roads. Compact-designed diesel drive with acceptable performance-to-weight ratio and an emission of toxic substances which will not exceed the admissible values in the intake air even with increased CH4 content.

WORK PROGRAM: Selection of a suitable diesel engine. Design and production of the vehicle. Trials in underground operation.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

7.0047, AUTOMATIC LOCOMOTIVE TRANSPORT IN MAIN ROADWAYS AND BRANCHES
GOING, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECT: Mining technology and coal preparation.

FIELD: Conveyor equipment automatic conveyor systems.

OBJECTIVE: Better utilization of the locomotive and car rolling stock, increased transport capacity, reduction of man shifts and frequency of accidents, reduction of operating costs. In the final stage the contemplated complex automation system is to include four levels: 1. travel routes and traction units; 2. communication between roadway and train; 3. interlocking installation and control logic; 4. central process control unit.

WORK PROGRAM: Concept definition; Installation in two construction phases; Start-up and trial operation.

STATUS: Item 1 of the work program has been completed.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

7.0048, POWER-FACTOR IMPROVEMENT IN UNDERGROUND POWER SUPPLY NETWORK
HERMS, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Greater wattful power output with existing cables, reduced capital outlay.

WORK PROGRAM: Fabrication of prototypes for: Flameproof bank of capacitors of approx. 1200 kVA, 5 kV for centralized compensation, or approx. 180 kVA, 500 V for decentralized compensation per transformer. Capacitor protection device. Flameproof control and switchgear system.

STATUS: Preliminary discussions have been held with AEG and Siemens on the possibilities for installing flameproof banks of capacitors. Specific requirements for this equipment must first be determined, and only after this preliminary work has been done can the appropriate project studies be commissioned.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0049, 10 KV SUPPLY FOR MEDIUM VOLTAGE NETWORK
JUNGBLUT, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Improved safety and economy of operation of underground power supply, better configuration for operating network, improvement in underground voltage stability and starting characteristics of machines.

WORK PROGRAM: a) Planning work with supplier firms. b) Development of switchgear, transformers and monitoring equipment, with emphasis on safety consideration. c) Assembly of installations and laying of cables. d) Operating trials.

STATUS: It has taken a relatively long time for the inquiries put to relevant firms to be dealt with. Their various offers are at present under study.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0050, BATTERY-DRIVEN SUSPENSION MONORAIL LOCOMOTIVE
PETRI, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: Development of a locomotive for suspension monorails with light-weight battery and electronic controls, for operation in conditions of extra-high CH4 content (between 1 and 1.5%).

WORK PROGRAM: a) Specification of driving power and battery capacity, determining operating program. b) Development of motor, battery, controller and auxiliary elements. c) Operating trials.

STATUS: It has been possible to place a contract for one of the two prototypes for a suspension monorail locomotive decided on. They will be submitted to trials under different operating conditions; one locomotive will be operated on an upwards incline of 0-9g, the other on a downwards incline of 0-15g, both drawing a load.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0051, DEVELOPMENT OF POWER LINES OF GREATER FLEXIBILITY FOR CUTTING MACHINERY
SCHUTZ, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECTIVE: Mining technology and coal preparation.

FIELD: Energy supply.

OBJECTIVE: A special type of power feed for cutting machinery is to eliminate, to the degree possible, the power line failure as a result of falling rock, catching on supporting structure elements, and other causes.

WORK PROGRAM: 1. Project preparations; 2. Preparation of project study by the machinery supplier; 3. Preparation of project study by the cabling and line supplier; 4. Fabrication of experimental prototypes; 5. Fabrication of prototypes; 6. Underground installation and trials.

STATUS: Items 1 and 2 of the work program have been completed.

ADDENDA: Performing organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

7.0052, SELECTIVE EARTH FAULT MONITORING IN THE INTERMEDIATE-VOLTAGE NETWORK

THUNER, Ruhr Coal AG, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

MAIN OBJECTIVE: Mining technology and coal preparation.

FIELD: Energy supply.

OBJECTIVE: Development of techniques and technical equipment for the rapid and dependable detection of network sections afffected by earth faults, and disconnection of the smallest network section possible.

WORK PROGRAM: Analysis of all theoretical techniques possible for underground operation to determine their practical feasibility. Selection of the best-suited technique on the basis of experimental arrays. Fabrication of experimental and prototype equipment for testing on the surface. Trial operation underground.

ADDENDA: Peforming organization: Ruhrkohle AG.

SUPPORTED BY Germany - Federal Ministry of Economics - Bonn

7.0053, RUHR REMOTE HEAT RAILS, DEMONSTRATION PLANT, DIVIDED CENTERS

H. VOELCKER, Steag AG, *Essen, Nordrhein Westfalen, Federal Republic of Germany* 4300

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0054, REMOTE HEATING IN THE RUHR, DEMONSTRATION CENTER, INTERMEDIATE CENTER SECTION

H. VOELCKER, Steag AG, *Essen, Nordrhein Westfalen, Federal Republic of Germany* 4300

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0055, LONG-DISTANCE HEAT RAIL RUHR - MIDDLE SECTION

H. VOLCKER, Steag AG, *Essen, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: A first section of a heat rail is to be constructed in order to ensure the connection of existing local heat distribution networks including a heat power-station and other heat sources. The installation is to provide proof of feasibility of the total system concept. It is to be laid out in such a way as to enable it to be integrated into a large system at a later time. The project should provide information as to what extent transition to a connected system makes better use of existing power stations, whereby the storage capabilities of the network are to be made use of. Information will be available as to how to use existing fuels most efficiently. Questions related to ensuring supply will be taken account of.

WORK PROGRAM: a) Test of different types of compensations to accommodate the expansion due to heat, taking special account of the anchorage-point stress occurring during one sided depletion. b) Test of depletion systems. c) Development and operation of ventilation and de-venting systems suitable for winter operations. d) Test of different shut-off mountings and their respective drive mechanisms for the existing pressure and temperature situation. e) Development and test of dynamic pressure reduction mechanisms in case of trouble. f) Test of circuit and mode of operation of the return pumps. g) Development of trouble event management. h) Test of circuits to directly connect the heat rail with local networks of varying nominal pressures. i) Building and test of a load distribution for the supra-regional connective system. Optimizing of fuel input (grand load, peak load). Use of storage capabilities of the complete network systems. Considerations for electricity need. J) Test of a reliable control system for power, temperature and pressure.

STATUS: Building of the delivery stations has begun. In the region of Gelsenkirchen and Essen several tracks have been laid.

The first partial operation will begin the end of 1976.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0056, OVERALL STUDY ON THE POSSIBILITIES OF LONG-DISTANCE HEAT SUPPLY FROM HEATING POWER STATIONS IN THE FRG

F.J. MOLTER, Arbeitsgemein. Fernwaerme E.V., *Frankfurt 70, Federal Republic of Germany* 6600

DESCRIPTION OF PROJECT: OBJECTIVE: Estimate of the saving in fossil fuels which can be achieved on a short-term and medium-term basis in the Federal Republic by means of long-distance heating from heating power stations, in particular of the nuclear type, and statement of the ecological and politico-economic advantages obtained thereby, as well as the necessary measures and investments.

WORK PROGRAM: a) Statement of general principles. b) Determination and classification of the present and future heat requirement (quantitative and qualitative). c) Present and future possibilities of meeting the heat requirement from fossil and nuclear heat power stations. d) Technical and economical design of the extension of the long-distance installations; possibilities of an interconnected system. e) Estimate of the investment costs within the framework of the economical extension of the long-distance heat supply. f) Comparison of long-distance heat supply with other possible methods of meeting heat demand from the points of view of economics, political economy and ecology. g) Final comments and recommendations.

STATUS: Work on the study long-distance heat-system in the year 1975 concentrated mainly on the following parts: a) Determination of basic data and description of fundamental relationships influencing the technique and economics of heat production and distribution, b) Collection of data for a heat-atlas which will function as a statement on the extent to which long-distance heat-supply with strong heat-coupling is feasible in the Federal Republic of Germany. c) Differentiation of long-distance heat-system to other energy carriers, especially gas.

ADDENDA: Subcontractor: Wibera, Dusseldorf; KA-Plan, Heidelberg. Performing Organization: Arbeitsgemeinschaft, Fernwarme e.V. (AGFW)

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0057, PROGRAM STUDY 'HEAT DISPERSION'

ANTE, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

DESCRIPTION OF PROJECT: OBJECTIVE: It is planned to critically analyze existing long distance heat distribution systems in countries possessing highly technical standards. It is further planned to investigate how similar problems are solved in other branches of industry, and which of these solutions can be utilized for long distance heat distribution systems.

WORK PROGRAM: The investigation consists of six main points:

a) Development of a multi-dimensional classification system scheme for the purposeful arrangement of the data to be gathered.

b) Compilation of international experience of existing long-distance heat dispersion systems and those in process of being built.

c) Evaluation of published claims and actual values.

d) Deduction of development trends for future long distance heat dispersion networks, especially taking into consideration the anticipated costs.

e) Drafting of proposals for the technology of long distance heat distribution networks to be built and for improvements of those already existing.

f) Deduction of necessary research topics and programs, and proposals for current regulations.

STATUS: 40% of the survey was completed at the end of 1975.

ADDENDA: Subcontractor: KA-Planung Rudolf Otto Meyer.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0058, INVESTIGATION OF ELECTRON-ION CONDUCTIVITY AND THE MOBILITY OF CHARGE CARRIERS IN POLYETHYLENE

O. BOETTGER, A E G Telefunken AG, *Hamburg 11, Federal Republic of Germany* 2000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0059, INVESTIGATION OF THE INTERACTION BETWEEN POWER ELECTRONICS AND POWER GENERATING PLANTS

D. KNUTH, A E G Telefunken AG, *Hamburg 11, Federal Republic of Germany* 2000

DESCRIPTION OF PROJECT: OBJECTIVE: Improvement of the stability of supply and of the quality of electric power by reduction of mains reactions caused particularly by power electronics equipment in the public mains.

WORK PROGRAM: a) Development of a uniform theory of asymmetrical and polyphase voltage systems with regard to the switch elements and control methods of power electronics. b) Study of causes and effects of power transients in electric mains. c) Development of methods for the reduction or suppression of mains reactions arising from power electronics equipment. d) Study and development of new measuring techniques for mains reactions arising from power electronics and systems.

STATUS: The most important investigations are: calculation of power-factor, effective values of line currents and current harmonics when coupling a single or three phase supply network with a DC network with static converters which commutate on DC- or AC-side, the simulation of compensation systems with thyristor switched capacitors for welding machines; the development of the control of static converters which are connected in bridge circuit and which commutate on DC-side; the calculation of disturbing currents in single phase traction networks when loaded with pulsed converters with DC-voltage or current intermediate circuits.

A mobile test rig has been built after investigating the measuring and analysis system which is necessary for intercepting and rating the converter quantities of most interest when studying reactions in networks. This rig includes a FM tape station, a storage oscillograph, a frequency measuring instrument and analyser, a calculator of effective values and a plotter. The rig will be joined to a desk calculator with an interface which includes a working storage. The test rig for measuring network loads has been inserted successfully at the investigation of a locomotive E 181.2 which works with two frequencies.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0060, DEVELOPMENT OF SEMICONDUCTOR CONVERTERS FOR SWITCHING AND REGULATING

LUKANZ, A E G Telefunken AG, *Hamburg 11, Federal Republic of Germany* 2000

DESCRIPTION OF PROJECT: OBJECTIVE: Development of concepts for plants using novel semiconductor switches as well as for the associated measuring and control systems. Further development of cooling and protection systems used in these plants. Construction and test of a Triac switch.

WORK PROGRAM: a) Theoretical studies of concepts for plants for switching reactances as well as the use of semiconductor switches. b) Development and construction of measuring and control systems for rapid pick-up of electrical data and for an assessment of the power-line flicker. c) Studies on low-voltage semiconductor switches and test of a newly developed 10 kV semiconductor switch. d) Further development of protective devices and firing systems. e) Design and test of a Triac switch.

STATUS: The characteristics of the 10 kV semiconductor switch has been studied while being switched on and off. Furthermore the water cooling system of this switch has been investigated during a 1000 hour long test. Fundamental investigations of a vaporization cooling system being employed in power-electronics has been completed successfully. For studying opto-electronic firing systems two 6 kV semiconductor-switches have been developed. One is equipped with thyristors and the other with triacs. The firing power can be taken from the main circuit (Patent P 2259659.4) by a special network arrangement. The switch, equipped with triacs, uses a new method of opto-electronics system; the firing order circuit. By using optical fiber with more than one conductor it is possible to improve the reliability of the system. An arrangement for floating measurements on high voltage potential by using opto-electronics has been developed and tested.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0061, SF6-INSULATED CABLE WITH NON-PERMANENT CONNECTIONS

K. MUELLER, A E G Telefunken AG, *Hamburg 11, Federal Republic of Germany* 2000

OBJECTIVE: Development of highly reliable SF6-insulated cables with non-permanent connections for the transmission of electric power.

WORK PROGRAM: a) Basic investigations with plane and cylindrical alumina parts connected by means of special resins. b) Elaboration of methods for sealing tests. c) Development of auxiliary equipment for connection purposes and quality control on site. d) Development of suitable contact systems including short and long current carrying capacity tests. e) Construction and testing of model cables as well as manufacture of a short test line. f) Testing of a test line under practical conditions.

RELATION TO OTHER PROjECTS: Whereas the project NT 4488 deals with general investigations of SF6-cables insulated for high voltages, the described project concentrates mainly on the technique of cable connection.

STATUS: A SF6 gas-insulated line with natural cooling is able to transmit extremely high power, is very reliable and requires little maintenance. However, special problems arise with the technique of joining the prefabricated pieces in the trench as well as with the optimal outline, determined essentially by the power losses. Because of the very low thermal resistance between sheath and conductor, the capacity of the SF6-insulated line depends more on the outer heat-transfer than it would be in the case of conventional cables.

Methods have been investigated to join the prefabricated pieces of the line by means of an adhesive connection. In order to test these joints for a long time, a 2-phase 15 m long underground test-line was installed. It turned out that the joints did not have the mechanical strength anticipated by preliminary laboratory tests because of lack of prolonged-alternating stress strength. As there are no other successful solutions at present, it seems to be useless to continue the investigation of this joint-technique.

Independent of this, the heat-flux in the soil emitted from the test-line has been investigated. The thermal field, obtained by a lot of control-points, shows significant fluctuations during the day and differs from that temperature-field, which is the basis of conventional calculation methods. Especially in the summer, areas of heat-storage and heat-transfer to the ground-water are of great importance.

These phenomena as well as the specific thermal behaviour of the soil will be further investigated.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0062, UNCONVENTIONAL CIRCUITS FOR STATIC VOLTAGE TRANSFORMERS

NESTLER, A E G Telefunken AG, *Hamburg 11, Federal Republic of Germany* 2000

DESCRIPTION OF PROJECT: OBJECTIVE: Development of controllable auto-converters and inverters having a low power-weight ratio, high efficiency and high operating frequency.

WORK PROGRAM: a) Theoretical and practical studies of the static and dynamic limits of the electric load of semiconductor switching elements. b) Study of regulated direct voltage transformers and inverters of up to 50 kW with minimum losses and optimum power-weight ratio. c) Construction of laboratory models of alternative circuits.

STATUS: Semiconductor switches in which the switching-off is done by power transistors connected in parallel to a thyristor have been built and tested. Whereas the thyristor is for switching-on and carrying the current, the transistors have to take over the function of switching-off. A switch for high reverse voltages has been built where three power transistors are connected in a series for utilizing the thyristor reverse voltage of 1200 V.

A DC-DC converter, as well as three phase inverter, have been built with these switches. Different methods of controlling the inverter which supplies an asynchronous motor have been analyzed and realized.

Experiments for studying the applicability and power limit of integrated transistor switches in voltage transformers have been performed. Inverters being self- or load conducted have been simulated with digital computer programs for analysing the loads of the electrical components, so that optimization of these circuits will become possible.

Experiments with heat pipes which were done last year have been continued with better measuring equipment. In addition, the vaporization cooling system with inert fluorine chemicals has been studied using a test rig.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0063, PROJECT STUDY ON LONG-DISTANCE HEAT SUPPLY FROM HEATING POWER STATIONS IN THE MANNHEIM-LUDWIGSHAFEN-HEIDELBERG AREA

G. BLATTNER, K A Design Gmbh, *Heidelberg, Federal Republic of Germany* 6900

DESCRIPTION OF PROJECT: The study of the Mannheim-Ludwigshafen-Heidelberg area is one out of four regional studies which serve as model investigations of long-distance heating systems in regions with different structures. The choice of this area, besides being highly industrialized, it is also based on its particular structure consisting of different clusters. Several nuclear power stations, either under construction or being planned are situated in the periphery surrounding this region. The aim of this study is to find out to which extent it is possible to fulfill the long-distance heating demand of the industry by the nuclear power stations. To this purpose, an economically optimum design of a long-distance heating network is to be developed based on an accurately determined heat requirement. The existing long-distance heating network will form an integral part of the projected planning.

WORK PROGRAM: a) Representation of the existing situation of power and heat supply. b) Heat requirements and specific heat requirements per unit area. c) Determination of the location of the nuclear heating power station. d) Technical and economical concept of the extension of the long-distance heat supply in successive stages. e) Ecological effects of the long-distance heat supply as compared to other possibilities of meeting the heat-requirements. f) Comparative study of the long-distance heat supply from nuclear power stations and other possibilities of meeting the heat requirements, with respect to their economics. g) Coordinating discussions with public utilities. h) Summary of the essential results and recommendations.

STATUS: Points a) to d) of the program have been worked out and were completed in 1975. The chief task was to find out and analyse the heat requirements of the different groups of consumers and to forecast the economic development up to 1990. The result shows that in the region of MA/LU/HD a connected load of approx. 1,500 Gcal/hr for room temperature and 1,000 Gcal/hr for industrial requirements (i.e. 40 resp. 70% of the total heat demand) can be supplied by a district heating system with a remote nuclear heating power station. Half of the industrial heat requirements can be distributed by hot water, the other 50% in the form of steam. The concept of the district heating system has been developed in detail. (Text Abridged.)

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0064, DISTRICT HEAT SUPPLY SYSTEM FOR THE TOWN OF INGOLDSTADT

H. MECK, Stadtwerke Ingolstadt, *Ingolstadt, Bayern, Federal Republic of Germany* 8070

DESCRIPTION OF PROJECT: OBJECTIVE: Establishment of a district heat supply system for the town of Ingoldstadt in connection with the erection of a central hospital. Investigations into the possibilities of heat supply from the neighbouring Grossmehring power station.

WORK PROGRAM: a) Fundamental considerations regarding heat supply on a low-temperature basis. b) Investigation of a cooling-water transport line between Grossmehring and Ingolstadt. c) Study of the possibilities to cover the remaining heat demand. d) District heat supply to the town of Ingolstadt and the new hospital by tapping a turbine in the Grossmehring power station. e) Investigations into the district heat supply of the town of Ingolstadt and, in particular, the planned hospital. f) Comparison of the variants examined.

STATUS: The concept of the study was completed by the end of 1975. The final version is expected to be available by the end of January 1976.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0065, PHYSICS OF BREAKING ARCS - UNSTEADY PHENOMENA OF GAS BLAST

E. VONBANIEN, A E G Telefunken AG, *Kassel, Federal Republic of Germany* 3500

MAIN OBJECT: Conversion, transport and storage of energy.

FIELD: Improvement of circuit breakers.

OBJECTIVE: This project is a continuation of the NT 342 project. Both projects deal with the improvement of high-performance circuit breakers. The described project is intended to provide a physical explanation of the parameters of the arc produced during the operation of the breakers. It is the purpose of these investigations to clarify the interdependence between these arc parameters and the dimensions of the breaker chamber as well as the properties of the flow of the extinguishing medium.

WORK PROGRAM: Theoretical investigations of the turbulence in arcs and calculation of such arcs. Theory of transport mechanisms. Calculation of the interaction between the arc and the electrical network. Further development of the method of direct measurement and evaluation of power loss and arc time constant. Determination of the limit of breaking capacity of real circuit breakers. Investigation of clogging phenomena and determination of the resulting breaking capacity. High-power experiments including plasma diagnostics. Statistical evaluation of the results, special problems. To be regarded in connection with ET 1 (4.2.3.1) treating similar subjects.

ADDENDA: Performing organization: AEG-Telefunken AG, Hochspannungsinstitut.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0066, SYSTEM STUDY ELECTRIC BULK POWER TRANSMISSION

E. RUMPF, Aerospace Research Institute, *Mannheim, Federal Republic of Germany*

MAIN OBJECT: Conversion, transport and storage of energy.

FIELD: Transmission networks.

OBJECTIVE: Starting from the present state of technology, the possibilities of electric power supply in densely populated areas are to be investigated up to the year 2000 and ways for a solution are to be worked out.

WORK PROGRAM: Development of densely populated areas and their electric power demand. Development of areas with concentrated generation of energy. Technology of apparatus and systems. Factors for evaluation and their interlinkage. Development of model networks. Technical and economical comparison, results.

REFERENCE TO OTHER PROJECTS: The results of the system study will be of importance for all the other research activities which are sponsored within the field Transmission Networks for Electrical Energy.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0067, SF6 - ISOLATED DIRECT CURRENT SWITCHPOINT FOR HGUE STATIONS

W. SCHMITZ, Brown Boveri & Cie Company, *Mannheim 1, Baden Wuerttemberg, Federal Republic of Germany* 6800

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0068, WATER-COOLED HIGH-POWER TRANSMISSION CABLES

R. STECKEL, Brown Boveri & Cie Company, *Mannheim 1, Baden Wuerttemberg, Federal Republic of Germany* 6800

DESCRIPTION OF PROJECT: OBJECTIVE: Development of a cable with internal water cooling by forced convection for the transmission of very high electrical power.

WORK PROGRAM: a) Construction and testing of an experimental cable with dimensions similar to those of the present state of the art oil-cooled cables. b) Development of components for a large conductor diameter cable. c) Construction and testing of sealing ends and joint boxes. d) Accompanying system-analysis for system optimization.

RELATION TO OTHER PROJECT: The project will be carried out in collaboration with Felten & Guilleaume and is to deliver data for the system analysis recently started under project number ET 4042 concerning high power electrical energy transmission. The results of this project will take influence upon the introduction of superconducting cables into the market (ET 4036 and ET 4161).

STATUS: Heating tests have been made on three cables of 20 m length each. Aluminum-cooling ducts and a joint element have been tested on corrosion behavior. A test equipment with sealing ends and joint box was set up. Construction of the elements for the cooling station has been started.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0069, HIGH POWER ELECTRICAL TRANSMISSION (SYSTEM STUDY)

E. RUMPF, Research Assn. High Volt. Tech, *Mannheim, Baden Wuerttemberg, Federal Republic of Germany* 6800

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0070, SPARKOVER AND RECOVERY BEHAVIOR OF GAPS IN NON-MOVING SF6 GAS

SCHNEIDER, Research Assn. High Volt. Tech, *Mannheim, Baden Wuerttemberg, Federal Republic of Germany* 6800

DESCRIPTION OF PROJECT: OBJECTIVE: Investigation of the sparkover behaviour of gaps in SF6 to be used for overvoltage protection devices, and of the recovery behaviour of these gaps after direct current stress of known amplitude and duration.

WORK PROGRAM: a) Selection of a suitable gap with respect to shape and material. b) Investigation of the sparkover behaviour of a gap with special consideration of a desired small scattering of the sparkover values. c) Investigation of the recovery behaviour of the gap after being stressed by a direct current (max. 200 A, 20 ms). In a first step arc movement is prevented. d) Investigation of the recovery behaviour after movement of the arc.

STATUS: The first investigations were made concerning the selection of a gap with small scattering of its sparkover behaviour. The test facilities for the investigations of the recovery behaviour are going to be installed.

ADDENDA: Performing organization: Forschungsgemeinschaft fur Hochspannungs- und Hochstromtechnik e.V.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0071, BULK POWER TRANSMISSION NETWORKS

BUNDSCHUH, A E G Telefunken AG, *Monchengladbach 2, Federal Republic of Germany* 4070

DESCRIPTION OF PROJECT: Objective: The power grid components to be developed, compact h.v. overhead line systems, cables for heavy load transmission, unconventional tranformer designs, fully insulated medium voltage switchgear, will facilitate the increased throughput of the existing networks for the higher demands of the future. Extensive full-scale tests will be needed to verify the reliability of the system components. Associated performance studies and computer simulation incorporating load data are also planned.

WORK PROGRAM: a) The theoretical tasks include: loading capability of underground cable systems; simulation of transient system performance; optimization of investments in system hardware; topology of high loaded distribution networks. b) Activities in development and testing: insulated crossarms for line poles; testing of highly loaded SF6-cables, metal-clad surge diverters; ceramic and outdoor resin insulators for high mechanical demands, measurements on cable systems with external water cooling, d.c.-biased reactors; 110 kV compact transformer stations with extremely low noise level; fully insulated medium switchgear; buried distribution transformers. c) Accompanying technological investigations cover electrical characteristics of insulations under chemical working stress; furthermore environmentally acceptable insulating fluids are to be examined.

STATUS: The work has been systematically begun.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0072, OPTIMIZATION OF SOLID PLASTIC INSULATIONS

M. SAURE, A E G Telefunken AG, *Monchengladbach 2, Federal Republic of Germany* 4070

DESCRIPTION OF PROJECT: Objective: Basic investigation are to provide new knowledge about the electrical breakdown mechanism in solid plastic insulation for high voltage applications. So, it should be possible to produce power cables, electrical apparatus and equipment with more efficiency, more safety and saving of costs.

WORK PROGRAM: a) Special investigations about the breakdown mechanism. b) Investigations of the electrical conductivity of high polymers. c) Improvement of the methods for testing the insulation behavior and the structural phenomena. d) Testing of special insulating materials with regard to electrical properties and morphological structures. e) Optimization experiments on selected insulating materials f) Dimensioning of an experimental extruder for cables. g) Testing of heterogeneous insulating materials. h) Manufacturing of test models with practical dimensions, e.g. of casting resins and studies on the manufacturing process.

RELATION TO OTHER PROJECTS: This project provides a fundamental contribution to the deepening of knowledge about the electrical strength of insulating materials. The results can influence other projects.

STATUS: In order to verify the theoretical method conception of electric breakdown of high polymers, an experimental method for determining the inherent dielectric strength has been developed. It was found necessary to separate tree-initiation from tree-growth, since for one or the other different properties of the material are prevailing (R. Patsch, 1975). Measurement of the

electric conductivity were continued and interpreted theoretically in accordance with the model conception.

Knowledge about inhomogeneities in extruded polyolefine-insulations has been essentially improved and questions about their influence on insulation life were investigated. Processes leading to the formation of inhomogeneities during extrusion cross-linking and cooling were demonstrated.

The influence of peroxide-concentration in cross-linked polyethylene on the treeing behavior and the migration of fluids into trees was extensively investigated. Acetophenone, one of the migrating residues of DCP-degradation proved to be a temporary voltage stabilizer. (Text Abridged.)

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0073, LONG DISTANCE HEAT RAIL SAAR - LONG DISTANCE HEAT SUPPLY OF THE CITY OF VOLKLINGEN

H. BESCH, Saarberg Fernwaerme Gmbh, *Saarbruecken, Saarland, Federal Republic of Germany* 6600

DESCRIPTION OF PROJECT: OBJECTIVE: a) Utilization of industrial waste for long distance heat. b) Design and production of a 'long distance heat rail Saar' which is directed towards a high capacity line for a supraregional long distance heat supply system. It allows the use of different sources of waste heat and supra-regional shifting of power. c) Construction of an inner city long-distance heat distribution network with a capcity of ca. 75 Gcal/hr in the medium-sized city of Volklingen with ca. 50,000 inhabitants. d) Investigation and development of new processes such as the improvement of well-known processes of long distance heat technology with regard to the special requirements and possibilties for the use of waste heat.

WORK PROGRAM: a) Basic planning. b) Planning and erection of a heat feed line from the coke works Furstenhausen NW 350, ND 16 to the Central Station Saarwiesen. c) Planning and erection of a heat line from the power station Fenne to the Central Station Saarwiese NW 400, Nd 25 as part of the Saar rail. d) Planning and erection of a heat line from the Central Station Saarwiese to the swimming pool in Volklingen, NW 400, ND 25, as part of the Saar rail. e) Planning and erection of an innercity distribution network, NW 350/300, ND 16. f) Planning and erection of the delivery stations, coke works, power plant Fenne and Central Station Saarwiese. g) Research and development for the further development on the Haubenkanal. h) Research and development for the use of plastic pipes for the long distance heat networks. i) Research and development for the use of AZ-tubes in long distance heat networks.

STATUS: a) Negotiations with the city of Volklingen concerning their cooperation as well as compulsory connections and use are almost completed. b) The necessary measures will be started in September, 1976.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0074, STUDY OF THE LONG-DISTANCE HEAT-SUPPLY SYSTEM IN THE KOBLENZ-BONN-BAD GODESBERG-KOLN AREA

E. ORTH, Wibera Economics Consulting AG, *4000 Dusseldorf 1, Federal Republic of Germany*

DESCRIPTION OF PROJECT: OBJECTIVE: In the study, the demand for long-distance heating of the Koln/Bonn/Bad Godesberg/Koblenz region is to be investigated on the assumption that the nuclear power station now under construction in Mulheim-Karlich near Koblenz may also be used for the long-distance heating supply. The essential question is whether it is economical to transport thermal energy over a large distance and through a region with low heat requirements in order to utilize it later on for heat supply in congested areas. This study is one of four regional studies in which certain selected regions of different structure are investigated as to their demand for district heating. These four studies are the basis for the investigations of the heat requirements in the German Federal Republic.

WORK PROGRAM: a) Provisional demarcation of the areas to be investigated and presentation of present structures of supply. b) Investigation of the present and future heat requirements. c) Investigations of localization of nuclear heating power stations. d) Technical and economic conception of the extension of the district heating supply depending on future development. e) Investigation of investments. f) Financing problems, problems of taxation. g) Investigation of heat costs. h) Economic comparison of district heating supply between nuclear heating power stations and other possibilities to cover heat requirements. i) Environmental consequences. k) Coordination talks with participating public utilities. l) Summary of the results and recommendations.

STATUS: The survey of the heat requirements (room heating and production heat) in the studied area has been completed. The volume of district heating to be expected under certain conditions in the year 1990 has been determined as to its quantities and capacities.

Through contacts with the power-supplying enterprises of the area, alternative nuclear and fossile types of combined power-heat plants have been discussed and evaluated. Especially in view of a large-scale district heat supply system of the cities of Bonn and Koln potential locations for nuclear plants have been determined.

The planning of the necessary new capacities, transport networks and local distribution plants has been largely completed. An estimation of the required investments for the consecutive phases of expansion will be concluded soon.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0075, PLANNING AND DESIGN WORK FOR DEMONSTRATING INTERCONNECTION NETWORKS FOR LONG-DISTANCE HEAT SUPPLY IN THE OBERHAUSEN AREA

G. DEUSTER, Oberhausen Energy Supply AG, *4200 Oberhausen, Nordr. Westf., Federal Republic of Germany*

DESCRIPTION OF PROJECT: OBJECTIVE: The objective of this design study is to investigate the demand and the supply of long-distance heating for the area of the western Ruhr district. This area, which incorporates the cities of Oberhause, Mulheim, and Dinslaken, is densely populated and industrialized. This study is to be considered in conjunction with four further studies which will yield information on the long-distance heating demand in model areas of different structure. A subject of this study, in particular, will also be the tie-in of a high temperature reactor at a later date. The existing network will be included in the design. The four regional studies will then provide the basis for the 5th study, which will cover the demand for long-distance heating in the Federal Republic.

WORK PROGRAM: a) Evaluation of heat demand. b) Heat supply. c) Long-distance heating network. d) Electrical network, due to considerations of coupling heat and power systems. e) Power station. f) Evaluation of all variables. g) Supplementary planning. h) Economy studies. i) Investigation of a water distillation system arranged in sequence. k) Detail planning of the systems.

STATUS: Primary statistical survey in the district of Oberhausen and Mulheim, secondary statistical survey of the required heating power in district of Dinslaken. Evaluation of this data and development of specific factors. Comparison between primary and secondary surveys (work 1975 concluded).

ADDENDA: Subcontractor: GHT Gesellschaft fur Hochtemperaturreaktor-Technik mbH. Performing organization: Energieversorgun Oberhausen AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0076, HIGH VOLTAGE INSTRUMENTS, TEST TRANSFORMERS FOR VERY HIGH VOLTAGES AND POWER

HUEMER, Measurement Transf. Construct., *8600 Bamberg, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

7.0077, ENERGY TRANSPORT USING GAS OR LIQUIDS (H2, NH3, HOT WATER, ETC.)

UNKNOWN, Electricite de France, *Paris, France* 76008

Problems of energy transport using conduits carrying gas or liquids.

Technical feasibility studies: choosing the best solution from the economic point of view; determining transport cost.

Participating in and following-up studies on hydrogen transport done by GDF and of the transport of low temperature heat (geothermal, recovering thermal wastes).

ADDENDA: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

7.0078, GAS (H2, NH3, ETC.) OR LIQUID TRANSPORT

UNKNOWN, Electricite de France, *Paris*, *France* 76008

We will examine different ways of transporting energy in the form of a gas or liquid and optimize solutions, taking transportation costs into account. This project should result in a general computation method for comparing different methods of energy transport, particularly as related to the heating of localities.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

7.0079, ENERGY TRANSMISSION

UNKNOWN, Electricite de France, *Paris*, *France* 76008

Evaluate options that are open to the electrical energy producer in meeting fluctuations in long term demand other than producing hydrogen through electrolysis.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

7.0080, 1000 KV PROJECT

UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome*, *Italy*

When considering the evolution of the future transmission system of Italy, it can be foreseen that the present 420 kV system will be superimposed by a new system, at a voltage around 1000 kV. On this basis, ENEL has devised a Project for the construction of a 1000 kV pilot plant, consisting of a 15 km long line, which will be integrated into the 420 kV system through transforming stations.

The project will make it possible to study and test all system components directly in the field, before the construction and the development of the actual UHV network are started.

The project, which will last about 10 years, is composed of a large number of sub-projects; the most important ones are described in the following notices.

Part 1 of 9.

ADDENDA: Supporting agency & Performing organization: ENEL - Entr Nazionale per l'Energia Elettrica, Direzione Studi e Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

7.0081, CORONA EFFECT AND GROUND LEVEL GRADIENTS FOR OVERHEAD LINES OPERATING AT VOLTAGES BETWEEN 750 KV AND 1200 KV

UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome*, *Italy*

The aim of this research is to determine the characteristic values of the corona effect (losses, radionoise, audible noise) and of the ground level gradients for various conductor bundles in different positions and under different atmospheric conditions.

The project comprises the construction of an experimental line section with movable conductors, the development of digital instrumentation for the measurement of radionoise and audible noise, measurements of audible noise in anechoic chamber, and research on the physiological effects of the ground level gradients.

Part 2 of 9.

ADDENDA: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studi e Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

7.0082, MECHANICAL AND THERMAL BEHAVIOUR OF CONDUCTORS AND FITTINGS FOR OVERHEAD LINES OPERATING AT VOLTAGES BETWEEN 750 KV AND 1200 KV

UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome*, *Italy*

The objectives of this project are: to determine the wind and ice overloads on the conductors and the stresses which are transmitted to the towers; to evaluate the configuration and the mechanical characteristics of the conductors and earth wires submitted to the above-mentioned overloads, with particular regard to vibration problems; to evaluate the thermal limit of electrical overloads for conductors and joints; to study the behavior of spacers and dampers.

The research is partly carried out on two experimental lines in areas where wind and ice overloads are particularly frequent.

Part 3 of 9.

ADDENDA: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studi e Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

7.0083, INSULATION, PHENOMENOLOGY OF ELECTRIC DISCHARGES, DIELECTRIC TESTS FOR UHV SYSTEMS

UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome*, *Italy*

The purpose of this research is to acquire new knowledge in the field of electric discharges; this will be accomplished through the following steps: theoretic study of the phenomenology of electric discharge through air (lightning and switching over voltages) and over polluted insulating surfaces; laboratory research (lightning impulse tests, switching impulse tests, power frequency tests) on internal insulations of substation equipment (dry tests) and on outdoor insulations under non-polluted conditions (dry and wet tests); and laboratory research (power frequency tests and switching impulse tests) on outdoor insulators under artificial pollution.

Part 4 of 9.

ADDENDA: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studi e Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

7.0084, LIGHTNING WITHSTAND OF OVERHEAD LINES AND GROUNDING DEVICES OPERATING AT VOLTAGES BETWEEN 750 KV AND 1200 KV

UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome*, *Italy*

This research is meant to obtain a better knowledge of lightning characteristics and to experiment with the behaviour of a tower (1:10) to simulated lightning conditions.

Part 5 of 9.

ADDENDA: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studi e Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

7.0085, INTERNAL OVERVOLTAGES AND METHODS FOR THEIR CONTROL IN UHV SYSTEMS

UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome*, *Italy*

This research is carried out by means of a Transient Network Analyzer. The purpose of the study is: to assess the values of overvoltages in ENEL's future UHV system; to choose the means for their control (arresters, spark gaps, etc.) and to establish voltage test levels for machinery and equipment.

Part 6 of 9.

ADDENDA: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studi e Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

7.0086, UHV EXPERIMENTAL LINE - DESIGN, TESTING AND CONSTRUCTION OF TOWERS
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

This study is subdivided into three phases, as follows: design and construction of the various types of towers (with particular regard to insulating crossarms); mechanical and assembling tests on towers; design, construction and testing of the 1000 kV experimental line, with a length of 5 km.

Part 7 of 9.

ADDENDA: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studi e Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

7.0087, DESIGNING, TESTING AND CONSTRUCTION OF A 1000-KV SUBSTATION MODULE
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

The purpose of this research is to build a typical UHV substation module and to optimize the characteristics of its elements and geometrical arrangements from both the economic and technical standpoints; the necessary information will be obtained for assembling facilities and techniques.

ADDENDA: Supporting agency & Performing organization: ENEL - Ente Nazionale per l' Energia Elettrica, Direzione Studi e Richerche.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

7.0088, CHARACTERISTICS OF THE FUTURE UHV SYSTEM AND ITS PROTECTION SYSTEM
UNKNOWN, Electric Energy Agency, Directorate of Studies & Res., *00100 Rome, Italy*

After an investigation on present and future loads carried out in some of ENEL's districts, it has been possible to forecast in detail the 420 kV network in 1985. Further investigations will be carried out in the next years to set up the construction schedule, network configuration, substation schemes, and connections between the various elements.

At the same time a study has been conducted for the selection of the most suitable protection system for the future.

ADDENDA: Supporting agency & Performing organization: ENEL - Ente Nazionale per l'Energia Elettrica, Direzione Studies Richerche.

Part 9 of 9.

SUPPORTED BY Italy - National Electric Energy Agency - Rome

7.0089, HYDROGEN AS AN ENERGY CARRIER
W. VANDEELEN, Central Org. Adv. Appl. Res., Org. for Industrial Research, *Apeldoorn, Netherlands*

'Hydrogen as an energy carrier' is a paper study to investigate the effect of the production, transport and usage of hydrogen on the energy system of The Netherlands. It is meant to be a relatively short, broad evaluation as a basis for more specific studies (or R&D activities) in the next five years. The study is carried out by about 60 part-time participants from industry, government and R&D institutions.

Subprojects: a) Coordinating Group, managed by Ir. W. van Deelen. b) Group on Technical Aspects of Hydrogen Engineering, managed by Dr. W. Takens. c) Group on Production Aspects of Hydrogen, managed by Ir. J.W. Geus. d) Group on Hydrogen Storage, managed by Dr. Ch.A. Kruissink. e) Group on Transport and Distribution of Hydrogen, managed by Prof. ir. C.O. Jonkers. f) Group on Utilization (domestic, agricultural, commercial and industrial), managed by Prof. ir. C. van den Berg and Dr. J.B. Zabel. g) Group on Hydrogen as a Fuel for Automotive Purposes, managed by Dr. J.B. Zabel. h) Evaluation Group, managed by Dr. J. Quakernaat.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

7.0090, RUPTURE OF GAS DISTRIBUTING PIPE LINES
H.C. VANELST, Central Org. Adv. Appl. Res., Metal Research Institute, *Apeldoorn, Netherlands*

The investigation is focussed primarily on the safety of gas-transport pipe lines. The study regards the results of the comparison of foreign bursting tests on real scale with the Robertson data, experimentally obtained by the Metal Research Institute TNO. It was evident that a high correlation exists regarding arrest capability against brittle fracture. The important parameters are being studied by means of critical crack opening displacement measurements and the Rice-integral determinations. A part of the project focusses on the development of a test method for the determination of the crack-resistance against ductile fracture. The research develops in cooperation with the mentioned institutions.

SUPPORTED BY European Community - Brussels, Belgium

7.0091, NONDESTRUCTIVE TESTING
UNKNOWN, N.V. K E M A, *Arnhem, Netherlands*

Application of methods for non-destructive testing of components of power works, both conventional and nuclear. Special attention for use on inspection of existing plants, also under conditions of radioactivity.

Contribution to development of acoustical emission and eddy currents methods.

SUPPORTED BY Netherlands - N.V. Kema - Arnhem

7.0092, STUDIES OF TRANSFORMER PROBLEMS
UNKNOWN, N.V. K E M A, *Arnhem, Netherlands*

Project mainly concerned with damage in large transformers: a. Calculation of static forces and dynamic behaviour of transformers during a short-circuit. b. Detection of amount and character of damage in a transformer after a short circuit. Use of Low Voltage Impulse method, supplemented with calculations.

SUPPORTED BY Netherlands - N.V. Kema - Arnhem

7.0093, PROBLEMS OF ELECTRICITY TRANSMISSION
UNKNOWN, N.V. K E M A, *Arnhem, Netherlands*

Miscellaneous studies of problems of both high tension lines and underground cables: A. High tension lines: 1. Interference with cathodic protection of pipelines for natural gas; 2. Reflection of TV carrier waves; 3. Galoping lines. b. Underground cables: 1. study of interaction of cable and soil; 2. cross-bonding of mantle parts, especially behaviour under abnormal conditions (switching, lightning); 3. Study of dielectric properties and heat conductivity of oil-filled cables prepared with different materials; 4. Start of study of spacer-cables and DC transmission.

SUPPORTED BY Netherlands - N.V. Kema - Arnhem

7.0094, RESEARCH OF THE BEHAVIOUR OF SUBSOIL STEEL PIPELINES FOR TRANSPORT OF OIL, GAS OR WATER IN CROSSINGS WITH DIKES (RIVERS) & HIGHWAYS
A.M. GRESNIGT, Central Org. Adv. Appl. Res., Inst. for Building Constr., *Delft, Netherlands*

In The Netherlands an extensive sytem of pipelines has been constructed in the last 10-15 years. Difficulties have been encountered at points where the pipelines have to cross existing dikes. Because of the often highly compressible subsoil (peat and clay strata), differential settlement is liable to occur after the construction of such crossings. As a result, the pipeline is subjected to 'imposed' deformations. The pipeline must be able to adapt itself to these differences in settlement. That means that not only the strength is important, but especially the deformation capacity.

7. TRANSPORT AND TRANSMISSION OF ENERGY

A BFR grant is requested for the extra costs arising from the fact that more than one solution is selected for this demonstration and to permit a careful follow-up of the costs and performances involved.

ADDENDA: Performing organization: AB Atomenergie.

SUPPORTED BY Sweden - Council for Building Research

7.0101, OSCILLATION PROBLEMS AND PUMP ENERGY CONSUMPTION IN SMALL DISTRICT HEATING NETWORKS

C. JARVSTRAT, Orrje & Co. Scandiaconsult, *Stockholm, Sweden*

The load on a district heating network and, consequently, on the primary water flow, varies markedly depending on the season. Because of this, the pump energy consumption can be reduced considerably by regulating the speed of the distribution pumps. The interplay between the speed regulation and the automatic control in the distribution centres can, however, give rise to oscillations in the network in small district heating networks. This can, in turn, entail marked operational disturbances which eliminate the advantages of the speed regulation.

Two district heating networks have been selected for study. One of these has speed regulations and the other does not. The former is located in Fisksatra, Stockholm and serves multi-family houses with a total of 2,700 flats. The latter is located in Hovsjo, Sodertalje and serves multi-family houses with a total of 2,400 flats. In both cases, the network also serves two schools and a downtown centre.

The object is to study and compare oscillation problems and pump energy consumption in both networks. In addition to mapping out the differences with or without speed regulation, the aim is to draw up proposals for measures to deal with oscillation problems.

The project is broken down into stages, the first of which will comprise a preliminary study.

SUPPORTED BY Sweden - Council for Building Research

7.0102, TOM'S EFFECT IN DISTRICT HEATING SYSTEMS

C.H. LING, Steam Users Association, *Stockholm, Sweden*

The purpose of this project is to investigate whether Tom's effect, i.e. a reduction in the friction pressure drop through the addition of polymer in the water, can be implemented in district heating systems. This sub-project is devoted to investigating how the heat transfer in tube heat exchanger, suitable for a sub-distribution centre for a district heating system, is affected by the polymer addition.

SUPPORTED BY Sweden - Council for Building Research

7.0103, CRITERIA AND METHODS FOR THE LONG-TERM PLANNING OF TRANSMISSION AND DISTRIBUTION NETWORKS

J.A. BUBENKO, Royal Institute of Technology, *Stockholm 70, Sweden*

The object of this project is to provide the data necessary for formulation of a model for the long-term planning of power distribution systems. The primary aim is to survey and assess the factors which influence long-term planning of regional transmission and distribution systems. Factors which will be considered in the assesssment include the future energy policy of this country, the structural changes taking place in society, the significance of electric power for modern society, and environmental requirements.

The research comprises: 1. Analysis of the influence exerted by the built-up environment on the design of power systems. 2. Adaptation of the power system to environmental requirements. 3. Technical and economic evaluation of different methods with regard to the requirements of modern society. 4. Coordinated planning and construction of installations.

Work is to be done in consultation with planners and the representatives of power undertakings.

SUPPORTED BY Sweden - Council for Building Research

8. ENERGY UTILIZATION AND CONSERVATION

8.0001, ENERGY CONSUMPTION BY AUSTRALIAN TRANSPORT

J.A. LEE, Univ. of Melbourne, *Parkville, Victoria, Australia* 3052 (115528 (HRB NO.))

The consumption of energy by categories of Australian transport has been studied with a view to developing scenarios of transport energy demand resulting from changes in energy prices and supply. /IRF/

Paper submitted to the International Symposium on the Effects of Energy Shortage on Transportation Balance, University Park, Pennsylvania, May, 1974.

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY Australia - University of Melbourne

8.0002, ANALYSIS OF THE TRAVEL CHARACTERISTICS IN ALL CANADIAN CITIES (ABBREV)

A. CHUMAK, Unknown Inst. or Indiv. Grant, *Canada*

Analysis of the travel characteristics in all Canadian cities in order to permit the formulation and analyses of strategies for the automobile with respect to energy, urban and regional development, other travel modes, safety, infrastructure requirements and social equity.

SUPPORTED BY Canada - Ministry of Transport - Ottawa, Ontario

8.0003, EXAMINATION OF THE ENERGY CONSUMPTION OF TWENTY MAJOR MANUFACTURING INDUSTRIES

UNKNOWN, Klimoff Engineering Limited, *Agincourt, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

8.0004, ANALYSIS OF PRICE ELASTICITY OF TRANSPORTATION FUELS

UNKNOWN, Data Metrics Limited, *Calgary, Alberta, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

8.0005, A FEASIBILITY STUDY ON WASTE HEAT EFFLUENT USES IN AQUACULTURE

UNKNOWN, Underwood Mclellan & Assoc., *Calgary, Alberta, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

8.0006, STUDY TO IMPROVE ENERGY EFFICIENCY RESEARCH AND DEVELOPMENT IN CANADIAN AERONAUTICAL TECHNOLOGY

UNKNOWN, Dehavilland Aircraft of Canada, *Downsview, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

8.0007, ECONOMIC EVALUATION OF ENERGY SAVING SYSTEMS

O. COLAVINCENZO, Ontario Min. of Transp. & Com., *Downsview, Ontario, Canada* (128011 (HRB NO.))

Until yet the methods of design and analysis of steel pipelines are based solely on the elastic theory (in The Netherlands anyway). This elastic theory provides a very incomplete picture of the essential deformation capacity.

Research carried out by the Institute TNO for Building Materials and Building Structures has shown that the behaviour of buried steel pipelines under imposed deformations can be described much better with the aid of the plastic theory.

The object of this research is drawing up a more realistic set of design recommendations based on plastic theory and model studies undertaken, for buried steel pipelines for transport of oil, gas or water.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

7.0095, TRANSFER OF LOCALLY PRODUCED ENERGY TO THE PUBLIC MAINS

P. VANOOSTERHOUDT, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

Some energy sources (e.g. sun, wind) produce a very fluctuating energy flow. When these sources are utilized to cater for the entire and continuous energy consumption of a community, energy has to be stored during periods of surplus. The known accumulators are of unacceptable dimensions and require much maintenance. These systems are therefore only suitable for small consumers. For greater amounts of energy, as necessary for a substantial contribution to the national energy supply, use can often be made of the statement that the energy to be produced by these sources (solar cells, aeroturbines etc.) together is always less than the supply from the cooperating national power stations.

It is proposed to operate these energy sources, after conversion to electric power, in parallel with the conventional power stations.

A 'line commutated dc-ac converter' can be applied to deliver properly the primary fluctuating dc power to the public mains. In order to operate this system with a good power factor the 'dc-ac converter' is being modified using a low/high chopper.

ADDENDA: Supporting agency and Performing organization: Technische Hogeschool Eindhoven.

SUPPORTED BY Netherlands - Eindhoven University of Technology

7.0096, TRANSPORT OF COALS BY MEANS OF CAPSULES THROUGH PIPELINES

H. VANDENKROONENBE, Twente Univ. of Technology, Lab. for Design & Construction, *Enschede, Netherlands*

Capsule transport is one of the possible transport methods for the future, by which goods can be transported through pipelines without being contaminated by the transporting medium. If the specific weight of the loaded capsule is equal to the specific weight of the transporting liquid, this method is energetically very favourable.

Regarding the transport of coal, it is possible to realize an equal specific weight. Capsule transport is to be preferred to slurry transport, because for capsule transport the coal must be crushed and because during the transport there will be no pollution of the environment.

SUPPORTED BY Netherlands - Twente University of Technology - Enschede

7.0097, DEVELOPMENT OF TRANSPORT SYSTEMS FOR LIQUID OR GASEOUS FUELS FROM NATURAL SOURCE BY MEANS OF SHIPS

P. CROOCKEWIT, Rijn Schelde Verolme N.V., *Rotterdam, Netherlands*

OBJECTIVES: a) transportation of LNG by means of ships; b) transportation of LPG by means of ships; c) storage of LNG and LPG; d) loading, unloading and storage of LNG and LPG on artificial islands.

SUPPORTED BY Netherlands - Rijn Schelde Verolme N.V. - Rotterdam

7.0098, HEATED ROADS - RELATIONSHIP BETWEEN ENERGY CONSUMPTION AND QUALITY OF SERVICE

R. MAGNUSSON, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

The objective is to determine the way in which energy consumption and snow clearance service vary with the placing of the heating coils, the construction of the road pavement and the material in this, climatic conditions and the strategies employed in the supply of heat. Measurements of temperatures, heat flows, moisture contents etc, at varying applied heating power, air temperature and wind strength, will be made on portable test roads both in the laboratory and in the field. The results obtained during these tests will be compared with the results obtained, by purely theoretical means, by analytical models available at the Lund Institute of Technology or Trondheim Institute of Technology.

Simultaneously with these laboratory and field tests, some of the experiments gained by the various Municipal Services Departments and similar departments around the country in snow clearance and ground heating will be collected and analysed. This will throw a light on the snow clearance requirements for different road surfaces, the costs of construction, and the reasons for the very great variations in annual costs, for different methods of construction, in the value per unit plan area.

SUPPORTED BY Sweden - Council for Building Research

7.0099, ENERGY SUPPLY IN URBAN AREAS - A DISTRIBUTION NETWORK FOR HEATING ENERGY

S. BORGLIN, Univ. of Lund, School of Technology, *Lund 7, Sweden*

This project is a preliminary study for a larger main project entitled: 'Energy supplies in urban areas - a systems study of buildings, distribution networks and energy conversion plants.'. The preliminary study is broken down into 4 separate parts: Part 1: The theory of distribution networks for district heating. Part 2: An experimental method for a district heating network. Part 3: Data processing engineering. Part 4: The collection of viewpoints from practical operations. The purpose is to carry out, within each separate part, method analyses and compilations of knowledge of direct value for the main project.

SUPPORTED BY Sweden - Council for Building Research

7.0100, DEMONSTRATION AND FOLLOW-UP OF NEW HOT-WATER DISTRIBUTION TECHNOLOGY

P. MARGEN, Ab Atomenergi, *Nykoping 1, Sweden*

The purpose of this project is to verify, technically and economically, district heating distribution technology (including distribution within buildings) based on the use of plastic pipework. This technology should be so advantageous economically that it also permits the connection of housing areas with a relatively low load density, an objective which cannot be achieved using conventional technology with metal pipework. In addition, the purpose is to provide a demonstration of a technology which is less sensitive than the technology in use today with regard to the effects of settlement and external corrosion.

A heating system with plastic pipework is to be installed in a housing area with 120 dwelling units in such a way that half of the area is provided with different systems for heating and domestic hot water and the other half with a joint system for heating and domestic hot water. Particular attention will be paid to the choice of materials in both cases. A cost estimate will be carried out for a conventional system without plastic pipework as well as for three different plastic pipework systems, of which the two giving the best economy will be selected for the demonstration. A careful follow-up of the costs will be carried out and they will be compared with the costs for the conventional system. In addition, the water chemistry will be followed up during a two year period. After that, selected components will be inspected with regard to corrosion attacks. Measurements of heat losses and checks on the efficiency of the temperature control equipment will be carried out during a winter.

The purpose of this project is to develop a computer program which can be used in the Energy Management Program to perform economic evaluations of a variety of energy saving systems. A simplified energy consumption model of a transit system has been formulated. This model will be used to determine how various operational and system parameters affect energy consumption. The cost of the energy is then combined with the capital cost of the energy system to generate the cost streams required for the economic evaluation. This information will then be used to assess the economic viability of each energy system. A data base including aerodynamic drag, energy consumption profiles under various operational conditions of various off-the-shelf propulsion system (including a range of energy saving services) and power distribution technologies will be combined on a typical transit line to yield alternate conceptual designs of propulsion systems. The optimisation technique is to combine the data base parameters in a simple computer model to allow an evaluation of design options and trade-offs highlighting where the maximum energy savings can be found. /RTAC/

SUPPORTED BY Canada - Ontario Provincial Government - Toronto

8.0008, REVIEW OF AERODYNAMICS OF RAIL TRANSIT VEHICLES PHASE I
O. COLAVINCENZO, Ontario Min. of Transp. & Com., *Downsview, Ontario, Canada* (128042 (HRB NO.))

The purpose of this project is to: (a) Establish the background in rail transit vehicle aerodynamics; (b) Define aerodynamic research projects to be undertaken by the Ministry of Transportation and Communications of Ontario. The background information will provide an understanding for aerodynamic phenomena associated with rail transit vehicles. Also, it will permit us to determine the methods available for analyzing these phenomena. The project will be primarily a literature search into the following areas: (1) Steady and unsteady state aerodynamic drag forces in free air and particularly in tunnels. (2) The generation of pressure waves by a vehicle in a tunnel. (3) The generation of passing pulses. Some of the information obtained in this project will be immediately useful in the energy management study. This project comprises the first phase of a railed vehicle aerodynamic project. /RTAC/

SUPPORTED BY Canada - Ontario Provincial Government - Toronto

8.0009, PROPULSION SYSTEM DESIGN RATIONALE
I. DUNCAN, Ontario Min. of Transp. & Com., *Downsview, Ontario, Canada* (128005 (HRB NO.))

A review of propulsion systems around the world reveals a very wide range of capacities in relation to vehicle mass and maximum speed gradients. The purpose of this project is to discover and set down fundamental reasons to account for the choice of a specific propulsion system. Basic laws of motion will be reviewed with a view to discovering relations between average speed, maximum power, energy consumed and trip distance. /RTAC/

ADDENDA: Document provided to S.S.I.E. by the R.R.I.S.

SUPPORTED BY Canada - Ontario Provincial Government - Toronto

8.0010, FUEL ECONOMY AND EMISSION CONTROL MEASUREMENTS
C. SIMMONS, Ontario Min. of Transp. & Com., *Downsview, Ontario, Canada* (087006 (HRB NO.))

The components of this study are: developing equipment and procedures to measure the fuel consumption of passenger cars, light and medium commercial vehicles; obtaining complete instrumentation to accurately measure fuel consumption, velocity, acceleration, deceleration, distance travelled, time, fuel temperature, and atmospheric conditions; assembling fuel consumption, measuring and calibrating equipment into a convenient size which can be quickly adapted to any vehicle; using S.A.E. Recommended Practice J-1082 'Fuel Economy Measurement Road Test Procedure' as a reference, and modifying procedures for use on public combination of urban and suburban driving cycles; arranging to use the facilities of the Ministry of the Environment to check emission levels of the test vehicles. /RTAC/

SUPPORTED BY Canada - Ontario Provincial Government - Toronto

8.0011, RAIL VEHICLE POWER AND ENERGY CONSUMPTION STUDY
V. SOOTS, Ontario Min. of Transp. & Com., *Downsview, Ontario, Canada* (128051 (HRB NO.))

The purpose of this study, which is part of the general Energy Management Program, is to determine the power requirements and energy consumptions of transit vehicles operating in free air and in tunnels under various conditions as specified by operational parameters such as acceleration, maximum speed, station spacing etc. The study first establishes the mechanical limits of power requirements, energy consumption, regeneration and energy storage in terms of the operational conditions and free air and in tunnels. The calculations within this part of the study will use the results of the aerodynamic drag study (project 03605) and operational criteria established in other studies. The study then incorporates the performance characteristics of various propulsion systems - DC series, shunt or separately excited motors, as well as AC motors - with and without energy saving devices such as choppers and flywheels. The study relies here on input from investigations carried out by the Electrical Group. The resulting calculations will produce actual power and energy consumption profiles of the different propulsion systems under the various operational conditions considered. The energies associated with drags, momentum change, regeneration and equipment losses will be identified. The results will be used in the Economic Evaluation Program to determine the viabilities of the various propulsion options. The viable alternatives will then be investigated further with refined performance data and extended operational ranges in order to provide basic data for preliminary conceptional design of the total energy system. /RTAC/

SUPPORTED BY Canada - Ontario Provincial Government - Toronto

8.0012, FUEL ECONOMY DEVICE EVALUATION
UNKNOWN, Ontario Min. of Transp. & Com., *Downsview, Ontario, Canada* (087002 (HRB NO.))

The purpose of the project is to evaluate fuel economizing devices such as fuel injection systems, electronic carburetor devices, fuel additives, wire gasoline atomizers etc., from the standpoint of reliability, safety, emission considerations, and so on. /RTAC/

SUPPORTED BY Canada - Ontario Provincial Government - Toronto

8.0013, COMMERCIAL VEHICLE DRAG REDUCTION
UNKNOWN, Ontario Min. of Transp. & Com., *Downsview, Ontario, Canada* (087005 (HRB NO.))

The purpose here is to evaluate the possibilities of installing aerodynamic devices on certain vehicles, such as trucks. The study considers fuel conservation, vehicle design, and operating characteristics. /RTAC/

SUPPORTED BY Canada - Ontario Provincial Government - Toronto

8.0014, STUDY OF WESTERN CANADIAN ENERGY USE AND RESOURCES
J.C. WOOD, Alberta Research Council, *Edmonton, Alberta, Canada*

SUPPORTED BY Canada - University of Regina - Regina, Saskatchewan

8.0015, EXCITATION CONTROL FOR STABILITY / OPTIMAL LOAD FLOW
D.H. KELLY, Univ. of Alberta, *Edmonton, Alberta, Canada*

Excitation Control - a new excitation control scheme has been developed for stabilization of machines in power systems. This control is suboptimal and adaptive. Existing data is promising, indicating the stabilization of disturbed systems in a very short time. The proposed research is the extension of studies to multimachine systems and also to study the effects of practical approximations.

Optimal Load Flow - while load flow programs are extremely useful in the power industry, the need is to couple these programs with minimization of a cost function (such as fuel costs) and in this way find the load flow which best achieves this objective subject to operating system constraints. Several approaches exist and the present work is on an approach combining advantages of two of the major ones. In addition, factors such as optimal bus ordering are considered.

SUPPORTED BY No Formal Support Reported

8.0016, DETERMINATION OF THE DIRECT ENERGY USE BY TRANSPORT IN THE ATLANTIC PROVINCES
UNKNOWN, A D I Limited, *Fredericton, New Brunswick, Canada*

SUPPORTED BY Canada - Ministry of Transport - Ottawa, Ontario

8.0017, DEVELOPMENT OF A CONSERVER SOCIETY GAME TO SIMULATE TOTAL RESOURCE COSTS IN THE MARKETPLACE (ABBREV)
R.H. LOUCKS, Canplan Oceanology Limited, *Halifax, Nova Scotia, Canada*

Development of a conserver society game to simulate total resource costs in the market place and to develop consumer sensitivity to patterns of resource allocation precipitated by choices in the market place.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

8.0018, STUDY COVERING THE INTENSIVE AGRICULTURE-FOOD PRODUCTION WITH THE GOAL OF CORRELATING ENERGY FACTORS AND ENVIRONMENTAL IMPACT
R.H. HALL, McMaster University, *Hamilton, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

8.0019, DETERMINATION OF THE POWER REQUIREMENTS FOR PLOWING IN A VARIETY OF SOIL TYPES AND CONDITIONS
J.H. CLARK, Kemptville Col. of Agri. Tech., *Kemptville, Ontario, Canada*

SUPPORTED BY Canada - Department of Agriculture - Ottawa, Ontario

8.0020, CONTINUATION OF THE DETERMINATION OF POWER REQUIREMENTS FOR TILLAGE IN VARIOUS ONTARIO SOILS
J.H. CLARK, Kemptville Col. of Agri. Tech., *Kemptville, Ontario, Canada*

SUPPORTED BY Canada - Department of Agriculture - Ottawa, Ontario

8.0021, LINEAR INDUCTION MOTOR COMPARATIVE ANALYSIS
D. MUKHEDKAR, Univ. of Montreal, Center for Transportation Res., *Laval, Quebec, Canada* (099412 (HRB NO.))

To carry out theoretical and experimental research into linear inductions motors (LIM's). The objectives are: 1) To review, understand, and quantify the basic differences between the predictive models of a LIM developed by various researchers worldwide with particular emphasis on the influence of compensating windings to improve motor performance. 2) To study and quantify end effects for single and double sided LIM's. 3) To investigate and quantify through experimentation the effects of compensating windings with respect to energy consumption, efficiency and economic viability when used in a practical vehicle configuration. 4) To formulate a predictive analytical model based upon the world knowledge to date, and the experience gained during this work, and then verify the model experimentally.

ADDENDA: Document provided to S.S.I.E. by the R.R.I.S.

SUPPORTED BY Canada - Ministry of Transport - Ottawa, Ontario

8.0022, STUDY OF RESEARCH AND DEVELOPMENT TO IMPROVE ENERGY EFFICIENCY IN CANADIAN AERONAUTICAL TECHNOLOGY
UNKNOWN, Pratt & Whitney Aircraft Ltd., *Longueuil, Quebec, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

8.0023, STUDY TO IMPROVE ENERGY EFFICIENCY RESEARCH AND DEVELOPMENT IN CANADIAN AERONAUTICAL TECHNOLOGY
UNKNOWN, Canadair Limited, *Montreal, Quebec, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

8.0024, STUDY OF THE RELATIVE FUEL EFFICIENCIES OF AUTOMOBILES USING CATALYTIC CONVERTERS VERSUS AUTOMOBILES USING 'LEAN BURN' CARBURETION SYSTEMS
UNKNOWN, Shell Canada Limited, *Oakville, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

8.0025, DETERMINATION OF THE TOTAL ENERGY BUDGETS FOR FARMS IN WESTERN CANADA
UNKNOWN, Jensen Engineering Limited, *Olds, Alberta, Canada*

SUPPORTED BY Canada - Department of Agriculture - Ottawa, Ontario

8.0026, EXAMINATION OF THE ROLE OF WOOD PRODUCTS TECHNOLOGY IN LOW ENERGY HOUSING
UNKNOWN, Canadian Consultants Limited, *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

8.0027, IMPROVEMENT OF ENERGY UTILIZATION IN CANADA, TRANSPORTATION SECTOR
J. LUKASIEWICZ, Carleton University, *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

8.0028, IMPROVEMENT OF ENERGY UTILIZATION IN CANADA - PROJECT III - A STRUCTURAL ANALYSIS OF PRICE AND AVAILABILITY EFFECTS
G. PAQUET, Carleton University, *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

8.0041, PRODUCTION OF A BOOK FOR CANADIAN HOME BUILDERS ON WAYS TO IMPROVE BUILDING MATERIALS AND TECHNIQUES TO CONSERVE ENERGY
UNKNOWN, Housing & Urban Dev. Assn., *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

8.0042, DETERMINATION OF THE INDIRECT ENERGY USE BY CANADIAN TRANSPORT
UNKNOWN, I B I Group, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

8.0043, DETERMINATION OF NET ENERGY SAVINGS FROM SOLID WASTE MANAGEMENT OPTIONS
UNKNOWN, Peter Middleton & Assoc. Ltd., *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

8.0044, STUDY OF CURRENT AND COMPLETED WORK ON PERCEPTUAL, INSTITUTIONAL, AND TECHNOLOGICAL ASPECTS OF ENERGY CONSERVATION
UNKNOWN, Raymond Moriyama Arch. & Plan., *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

8.0045, REPORT ON ENVIRONMENTAL, ENERGY AND RESOURCE IMPACTS OF ALTERING THE DURABILITY OF MAJOR CONSUMER APPLIANCES (ABBREV)
UNKNOWN, Stevenson & Kellogg Limited, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

8.0046, DEVELOPMENT OF STUDY PROGRAMS CONCERNING THE TRANSPORTATION OF ENERGY AND THE REDUCTION OF ENERGY CONSUMPTION
UNKNOWN, Canadian Resourcecon Limited, *Vancouver, British Columbia, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

8.0047, DEVELOP AND FORMULATE A COMPREHENSIVE LONG-TERM PROGRAM OF TRANSPORTATION-RELATED ENERGY RESEARCH AND DEVELOPMENT PROJECTS
UNKNOWN, Canadian Resourcecon Limited, *Vancouver, British Columbia, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

8.0048, ARCHITECTURAL DESIGN OF CRITERIA OF BUILDINGS WHICH WILL CONSERVE ENERGY AND REDUCE COST OF OPERATION
R. GEMMELL, Manitoba Dept. of Public Works, *Winnipeg, Manitoba, Canada*

SUPPORTED BY Canada - Manitoba Provincial Government - Winnipeg

8.0049, HEAT CONTROLLED WINDOW GLASS
UNKNOWN, Academy of Technical Sciences, Optical Laboratory, *Copenhagen, Denmark*

PURPOSE OF PROJECT: 1) suppression of incident solar radiation (windows of southern exposure); 2) suppression of reradiation in solar radiation receivers.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0050, ENERGY SAVING DRYING METHODS FOR GREEN FODDER AND THE LIKE
UNKNOWN, Bioengineering Institute, *Copenhagen, Denmark*

The project was started in 1972 as a continuation of the Bioengineering Institute's work on the optimization of the artificially dried green crop quality with a minimum of expended energy.

The purpose of the project is to reduce the energy consumption in artificial drying of agricultural crops, to minimize the emission of dust from the drying installation, and to investigate the possibilities for alternative utilization of protein rich crops through fractionation, with the size of the energy expenditure taken into account.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0051, ENERGY VALUE OF PRODUCTS AND ACTIVITIES IN THE DANISH COMMUNITY
UNKNOWN, Niels Bohr Institute, *Copenhagen, Denmark*

Initiative provided by professor Bent Elbek. Project background is needed for a more precise estimate of the energy costs involved in product manufacture, processes, distribution systems, etc.

Independent Danish contribution to the development of the new discipline: energy analysis.

The purpose of the project is to obtain Danish data on the use of energy, to assess past and future patterns of energy application with respect to rational use of energy and to obtain Danish data on international joint assessments.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0052, ENERGY UTILIZATION AT GYLLE
UNKNOWN, Royal Veterinary & Agricult U, Agricultural Engin. Institute, *Copenhagen, Denmark* 1870

During the work at the Agricultural Engineering Institute Report No. 24, 'Recovery of Heat in Agriculture', it was discovered that this is a very promising possibility. At present the studies involve the utilization of the energy in stable manure for heating the dwellings and water on farms.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0053, MINIMIZING RESOURCES
E. REITZEL, School of Arc. of The Art Acad, *Copenhagen, Denmark*

The object is to find, through research, structures that are characterized by a minimum consumption of energy and raw material resources. Since the architect shapes the physical configurations of very large-scale to very small-scale objects (cities, road networks, houses, small articles), he operates within this research work with a method that can handle entire systems within the economy of resources.

SUPPORTED BY Canada - Department of Energy, Mines and Resources Ottawa

8.0029, IMPROVEMENT OF ENERGY UTILIZATION IN CANADA - PROJECT III - A STRUCTURAL ANALYSIS OF PRICE AND AVAILABILITY EFFECTS
G. PAQUET, Carleton University, *Ottawa, Ontario, Canada*

The important impact of the availability and/or price of certain energy sources on the pattern of Canadian development has been well documented. In recent years, as energy has become a center of general interest, it has been of concern to many that we appeared to have no instrument which could somewhat accurately measure either the effects of macro/world changes or the effective impact of proposed improvements in energy utilization on the different sectors of the Canadian economy. We also know very little about the relative importance of price and availability effects as channels affecting different sectors of the economy differently. Our intent is to develop an instrument capable of gauging such effects. We intend to build on the work done and in progress at Statistics Canada, at Hydro Ontario, at the Whiteshell Nuclear Research Establishment, and the University of Illinois. The major tool of analysis at this stage shall be simulation using an input-output analytical structure.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

8.0030, IMPROVEMENT OF ENERGY UTILIZATION IN CANADA -- URBAN USE SECTOR
J.T. ROGERS, Carleton University, *Ottawa, Ontario, Canada*

The work to date has covered the following topics: Application of CANDU reactors to dual-purpose use. Utilization of low-grade heat in Canadian industry. Survey of present district heating systems throughout the world. Survey of utilization of energy for residential and commercial purposes in Canada. Development of methods of optimization of dual-purpose power plants and other energy devices. Study of thermal energy storage systems for dual-purpose power plants. Development of notes on electrical energy conversion. Results have been reported in ERG Reports 74-3, 75-4 and in internal technical memos.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

8.0031, THE ENFORCEABILITY OF PROPOSED CANADIAN SALES-WEIGHTED FUEL ECONOMY STANDARDS FOR AUTOMOBILES, FROM A TECHNICAL & FINANCIAL POINT OF VIEW
UNKNOWN, Davis Eryou & Associates Ltd., *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

8.0032, STUDY ON THE EVALUATION OF TRUCK AERODYNAMIC DRAG REDUCTION DEVICES
UNKNOWN, Davis Eryou & Associates Ltd., *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

8.0033, DEVELOPMENT OF AN EFFICIENT, OIL-FIRED, WARM-AIR DOMESTIC HEATING SYSTEM
UNKNOWN, Onex Industries Limited, *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

8.0034, FINE-PARTICLE BENEFICIATION OF ORES AND WASTE MATERIALS
J. VISMAN, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

Beneficiation flowsheets and equipment specifications for ores and waste materials requiring special study, as a direct service to industrial companies. Examples: barite tailings, sand deposits for fiberglass manufacturing, recovery of copper from shredded electric wire remnants, low-grade phosphorus deposits, etc.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

8.0035, EFFLUENT TREATMENT AND SLIMES DISPOSAL
J. VISMAN, Dept. Energy Mines & Resources, Centre for Min. & Energy Tech., *Ottawa, Ontario K1A OE8, Canada*

Develop equipment and processes for the recovery of re-usable plant water from industrial waste water in order to reduce spillage of same in rivers, lakes, and the sea; and thereby preventing pollution. One such piece of equipment is the slugging cyclone, which removes finely divided solids from dilute effluents in the form of semi-solid slugs for disposal with course reject, reducing or avoiding the need for slurry ponds.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

8.0036, OFF PEAK HEATING
W.B. COOKE, Saskatchewan Power Corporation, *Regina, Saskatchewan, Canada*

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

8.0037, DEVELOPMENT OF A FUEL-EFFICIENCY METER FOR FARM TRACTORS
F.W. BIGSBY, Univ. of Saskatchewan, *Saskatoon, Saskatchewan, Canada*

To develop an efficiency meter which will continuously indicate, to the operator, efficiency in terms of H.P. hr./gal. or gal./acre as required.

SUPPORTED BY Canada - Department of Agriculture - Ottawa, Ontario

8.0038, TECHNICAL AND ADVISORY SERVICES FOR THE OFFICE OF ENERGY CONSERVATION ON THE ENERGY CONSERVATION PROGRAM
UNKNOWN, Fernand Seguin Enterprises Inc, *St. Charles on Richelieu, Que., Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

8.0039, RESEARCH AND THE COMPILATION OF A SERIES OF BOOKLETS ON ENERGY CONSERVATION
UNKNOWN, Corpus Publishers Services Ltd, *Toronto, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

8.0040, STUDY OF THE ECONOMIC IMPLICATIONS OF OPTIMAL BUILDING INSULATION ON DISTRICT CENTRAL HEATING SYSTEMS
UNKNOWN, Hedlin Menzies & Assoc. Ltd., *Toronto, Ontario, Canada*

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0054, CHEAP HOUSE - STYLE OF BUILDING AND ALTERNATIVE ENERGY SYSTEMS
UNKNOWN, School of Arc. of The Art Acad, *Copenhagen, Denmark*

In the past few years the institute has been working on alternative energy systems. In part as studies, information gathering activities ('Freja 74') and development work. Against this background, a working group was formed, consisting of teachers, consultants and students for the 'cheap house' project. The aim of the project is to verify the material with practical experiments in conjunction with the theoretical work at the institute. The shop research will be carried over into a research dwelling.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0055, LIGHTWEIGHT ACCUMULATOR
Z.A. PIONTKOWSKI, Technical Univ. of Denmark, *Copenhagen, Denmark*

During Z.A. Piontkowski's thesis work, he and the project chief, P. O. Henk, came upon the idea of determining the principle of operation of an accumulator that distinguishes it from others presently in use.

The aim of the project, above and beyond the thesis work, is to build an accumulator that operates in accordance with the principle whereby the active material, when charged, is deposited as a coating on the electrodes, and dissolves again in the electrolyte when discharged. Experiments are being conducted with repeated charging and discharging in order to evaluate the service life conditions.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0056, LOW-ENERGY DWELLINGS
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

In the physical sense there is no necessity of using large amounts of energy for space heating of apartments in order to withdraw small amounts of energy, body heat. With heat insulation and tight sealing of the dwelling, and controlled fresh air ventilation with heat recovery, the energy consumption for heating can be supplied solely by the heat given off by the housekeeping and the occupants. This is nearly a question of a timely leveling of the difference between heat loss and heat supply with the aid of heat accumulators.

The aim of the project is to demonstrate whether it is technically and economically possible to decimate, eventually to eliminate completely, the consumption of energy for the space heating and hot water. What is foreseen is apartments without the traditional energy sources except electricity for housekeeping, plus eventually a slight contribution from the constant energy sources (sun, wind, heat of the earth?) (When the required permission is given, the project will be carried out in three or four years).

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0057, HIGHLY INSULATED CONCRETE FACADES
UNKNOWN, Technical Univ. of Denmark, Inst. of Housing Construction, *Copenhagen, Denmark*

In construction extensive use is made of concrete facades made up as sandwich structures with a 5-10-cm thick layer of insulation between two layers of concrete. With the scarcity of energy sources it has become urgent to increase the thickness of the insulation in order to reduce the heat loss and, thereby, the energy consumption. However, it is not possible, with the conventionally used principles of construction of concrete facades, to produce sandwich facade elements with thick insulation without certain unfortunate consequences with respect to bearing properties.

One possible solution is the unit-cast or glued sandwich construction with the two outer layers of concrete and a thick, middle layer of heat insulation, with the insulation layer as part of the bearing structure. The aim of the project is to investigate the capability of such a layered construction to participate in the load-bearing function.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0058, CLIMATIC CONDITIONS AND REFERENCE YEAR
UNKNOWN, Technical Univ. of Denmark, Lab. for Heat Insulation, *Copenhagen, Denmark*

Since a building and its heating system, and its occupants, make up a complicated system with nonlinearities, the calculations of comfort and annual energy consumption in buildings requires weather data for a whole year, hour by hour, i.e., for a reference year.

The international plan involves the development of a model for the reference year similar to the Danish model. The aim of the project is to work out a common format that will make it possible to exchange data and programs, and to recommend a method of selection.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0059, WINDOW DESIGNS THAT ARE OPTIMUM IN BOTH SUMMER AND WINTER WITH RESPECT TO HEAT ENGINEERING AND ILLUMINATION ENGINEERING CHARACTERISTICS
UNKNOWN, Technical Univ. of Denmark, Lab. for Heat Insulation, *Copenhagen, Denmark*

The laboratory is presently conducting a thesis project in which the emphasis is put on the heat-engineering influence of window designs on room comfort and energy consumption. In order to get the total picture, it will be necessary to evaluate the illumination-engineering aspect of room comfort.

The aim is, on the one hand, to develop window designs that are optimum with respect to both heating and illumination, and, on the other hand, through full-scale experiments to verify that these window designs satisfy the requirements that the design-engineering calculations pose.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0060, AIR TIGHTNESS OF BUILDING STRUCTURES
UNKNOWN, Technical Univ. of Denmark, Lab. for Heat Insulation, *Copenhagen, Denmark*

PURPOSE OF PROJECT: 1) to obtain capability of ascertaining --and presumably to intensify -- the demand for air tightness in buildings; 2) to analyze the consequences of such an intensification with respect to hygiene, comfort, and energy for apartments in both high and low buildings.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0061, HOLLOW WALL INSULATION
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

Aim is to compile comparative data on the heat-economy effect and possible construction-engineering side-effects of various types of hollow wall insulation.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0062, ENERGY CONSUMPTION IN TRANSPORTATION
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

An investigation is being made of the energy consumption of the transportation sector with a view of making it efficient.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0063, ENERGY CONSUMPTION IN TRANSPORTATION
UNKNOWN, Technical Univ. of Denmark, Inst. of Road Building, *Copenhagen, Denmark*

The aim is an evaluation of the energy consumption of individual means of transportation in long-distance traffic in order to be able to introduce trip cost into models used to predict future traffic in Denmark.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0064, OPTIMIZING MANUFACTURING PROCESSES AT TIMES OF ENERGY AND RAW MATERIAL SHORTAGES
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

An improvement of the operational results of an industrial activity is made by investments in the development of new technology, production base and collaboration. The prerequisites for this development has been free access to 'unlimited' resources, and economic optimization has primarily been determinative for the development.

This picture has now changed, in that serious scarcities have appeared in certain industrial raw materials in the past years. Society must rely on a more moderate increase in energy consumption; the long-term energy supply will be many times more expensive, since new technical discoveries and developments can scarcely solve the immediate energy problems.

The purpose of the project is, in part, to investigate what influence the scarcity of raw materials and energy will have on the optimization of the design and fabrication processes for heavy-current engineering products and partly to use the obtained information to realize new technologies, processes, materials and products.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0065, SAVING OF ENERGY BY DRYING WOOD
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

On the basis of earlier investigations on drying ovens in operation, including economic operational studies, a newer investigation was made of energy saving measures such as heat exchange of the replacement air, motor sizes and speeds, motor placed inside an oven etc. Investigations of energy saving in the drying of wood have not been undertaken previously.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0066, ENERGY CONSUMPTION IN A SPACE THAT IS HEATED BY DIFFERENT METHODS
UNKNOWN, Technical Univ. of Denmark, Heat. Eng. & Air Condit. Lab., *Copenhagen, Denmark*

The greatest potential for saving in energy consumption in Denmark is admittedly in the area of the heating of buildings, which at present represents about 50 percent of all energy consumption.

The aim of the project is to compare the heat loss (and thus the heat energy budget) from a space heated by different methods (radiators, radiant heaters, radiant heating from floors, and hot-air).

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0067, THERMALLY COMFORTABLE CLOTHING
UNKNOWN, Technical Univ. of Denmark, Lab. for Heat Insulation, *Copenhagen, Denmark*

If the average temperature in each dwelling in Denmark in the winter can be reduced one degree centigrade, it would reduce the country's total energy consumption about four percent. This could happen in connection with a modest increase in the insulation properties of everyday clothing. The Heat-Insulation Laboratory has just developed a thermal mannequin specially devised for the measurement of the insulation properties of actual parts of garments.

It is intended to use this measuring equipment with the aid of a fashion expert (such as Dior) to develop a line of clothing which is at the same time fashionable, comfortable, and well insulated so that the wearer will endure a lower room temperature when wearing one of these garments.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0068, INFLUENCE OF THE WINDOW ON ENERGY CONSUMPTION FOR HEATING THE ROOM
UNKNOWN, Technical Univ. of Denmark, Lab. for Heat Insulation, *Copenhagen, Denmark*

The laboratory has conducted data processing calculations which indicate that the widespread conception that the larger the windows the greater the energy consumption; for heating is not correct for every building design. Particularly for windows facing south the incident sunlight is so great (even in winter) that it is economically advantageous to increase the window area up to a certain maximum.

The project is aimed, on the one hand, at the use of EDP calculations and, on the other hand, at the use of practical research to arrive at window designs that are optimum for heating in both summer and winter.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0069, LOW ENERGY GREENHOUSE WITH MOBILE FIBER INSULATION
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

The background for the idea is a presently current development project at the Heat Insulation Laboratory: mobile insulation of windows, which, together with the very great energy consumption in the greenhouse, has brought the initiative for this project and this joint effort.

The purpose of the project is to test the theoretically computed possible energy savings in an experimental greenhouse with mobile insulation made of glass fibers, together with the changes in the internal climate that must be occasioned by the lighting-, moisture-, and radiation conditions, for the production of various crops.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0070, TOTAL ENERGY SYSTEM FOR A GREENHOUSE
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

A number of greenhouse crops can be raised advantageously entirely or partially with the use of artificial lighting, which means that they will be able to be grown in a highly insulated greenhouse. The electric energy for the lighting fixtures is produced by local diesel generators. Heat loss from the fixtures and the diesel motors is utilized for the heating of the entire greenhouse.

The purpose of the project is to work out an up-to-date outline of the project. If it is shown that the project is economic with respect to energy and/or money, a detailed project will be worked out that will then try to be realized.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0071, HIGHLY INSULATED, LIGHT-WEIGHT, LOAD-BEARING SANDWICH STRUCTURES
UNKNOWN, Technical Univ. of Denmark, Inst. of Housing Construction, *Copenhagen, Denmark*

With a view toward reduced energy consumption for home heating against a background of general scarcity and price in-

creases for important building materials, it has become increasingly necessary to utilize the properties of the materials in an optimum manner in relation to a given constructional function. The development work around Denmark Technical College's zero-energy house led to a completely new and 'unproved' elemental structure, a sandwich structure with constructional utilization on the insulating material, mineral wool. The construction principle provides saving of material and at the same time a high heat-insulating property combined with the necessary mechanical properties.

High heat-insulating value is important but for further development to the point of general production the solution of the safety requirements is just as important. The project aims at setting up and verifying useable computer methods and at the same time to throw light on a series of conditions regarding strength, combustibility and acoustics.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0072, COMFORT CONTROL OF INDOOR CLIMATE
UNKNOWN, Technical Univ. of Denmark, Lab. for Heat Insulation, *Copenhagen, Denmark*

It is well known that much energy is lost because the indoor temperature is often higher than desired by occupants. This happens, among other things, because most regard is given to the one who desires the highest temperature. The laboratory has developed an apparatus that can control the indoor temperature according to the occupants' clothing and level of activity.

The aim of the project is to conduct comparative measurements of the energy consumption in buildings (for example, in schools or offices) where this comfort control is used and where the building temperature is controlled by conventional methods.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0073, MOISTURE AND HEAT TRANSPORT IN BUILDING STRUCTURES
UNKNOWN, Technical Univ. of Denmark, Lab. for Heat Insulation, *Copenhagen, Denmark*

For a number of years the laboratory has been working on the transport of moisture in building structures. In this connection it has developed equipment for measuring the moisture content with gamma rays.

The aim of the project is to determine moisture transport in building structures, particularly in view of the fact that the energy consumption in the case of moist insulating material is up to 100% greater than for dry insulating material. It is also of interest to determine moisture transport from the point of view of industrial processes such as drying.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0074, RECOVERY OF HEAT FROM ROTARY DRYING KILNS
UNKNOWN, Technological Inst., *Copenhagen, Denmark*

Various trades that are supported by the technological service institutes use drying processes that require a lot of energy. A research and instruction installation has been set up for the purpose of studying the possibilities of saving energy by means of recirculation and heat exchange. An industrial drier for a laundry is used as object of study, since is well known that laundries use a very great amount of heat.

The purpose of the project: 1) to find those processing conditions under which tumble drying can be used with optimum energy economy in a system with partial recirculation of the drying air; 2) to investigate the conditions for the use of the excess heat in the exhaust air for complete or partial preheating of the input air; 3) to test filters for the removal of lint from the circulating and exhaust air; 4) to develop a systematic investigatory procedure including measurement techniques for such processes.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0075, HEAT RECOVERY IN THE PLASTICS INDUSTRY
UNKNOWN, Technological Inst., *Copenhagen, Denmark*

Mention is made of a partial project under the main project formulated by SOFUS-Jern on the recovery of industrial waste heat. The purpose is to point out the possibilities of saving energy and recovering energy, as well as to indicate technically feasible solutions that can be applied on an economic basis by the plastics industry. Special emphasis is on the feasibility of utilizing the waste heat that is converted in the oil coolers for injection casting and extruding machines.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0076, ENERGY SAVING MEASURES IN THE USE OF COMPRESSED AIR
UNKNOWN, Technological Inst., *Copenhagen, Denmark*

The use of compressed air is one of the main energy sources in industrial automation. Normally, an efficiency of 10-20% is achieved. This is ascribed primarily to losses through leaks in the system and the use of a blow-off pressure typically 50% of the operating pressure.

An attempt is being made through this project to chart the most frequent causes of leakage and to come up with measures for improvement in this regard, as well as to investigate the possibilities for recovering the blow-off pressure through the use of a closed system.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0077, AIR TIGHTNESS OF A BUILDING
UNKNOWN, Technological Inst., *Copenhagen, Denmark*

Through a series of consultations done by the departments of Construction Engineering and Heat and Insulation Engineering in the course of the winter and spring of 1973/74 the Technological Institute has recognized the fact that many untight buildings can have a very high energy requirement for heating. In practice certain ones have been impossible to heat with the otherwise correctly planned heating equipment. On the other hand, many tight buildings can suffer moisture damage in parts of the structure and household effects and at the same time cause a reduced comfort condition for the people who use the building.

AIM OF THE PROJECT: 1) development of methods for measuring air exchange, both involuntary leaks and planned ventilation; 2) analysis of the conditions in existing dwellings, quality testing of representative selected buildings; 3) studies of the importance of air exchange for heat loss; 4) reporting concrete solutions for obtaining satisfactory air exchange, technically and economically optimized with respect to energy consumption and comfort. The reports will deal with both existing and new construction.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0078, HEAT SAVING METHODS IN LAUNDRIES
UNKNOWN, Technological Inst., *Copenhagen, Denmark*

The project is planned in conjunction with the Trade Union of the Laundry Industry in Denmark and approved as a joint Scandinavian project of the corresponding trade unions in Norway, Sweden and Finland.

THE PURPOSE IS: 1) to point out uncomplicated arrangements that the individual laundry can carry out directly; 2) to develop a method for investigations based on consultation with more thorough heat-saving measures; 3) to obtain information on the technical possibilities of heat-saving measures around the individual processes in laundries; 4) to obtain information on the possibilities of utilizing the excess heat at laundries or in their immediate vicinity.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0079, HUMIDITY-CONTROL AND HEAT-ENGINEERING CONDITIONS IN HIGHLY INSULATED ROOF AND WALL STRUCTURES (ABBREV)
UNKNOWN, Construction Research Inst., *Horsholm, Denmark*

In the future, houses will be built with better heat insulation and apparently will be made up of components with a configuration different from that of the building style of today. SBI has therefore had an experimental house built where such new types of structures can be evaluated from the point of view of humidity-control and heat-engineering (including deformation caused by moisture) under the effects of the weather. The house is built with replaceable wall and roof structures, so that the types of structures can be installed that are considered to be most expedient at any time. Purpose of the project on new types of highly insulated wall and roof structures: 2) to investigate the moisture-control conditions in structures which would be difficult to evaluate theoretically; 3) to use materials and combinations of materials that have not been generally used heretofore; 4) to measure the resistance to heat flow and influence of bridges of cold; 5) to evaluate the breakdown of materials exposed to the effects of the natural climate and compare with corresponding results obtained wth accelerated effects in the laboratory; 6) to evaluate the importance of the absence of air tightness of wall elements with respect to moisture and insulation.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0080, AIR TIGHTNESS OF PARTS OF BUILDINGS
UNKNOWN, Construction Research Inst., *Horsholm, Denmark*

Laboratory measurements are being taken of the air tightness of parts of buildings.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0081, ENERGY SAVING BY CONTROLLING ARTIFICIAL LIGHTING IN ACCORDANCE WITH THE VARIATION OF SUNLIGHT
UNKNOWN, Academy of Technical Sciences, Illumination Engin. Laboratory, *Lyngby, Denmark* 100

The aim of the project is to ascertain the obtained energy savings by regulating the artificial lighting in accordance with the variation of daylight.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0082, INFLUENCE OF ILLUMINATION ON THE HEAT BALANCE AND ENERGY CONSUMPTION IN A BUILDING
UNKNOWN, Academy of Technical Sciences, Illumination Engin. Laboratory, *Lyngby, Denmark* 100

The aim is to devise a program system for designing illumination (daylight - artificial light) which, together with the other installations in the building, provide the optimum solution for illumination.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0083, ENERGY CONSUMPTION MODEL FOR THE TRANSPORTATION SECTOR
UNKNOWN, Area Vocational Tech. Inst., Traffic Research Group, *Lyngby, Denmark*

The transportation sector's energy consumption represents one dimension in the elucidation of the consequences of alternative traffic policies. A simulation model is being compiled that will be used to compute the total energy consumption in the transportation sector. Inputs if transport operation may be broken down into means of transportation, the energy saving of the means of transport and the degree of utilization.

SUPPORTED BY Denmark - Danish Government - Copenhagen

8.0084, MODEL COMMUNITY WITH NOVEL ENERGY AND HEATING SYSTEMS
A. STRASSBERGER, Unknown Inst. or Indiv. Grant, *Federal Republic of Germany*

MAIN OBJECT: Efficient utilization of energy.

FIELD: Heat supply for buildings.

OBJECTIVE: Energy saving buildings based on sensible planning. Saving energy through integrated energy supplies. Heating rooms with energy produced during the summer. Utilization of diverse heat sources.

WORK PROGRAM: With the object of constructing a model community demonstrating the aspects of economical energy consumption and cost optimization planning, a preliminary study will be set up, which should outline: the basic building program; a procedure for planning and realization.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0085, FUTURE ELECTRICAL ENERGY NEEDS AND ITS SUPPLY, ESPECIALLY WITH THE HELP OF NUCLEAR ENERGY
H. MANDEL, Technical Univ. of Aachen, Inst. for Elec. Installations, *Aachen, Nordrhein Westfalen, Federal Republic of Germany* 5100

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0086, THE CONURBATION OF BERLIN - ASCERTAIN THE POSSIBILITIES OF SAVING ENERGY AND SUBSTITUTING NUCLEAR ENERGY FOR FOSSIL FUELS
P. SCHADE, Berlin Energy Inst. Gmbh, *Berlin, Federal Republic of Germany* 1000

DESCRIPTION OF PROJECT: OBJECTIVE: The project study of Berlin forms part of an overall study prepared by the Arbeitsgemeinschaft Fernwarme e.V. (district heat association). This study is conducted to ascertain the existing heat requirement potential to be covered by district heat. The section concerning Berlin deals with the particular situation (insularity) of this town. Investigations are to refer to possibilities of extending the Berlin town heating system by an optimal utilization of waste heat emitted from a nuclear power plant, in conjunction with a description of the economic aspects involved. For this purpose, an exact specification of the heat density and heat requirement must be established. The study will also comprise the aspects of energy conservation and improved air quality in densely populated areas in connection with the use of district heat.

WORK PROGRAM: a) Description of existing conditions with regard to electricity and heat supply. b) Heat requirement and quantity of heat per unit. c) Siting of the nuclear heating power station. d) Technical and economic concept of an extension of the district heat supply system with regard to timing. e) Ecological impact of district heat supply. f) Comparison of district heat supply with other possibilities of covering heat requirements. g) Coordination and project handling. h) Summary of essential results and recommendations.

ADDENDA: Subcontractor: BEWAG, Berlin Ing.-Buro Bartels, Berlin KA-Plan, Heidelberg KWU, Mulheim/ZBZ, Berlin STEAG, Essen, Performing organization: Energieanlagen Berlin GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0087, CONCEPT OF ECONOMICAL USE AND SUPPLY OF ENERGY TO BE USED AS AN EXAMPLE IN CONSTRUCTION OF THE NEW BUNDESTAG AND BUNDESRAT BUILDINGS
UNKNOWN, Arbeitsgemeinschaft Krev, *Cologne 1, Nordrhein Westfalen, Federal Republic of Germany* 5000

DESCRIPTION OF PROJECT: OBJECTIVE: in view of the significance for the future of a generally applicable concept of energy supply and use especially for public building projects, the study group KREV, in cooperation with the Federal Building Directory, was commissioned to work out a concept for the economical use and supply of energy for public building projects. This was to be done with a real project in view, the planned construction of the new Bundestag and Bundesrat buildings (houses of parliament).

WORK PROGRAM: a) Energy oil ecological situation in the district of Bonn. b) Classification and selection of typical building portions to be investigated. c) Energy characteristics of a selection of building systems. d) Calculation of energy requirements. e) Determination of energy consumption. f) Computation of the total energy requirements and total energy consumption, Bundestag/Bundesrat. g) Assessment of several concepts of energy supply and estimation of their specific costs. h) Rough estimate of feasibility. i) Suggestions and program proposals for the further development of the concept, with the example of the building of the Bundestag and Bundesrat in view. j) Applicability of the results to other building projects.

ADDENDA: Subcontractor: Ingenieurburo Canzler KA-Plan GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0088, ENERGY SAVINGS AT APERTURES IN BUILDINGS (CROSS SECTION REPORT)

A. SCHWABE, Inst. Construc. W Plastic E.V., *Darmstadt, Hessen, Federal Republic of Germany* 6100

DESCRIPTION OF PROJECT: OBJECTIVE: Description of the sources of energy loss at apertures in buildings, the thermal insulation improvements at all apertures (windows, doors, light domes) and the possibilities for improvement in old buildings.

WORK PROGRAM: a) Description of the actual situation in buildings, bearing in mind the minimum requirements contained in the existing standards, etc. b) Investigation and description of the structural designs, the measures taken to improve the protection against heat and cold apertures and the technical possibilities for energy recovery. c) Description of the efficiency of such measures.

STATUS: A 10-point programme has been prepared in draft form, the relevant literature has been scanned. Commencement of evaluation and elaboration.

ADDENDA: Performing organization: Institut fur das Bauen mit Kunststoffen e.V. (IBK)

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0089, PRACTICAL EXPERIENCE WITH THERMAL INSULATION

A. SCHWABE, Inst. Construc. W Plastic E.V., *Darmstadt, Hessen, Federal Republic of Germany* 6100

DESCRIPTION OF PROJECT: OBJECTIVE: Compilation and evaluation of practical experience in the use of additional thermal insulation measures at the outer walls of old and new buildings and the effective application of this information for future measures.

WORKING PROGRAM: a) Inspection and classification of around 500 properties. b) Breakdown into type of construction, type of building etc. c) Recording of measures by means of questionnaire. d) Comparison with experience of housebuilders. e) Evaluation of reports.

STATUS: Inspection, classification, breakdown and recording by questionnaire have already been carried out. Evaluation of report now being commenced.

ADDENDA: Performing organization: Institut fur das Bauen mit Kunststoffen e.V. (IBK)

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0090, AGROTHERM

H. LUCKOW, August Thyssen Huette AG, *Duisburg 11, Nordrhein West., Federal Republic of Germany* 4100

DESCRIPTION OF PROJECT: OBJECTIVE: In an ecologically beneficial way Agrotherm is meant to dissipate the waste heat from power plants by means of a pipeline system buried in the ground. The result thereof will be: greater independence for the selection of the location of power plants. Improved efficiency of power plants as compared with necessarily required dry cooling towers. Increased productivity in agriculture and posible cultivation of plants previously not cultivated here.

WORK PROGRAM: Tests run at four places under different conditions are meant to investigate the problems listed below: Water temperature at the system inlet and outlet. Temperature profile in the ground. Humidity profile in the ground. Soil testing. Determination of meteorological data. Establishing the model of an Agrotherm system layout. Accelerated cultivation. Change in crop rotation. Test of subtropical and tropical plants. Impact on yield and quality.

STATUS: Planning stage for test facilities has been completed. Work was started in October 1975 for setting up the test facilities. Start-up will be in March/April 1976.

ADDENDA: Subcontractor: Landwirtschaftskammer Rhld. Bayer; Landesanstalt fur Bodenkultur und Pflanzenbau; PREUSSAG AG; Messerschmitt-Bolkow-Blohm.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0091, INVESTIGATION OF THE ECONOMIC POSSIBILITIES OF A REDUCTION OF ENERGY INTENSITY IN HOUSEHOLD ELECTRIC APPLIANCES

J. PAUTZ, Essen Electro Heat Inst. E.V., *Essen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: Investigations of electric household appliances with the aim of decreasing the energy intensity of such appliances considering the economic possibilities. The energy lost by waste water and exhaust air on its way across the surface of the appliance is to be determined and evaluated. Moreover, the mode of operation and the structure of the appliances with regard to the energy consumption will be analyzed.

WORK PROGRAM: a) Evaluation of the energy consumption. b) Determination of the energy balance limits. c) Investigation of the mode of operation with regard to rational electricity consumption. d) Evaluation of constructive suggestions by taking into consideration economic aspects.

STATUS: Within the research activity, the following measurements on electrical devices for housekeeping have been done in the year 1975: Electrical changes: Ascertaining of power consumption for first heating up and actual incoming power for permanent heating of electrical heater in dependence of the used vessels. Determination of the parts of power dissipation during heating up and permanent heating. Dishwasher: Determination of consumption of energy and water, of the quality of cleaning and drying of dishwasher and its variation with temperatures and water-flow during the rinsing and the cleaning periods. Linendryer: Ascertaining the energy balance for different types of drying devices. Design of a heat-exchanger for heat recovery for drying devices with blow out of air. Refrigerating equipment: Investigation of energy consumption of devices for cooling under conditions similar to the practical use. Investigation of the influence of the thermal conductance of the evaporator and the condenser to the power consumption. Water boiling equipment: Experiments for heat recovery for the warm water which leaves the douche-tub while using different types of heat-exchanger. Determination of the heat dissipation of storage units for hot water particularly where the units do not wear heat insulation.

ADDENDA: Performing organization: Electrowarme-Institut Essen e.V.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0092, HEAT AND MASS TRANSFER DURING THE APPLICATION OF GAS PLASMA

H.O. ROSSNER, Fried Krupp Gmbh, *Essen 1, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: Objective: To continue the experimental work on plasma metallurgy with the object of find-

ing an economic, energy-saving process of producing steel from sponge iron.

WORK PROGRAM: a) Examination of mass transfer on the metal-slag, metal-gas, and slag-gas interfaces under continuous melting of sponge iron by means of gas plasma. b) Examination of reactions during continuous deoxidation of steel separated from the melt-down slag. c) Determination of the energy balance of this process.

STATUS: The necessary experimental melting plant for the project has been constructed and put into operation. Heats are at present being run in this plant in accordance with the program. The results already obtained indicate that the project will be a success.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0093, ENERGY COMPOUND INTEGRATED IN THE BRICK INDUSTRY TO BE APPLIED BETWEEN STOVE AND KILN

C.O. PELSLEUSDEN, Brick Research Institute E.V., *Essen 13, Nordrhein Westfalen, Federal Republic of Germany* 4300

DESCRIPTION OF PROJECT: OBJECTIVE: By appropriate recuperation of the kiln heat in connection with suitable adjusting of atmospheric condition and air volume with regard to the drying process the total heat requirement of the brick industry is to be reduced.

WORK PROGRAM: a) Development of computing programmes for the calculation of - the thermal insulating wall with a sink of the heat flow, - the counter-flow heat exchanger with a sink of the mass flow. b) Investigation of reactions of process engineering on the drying process. c) Testing of the energy compound in a brickwork.

ADDENDA: Performing organization: Inst. fuer Ziegelforschung E.V.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0094, THE APPLICATION OF NEW TECHNOLOGICAL SYSTEMS FOR THE HOME SIMILAR TO THE FROHNHOF TEST PROJECT IN KOENIGSWINTER

P. GOERICKE, Energy Engineering Gmbh, *Essen 18, Nordrhein Westfalen, Federal Republic of Germany* 4300

ADDENDA: Performing organization: Energietechnik GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0095, INSTALLATION OF A HEAT-PUMP PLANT FOR THE PRODUCTION OF HEAT AND WARM WATER FOR RESIDENTIAL BUILDINGS

E. ARNOLD, United Esslinger Hous. Enterp., *Esslingen, Baden Wuerttemberg, Federal Republic of Germany* 7300

DESCRIPTION OF PROJECT: OBJECTIVE: Gaining of practical experience in heating of residential complexes with new heating systems and use of heat pumps.

WORK PROGRAM: a) Installation of a heat pump plant for production of heat and warm water to provide for the restoration project -Schmelztorstrasse. b) Comparison of different heating systems under the same structural and climatic conditions. c) Investigation of the profitableness of established systems.

STATUS: The installation of the heat pump plant was completed in 1975. Measurements on the heat pump system will be carried out in 1976 and 1977.

ADDENDA: Performing organization: Vereinigte Esslinger Wohnungsunternehmen GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0096, ENERGY CONSERVATION THROUGH RENOVATION OF OLD BUILDINGS

F. GRUENING, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

DESCRIPTION OF PROJECT: OBJECTIVE: Identification of energy conservation that can be realised by taking energy conservation constructional measures and by installing efficient energy systems in old residential buildings (Part A).

Development of a catalogue of priorities indicating feasible action to stimulate and support energy use (Part B).

WORK PROGRAM: a) Determination of the structure of the existing number of old buildings (up to 1970) and the technical energy systems installed (heating, ventilation, air-conditioning, water supply, lighting). b) Calculation of the annual energy consumption of existing old buildings. c) Suggestions for energy-conservation constructional measures (especially for outer walls and windows) and efficient energy systems with special regard to technical and economic feasibility. d) Determination of potential energy conservation broken down into the different types of buildings.

STATUS: Primary surveys are presently being conducted to determine the number of existing buildings and the technological energy systems installed in old residential buildings.

Expert interviews to collect data on non-residential old buildings will be started in late January 1976.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0097, ECONOMIC ENERGY USE IN BUILDING CONSTRUCTION

B. WEIDLICH, Battelle Institute E.V., *Frankfurt 90, Hessen, Federal Republic of Germany* 6000

DESCRIPTION OF PROJECT: OBJECTIVE: The aim is to provide manuals showing the relevant knowledge of the energy conservation in buildings, summarized in a clearly arranged form which can easily be applied into practice.

The special objectives in view are the following: to make evident interesting energy-economical relationships between building design, building construction and physics on the one side and energy system on the other; to identify the energy system available for an efficient use of energy; to show energy systems which are optimal for energy conservation in special building types.

WORK PROGRAM: a) Collection of data and information for the following sectors: building design, building construction, physics; energy systems and components; organisation and cooperation models in the building sector. b) Assessment of materials with special reference to economic energy use. c) Identification of interdependencies between the individual sectors. d) Description of three model studies showing the possibilities of energy conservation. e) Summary of results as a basis for the printed technical records of the manuals.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0098, DEVELOPMENT OF AN INDUSTRIAL PROCESS FOR THE PRODUCTION ON IN2O3 LAYERS FOR THE IMPROVEMENT OF THE K-VALUES OF INSULATING GLASS PANES

H.J. GLAESER, Flachglas AG Delog Detag, *Gelsenkirchen, Nordrhein West., Federal Republic of Germany* 4650

DESCRIPTION OF PROJECT: OBJECTIVE: Development of a process for the large-scale manufacturing of highly effective, transparent layers on the basis of In2O3 for energy saving insulation glass.

WORK PROGRAM: Step I: With the help of the information gained in the laboratory investigations, it is planned to erect a semi-industrial plant in order to develop a process for the production of glass panes up to 1 square meter. The plant necessary to produce the metallic layers already exists. For the subsequent oxidation of the metallic layers, suitable oxidation and 'form' ovens must be installed from which In2O3 layered glass can be produced.

Step II: It is subsequently planned to work on transferring the process to a large scale production of glass panes up to 1.5 x 2.5 square meters. Also, in this case, the apparatus necessary for the production of the metallic layers already exists. The oxidation and 'form' ovens must be constructed utilizing the experience gained by the semi-industrial plant.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0099, ENERGY-CONSERVING BUILDING METHODS IN RESIDENTIAL AND URBAN CONSTRUCTION

K. GERTIS, Fraunhofer Society, Inst. for Construction Physics, *Holzkirchen, Bayern, Federal Republic of Germany* 8150

Goal: The energy situation in residential and urban construction is marked on one hand by an enormous increase in energy needs in the next ten years, and on the other by the effects of the worldwide energy shortage. The size of the energy needs construction and the difficulties connected with satisfying these needs require a critical overall examination. On the part of construction physics it is to be clarified if, and by what means the heating technology concepts of outside construction components can be improved with respect to energy economy (e.g., winter problems) and if solar energy can be used through climatically propitious construction methods.

Work Plan: Through theoretical studies, the following points should be investigated for their energy-economic effects: Optimal insulation of outside construction under consideration of the construction-technological, climatological, energy-economic, and financial effects; Influence of the heat losses and heat gains through window surfaces on the room energy balance; Connection between window size, solar radiation, and lighting energy; and Behavior of construction parts with radiation-selecting surfaces and latent reservoirs from the energy technology view.

SUPPORTED BY Germany - Ministry for Sp. Const. Meth. & Urb. Plan. - Bonn

8.0100, TEMPERATURE FIELD IN PLATE APPARATUS

K. GERTIS, Fraunhofer Society, Inst. for Construction Physics, *Holzkirchen, Bayern, Federal Republic of Germany* 8150

DESCRIPTION OF PROJECT: OBJECTIVE: Studies to clarify uncertainties in the dimensioning of plate apparatus for thermal conductivity testing.

WORK PROGRAM: Theoretical investigations into the influence of the geometric dimensions and thermal conductivity of plate apparatus components, the influence of the temperature gradient adjacent to the test specimen on the ambient temperature and the difference between measured and ambient temperature.

STATUS: Investigations have been initiated. It is necessary to develop an EDP Program for the three-dimensional temperature field in the plate apparatus.

ADDENDA: Performing organization: Fraunhofer-Gesellschaft Zur Foerderung der Angewandten Forschung E.V. (FHG), Inst. fuer Bauphysik.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0101, THE WINDOW AND ITS HEAT BALANCE DUE TO SOLAR RADIATION AND HEAT LOSS PROTECTIVE MEASURES (FHO 106)

H. KUENZEL, Fraunhofer Society, Inst. for Construction Physics, *Holzkirchen, Bayern, Federal Republic of Germany* 8150

DESCRIPTION OF PROJECT: OBJECTIVE: During solar radiation, a heat gain can be achieved through windows. On the other hand, in the event of a lack of insulation (particularly at night), a heat loss can be observed, corresponding to the k-value of the window. It is to be clarified to what extent this heat loss can be reduced by roller blinds or curtains. The study of heat gain and heat loss will give a total heat balance for the window.

WORK PROGRAMME: Comparative studies on the heat consumption in two rooms with windows of equal size and orientation, with one window shaded during the day and another one protected by blinds and/or curtains by night.

STATUS: Planning and initial preparatory work for investigations completed.

ADDENDA: Performing organization: Fraunhofer-Gesellschaft Zur Foerderkung der Angewandten Forschung E.V. (FHG), Inst. fuer Bauphysik.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0102, CORRELATION BETWEEN AIR PERMEABILITY OF JOINTS IN WINDOWS AND ROOM VENTILATION (FHO 110)

H. KUENZEL, Fraunhofer Society, Inst. for Construction Physics, *Holzkirchen, Bayern, Federal Republic of Germany* 8150

DESCRIPTION OF PROJECT: There is no information available on the correlation between air permeability of joints and ventilation. This will be of interest for evaluating the ventilation to be expected in connection with a given air permeability of joints. Therefore, clarification of fundamental correlation between air permeability of joints, pressure difference and ventilation for various leak rates of room is needed.

WORK PROGRAM: Examinations in a test room (in testing area Holzkirchen). Measurement of ventilation at varying pressure differences, leak rates of the room and air permeability of window joints. Determination of inter-relationships.

ADDENDA: Performing organization: Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung E. V. (FHG), Inst. fuer Bauphysik.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0103, EXTERNAL WALL INSULATION, RADIATOR ARRANGEMENT AND ROOM CLIMATE (FHO 109)

H. KUENZEL, Fraunhofer Society, Inst. for Construction Physics, *Holzkirchen, Bayern, Federal Republic of Germany* 8150

DESCRIPTION OF PROJECT: Objective: The situation in the energy sector requires new conceptual studies. These also include the problem of an expedient arrangement of radiators with a view to heating consumption and room climate. To achieve favourable room climate, it has so far been considered necessary to locate radiators underneath the windows. It remains to be clarified whether this will also be required in the event of high external wall insulation and high quality windows being selected.

WORK PROGRAM: Experimental comparison of heat consumption and room climate with high and low external wall insulation and different location of radiators (underneath the window and on the inner wall opposite the window). Investigations are carried out in a test house modified for this purpose within the field testing area of Holzkirchen.

ADDENDA: Performing organization: Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung E.V. (FHG), Inst. fuer Bauphysik.

ADDENDA: Performing organization: Fraunhofer-Gesellschaet zur Foerderung der Angewandten Forschung E.V. (FHG), Inst. fuer Bauphysik.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0104, IMPROVING THE MODE OF OPERATION OF HEAT PUMPS

U. AMBERG, Karl Weiss Giessen Fab. Elek., *Lindenstruth, Hessen, Federal Republic of Germany* 6301

DESCRIPTION OF PROJECT: OBJECTIVE: Use of heat pumps in supplying air conditioning for comfort, hygiene and stables.

Optimization of the equipment in regard to power, operational safety and control.

WORK PROGRAM: Design of prototypes for the three applications. Construction of a calorimeter chamber for the reproducible measurements of all performance data of the air conditioners. Optimization of the performance of the equipment and development for series production.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0105, APPRAISAL OF THE PROPOSAL TO INSTALL A HEAT PUMP FOR HEATING AND HOT WATER CONVERSION IN RESIDENTIAL BUILDINGS

B. CANZLER, Ingenieurbuero B. Canzler, *Muelheim, Nordrhein Westfalen, Federal Republic of Germany* 4330

8. ENERGY UTILIZATION AND CONSERVATION

Part 2 of 2.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0106, BASIC INVESTIGATIONS INTO THE POSSIBILITIES OF SEWAGE UTILIZATION FOR HOUSEHOLD PURPOSES

EBERSBACH, Energy Economics Research Org., *Munich, Federal Republic of Germany*

MAIN OBJECT: Efficient utilization of energy.

FIELD: Economical heat utilization.

OBJECTIVE: First, the possible extent and conditions of feasible recovery of waste heat in private households are to be looked into. Furthermore, investigations are to be made into the technology of heat recovery with regard to the economic questions implicated.

WORK PROGRAM: Evaluation of the characteristics of heat demand and waste heat. b) Techniques of heat recovery with equipment attached to flat, house or centrally located station. c) Evaluation of the proportion of possible energy savings. d) Measurement and recording of the characteristics of heat demand and waste heat.

This research program is closely associated with study ET 2, entitled 'Central heat recovery from hot water consumption in multi-family dwellings'. Study ET 2 will benefit from the research program mentioned above.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0107, IMPROVED MATHEMATICAL TECHNIQUES FOR OPTIMIZING THERMAL BEHAVIOR OF TALL BUILDINGS BY USING MOBILE MEASUREMENT TECHNIQUES

M. GERN, Messerschmitt Boelkow Blohm, *Munich 80, Bayern, Federal Republic of Germany* 8000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0108, FUEL CONSERVATION IN CONVENTIONAL HOT WATER HEATING SYSTEMS BY GAS-OPERATED HEAT PUMPS

ROSTEK, Audi N S U Auto Union AG, *Neckarsulm, Baden Wuerttemberg, Federal Republic of Germany* 7107

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0109, SCHOOL AND SPORTING CENTER ALTENKUNSTADT

M. MEISSNER, Meissner & Ebert, *Nuremberg, Bayern, Federal Republic of Germany* 8500

DESCRIPTION OF PROJECT: OBJECTIVE: Comparative surveys of specific projects as an aid to a decision on an economical energy supply and energy combination system.

WORK PROGRAM: List of possible technically applicable solutions such as elimination of moisture through heat-pump, heating through water/water/heat-pump, storage-system, heat recycling, drive for heat-pumps, heat protection, solar energy, utilization of surface water. b) Collection of costs for energy demand and capital-costs. c) Service and investment.

STATUS: The project-study is finished. The study shows the economic comparison between customary energy production and use of fossil fuels, gaseous fuels and total electric supply. It will be determined by combined data from energy costs, capital costs, investment and service costs. Different systems will be compared. The conclusion will be summarized and recommendation for applicability and feasibility will be presented.

ADDENDA: Performing organization: Meissner and Ebert.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0110, USE OF HEAT PUMPS TO RAISE TEMPERATURES IN AN ECONOMICAL WAY AND FAVOURABLE TO THE ENVIRONMENT

L. BABACSY, Mitec Moderne Indust. Gmbh, *Ottobrunn, Bayern, Federal Republic of Germany* 8012

DESCRIPTION OF PROJECT: OBJECTIVE: The objective of this study is to investigate the possibilities of using heat pumps to make use of waste from power plants. These investigations should demonstrate whether waste heat from power plants, raised to a suitable temperature level by heat pumps can be used thermodynamically and economically a) inside a power plant itself, b) as heating for buildings.

WORK PROGRAM: The work program includes the setting up of model systems which describe the present state of power plant and heating technology; and others which contain the introduction of heat pumps as explained under 'objectives'. It is further necessary to evaluate the thermodynamic technical, economical and optimization sides of these models. Contact to heat pump producers, power plants and power plant contractors, etc., will be established and maintained in order to ensure that the systems developed are as realistic as possible.

STATUS: Work has begun on the development of thermodynamic models, after a literature study has been completed and dealing with the present states of power plant and heating technology with emphasis on the field of power-heat coupling and preheating of drinking water, as well as the thermodynamic evaluation of power and heating processes. Care was taken to ensure that the models utilizing heat pumps were to be, as far as possible, directly compared to the present static models, e.g. comparison of a regenerative preheating system for drinking water with preheating via coupling (counter-pressure machine, withdrawing machine) with a power-heat coupling system which functions with a condensation machine and heat pumps. Currently work is being done on computer programs which will render it possible to evaluate the theoretical models with a longer number of parameters. A transition will follow from the present static models, which proceed from a certain working point (environmental conditions, demand situation), determined by parameters, to dynamic models with variable working points (daily and yearly fluctuations of the environmental conditions and demand situation).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0111, OPTIMIZATION OF REFRIGERATORS AND FREEZERS UNDER THE ASPECT OF ENERGY CONVERSION

F. HERMANN, G. Bauknecht Gmbh, *Stuttgart 1, Baden Wuerttem., Federal Republic of Germany* 7000

DESCRIPTION OF PROJECT: OBJECTIVE: Examination of the possibilities of reducing the energy input of refrigerators and freezers, taking into account the manufacturing costs.

WORK PROGRAM: a) Studies in connection with system engineering. b) Drawing up of computation program. c) Carrying out of basic tests. d) Evaluation of the possibilities for solution.

ADDENDA: Subcontractor: Dornier System GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0112, STUDY ON TECHNOLOGIES FOR SAVING ENERGY

B. WAHL, Fichtner Consult. Eng. Gmbh, *Stuttgart 30, Baden Wuerttem., Federal Republic of Germany* 7000

OBJECTIVE: The starting point of this investigation is the present situation in the field of energy technology (procurement, conversion, transport and application of energy). The use of energy in three basic sections of consumption, namely industrial production, housing and transportation will be studied.

The most significant state-of-the-art and new technologies that are applicable to procurement, conversion and application of energy will be analyzed with regards to their present or futur

potential to make rational use of energy resources. Promising areas of future research and development efforts and/or increased application of known technologies regarding rational use of energy will be identified. A general evaluation of merits of technologies will take into consideration such factors as environmental protection, economic benefits and the efficiency of energy conversion. In addition, non-technical factors and their potential influence on energy consumption will be studied. Also, the effects of implementing various technical and non-technical measures, such as specific administrative measures or modification in taxation will be assessed.

As a result of this study, the most important technologies regarding the rational use of energy will be identified and the findings will be presented in such a way that this study can be used as a principal source for future planning efforts.

WORK PROGRAM: a) Survey of the pivotal issues of energy procurement and energy application in industry, transportation and the residential area. Historical trend and future projections of energy consumption. b) Assessment of the state-of-the-art of energy technology and future developments up to the year 2000. c) Potential influence of administrative measures regarding procurement and application of energy with the basic objective of energy conservation.

STATUS: Technical work essentially complete. Investigation of technical potential of efficient use of energy and its economic merits.

ADDENDA: Performing organization: Fichtner Beratende Ingenieure.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0113, ROOM HEAT STORAGE PROCESSES

H. BACH, Univ. of Stuttgart, Inst. for Therm. & Heat Eng., *Stuttgart, Baden Wuerttemberg, Federal Republic of Germany* 7000

DESCRIPTION OF PROJECT: OBJECTIVE: To calculate the heat storage factor for each month of the year and compare the results of September and July with the known storage factors of the VDI regulations 2078.

WORK PROGRAM: a) Calculating the missing meteorological data. b) Putting into operation and testing the calculating programme. c) Comparing the new results of September and July with the factors of VDI 2078 and fixing the marginal conditions. d) Conducting the calculations and issuance of the results in graph and chart form. e) Evaluation of the results.

ADDENDA: Performing organization: Inst. fuer Thermodynamik und Waermetechnik - (Abt. Heizung-Leuftung-Klimatechnik - der Universitat Stuttgart).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0114, INVESTIGATION OF THE OVERALL EFFICIENCY OF HEATING SYSTEMS

H. BACH, Univ. of Stuttgart, Inst. for Therm. & Heat Eng., *Stuttgart, Baden Wuerttemberg, Federal Republic of Germany* 7000

DESCRIPTION OF PROJECT: OBJECTIVE: The investigation aims at the development of criteria for the energetic judgment of heating systems. It further aims to develop, demonstrate and verify these criteria.

WORK PROGRAM: a) Construction of a test facility for heating boilers (movable test facility) to measure the boiler overall-efficiency. b) Construction of a test facility to examine the dynamic behaviour of heating systems. c) Influence of control. d) Influence of heat storage factors in buildings. e) Investigation of heat losses in the system. f) Measurement of heat load. g) Formulation of a concept to judge the energetical efficiency by measurements. h) Summarizing of all parameters to judge planned systems.

ADDENDA: Performing organization: Inst. fuer Thermodynamik und Waermetechnik der Universitat Stuttgart.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0115, FUEL CONSERVATIONS IN CONVENTIONAL HOT WATER HEATING SYSTEM BY GAS-OPERATED HEAT PUMPS

ROSTEK, Volkwagenwerk AG, *Wolfsburg, Niedersachsen, Federal Republic of Germany* 3180

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0116, INVESTIGATIONS FOR OPTIMIZING ENERGY SUPPLY TO DAIRIES

E. DECKER, Rhine Westphalian Elect Plant, *4300 Essen 1, Federal Republic of Germany*

MAIN OBJECT: Efficient utilization of energy.

FIELD: Economical heat utilization.

OBJECTIVE: The aim of this project is to draw up a detailed energy analysis for the typical dairy and, on the basis of this example, to discuss the possibilities for energy recovery in this one operation and - with the help of statistics on the energy demand structure in a number of other dairies - in the dairy industry as a whole.

WORK PROGRAM: a) Analysis of energy requirements and waste heat. b) Collection, evaluation and comparison of statistical data. c) Examination of the technical possibilities offered by heat recovery systems. d) Investigation into the economy of using such systems, and final report.

ADDENDA: Subcontractor; Forschungsstelle fur Energiewirtschaft. Performing organization: Rheinisch-Westfalisches Elektrizitatswerk.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0117, CENTRAL HEAT RECOVERY FROM HOT WATER CONSUMPTION IN MULTI-FAMILY DWELLINGS

P. GORICKE, Rhine Westphalian Elect Plant, *4300 Essen 1, Federal Republic of Germany*

MAIN OBJECT: Efficient utilization of energy.

FIELD: Economical heat utilization.

OBJECTIVE: The aim of this project is to find ways to put the energy present in the used hot water of a multi-family dwelling to practical use. This is in line with the efforts to decrease specific energy consumption - through technical and economic improvements in the use of energy - without sacrificing comfort and, while doing this, to decrease the heat burden on our surface waters.

WORK PROGRAM: a) Determination of initial data, and theoretical investigations related to the research task. b) Examination of the different equipment models available for the heat recovery system (heat exchangers, heat pumps) and subsequent selection of the optimum design. c) Development of a technical system suitable for installation in multi-family dwellings. d) Practical trials in a dwelling with four to eight families. e) Evaluation of the results, and discussion of the possibility of readiness for mass production. The results of Project ET 18 will be a direct input for this project.

ADDENDA: Subcontractor: Forschungsstelle fur Energiewirtschaft, AEG. Performing organization: Rhine-Westphalian Electric plant AG.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0118, UTILIZATION OF THE HEAT POTENTIAL OF THE ERFT RIVER

P. KALISCHER, Rhine Westphalian Elect Plant, *4300 Essen 1, Federal Republic of Germany*

MAIN OBJECT: Efficient utilization of energy.

FIELD: Economical heat utilization.

OBJECTIVE: On the basis of an actual example, a technical concept for the economical utilization of waste heat at a low temperature level is to be developed. The heat source is the Erft River. Even on cold winter days, its temperature does not exceed

10 degrees C, since the water comes for the most part from the brown coal pits, i.e., from a great depth. For this reason, the pollution level is relatively low. The first order of business will be to determine the amount of heat available as well as the potential customers for it; in addition, the technical concepts will be examined as to their overall economy, economy of energy use, use of waste heat, and technical feasibility.

WORK PROGRAM: a) Determination of supply of, and demand for, heat. b) Development of technical concepts and discussion of their fundamental aspects. c) Closer examination of a suitable example as to its technical feasibility and profitability. d) Report on possible solutions, both general and specific. Evaluation of possible ways of carrying out a demonstration project. e) Planning of a demonstration project.

ADDENDA: Sucontractor: Forschungsstelle fur Energiewirtschaft, Munich; Ing. Buro Canzler, Milheim/R; Rheinbrau-Haustechnik, Wesseling, and performing organization: Rheinisch-Westfalisches Elektrizitatswerk, Essen.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0119, FUTURE ELECTRICAL ENERGY NEEDS AND ITS SUPPLY, ESPECIALLY WITH THE HELP OF NUCLEAR ENERGY

THOSS, Univ. of Munster, Inst. for Com. & Dom. Concerns, *4400 Munster, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0120, BASIC INVESTIGATION OF POSSIBILITIES OF USING WASTE HEAT IN HOUSEHOLDS

K.F. EBERSBACH, Soc. for Practical Energy E.V., *8000 Munich 80, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0121, NEW AMALGAM TECHNOLOGIES FOR IMPROVING THE LUMINOUS EFFICIENCY OF FLUORESCENT LAMPS

G. FRANCK, Osram Gmbh, *8000 Munich 90, Federal Republic of Germany*

DESCRIPTION OF PROJECT: Objective: Today fluorescent lamps are used mostly in closed luminaires. There they are not operating with optimum light output. Used in this way, the wall temperature of the lamp is too high. This leads to an increased Hg vapour pressure and a decreased light output. Using amalgams instead of pure mercury, the mercury vapour pressure can be optimized so that in spite of the high wall temperature, the light output of the lamp is a maximum. Thus, for the same light output, less energy is required.

WORK PROGRAM: a) Producing ternary amalgams based on indium. Measuring the Hg vapour pressure curves and the enthalpy of vapourization. b) Use of other metals like Os, Pb, Tl as basic gubstances in the ternary amalgams. Measuring the Hg vapour pressure properties of pure alkaline earth amalgams. c) Development of suitable amalgam technology for use in the lamps. d) Increasing the light output using suitable amalgams.

STATUS: The previously described paste amalgam method was further developed with the aim to introduce it into the production. This necessitated several individual examinations: The dosage, the viscosity of the paste, and the distribution of the particle size of the metals in the paste of the main amalgam and the starting amalgam all had to be cleared. A first experiment under factory conditions showed that the paste amalgam method is in principle usable in the production.

For further investigations a conveyor belt was constructed. This conveyor allows for testing of the paste amalgam under factory conditions. Particularly the accuracy of the dosage and the drying of the paste on the lamp mounts had to be tested. This drying had to be completed within a temper line which had to be designed according to the conditions of the production process.

Besides this, we started investigating new amalgams based on the systems Hg-In-Ca and Hg-In-Mg, with the aim to lower the material costs. The investigations concerning the composition and vapour pressure of these amalgams will be done at the Chemical Institute of the KFA, with which a co-working contract was signed on September 23, 1975.

ADDENDA: Subcontractor: KFA Julich.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0122, HALOGEN METAL HIGH-PRESSURE DISCHARGING LAMPS OF LOW COLOR TEMPERATURE AND HIGH LUMINOUS EFFICIENCY BY MOLECULAR IRRADIATION

H.P. POPP, Osram Gmbh, *8000 Munich 90, Federal Republic of Germany*

DESCRIPTION OF PROJECT: Objective: By means of dysprosium iodide addition a high-pressure discharge lamp has to be developed that exhibits a warm colour, good luminous efficiency, and good colour rendering. Since the power of these lamps covers the range between 100 and 300 watts, they also can be used for indooor illumination. Incandescent lamps working with poor efficiency could be substituted by these improved high-pressure lamps.

WORK PROGRAM: a) Drawing up the basic concept of the new molecule lamp. b) Developing an isothermal quartz envelope. c) Developing a new stable emitter. d) Preparing the metal iodides. e) Measuring the data and properties of the new molecule lamp.

STATUS: The enhancement of the number density of the radiating particles is of paramount importance in order to develop an efficient lamp of low colour temperature (ca. 3400 K). This goal has been achieved either by an isothermal geometrical shape of the lamp envelope, a measure that provides a higher vapour density combined with a lower thermal load of the quartz walls in favour of lamp lifetime, or by way of formation of complexes of high volatility employing for example Sn and/or Na.

Enhancement of vapour density was obtained also through lower positioning of the electrodes or through a thermal shield at the under side of the lamp. Both of these solutions permit a horizontal burning position only.

With Dy, Na, Tl, Sn-250 W-lamps 81 lm/W could be realized at 3400 colour temperature and an Ra-value of 89. The dysprosium is needed for the enlargement of the spectral output in the red. Meanwhile we could prove, with the aid of theoretical particle density calculations, that were carried out as function of arc temperature, that DyBr- and DyJ-molecules are stable at temperatures as high as 5000 K and are therefore apt for emission over a wide range of the arc.

Improvements in the techniques of chemical preparations and lamp filling were of course prerequisites for the accomplishments.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

8.0123, AUTOMOBILES - ENERGY CONSUMPTION

P. DREYER, Transportation Research Inst., *Arcueil, France* 94110

We intend to accumulate data on the energy consumption of automobiles to develop a program that simulates urban fuel consumption. Previous programs on measuring noise levels will be used to represent traffic conditions.

We intend to study the penetration of the diesel engine used in some cars and in delivery vehicles and survey diesel engine owners to discover the reasons for their choice; the economic benefits of using low power diesel vehicles are often unclear.

The emphasis will be on economic aspects (initial cost, fuel cost, maintenance cost) and on performance. Energy consumption will be verified by attaching a flowmeter to the automobiles belonging to some of the surveyed parties during one or two of their usual runs.

We will simultaneously measure and estimate fuel consumption under urban traffic conditions on specific runs.

We will prepare a general information paper on fuel consumption in heavy automobiles.

In order to determine the effect of driving habits on fuel consumption in heavy trucks, we will measure the fuel consumption of a single truck on the same intercity run under different drivers. We will also simulate consumption.

ADDENDA: Supporting agency and performing organization: Institut de Recherche des Transports.

SUPPORTED BY France - Institute of Transportation Research - Val de Marne

8.0124, ENERGY CONSUMPTION IN PRIVATE CARS IN THE CITY (DEFINING CITY 'CYCLE')
P. FARGIER, Transportation Research Inst., *Arcueil, France* 94110

The goal of this study is to better understand energy consumption in private cars in cities. It has 2 aspects: a) a number of measurements of such consumption in vehicles now in use, b) ascertaining one or more 'cycles' or trips representative of driving conditions, which will permit us to compare various preliminary designs of new types of vehicles.

Complex statistical problems must be solved before measures to be taken can be determined and implemented.

SUPPORTED BY France - Transportation Research Institute - Acueil

8.0125, FUEL CONSUMPTION AND POLLUTION FOR DIFFERENT TRAFFIC SITUATIONS ON CITY FREEWAYS
B. FAVRE, Transportation Research Inst., *Arcueil, France* 94110

The objective of this study is to take different traffic situations and relate them to a specific noise level, degree of pollution, and fuel consumption for all the vehicles involved. The starting process and traffic jams will receive particular attention.

Computers will determine these values as soon as we find precise relationships, between various parameters, such as: speed, traffic flow, percentage of heavy trucks, direction, etc.

The models will be supported by in situ measurements, at the roadside for pollution and noise, on cars stopped by traffic jams for fuel consumption.

By using these measurements, we will be able to devise tables on automobile fuel consumption under various characteristic flow conditions. We will also obtain the data needed to do the same study on intersections with traffic signals in order to compare such intersections with intersections at which the road level changes.

ADDENDA: Supporting agency and performing organization: Institut de Recherche des Transports.

SUPPORTED BY France - Institute of Transportation Research - Val de Marne

8.0126, AUTO DRIVERS - RELATIONSHIP BETWEEN NOISE PRODUCTION AND FUEL CONSUMPTION
G. PACHIAUD, Transportation Research Inst., *Arcueil, France* 94110

A study conducted by the center for research and evaluation of harmful substances (C.E.R.N.) in 1972 showed that noise production in Renault 16 was influenced by different types of driving. As a result of this study, we can hypothesize that there is a close relationship between noise production and fuel consumption.

The goal of the present study is to measure the extent of this relationship.

We will once again use the 1972 experimental apparatus in 1975 and complete noise level measurements with measurements of fuel consumption.

Approximately ten cars of different ages will make the same trip at the same time.

Addenda: Supporting agency: Ministere De La Qualite De La Vie.

SUPPORTED BY France - Ministry for The Quality of Life & Environ. - Paris

8.0127, MEASUREMENT OF ENERGY CONSUMPTION (ABBREV)
J. MARTIN, Univ. of Grenoble, Inst. of Ec. & Judicial Energy, *Grenoble, France* 38040

In the domain of energy, the measurement of consumption, like that of production, depends on the conventions since it is necessary to be able to add together different forms of energy (petroleum, gas, coal, etc.). The prevalent practice of retaining for each form of energy its own calory content measured in the ideal conditions of the laboratory, with perhaps the exception that one has a common measure for the production of electrical energy.

Construction of the energy balance sheet on this basis gives an excellent image of the energy 'demanded' by an economy, but no information on the energy which has been effectively used, of the fate of the wastes of all sorts which are produced where the fuel is consumed. The hypothesis is made in the envisioned study that the difference between energy 'demanded' and energy 'used' varied in the past. A good knowledge of the latter will be of great assistance in understanding the evolution of energy consumption in the past, and permits better provision of the future. The plausibility of this hypothesis rests on the fact that in reality the diverse forms of energy are used with different efficiencies, if only the structure of energy consumption is developed (rate of technical progress combined with consumer preparation for the structure of different ages).

The present research proposes therefore to determine past performance coefficients of equivalence in order to allow the measure of the consumption of energy in terms of energy 'used'. The industrial sector will be the principal field of application of this research for which three types of complementary approaches have been employed: 1. global approach for the industrial sector ensemble, in time and space, relying essentially on statistical methods. 2. Beginning with investigation and calculation estimate efficiencies for large categories of energy use in industry (heating, vaporization, ovens, etc.). 3. Detailed analysis of the evolution of energy required and used in several industrial branches (2 or 3). Particularly important from the point of view of energy consumption (cement, glass, etc.).

ADDENDA: Performing organization: Institut Economique et Juridique de l'energie, Universite de Grenoble II.

SUPPORTED BY France - National Science Research Center - Paris

8.0128, USING LOW TEMPERATURE HEAT
UNKNOWN, Electricite de France, *Paris, France* 76008

Using low temperature heat sources, usually unusable, and lost to the atmosphere or in liquid wastes, as a 'heat source' for heat pumps. These sources can be natural (phreatic and geothermal strata), industrial (plant coolant water), or domestic (polluted air from homes, liquid wastes, etc.).

Using such sources in conjunction with heat pumps is less wasteful from the point of view of energy, than using them with a heater whose fuel is designed to raise the thermal level of the heat collected. They could be a substitute for fuel oil in certain cases (heating premises).

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

8.0129, ENERGY STUDY OF AN INDUSTRIAL CHEMICAL PROCESS
UNKNOWN, Electricite de France, *Paris, France* 76008

Reducing the consumption of energy needed for synthesizing vinyl chloride by increasing the energy output of the plant through using electricity. Two stages are planned: a. Improving the existing installation; b. Studying a draft of a process using the same reactions.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

8.0130, IN SITU STUDY OF INSULATION PROBLEMS
L. BERTOLO, Ministry of Equipment, Building Ind. Sci. & Tech. Ctr, *Paris, France*

Goal: Verify compliance with insulation regulation requirements.

Method: We will study measurements of losses through transmission through an external opaque wall; this includes losses through the relation of this wall with the rest of the construction. Uncover insulation defects.

Program: Study a method of measuring losses, combining surface temperature measurements (using infrared) and flux measurements (using fluximetry).

Test models for localizing insulation defects. Using gammagraphy and core sampling.

SUPPORTED BY France - Ministry of Equipment & Housing - Paris

8.0131, SAVING ENERGY IN PRESENT HOUSING
P. FRIDMANN, Ministry of Equipment, Building Ind. Sci. & Tech. Ctr, *Paris, France*

Goal: Define automatic control equipment that can be installed without disturbing existing elements excessively, according to building type and present heating system.

Also define in each case the different precautions to be taken and eventual modifications of the installation.

Determine the financial aspect (investment) and attainable saving of energy.

Method: The study is based on: Initially typifying different diagrams of present installations, analyzing possibilities of installing automatic control systems case by case, and projects already completed by the service on automatic controls.

Program: Studying all possible cases in order to understand the different possible methods of control in present buildings.

SUPPORTED BY France - Ministry of Equipment & Housing - Paris

8.0132, INCREASING HEAT ECONOMY BY WORKING ON CONTROL AND METERING EQUIPMENT
P. FRIDMANN, Ministry of Equipment, Building Ind. Sci. & Tech. Ctr, *Paris, France*

Goal: Precisely define the thermal behavior of construction-furnaces control bodies, according to: a) climatic data, b) characteristic parameters of construction, c) characteristic parameters of furnaces, d) characteristic parameters of the automatic control system; in order to: a) compare different possible systems according to comfort and energy consumption, b) enable us to reasonably choose one system to use from among the vast number of possible combinations, c) make innovations in the designing of heating, its control, and perhaps even construction in order to make the best use of an especially interesting heating system (feasibility study).

Method: The study is based on: 1. 'In situ' observations: 2. Laboratory tests: 3. Analogous studies.

Program: The 1975 program which is based on experimental results of the last few years is as follows: Analogous study of individual and proportional control.

Analogous study of operational intermittences in order to decrease energy consumption.

SUPPORTED BY France - Ministry of Equipment & Housing - Paris

8.0133, THERMAL CALCULATIONS USING A COMPUTER
J. LEQUERE, Ministry of Equipment, Building Ind. Sci. & Tech. Ctr, *Paris, France*

Goal: Make a tool available to the designer and the administration for: predicting annual expenses for heating homes and apartments, determining a priori what saving could entail which construction or equipment modification, verifying compliance of the G coefficient with regulations.

1975 program: Modify and complete program loss computations in order to include the final form of 'TH regulations'.

Establish a new itemized list of data adapted to calculating the coefficient of homes and completing the corresponding computation program.

Perfect programs predicting heating expenses, using extremely exact climatic data.

SUPPORTED BY France - Ministry of Equipment & Housing - Paris

8.0134, COMPARING METHODS OF CALCULATING ANNUAL HEAT CONSUMPTION
J. LEQUERE, Ministry of Equipment, Building Ind. Sci. & Tech. Ctr, *Paris, France*

Goal: Perfect computation programs for predicting annual heating expenditures. Attempting to make the different computation methods used in France uniform.

Program: Comparing different methods of calculating present annual heat consumption, including different degrees of precision in computation methods now being used.

SUPPORTED BY France - Ministry of Equipment & Housing - Paris

8.0135, REDUCING LOSSES THROUGH VITREOUS WALLS
C. MOYE, Ministry of Equipment, Building Ind. Sci. & Tech. Ctr, *Paris, France*

Goal: Discover the amount of loss through walls including their protection, and find means of reducing losses.

Method: 1) We will determine the K coefficient of vitreous bays equipped with protective devices by computing air renewal in the area between the vitreous bay and its means of protection. 2) computation methods will be verified by comparing results with previous measurements carried out at the scientific and technical construction center (LSTB) on walls with thin layers of air. 3) We will use a measuring device still on the drawing board to determine the effects of wind on ventilation of the air layers.

Program: We will fix and verify the computation method. We will calculate the occurrence of successive parameter variations on the K coefficient of the vitreous K: The closing's permeability to air, isolating the closing, and its interior's emission capacity.

SUPPORTED BY France - Ministry of Equipment & Housing - Paris

8.0136, EXCHANGERS AND HEAT PUMPS
A. REGEF, Ministry of Equipment, Building Ind. Sci. & Tech. Ctr, *Paris, France*

Goal: Establish criteria for predicting energy consumption of heating systems including heat recovery equipment or heat pumps.

Method: Define typical heating systems. Analyze heating needs imputable to each element of the system. Form characteristics of equipment in operation.

Integrate a general method of calculating consumption.

Progress: A general scientific and economic study has enabled us to draw up a preliminary list comparing four typical systems using a double flux ventilation and equipment used for laboratory tests.

Program: Complementary tests for specifying certain aspects of the behavior of a heat pump.

Determining laws giving the instantaneous power provided by each of the system's components in accordance with the chosen method of control.

Draw up a computation procedure for one year, based on climatic data.

SUPPORTED BY France - Ministry of Equipment & Housing - Paris

8.0137, PROBLEMS CREATED BY SAVING ENERGY - DANGER IN CASE OF FIRE RESULTING FROM USING PLASTIC INSULATORS AND CASINGS
UNKNOWN, Ministry of Equipment, Building Ind. Sci. & Tech. Ctr, *Paris, France*

A greater use of plastic materials in construction in order to reduce energy consumption resulting from heat loss has created special dangers that must be characterized in such a way as to establish safety regulations for construction: 1. Characteristics of various dangers in case of fire caused by using plastics. In 1974, our work dealt with degradation temperatures after which the dangers (flammability, fumes, toxicity) begin for polyester casings and phenolic and polystyrene plastic foams on the one hand, and with composite panels including the following materials in an existing plant (30 by 40 cm furnace). In 1975, the same experimental work will be done on other plastic casings and various polyurethane and pvc foams. A more complete study will be carried out on a furnace with a radiant panel and controllable ventilation that must be constructed if we are to proceed with tests of half-size elements (1 by 1 m). In addition, this furnace will be completed with installations for measuring smoke output, opacity and toxicity (using external sources to measure toxicity). 2. Usage guide for designing buildings that use plastics. In 1974, following the tests discussed in the above paragraph, a preliminary list of typical cases was compiled including polyester casings, phenolic and polystyrene foams, and mineral wools. This preliminary list will be completed in 1975 for buildings using pvc and polyurethane foams and for various solutions according to the set-up, use, and future of the buildings.

SUPPORTED BY France - Ministry of Equipment & Housing - Paris

8.0138, HEATING FROM A DISTANCE - EFFECTS OF APPLYING NEW ENERGY REGULATIONS

UNKNOWN, Ministry of Equipment, Building Ind. Sci. & Tech. Ctr, *Paris, France*

Long-term goal: The final goal of the project is to study adjustments that will have to be made in the design of long distance heat distribution plants in order to comply with recent regulations made in order to save energy.

This study involves the following 4 major points: Adapting distribution network diagrams to control requirements of the April 10, 1974 decree. Finding a long distance heat distribution system that reduces heat loss. Adapting distribution and apportionment systems to counting requirements. Adapting long distance heat production and distribution plants in order to satisfy operation control requirements.

Proposed method - validity limits: Since this project consists of a theoretical study of diagrams, we will study modifications that can be made in response to regulations, based on traditional diagrams, and establish in each case the change in the economic cost of the plant. The unit prices used as a basis in this economic study are those of traditional plants, and the diagrams use well-known materials and processes without new technology.

Medium-term goals: The principal goals for the 4 points enumerated under study goals are: Adapting distribution network diagrams to control requirements of the April 10, 1974 decree. We will study the occurence of dividing building into individually controllable homogeneous thermal parts, and the resulting division of distribution networks according to temperature levels and control precision up to fine control points. Finding a long distance heat distribution system that reduces heat loss: The main idea is to separate uses by independent networks in order to obtain a minimum heat loss in each of these networks. Adapting distribution and apportion systems to metering requirements: Since one of the probable orientations of heating operation contracts is profit-sharing (dividing savings and surplus), we will define metering methods that can be retained and steps to take in order to install meters. Adapting long distance heat production and distribution plants in order to satisfy operation control requirements: We will establish the census of measurement instruments to be installed for a good understanding of the plant's operation, on the one hand, and of fixed control instruments to be installed in order to adapt the plant's operation to needs when necessary, on the other hand. (Text Abridged.)

SUPPORTED BY France - Ministry of Equipment & Housing - Paris

8.0139, SPECIAL PROBLEMS OF HEATING INDIVIDUAL HOMES

J. VILLAIN, Ministry of Equipment, Building Ind. Sci. & Tech. Ctr, *Paris, France*

Goal: 1) Discover the annual heat consumption rates of individual homes and what they depend on. 2) Find out how to decrease consumption by working on the construction-heating-control-automization group of operating methods (intermittence).

Method: The method consists of: 1) In situ observations for specifying and quantifying parameters relating to the mode of operation and occupation, acquiring bases of comparison with other calculations on the analogous model. 2) Calculations on the similar CSTB model for different combinations of the construction-heating-operational method group in order to make as thorough a study as possible of the effect of the different parameters.

Progress: We have completed the observations listed under 0 1 of 'method', using 2 wing groups without control.

Program: We will followup the observations made in '74, with wings equipped with different types of control (central, room by room, etc.)

SUPPORTED BY France - Ministry of Equipment & Housing - Paris

8.0140, CHEMICAL OPERATIONS IN INDUSTRY

UNKNOWN, Natl. Scientific Res. Center, *Paris, France* 75700

OBJECTIVE: Save small amounts of energy by improving existing in-dustrial chemical processes.

Research will be done in two steps: the first will develop procedures, the second will examine the properties of reaction media.

SUMMARY: a) Develop procedures: devising models: study model making techniques that can be applied to industry-related problems; acquire and treat thermodynamic and kinetic data of interest to industry and related to energy problems; analysis and separation techniques: up-grading petroleum fractions, low-grade ores, and residues through sep-aration by specific methods (specific solvents, dyes, etc.); chemical engineering: reactor design, photochemical, biochemical, and electrochemical engineering; b) Properties of reaction media: study of optimizing reaction media in industrial chemical operations, choice of solvent, conditions of medium heterogeneity, use of dissolved salts, etc.

ADDENDA: Supporting agency and performing organization: Centre National de la Recherche Scientific.

SUPPORTED BY France - National Science Research Center - Paris

8.0141, ENERGY USED BY FRENCH INDUSTRY FOR FRAGMENTATION PROCESSES

P. MARIOGE, Ministry of Industry & Res., Bureau of Geol. Mining Res., *Paris 15E, France*

The objective of this study was to determine the degree of priority that should be accorded to fragmentation research.

The study was conducted by region. We compiled a list of the energy-consuming industrial activities involved in fragmentation processes.

To facilitate comparison, we used 1972 as our reference year; the statistics had already been published. Taken as a whole, the heavy industries listed use about 2 percent of France's electrical energy (based on electrical energy output in 1972) for fragmentation processes.

ADDENDA: Supporting agency and performing organization: Ministere de L'Industrie et de la Recherche Bureau de Recherches Geologiques et Minieres Service Geologique National.

SUPPORTED BY France - Ministry of Industry & Research - Paris

8.0142, TURBOCHARGING THE S I ENGINE
A. ECOMARD, Petroleum Institute, *Rueil Malmaison, France* 92502

Connected studies on energy consumption during urban driving have demonstrated the big impact of mechanical friction losses. Furthermore these frictions above all depend upon engine displacement. Following this a study aimed at turbocharging an S I, for energy conservation reasons, this is to say obtaining maximum torque under low running conditions, has been launched. The main optimization criteria is linked with preventing knock phenomena.

The theoretical and experimental study is mainly devoted to establish the best set of compression ratio, spark timing inlet and pressure temperatures, values for minimizing urban fuel consumption while maintaining a normal safe margin with knock occurences.

ADDENDA: Supporting agency: Institut de Recherche des Transports. Performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Transportation Research Institute - Acueil

8.0143, EFFICIENCY OF INDIVIDUAL SPACE HEATERS OPERATING AT PARTIAL POWER
G. PILE, Petroleum Institute, *Rueil Malmaison, France* 92502

SUMMARY OF PROJECT: Collective research by all French oil companies, headed by UCSIP and coordinated by IFP. The objective is to reduce the oil consumption of individual space heaters without detracting from the comfort of users and without requiring high investments or using sophisticated equipment. Laboratory tests were performed on 15 heaters. Consumption is being measured in 20 individual houses. The entire project will be completed and written up before the end of 1976. Tests have already shown the degradation of heater efficiency that is caused by the excess power of the heater with regard to the mean manual needs as the result of losses via the walls. Although hot water is supplied with very poor efficiency during the summertime, this fact has only a slight consequence on fuel consumption. Nighttime adjustment is a technique to be recommended.

ADDENDA: Supporting agency: Union des Chambres Syndicales de l'Industrie du Petrole. Performing organization: Institut Francais du Petrole.

SUPPORTED BY France - Federated Union of Petroleum Industries - Paris

8.0144, REGENERATING USED LUBRICATING OILS
UNKNOWN, Petroleum Institute, *Rueil Malmaison, France* 92502

SUMMARY: The consumption of all types of lubricating oils depends on the degree of industrialization of each country but amounts to and sometimes exceeds a percentage of the total consumption of petroleum products. This is hardly a negligible amount (about 1,000,000 tons/year in France); therefore, even if much of this amount is ordinarily degraded, this constitutes a danger of pollution. Because of equipment that traps wastes, whose use is spreading, it is becoming possible to recover unburned fractions in the form of basic oils. We are now treating used engine oils in order to produce basic oils of the same quality as unused products.

ADDENDA: Supporting agency and performing organization: Institut Francais Du Petrole.

SUPPORTED BY France - Petroleum Institute - Rueil - Malmaison

8.0145, PERFECT A PROCEDURE FOR SEPARATING IN A MOLECULAR SIEVE IN THE CHROMOGRAPHIC STATE FOR ENERGY CONSERVATION
J.M. GUTTIEREZ, Petroleum Enterpr. Res. Activ., *Solaize, France*

Development of experimental instruments for examination of complete procedure possibilities. Intensive use of instrumentation for examining various control variables.

ADDENDA: Performing organization: Enterprise De Recherches Et Activites Petrolieres.

SUPPORTED BY France - General Delegation for Scientific & Technical Res.

8.0146, ENERGY CONSUMPTION OF AUTOMOBILES IN URBAN AREAS - DETERMINING URBAN CYCLES
P.H. FARGIER, Transportation Research Inst., *Val de Marne, France*

Our objective is to better understand energy consumption in urban automobiles. This project has two aspects: a) measure fuel consumption in automobiles currently in use, and b) determine one or more 'cycles', runs respresentative of traffic conditions that will enable us to compare various test models (automobiles).

Before determining which measurements to take and how to use such measurements, we must solve complex statistical problems.

ADDENDA: Supporting agency and performing organization: Institut de Recherche des Transports.

SUPPORTED BY France - Institute of Transportation Research - Val de Marne

8.0147, COMBUSTION
UNKNOWN, Coal Fields Research Center, Lab. Verneuil en Halatte, *60 Verneuil en Halatte, France*

Goal: Use our knowledge of combustion and our equipment for studies on saving energy during combustion or recovering heat in poor fuels, to be carried out in factories or in laboratory pilots.

Investigations and expert appraisals: We will investigate possibilities of reconverting different industrial plants to coal because of general energy policy. We will take part in technical appraisals of large plants using thermal energy, thus applying the May 20, 1974 decree.

Studying the improvement of nitrogen combustion by preheating and/or using additives to reduce excess smoke in air; this study will be carried out in an existing 400th/h experimental furnace.

Designing and constructing a 500 th/h experimental furnace for studying the combustion of highly cindrous fuels (impure coals, bituminous schists, wastes); this furnace will have means of visualization and continuous registration of variables studied and results obtained. Tests will begin in 1976.

SUPPORTED BY France - Ministry of Industry & Research - Paris

8.0148, INSULATING SELF-OPERATING LIGHT PANELS
UNKNOWN, Coal Fields Research Center, Lab. Verneuil en Halatte, *60 Verneuil en Halatte, France*

Goal: Using our experience with creating plastics and manufacturing light materials for studying the best group of materials to be used for fabricating light insulating panels, with the goal of optimizing the overall energy picture by taking into account the costs of different solutions and of the resulting saving in heating.

Project orientation: We will determine usage characteristics for the different types of panels indicated below: Thermal conductivity coefficient and computation of the K coefficient of corresponding useful thermal transmission by using a standard 5cm thickness; energy contained per squared meter of panel; mechanical properties such as resistance to compression, traction, bending; and usage characteristics: apparent density, thermal degradation coefficient, fire resistance; phonic insulation and adsorption properties. Materials used for these studies are of 2 types: pure cellular plastic sandwiched panels, such as for mophenolic, polyurethane, PVC foam, etc.; light concrete base panels with organic or mineral binders in order to improve fire resistance, increase mechanical and phonic insulation properties, reduce prices without affecting the energy balance sheet. In these panels, granules and light sand are obtained by expanding schist, clay and glass deposits with a loose density between 150 and 350 kg/m3. Associated with organic and mineral binding materials, organic binding materials have a base of epoxide, polyester, formophenolic, and polyurethane resins; mineral binders have a portland cement base and can thus be made available in foam form.

SUPPORTED BY France - Ministry of Industry & Research - Paris

8.0149, EFFECTIVE UTILIZATION OF URBAN AND HOUSING RESOURCES
I. TANASHI, Building Research Institute, *Tokyo, Japan* (115334 (HRB NO.))

The purpose of the research is to relocate urban functions in order to: (1) utilize existing urban transportation facilities more effectively; (2) to use road space more efficiently for the purpose of accommodating new systems of urban transportation, facilities of supply and disposal (electric, gas, water, sewage, etc.) and open space; and (3) to determine each mode of transportation's optimum share from an energy saving point of view. /IRRD-IRF/

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY Japan - Japanese Government - Tokyo

8.0150, REGENERATION AND RECUPERATION OF HEAT IN HOUSES
J. CLAUS, Central Org. Adv. Appl. Res., Central Technical Inst., *Apeldoorn, Netherlands*

Study and analyses of the thermal behaviour of heat regenerative and recuperative systems (Econovent Heat Exchangers).

Addenda: Supporting agency: N.V. Nederlandse Gasunie. Performing organization: Centraal Technisch Instituut TNO.

SUPPORTED BY Netherlands - Netherlands Gas Union N.V. - Groningen

8.0151, ENERGY CONSUMPTION OF HOUSEHOLD REFRIGERATION
P.J. GORIS, Central Org. Adv. Appl. Res., Central Technical Inst., *Apeldoorn, Netherlands*

An analysis will be made of the energy consumption of a household refrigerator.

Special attention will be given to the influence of: change in on-off periods; defrosting; thermodynamic efficiency; and the effect of the combination of freezer and refrigerator in one system.

Addenda: Supporting agency: Nijverheidsorganisatie TNO. Peforming organization: Centraal Technisch Instituut TNO.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

8.0152, IMPROVEMENT OF HEATING APPLIANCES
D.J. HEEDEN, Central Org. Adv. Appl. Res., Central Technical Inst., *Apeldoorn, Netherlands*

The improvement of the efficiency of available heating appliances and the development of new heating systems that make an efficient use of the energy in fuel oil and natural gas.

An analysis is made of the different factors that influence the efficiency of heating apparatus. Special attention is paid to the seasonal efficiency. The data are collected with laboratory measurements and with field measurements.

A new type of heating apparatus will be constructed in which water vapour condensation contributes to the heat transfer. The possibilities of low temperature heating systems will be investigated.

Addenda: Supporting agency: Nijverheidsorganisatie TNO. Performing organization: Centraal Technisch Instituut TNO.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

8.0153, ENERGY CONSERVATION BY IMPROVING THE ACTIVITY OF ELECTRODES FOR THE ELECTROLYTIC PRODUCTION OF CHLORINE AND SODIUM HYDROXIDE
D. THOENES, A K Z O, *Arnhem, Netherlands*

By applying more expensive electrodes in electrolysis cells it is possible to raise the efficiency of the electric power consumption for the production of chlorine and sodium hydroxides.

AKZO has acquired detailed information about investment costs versus energy consumption per ton of product.

SUPPORTED BY Netherlands - A K Z O N.V. - Arnhem

8.0154, INVESTIGATION OF COOLING WATER DISCHARGES - NON-BIOLOGICAL
K.J. KELLER, N.V. K E M A, *Arnhem, Netherlands*

Investigation of the distribution of cooling water discharged from power stations in rivers, canals, lakes, estuaries and the sea.

Investigation of the process of temperature equalization, especially the exchange of heat at the water-air surface. Use is made of a number of permanent, temperature registering stations.

Correlation with meteorological conditions is sought.

SUPPORTED BY Netherlands - N.V. Kema - Arnhem

8.0155, HEAT ECONOMY OF HOUSES
M.C. MOERDIJK, N.V. K E M A, *Arnhem, Netherlands*

A comparison of the heat requirements of three small houses will be made throughout several years. House 1 is built conventionally. House 2 and house 3 are well insolated. House 1 and 2 are provided with a conventional, gas-fired central heating installation.

This combination will be used to investigate the effects of several types of ventilation and of several ways of insolation. House 3 will be provided with several, more or less unconventional ways of heating. This will include all-electric heating and the use of heat pumps.

SUPPORTED BY Netherlands - N.V. Kema - Arnhem

8.0156, ENERGY USE OF HOUSEHOLD APPLIANCES
UNKNOWN, N.V. K E M A, *Arnhem, Netherlands*

Objective: to decrease the consumption of electricity by household appliances. Study of consumption of refrigerators and deep-freezers. Study will be continued with other apparatus.

Final objectives: a. to make designers and manufacturers more energy-conscious; b. possible issue of certificate on energy-consumption by KEMA.

SUPPORTED BY Netherlands - N.V. Kema - Arnhem

8.0157, THE INFLUENCE OF THE WINDOWS ON THE HEAT LOSSES OF DWELLINGS
J.H. HAAGH, Breda Academy of Technology, *Breda, Netherlands*

Determination of the effective heat-flow passing the glass surface of a window as a function of the temperature of the radiator. (Radiator placed under the window).

Addenda: Performing organization: Hogere Technische School Breda.

SUPPORTED BY Netherlands - Ministry of Education and Science - The Hague

8.0158, INVESTIGATIONS ON THE ENERGY CONSUMPTION IN OFFICE BUILDINGS DEPENDING ON BUILDING DESIGN AND CLIMATE CONTROL SYSTEM
P. EUSER, Central Org. Adv. Appl. Res., Inst. for App. Physics, *Delft, Netherlands*

Computerized calculations about the annual energy consumption for heating and cooling based on hourly meteorological data. Properties of building to be varied: glazing, sunshading, mass of the walls, ratio outer surface/volume, ventilation rate. Climate control systems to be considered: warm water heating with conditioned air, Fancoil system, all air conditioning, two and four pipe heating and cooling systems, heat pumps systems, heat recovery applications, possibility of heating and cooling with use of solar energy.

Addenda: Supporting agency: Nijverheidsorganisatie TNO. Performing organization: Technisch Physische Dienst TNO.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

8.0159, MODEL STUDIES OF SPACE HEATING
C.J. HOOGENDOORN, Delft Univ. of Technology, *Delft, Netherlands*

The objective is to study the thermal climate in dwellings: the factors of comfort versus energy consumption for space heating.

Addenda: Supporting agency: Technische Hogeschool Delft.

SUPPORTED BY Netherlands - Delft University of Technology

8.0160, DIRECT HEATING OF OBJECTS BY BURNING GAS

C.J. HOOGENDOORN, Delft Univ. of Technology, *Delft, Netherlands*

The objective is to substitute the electrical heating of furnaces in metallurgy industries for direct heating by high impulse gasflames. One of the conditions is that a reasonable uniformity of heating can be realized. The heat transfer (by convection and radiation) is measured. The influence of chemical reactions in the boundry region is determined. A computer model of this process will be developed. The turbulence in the flame is an important subject for experimental and theoretical studies. The project develops in cooperation with the Internation Flame Research Foundation, Ymuiden, The Netherlands.

Addenda: Supporting agency: Technische Hogeschool Delft.

SUPPORTED BY Netherlands - Delft University of Technology

8.0161, LOCAL HEATING FOR TOWNS TO BE BUILT (IN PLANNING)

G.S. JONKER, Delft Univ. of Technology, Center for Env. Science Tech., *Delft, Netherlands*

Methods for local heating will be studied concerning towns to be built (Almere, North quarter of Breda and the quarter Holy of the town Vlaardingen) as well as environmental aspects. Also will be regarded: a) Incineration of refuse; b) Efficient utilization of power stations and their capacity (MW); c) Utilization of solar energy for space heating; d) Use of water heat, etc.

The partial utilization of solar energy and waste heat is of substantial importance for the physical planning of the town concerned. What is acceptable from the point of view of civil engineering will be studied.

Addenda: Supporting agency: Technische Hogeschool Delft; Performing organigation: Technische Hogeschool Delft, Centrum voor Technische Milieukunde.

SUPPORTED BY Netherlands - Delft University of Technology

8.0162, COMPUTER SIMULATION OF RECIPROCATING COMPRESSORS (LEADING TO BETTER VALVE DESIGN AND REDUCTION OF ENERGY CONSUMPTION)

S. TOUBER, Delft Univ. of Technology, Lab. for Thermal Power Engin., *Delft, Netherlands*

The total energy consumption of reciprocating compressors in industrial countries is estimated to be about 1 per cent of the national consumption of energy. The self-acting valves are the main reason for energetic losses in reciprocating compressors. These losses may amount to 20-25 percent of the shaft power. The substantial reduction can be reached by better valve design. Objective of the project was the developmnt of a compressor simulator as an aid in the design of compressor valves. Reciprocating compressors are in use in different fields including transmission of energy and thermodynamic conversion of energy (examples; air powered tools and other machinery, refrigeration and air conditioning plants including heat pumps). Also the application of compressed gases in the chemical industry is important. Compressor simulation at the basis of a mathematical model provides a basis for valves with better dynamical behaviour and less energetic losses. The simulator is of simple design and readily accessible to non-mathematicians.

SUPPORTED BY Netherlands - Delft University of Technology

8.0163, SIMULATION OF AIR CONDITIONING SYSTEMS

A.H. VANPAASSEN, Delft Univ. of Technology, *Delft, Netherlands*

The result of this project will be a computer simulation of the system formed by the building, the air conditioning plant and the outdoor climate. Each of these components are investigated in detail to make a mathematical model of it. Every model will be checked by experiments. The computer simulation can be used to calculate the energy consumption of various air conditioning systems. Moreover the effect of various features for saving energy can be calculated. A preliminary calculation showed, for example, that the energy consumption can be reduced enormously using an airhandling system of which the most economic use of energy can be expected. This system was built up by means of conventional components.

SUPPORTED BY Netherlands - Delft University of Technology

8.0164, ENERGY CONSERVATION IN FLASH DISTILLING OF SALT WATER

A.W. VEENMAN, Delft Univ. of Technology, Lab. for Thermal Power Engin., *Delft, Netherlands*

This project concerns the development of a vertical evaporator unit. The apparatus consists of a flashing column and a heat exchanger. This latter part contains a fluidized bed system. The investigation concerns the realization of an optimal design of flash type evaporators and also regards the mechanisms of heat transfer in fluidized bed heat exchangers. The objective is to produce potable water and water for industrial purposes cheaper than by the conventional distilling procedures and with the smallest thermal and biological effects for the environment.

ADDENDA: SUPPORTING AGENCY AND PERFORMING ORGANIZATION: Technische Hogeschool Delft.

SUPPORTED BY Netherlands - Delft University of Technology

8.0165, ALTERNATE ENERGY SOURCES FOR AIRCRAFT PROPULSION

H. WITTENBERG, Delft Univ. of Technology, *Delft, Netherlands*

In the disciplinary group 'Aircraft Design and Flight Mechanics' of the Department of Aeronautical Engineering a study is performed on the design and performance of civil aircraft with propulsion systems using non-conventional energy sources. As a first project a preliminary design of an aircraft with a nuclear reactor has been finished (preliminary report M211 'Prospects and Problems of the Nuclear Propelled Aircraft').

The project was part of a post-graduate study, fulfilled in cooperation with the disciplinary group on nuclear engineering of the Department of Mechanical Engineering at Delft.

The second project is the design of an aircraft with liquid hydrogen as fuel. A detail-study on the design of the fuel tanks will be completed early 1975. The aircraft design study will be performed in 1975/1976, dependent on available staff.

SUPPORTED BY Netherlands - Delft University of Technology

8.0166, INVESTIGATION OF THE UTILIZATION OF ALTERNATIVE FUELS FOR AUTOMOTIVE PURPOSES

UNKNOWN, D A F Truck B.V., *Eindhoven, Netherlands*

By means of a desk study, investigation is made of alternative fuels for diesel engines. Not only the technical possibilities are studied, but also the economical and financial consequences of changing, rebuilding or re-designing diesel engines for reliable operation on alternative fuels are investigated.

SUPPORTED BY Netherlands - D A F Truck B.V. - Eindhoven

8.0167, ENERGY, POLLUTION AND SHORTAGE ASPECTS CONCERNING THE MANUFACTURING OF BUILDING MATERIALS

H.A. CORNELISSEN, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

The production chain extending from raw materials to products is studied regarding the energy consumption with respect to each stage of the production, the amount of pollution of air, water and soil, and the possibility of shortage of materials.

If electric power is consumed during the production process, the pollution caused by generating the electricity is attributed to the product. The advantage of this method is that possible 'critical paths' are clearly recognized.

The study results in a series of data regarding the energy consumption and pollution. In this way it may be possible to trace the influences of changes in governmental policy on the industries concerned regarding energy and pollution-management.

The data mentioned can become criteria for the choice of building materials. The study has been carried out for concrete and brick, with a family house as the final product. The investigation is executed in cooperation with the Future Shape of Technology Foundation. This organization manages an overall project regarding a number of materials (e.g. metals, plastics and wood).

Addenda: Supporting agency and Performing organization: Technische Hogeschool Eindhoven.

SUPPORTED BY Netherlands - Eindhoven University of Technology

8.0168, TECHNICAL (ARCHITECTURE, GEOGRAPHY, EQUIPMENT ETC.) DESIGN OF OPTIMAL PROTECTION (AGAINST CLIMATOLOGICAL IMPACT) OF HOUSES & OTHER BUILDINGS

J. HAMAKER, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

The objective is to develop cheap and efficient air conditioning system (space-heating, cooling, recuperation of heat etc.) for houses and other buildings as a function of the building, construction materials, architecture and climatological factors.

To realize this purpose, the dynamic-thermal behaviour of a building has to be described as a function of external climate. The mathematical model of a room has been completed.

A model concerning a system of rooms is being developed now. The criteria concerning the quality of the protection (against climatological impact) are: a) The annual exploitation costs of the equipment; b) a set of conditions with respect to comfort of the dwelling.

SUPPORTED BY Netherlands - Eindhoven University of Technology

8.0169, ENERGY, POLLUTION AND SHORTAGE ASPECTS CONCERNING THE MANUFACTURING AND THE USE OF BUILDING MATERIALS

P.C. KREYGER, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

The production chain extending from raw materials to products is studied regarding the energy consumption with respect to each stage of the production, the amount of pollution of air, water and soil and the possibility of shortage of materials. If electric power is consumed during the production process, the pollution caused by generating the electricity is attributed to the product. The advantage of this method is that possible 'critical paths' are clearly recognized. The study results in a series of data regarding the energy consumption and pollution. In this way, it may be possible to trace the influences of changes in governmental policy on the industries concerned regarding energy and pollution-management. The data mentioned can become criterions for the choice of (building) materials. The study has been carried out for concrete and brick, with a family house as the final product. The investigation is executed in cooperation with the Future Shape of Technology Foundation. This organization manages an overall project regarding a number of materials (e.g. metals, plastics and wood).

ADDENDA: Supporting agency and Performing organization: Technische Hogeschool Eindhoven.

SUPPORTED BY Netherlands - Eindhoven University of Technology

8.0170, SAVING OF ENERGY & WATER & DECREASE OF POLLUTION IN THE MANUFACTURE & USE OF BUILDING MATERIALS FOR SHORT, MEDIUM & LONG TERM PLANNING

P.C. KREYGER, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

From the studies of production chains of building materials, data are obtained which are used for further evaluation of savings in energy and water and the decrease of pollution. For instance, comparisons are made regarding the saving of the prementioned factors during the building process and during the exploitation-period of buildings and hereafter (demolition problem). Also the problem of household refuse (solid and liquid) during the exploitation period is considered.

Special attention is paid to the possible effect of pollution on the ratio and amounts of positive and negative air-ions and their influence on health. The same applies to a possible exchange between air-ions and building materials indoors.

Addenda: Supporting agency and Performing organization: Technische Hogeschool Eindhoven.

SUPPORTED BY Netherlands - Eindhoven University of Technology

8.0171, USE OF BACKGROUND RADIATION FOR ENERGY PURPOSES

P.C. KREYGER, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

A study is made to look for the possibility of amplifying background radiation for energy purposes on one side and for preservation of food by means of effecting the ratio and amounts of air-ions on the other side.

SUPPORTED BY Netherlands - Eindhoven University of Technology

8.0172, ELECTRIC CAR FOR TOWN AND NON-RESIDENT TRAFFIC

J.A. SCHOT, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

An electric car for use in towns and non-resident traffic purposes is being developed. This vehicle has to meet the following demands: a) Effective load: 200 kg; 2 persons and children and/or luggage. Total weight, incl. effective load 1350 kg. b) Maximum speed: 80 km/h; c) Cruising speed: 55 km/h; d) Range: 100 km for cruising speed; e) Acceleration: 1,5 m/s2 (for nominal loading); f) Engine: 15 kW d.c. capable of being overloaded up to 50 kW. g) Accumulator (lead): 9 kWh/120V, exchangeable; h) Brakes: electrical and mechanical.

The research focusses primarily on testing the durability of accumulators under continuous and pulsatory loading.

Other subjects are comparison of several types of accumulators, for which the life time, loading capacity, economic aspects are considered. Further the optimal design of the coach-work and the system of accumulator exchange are studied.

Addenda: Supporting agency and Performing organization: Technische Hogeschool Eindhoven.

SUPPORTED BY Netherlands - Eindhoven University of Technology

8.0173, ELECTRONIC CONTROL OF ELECTRIC ENGINES

P. VANOOSTERHOUDT, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

A substantial improvement of efficiency for the control of electric machines can be obtained by utilizing inverters for induction machines and Choppers for d.c. machines especially when the number of revolutions has to be modified within a great range. Also the recuperation of deceleration energy during braking contributes to the improvement of the efficiency. Electronic control often results in decreased wear and therefore less maintenance. This leads to materials conservation.

Addenda: Supporting agency and Performing organization: Technische Hogeschool Eindhoven.

SUPPORTED BY Netherlands - Eindhoven University of Technology

8.0174, LIGHT SOURCES
BLEEKRODE, Philips Research Laboratories, *Eindhoven, Netherlands*
Light sources with higher efficiency.

SUPPORTED BY Netherlands - Philips Research Laboratories

8.0175, TECHNOLOGICAL AND SOCIAL FORECASTING
LUBBEN, Philips Research Laboratories, *Eindhoven, Netherlands*
Energy saving products and processes - desk studies.

SUPPORTED BY Netherlands - Philips Research Laboratories

8.0176, HIGH SPEED GROUND TRANSPORT (TRANSRAPID)
UNKNOWN, Van Doornes Automobielfab B.V., *Eindhoven, Netherlands*
In the TRANSRAPID project, which is based on the magnetic levitation technology, the aim is to develop and realise a high speed (500 km/h) ground transport system in Europe, which must combine the comfort and safety of the existing railways with the speed of a modern aircraft; thereby reducing the energy consumption on medium distances in Europe.
Addenda: Supporting agency: Krauss-Maffei A.G.

SUPPORTED BY Netherlands - Van Doorne's Automobielfabriek - Eindhoven

8.0177, URBAN TRANSPORT SYSTEM
UNKNOWN, Van Doornes Automobielfab B.V., *Eindhoven, Netherlands*
In the urban transport systems-study and realisations, the aim is to reduce energy consumption by: a) harmonising the existing modes of urban transport; and b) realising additional systems of advanced technology (automated, dualmode, etc.) both aimed at promoting the use of public transportation.

SUPPORTED BY Netherlands - Van Doorne's Automobielfabriek - Eindhoven

8.0178, STUDY OF THE IMPACT OF NUCLEAR ENERGY ON THE CHEMICAL INDUSTRY
UNKNOWN, Dutch State Mines, Netherlands Res. & Pat. Dept., *Geleen, Netherlands*
This study comprises some orientating desk studies on the impact of nuclear energy on the chemical industry, such as the application possibilities of nuclear heat to the chemical process industry, thermochemical hydrogen production.

SUPPORTED BY Netherlands - Dutch State Mines - Heerlen

8.0179, RECYCLING OF POLYMERS
UNKNOWN, Dutch State Mines, Netherlands Res. & Pat. Dept., *Geleen, Netherlands*
This project comprises desk studies and experimental work on the possibilities of the recycling of thermoplastics and on the recovery of monomers from condensation polymers (nylon, polyesters, etc.).

SUPPORTED BY Netherlands - Dutch State Mines - Heerlen

8.0180, ENERGY CONSERVATION
W. TAKENS, Netherlands Gas Union N.V., *Groningen, Netherlands*
Three main facts are studied: a. Insulation of dwellings. b. The improvement of the efficiency of appliances. c. The winning back of low caloric warmth.

SUPPORTED BY Netherlands - V E G Gas Institute N.V. - Rijswijk

8.0181, ENERGY
J.P. VANDENBERG, Netherlands Gas Union N.V., *Groningen, Netherlands*
The project concerns 120 houses, 56 subsidized and 64 non-subsidized dwellings. The houses are of the traditional row type design. Part of these dwellings will be used for reference. They have to satisfy recent regulations and standards. The remainder will be thermally improved, by: a) Filling the cavity walls with polyurethane foam. b) Installing double windows in the living room. The other windows will be exchanged for windows with thicker glass.
The central heating system will be improved.

SUPPORTED BY Netherlands - Netherlands Gas Union N.V. - Groningen

8.0182, KRUISEMUNTSTRAAT-PROJECT, APELDOORN (THE NETHERLANDS)
J.P. VANDENBERG, Netherlands Gas Union N.V., *Groningen, Netherlands*
The objectives are to measure in two symmetrically situated rows of houses with and without foam filling of the cavity walls: a. gas consumption; b. living characteristics; c. warm water consumption; and d. family composition.

SUPPORTED BY Netherlands - Netherlands Gas Union N.V. - Groningen

8.0183, PROJECT - VLAARDINGEN
J.P. VANDENBERG, Netherlands Gas Union N.V., *Groningen, Netherlands*
Two hundred houses, to be built in Holy-Noord Vlaardingen, The Netherlands, will be investigated concerning heat losses. a. The first group of houses is built according to recent construction regulations. b. The second group is built according to 'improved insulation regulations.' c. In the third group experiments will be performed to obtain optimal insulation regulations and reduced central heating capacity.

SUPPORTED BY Netherlands - Netherlands Gas Union N.V. - Groningen

8.0184, OPTIMIZING NATURAL GAS CONSUMPTION IN THE NETHERLANDS
J.P. VANDENBERG, Netherlands Gas Union N.V., *Groningen, Netherlands*
Survey: The research focusses on technical-physical aspects of the natural gas consumption in domestic and industrial regions.
Starting point is the energy/gas balance of the national gas supply specified to type of transport, losses during transport and category of consumer.
The information, obtained by desk studies and research will be used to estimate the savings in the field of efficiency improvement in the short and in the long run.
Domestic and commercial consumption: In this field the sales department of the Nederlandse Gasunie and its Research Team on Information and Product development cooperate with the VEG-Institution to draw up the energy balance of houses and other buildings. Attention is paid to the influence of heat transmission, warm water supply, ventilation, insulation, and to environmental comfort aspects.
The preceding applies to both recent systems and apparatus and to alternatives such as heat pipes, heat pumps, etc.
The project will be finished at the beginning of 1977.
The experiments are performed at the laboratory of the Gasunie.
Addenda: Supporting agency & performing organization: N.V. Nederlandse Gasunie.

SUPPORTED BY Netherlands - Netherlands Gas Union N.V. - Groningen

8.0185, ENERGY CONSERVATION BY IMPROVING THE SURFACE PROPERTIES OF THE EQUIPMENT EMPLOYED FOR PRODUCTION OF CHLORINE AND SODIUM HYDROXIDE (ABBREV)

D. THOENES, A K Z O, *Hengelo, Netherlands*

By applying more advanced equipment in electrolysis cells, it is possible to raise the effiency of the electric power consumption for the production of chlorine and sodium hydroxides.

AKZO has acquired detailed information about investment costs versus energy consumption per ton of product.

SUPPORTED BY Netherlands - A K Z O N.V. - Arnhem

8.0186, ENERGY CONSERVATION PROJECT

HOEKSTRA, Hoogovens Ijmuiden B.V., *Ijmuiden, Netherlands*

The objectives are: 1. Utilization of waste heat of rolling steel works. Production of steam to generate electricity; the project is in planning. 2. Utilization of waste heat from stack gases of oxysteel works. The project has been partly executed. 3. Utilization of the supply pressure of the natural gas and top pressure of blast furnaces respectively by applying expansion turbogenerators (feasibility studies). 4. General objective: decrease of energy consumption and optimal allocation of the gases produced.

SUPPORTED BY Netherlands - Hoogovens Ijmuiden B.V.

8.0187, RECYCLING

LAMERS, Central Technology Estel N.V., *Nijmegen, Netherlands*

Study of the recycling problem of several materials related to their specific energy consumption in cooperation with the Future Shape of Technology Foundation, The Hague, The Netherlands.

SUPPORTED BY Netherlands - Estel N.V. - Nijmegen

8.0188, SYSTEMS FOR WARM WATER SUPPLY

M. SOLLMAN, Water Works N.V., Testing & Res. Institute, *Rijswijk, Netherlands*

OBJECTIVE: Investigation related to energy, water consumption and comfort of different systems for warm water supply in houses.

SUPPORTED BY Netherlands - Testing & Research Institute - Rijswijk

8.0189, SAVING WATER AT HOME

M. SOLLMAN, Water Works N.V., Testing & Res. Institute, *Rijswijk, Netherlands*

We are conducting investigations into the possibilities of installing water-saving fittings in houses.

Further investigations may be directed to research other systems for w.c. flushing to reduce water consumption.

SUPPORTED BY Netherlands - Testing & Research Institute - Rijswijk

8.0190, INFLUENCE OF NEW FUEL GASES ON APPLIANCES AND INDUSTRIAL EQUIPMENT

W. TAKENS, V E G Gas Institute N.V., *Rijswijk 2100, Netherlands*

New gases will enter the energy market. This can have influence on the construction of household appliances and industrial equipment.

The purpose is to investigate which construction each gas matches.

SUPPORTED BY Netherlands - V E G Gas Institute N.V. - Rijswijk

8.0191, CONSUMPTION OF RAW MATERIALS FOR THE PRODUCTION OF SEVERAL TYPES OF BUILDING MATERIALS

UNKNOWN, Bouwcentrum, *Rotterdam, Netherlands*

Survey: People are beginning to realize that the stocks of raw materials are limited on the 'space ship Earth' and therefore these stocks have to be utilized in a sensible way. For building purposes enormous quantities of materials are used. For this field it is desirable to study the possibilities to realize changes in the consumption and conservation of materials.

Methodology: The study will be restricted to some types of building materials such as: concrete steel, aluminium, wood and gypsum. Subsequently data will be collected regarding the amount of consumed energy and raw materials necessary to attain the final application. The data must be presented in such a form that they are comparable.

Planning: a) Data are to be traced and processed from several sources; b) A system will be developed to classify the data; c) In 1975 a preliminary comparison will become possible for some types of building materials. The results will be reported at the end of the year 1976 and will probably be published; and d) Depending on the progress, a more detailed study will be made.

SUPPORTED BY Netherlands - Ministry of Housing & Physical Planning

8.0192, SYNTHETIC MATERIALS AND CONSERVATION OF ENERGY

E.K. WULKAN, Bouwcentrum, *Rotterdam, Netherlands*

Some subjects in the framework of the study are: a) Fiber materials and their application; b) Foam strips for insulation and quality regulations concerned; c) Quality regulations for plastic and rubber strips (against draught); and d) Deterioration of PS-foam by wood perservation means.

SUPPORTED BY Netherlands - Ministry of Housing & Physical Planning

8.0193, INSPECTION METHOD FOR FILLED (INSULATION FOAM) CAVITY WALLS OF EXISTING HOUSES

E.K. WULKAN, Bouwcentrum, *Rotterdam, Netherlands*

Filling cavity walls with insulation material, especially UF-foam, is one of the most applied methods for improving the thermal insulation of a dwelling. The commissioner cannot check easily if the right material has been applied and if the operation has been carried out well. Therefore Building Center has formulated regulations in cooperation with Ministry of Housing and Physical Planning and the Netherlands Organization for Applied Scientific Research TNO. Subsequently a test system has been designed to verify at random whether the operation satisfies the regulations.

The random tests are (preliminary) only performed in the cases of subsidized insulation improvement.

SUPPORTED BY Netherlands - Ministry of Housing & Physical Planning

8.0194, SERVICE SYSTEMS - SPACE HEATING, LIGHTING, VENTILATION AND AIR CONDITIONING FOR OFFICE BUILDINGS

E. DEKKER, Building Centre, Dept. for Programming Bldgs., *Rotterdam, Netherlands*

The study is a part of an overall project concerning office-buildings. This part of the investigation regards impeding-aspects, standards for installations, maintenance, energy consumption for illumination, space heating, ventilation, air conditioning, etc.

Addenda: Performing organization: Bouwcentrum.

SUPPORTED BY Netherlands - Ministry of Housing & Physical Planning

8.0195, DAYLIGHT REQUIREMENTS OF DWELLINGS IN RELATION TO THE TREND OF REDUCING THE WINDOW SURFACE IN CONNECTION WITH ENERGY CONSERVATION

A.J. RODRIGO, Building Centre, Dept. for Environmental Engin., *Rotterdam, Netherlands*

The trend is to reduce the window surface as a consequence of the 'energy crisis'. The guide-lines concerned will be taken up in new regulations for the building of subsidized dwellings.

This study focusses on the minimal conditions for windows with respect to daylight illumination.

Addenda: Performing organization: Bouwcentrum.

SUPPORTED BY Netherlands - Ministry of Housing & Physical Planning

8.0196, COLD-BRIDGES IN WELL-INSULATED DWELLINGS

E. TAMMES, Building Centre, Dept. for Environmental Engin., *Rotterdam, Netherlands*

It has been proved that the influence of 'cold-bridges' on the internal climate and on the fuel consumption of well-insulated houses, is relatively more important than for thermal poorly insulated dwellings.

The influence may be decreased by applying special construction methods or by more extreme standards concerning the insulation of the front wall and floor surface. There are indications that details may be important in this field.

Addenda: Performing organization: Bouwcentrum.

SUPPORTED BY Netherlands - Ministry of Housing & Physical Planning

8.0197, DEVELOPMENT OF REGULATIONS AND STANDARDIZATION REGARDING THE PRODUCTION OF DOUBLE WINDOWS FOR ENERGY CONSERVATION IN DWELLINGS

E. TAMMES, Building Centre, Dept. for Environmental Engin., *Rotterdam, Netherlands*

The application of double windows (whatever the construction may be) for energy conservation in dwellings has now become of public interest. The manufacturers concerned are active on the Dutch market. At the moment the difference in costs compared with single glazing, even when the fuel prices would increase substantially, cannot be an economical proposition to apply double windows. It is evident that standardization of dimensions, increase of building projects etc. will result in acceptable prices. The objective is to analyze the double window systems as regards their physical, technical and economical properties and to develop guidelines for use later on, when more experience is available and quality regulations may be formulated.

SUPPORTED BY Netherlands - Ministry of Housing & Physical Planning

8.0198, DEVELOPMENT OF CONSTRUCTIONS AND COST ESTIMATING FOR SUBSTANTIALLY IMPROVED THERMALLY INSULATED DWELLINGS

H. VANBREMEN, Building Centre, Dept. for Environmental Engin., *Rotterdam, Netherlands*

The Future Shape of Technology Foundation has recommended in a report (1974) concerning energy conservation that it is necessary to improve the thermal insulation regulations for houses and other buildings to be built after 1975 or 1976, thus reducing the energy consumption of space to about 50 percent with respect to the recent types of dwellings.

The adaptation of current methods will be studied, including the economic aspects by cost estimating.

Some Dutch and multinational manufacturers of insulating-materials will cooperate in the project.

Anticipating this cooperation the Organization SKOOP (Stichting Komfort Optimalisering, Foundation for Optimalization of Comfort in Dwellings) has set up a working group.

SUPPORTED BY Netherlands - Ministry of Housing & Physical Planning

8.0199, STUDY OF FUEL CONSERVATION BY FILLING OF CAVITY WALLS AND/OR DOUBLE WINDOWS IN ALREADY EXISTING DWELLINGS, SUBSIDIZED BY THE GOVERNMENT

H. VANBREMEN, Building Centre, Dept. for Environmental Engin., *Rotterdam, Netherlands*

The thermal insulation of many thousands of dwellings (most of these being one-family houses and inhabited by the owner) has been improved by the stimulated subsidy given by the Dutch Government.

Particularly many cavity walls have been filled with UF-foam, mineral wool or silicon treated perlite and/or houses have been provided with double glazing.

A number of these improved dwellings at random will be studied regarding the fuel consumption. The data will be compared with those of comparable but non-insulated houses. In this way the fuel savings can be assessed.

Addenda: Performing organization: Bouwcentrum.

SUPPORTED BY Netherlands - Ministry of Housing & Physical Planning

8.0200, DEVELOPMENT OF DWELLING-TYPES WITH LOW ENERGY CONSUMPTION FOR SPACE HEATING

H. VANBREMEN, Building Centre, Dept. for Environmental Engin., *Rotterdam, Netherlands*

In 1974 the development of a family house type started with a substantially improved thermal insulation, a higher efficiency of the space heating system, an improved control of the apparatus, and the application of solar energy as an additional heating source. The expectations are that the fuel consumption of this new type of family house will be 50-75 percent lower than of the traditional dwelling.

SUPPORTED BY Netherlands - Ministry of Housing & Physical Planning

8.0201, IMPROVING THE THERMAL INSULATION OF DWELLINGS, QUARTER BY QUARTER

H. VANBREMEN, Building Centre, Dept. for Environmental Engin., *Rotterdam, Netherlands*

The objective is to realize, quarter-by-quarter, for existing dwellings, an acceptable temperature during the cold seasons at reasonable costs, even though fuel prices have increased. The energy conservation has been estimated at 20-30 percent.

Addenda: Peforming organization: Bouwcentrum.

SUPPORTED BY Netherlands - Ministry of Housing & Physical Planning

8.0202, HEATING, VENTILATION AND THERMAL INSULATION OF HOUSES MADE IN SERIES-PRODUCTION

H. VANBREMEN, Building Centre, Dept. for Environmental Engin., *Rotterdam, Netherlands*

In cooperation with the Association of System Builders, building-technical, building-physical and installation-technical aspects of dwellings built in series-production are studied. The objective is to realize an improved internal climate and an integration of the installation (for heating, air conditioning, etc.), with the building design and adapted to the applied type of construction system, has been proved.

It is clear that especially the integration of the heating and ventilation apparatus as well for concrete building as for system building (prefab) applying big parts is problematic. Although it has appeared that the humidifying of the air may be principally required, its realization offers considerable difficulties. Finally the recuperation of heat in the case of ventilation has been recognized as the most important aspect. But through lack of time and funds the subject has not been studied fundamentally.

Addenda: Performing organization: Bouwcentrum.

SUPPORTED BY Netherlands - Ministry of Housing & Physical Planning

8.0203, STUDY OF THERMAL INSULATION, SOLAR ILLUMINATION AND VENTILATION OF DWELLINGS AS A BASIS FOR BUILDING REGULATIONS (ABBREV)

H. VANBREMEN, Building Centre, Dept. for Environmental Engin., *Rotterdam, Netherlands*

Study of thermal insulation, solar illumination and ventilation of dwellings as a basis for building regulations to be developed for the Dutch Governmental Normalization Committee.

Just as the preceding years studies are performed for the Dutch Governmental Normalization Committee. The three subjects: thermal insulation, ventilation and solar illumination of houses are of substantial importance for the energy consumption of the space heating system in houses.

Addenda: Performing organization: Bouwcentrum.

SUPPORTED BY Netherlands - Ministry of Housing & Physical Planning

8.0204, DESK STUDY ON ENERGY CONSERVATION VERSUS PHYSICAL PLANNING - IN PLANNING

R. DUNNEN, Central Org. Adv. Appl. Res., *Rotterdam, Netherlands*

Survey: One of the factors stimulating the suburban development near large agglomerations is the private motor car, which offers the opportunity to shorten the 'switch over time' between the human social activities. The effects caused by the 'energy crisis' on the Physical Planning, have to be studied in this framework.

Program: A comparison will be made between two community patterns: a) a concentrated community concerning all social functions; b) a concentrated community, but the social function of living is deconcentrated to a number of suburbs, connected by roads with the town-agglomeration; c) The same as situation b), but in this case the municipal transport system is very well equipped.

A number of propositions regarding the utilization can be evaluated. The comparison is performed by means of cost and time estimating. Also compromises will be regarded. A simple computer model will be used.

SUPPORTED BY Netherlands - Ministry of Housing & Physical Planning

8.0205, IMPROVEMENT OF THERMAL INSULATION OF RENOVATION PROJECTS REGARDING HOUSES (INTERDISCIPLINARY PROJECT)

H.O. ECKHARDT, Central Org. Adv. Appl. Res., *Rotterdam, Netherlands*

This study is a part of the project: 'The Technical Aspects of Renovation of Dwellings.'

The subjects are: a) technical requirements to be put to renovated houses e.g., regarding thermal insulation, heating and ventilation; b) renovation methods; c) management; and d) appreciation of dwellings as regards possibilities of renovation.

SUPPORTED BY Netherlands - Ministry of Housing & Physical Planning

8.0206, DUROX & GROOSMAN PARTNERS CONCRETE

UNKNOWN, Groosman & Partners, *Rotterdam, Netherlands*

The objective is to measure the heat losses of six houses built from Durox porous concrete.

SUPPORTED BY Netherlands - Netherlands Gas Union N.V. - Groningen

8.0207, DEVELOPMENT OF SYSTEMS TO USE LOW TEMPERATURE WASTE HEAT

P. CROOCKEWIT, Rijn Schelde Verolme N.V., *Rotterdam, Netherlands*

Systems are mainly recovering remnant industrial heat of low temperature.

SUPPORTED BY Netherlands - Rijn Schelde Verolme N.V. - Rotterdam

8.0208, THE RELATION BETWEEN THE WEATHER CONDITIONS, THE BUILDING AND THE INSTALLATIONS IN THE BUILDING

E. VANGUNST, Central Org. Adv. Appl. Res., Res. Inst. for Envir. Hygiene, *The Hague, Netherlands*

Subprojects: Model for the prediction of the momentaneous temperature distribution as a function of the inside and outside heat load of the building; the dynamical behaviour of the installations, especially the transient response to changes of the set point in relation to the energy consumption; the use of meteorological data for the calculation of the daily temperature fluctuations in and the energy consumption of a building; the correlation between the real energy consumption and the outcome of the computer calculation.

SUPPORTED BY Netherlands - Organization of Health Research - The Hague

8.0209, ENERGY CONSERVATION (SEQUEL PROJECT)

C. DEZWAAN, Future Shape of Tech. Found., *The Hague, Netherlands*

This project is a sequel to a finished investigation (Energy Conservation, Ways and Means, Future Shape of Technology Foundation publication no. 19, May 1974).

The research concerns the problematic areas traced by the preceding study.

SUPPORTED BY Netherlands - Royal Institute of Engineers - The Hague

8.0210, DEVELOPMENT OF METHODOLOGY FOR THE DETERMINATION OF ENERGY INVESTED IN MATERIALS

A.C. SJOERDSMA, Future Shape of Tech. Found., *The Hague, Netherlands*

The objectives are: a) To develop and define descriptive terms concerning 'energy-investments' in materials and products (securing the comparability of data); b) To provide a coherent framework for a methodology regarding energy-investments as to procedure and conventions.

It was found that the form of the analysis depended upon the objectives of the analysis. In particular, where the main interest lay in the effect of energy use on resources, it recommended that analysis be carried out in Free Energy terms. Free Energy analysis also provided the most powerful tool for assessing economic potential and process waste. However it recognised the difficulty of obtaining Free Energy data for many systems. Where the energy source was a high intensity fuel, like oil, coal, nuclear, etc. the workshop found that the error in using gross enthalpy did not exceed 10%.

SUPPORTED BY Sweden - International Fed. Inst. for Adv. Stud. - Stockholm

8.0211, COMBINED ROAD/RAIL FREIGHT TRAFFIC

F. OUDENDAL, Netherlands Railways Company, *Utrecht, Netherlands*

Substitution of road-hauling by rail transport for the longer distances can save a considerable amount of fuel. Per ton-kilometer of the payload road vehicles consume about 400 kcal, the rail transport only 130 kcal. Savings of up to 50% are possible, with containerized freight including transfer of the containers between rail and road at both ends of the trip, including collecting and distributing the containers by road. Minimum distances of the rail link of 150 kilometers are envisaged. Further investigations are planned in the commercial and operational field.

Addenda: Supporting agency and Performing organization: Nederlandse Spoorwegen NS.

SUPPORTED BY Netherlands - Netherlands Railways N.V. - Utrecht

8.0212, ENERGY, MOISTURE AND CARBON DIOXIDE-EXCHANGE IN GREENHOUSES

B.J. HEIJNA, Agricultural Engineering Inst., *Wageningen, Netherlands*

The climate in a greenhouse is influenced by the ambient climate, the crop, and technical means in the glasshouse. The objective is to trace the relations between these factors to be able to explain and improve the cultivation results and modify the equipment correspondingly. Further the research may lead to a list of standards concerning the construction and operation of greenhouses.

SUPPORTED BY Netherlands - Ministry of Agriculture - The Hague

8.0213, MEASUREMENT OF HEAT LOSS OF BAYS

B.J. HEIJNA, Agricultural Engineering Inst., *Wageningen, Netherlands*

The share of the energy costs and production costs of intensively heated greenhouses is about 25% nowadays. Limiting the heat losses through the bays is an important factor stimulating the research especially on new constructions and new materials. Heat losses from several materials and constructions are determined.

SUPPORTED BY Netherlands - Ministry of Agriculture - The Hague

8.0214, ENERGY IN AGRICULTURE - RESEARCH INTO THE POSSIBILITIES OF ECONOMICAL POWER-CONSUMPTION IN AGRICULTURE

J.M. LANGE, Agricultural Engineering Inst., *Wageningen, Netherlands*

In the past the interest has been focussed on the input-output of capital, where the substitution of labour by capital was of great importance. Little is known about the direct or indirect input/output of energy in the agricultural field. Information about this relation may result in a more efficient use of energy in the field of agricultural engineering. The use of energy has to be weighed against the economic profit. This may result in recommendations concerning energy conservation (absolutely as well as relatively). Further the investigation may lead to the development of new techniques and so the realization of a lower energy consumption per unit of product.

SUPPORTED BY Netherlands - Ministry of Agriculture - The Hague

8.0215, TRENDS IN ELECTRIC POWER CONSUMPTION IN AGRICULTURE

J.M. LANGE, Agricultural Engineering Inst., *Wageningen, Netherlands*

The increase of mechanization and automatization of the agricultural industry resulted in an increasing consumption of electrical energy. The trend is to apply more powerful engines and to utilize more engines at the same time. The objective of this investigation is to determine the optimal electric power to run an agricultural producing unit economically.

The project is developed in cooperation with KEMA (Dutch Electricity Generating Board), Arnhem, The Netherlands.

SUPPORTED BY Netherlands - Ministry of Agriculture - The Hague

8.0216, ADDED ENERGY AGRICULTURAL PRODUCTS

C.T. DEWIT, Wageningen Ctr. of Agric. Sci., *Wageningen, Netherlands*

Preliminary calculations of the added energy of Dutch agricultural production (farm gate stage) have been made by analyzing the technical process and by applying the techniques of input-output economics.

The basis of the calculation is continuously improved by using more recent data of added energy of the inputs of capital and resources. Attempts are being made to separate 'labour replacing' and 'yield increasing' inputs.

Inputs of energy are composed with the energy output of near-waste products to evaluate the possibility of more closed systems of energy production and use.

SUPPORTED BY Netherlands - Agricultural University at Wageningen

8.0217, SIMPLE COLUMN FOR CONTINUOUS FRACTIONAL CRYSTALLIZATION (AS AN ALTERNATIVE TO DISTILLING)

G.J. ARKENBOUT, Central Org. Adv. Appl. Res., Inst. for Physical Chem., *Zeist, Netherlands*

Some favourable features of continuous fractional crystallization (e.g., in comparison with distillation) are: the large separation effect of the one-stage process, the moderate process temperature and the low consumption of energy.

Because of the large separation effect of the one-stage process the number of theoretical plates required for a distinct separation is smaller in crystallization than in distillation. This relatively small number of theoretical plates limits in its turn the reflux ratio required. As the energy consumption of a process is about proportional to the reflux ratio, the energy consumption of the crystallization process will be considerably lower than that of the distillation process. Moreover the heat of transition is smaller in crystallization than in distillation.

An important saving of energy may be obtained by replacing a number of distillation processes used in large scale productions by continuous fractional crystallization.

Unfortunately the process of fractional crystallization cannot yet be applied on a technical scale because of lack of suitable crystallization columns.

The crystallization column, developed in the Institute for Physical Chemistry TNO, however, has promising features for an application on a technical scale: the construction is simple, the operation is easy and reliable.

The scaling up of the column to dimensions of technical interest, is in progress. This scaling up is realized by TNO in cooperation with a manufacturing company and some producers of chemicals.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

8.0218, THE INFLUENCE OF GEOMETRIC HIGHWAY DESIGN ON SOUTH AFRICAN PASSENGER VEHICLE OPERATING COSTS

C.J. BESTER, Univ. of Stellenbosch, *Stellenbosch, Cape Province, Republic of South Africa* (115086 (HRB NO.))

The representative design vehicle for S.A. traffic was determined as a 1,6 scrip 1 1050 kg passenger vehicle. An accurate fuel flow meter was installed and extensive tests carried out at a range of speeds, grades and curves of various radii. The additional fuel consumption was also determined for decelerating down from various speeds and accelerating back again to the initial speed. These tests were reduced to a complete set of operating cost tables for utilization in highway design economic analysis and decision making. /IRF/

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY South Africa - Republic of South Africa Govt. - Pretoria

8.0219, LIGHT-METAL TRAILER FOR TIMBER TRANSPORTS

A. ANDERSSON, Unknown Inst. or Indiv. Grant, *Sweden*

As regards timber transports, as well as transportation in general, it is important to find ways and means of increasing payload by reducing vehicle weight. Superstructural frames and light-metal loading girders for lorry chassis have already been designed and constructed by the leader of the project described below.

This project aims at constructing a lorry trailer by use of light 0etal for the frame as well as the girders and the other load-bearing parts. The saving of weight, which may thus be converted into useful load, will amount to about 1,400 kg, corresponding to about 3 cubic meters of timber. With present freight rates and the ordinary transport work, this will mean an additional income of Skr 10-11 000/annually.

By designing completely new trailers instead of improving on a conventional chassis, it is also possible to make certain technical alterations, primarily concerning design and fitting in the spring system. These alterations are done in order to achieve better durability, better road-holding capacity and simplified service. Furthermore, the trailer will be provided with a lighting system of a new and safer design.

Buyers are hauling contractors, forest companies, and other forest transport enterprises.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0220, HEAT RECOVERY FROM WASTE WATER BY MEANS OF HEAT PUMP

S. HEDLY, Unknown Inst. or Indiv. Grant, *Sweden*

This project aims at recovering energy out of waste water by means of a heat pump and by studying the amount of energy thus saved. The waste water collects in a tank, where the evaporator of heat pumps is placed. The construction of the evaporator prevents larger particles like scraps of paper, rags, etc. from obstructing heat exchange. Another specific feature about this equipment is the two-stage condenser battery of the heat pump. Condensation occurs against the current stream of incoming cold water. Thanks to this construction the superheated gas, coming from the compressor, may be utilized to postheat incoming water for tapping. The idea is a construction consisting of one container, holding two water-heaters and waste-water tank, as well as the 'apparatus room'.

The results of the project may well prove useful when it comes to heating incoming tap water in ordinary houses as well as blocks of flats, and warehouses.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0221, INSULATING AND SEALING CURTAIN

A.T. IWANICKI, Unknown Inst. or Indiv. Grant, *Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0222, DEVELOPMENT OF ENERGY SAVING WALL-PAPER VT

P. NILSSON, Unknown Inst. or Indiv. Grant, *Sweden*

Development and study of a heat-insulating flexible (can be rolled) sandwich construction. The study comprises an investigation of its energy saving qualities as well as other technical properties, in view of the fact that it - besides being directly heat-insulating - is also heat-reflecting, air-proof and diffusion-proof.

APPLICATION: Additional insulation of existing buildings.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0223, TESTING OIL-FIRED BOILERS FOR ONE-FAMILY HOUSES - OPERATING ECONOMY AND A GENERATION OF HOT WATER - EVALUATION OF SWEDISH STANDARD SIS 574201

P.H. RASMUSSEN, Unknown Inst. or Indiv. Grant, *Sweden*

An evaluation of Swedish Standard SIS 574201 concerning the testing of oil-fired boilers for one-family houses has been carried out at the Department of Heating and Ventilation, the Royal Institute of Technology, Stockholm and has lead to directions for making the testing procedure more efficient and cheaper and to mathematical models for economic testing and hot-water consumption. These models should, for example, be useful for facilitating industrial development work.

The intention is to publish the results in English in the form of doctoral thesis.

This project refers to a linguistic review and check of the English text with a view to further distribution and for printing a supplementary edition of the thesis in the Department's series of publications and for international distribution.

SUPPORTED BY Sweden - Council for Building Research

8.0224, EVAPORATION COOLING

J. RYDBERG, Unknown Inst. or Indiv. Grant, *Sweden*

The evaporation of water in the outdoor air during the summer in central Sweden can result in a temperature drop of 2-3 degrees C. Water can be cooled to 5-6 degrees below the temperature of the air by means of a controlled counterflow in a cooling tower. Theoretically, the water can be cooled to the dew point of the air. This means a temperature drop of 10-13 degrees C. This case, which is, perhaps, the most interesting, can be implemented practically by cooling the air but has not previously received attention. There are several other cooling tower processes which may be of interest. The present project aims at dealing with these cooling tower processes. Several processes must be investigated theoretically and tested experimentally.

Premises are normally cooled by blowing in refrigerated air. Air which is 8-10 degrees centigrade below the temperature of the room air cannot be blown in due to the risk for draught. This means that suitably adapted cooling tower processes should give every possibility of cooling premises from the comfort and work environment point of view. A refrigerator and a cooling tower is normally used for this purpose today, together with a duct system for distributing the refrigerated air. If evaporation cooling is used in the manner described above through a preliminary cooling of the air, the refrigerator, which is the most expensive component both with regard to procurement and operation, can be done away with. The cooling tower and the duct system are retained. The energy required for operating the system is taken from the air and is free. It is originally supplied to the atmosphere through solar heat. This process does not give rise to any environmental damage. Cooling is used nowadays to a considerable extent in Sweden for offices, department stores, cinemas, hotels, restaurants, hospitals etc.

SUPPORTED BY Sweden - Council for Building Research

8.0225, INSULATING VENETIAN BLIND FIXED TO THE OUTSIDE FACE OF THE WINDOW FRAME

G. SERNEBLAD, Unknown Inst. or Indiv. Grant, *Sweden*

Great efforts are made to improve the insulation capacity of windows. This applies to insulation against heat and cold as well as noise. Existing devices have certain properties but lack others, and for this reason a satisfactorily functioning unit comprises a number of components, which is very capital intensive.

The objective of this project is to produce a model of an insulating Venetian blind for testing in the climate chamber and sound laboratory.

If the values obtained agree with those given by theoretical calculations, and if the mechanical function is reliable in winter conditions, this insulating Venetian blind will serve a useful purpose in reducing heating costs and balancing room temperatures. Furthermore, the blind has the capacity of admitting light in the closed position at the same time as it constitutes a screen affording privacy and burglary protection.

The insulating Venetian blind can be fitted both to existing and planned windows. Suitable fields of application are residential buildings, schools, hospitals, offices.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0226, HOT AIR DRYING OF FORAGE CROPS - STUDIES CONCERNING POSSIBILITIES OF IMPROVING ENERGY AND TOTAL ECONOMY

C. TRAGARDH, Univ. of Lund, *Alnarp, Sweden*

At present forage crops are dried by use of hot air and without pre-treatment or, to a certain extent, in the field. The latter procedure, however, is extremely dependent on weather conditions. In order to dry plant material with a water content of 80%, about 0.4 l of oil/kg of dry matter is required. A decrease of water content to 70% by pressing will reduce oil consumption by 50%. This demands restoring, after concentration and drying, of the press liquid to the pressed forage crop.

The project will embrace: 1. Measuring of material and energy balances for a hot air drier. 2. Tests involving concentration of press liquid with reverse osmosis at STU's (STU is The National Swedish Board of Technical Development) membrane station, Alnarp. 3. Tests involving evaporation and dehydration of press liquid in such equipment where the exhaust air may be used as a heating medium. 4. Techno-economic evaluation. Based on experience thus gained, a second phase, outside this project, might embrace development of adequate supplementary equipment for an already existing hot air drier.

8. ENERGY UTILIZATION AND CONSERVATION

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0227, THE ALTERNATIVE ENERGY HOUSE - PART I
S.G. OSKARSSON, Ab Thermia Verken, *Arvika 1, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0228, POWER CONTROL, THE HOUSE WITH IDEAL VALUES, AND HEATING COMFORT CONTROL
S.G. OSKARSSON, Ab Thermia Verken, *Arvika 1, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0229, INVESTIGATION CONCERNING RECOVERABLE METALS
I. FALDT, Project Administration Firm, *Bjuv, Sweden*

OBJECTIVE: The project aims at surveying energy saving possibilities by recovering and re-utilizing waste products from the Swedish iron, steels and ferroalloy industry. Such waste products are for instance slags, ferruginous dust, and other powdered products.

APPROACH: An investigation.

PROGRESS: A final report is available.

INTENDED USE OF RESULTS: The investigation will report on the approximate annual quantities and products of interest. Furthermore, the investigation will provide a basis for an assessment of today's technology for recovering the various products, when it comes to the problem of deciding whether this technology should be considered sufficient or whether there is need for R & D work. According to a rough estimate the energy saving potential would be 50,000 cubic meters/year of oil.

ADDENDA: Performing organization: Firma Projektadministration.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0230, HEAT RECOVERY IN CYLINDER DRIERS
A. KVIST, Boras Wafveri Aktiebolag, *Boras, Sweden*

The project aims at developing a prototype design for heat recovery from exhaust air in cylinder driers. The energy in the exhaust air is transferred by heat exchange to water, which is used in a previous washing process.

INTENDED USE OF RESULTS: The results are envisaged to produce valuable information as the basis of further development concerning other hot air discharges in the textile industry, as regards both solutions in principle and the choice of material.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0231, DEVELOPMENT OF METHODS FOR TESTING HEAT ENERGY INDICATORS
R. OHLON, Materials Testing Institute, *Boras, Sweden*

The primary aim of the project is to make equipment, which has already been designed for use at Boras, more complete. This is to make it possible to include realistic tests with heat volume indicators or hot water. Thus, the already existing test branches are to be fitted with heated supply tanks. Furthermore, temperature baths and other facilities are to be prepared for testing integrating devices.

Separate equipment for testing evaporation indicators is to be developed.

Investigations will then be made with different types of indicators, in order to make valuable observations on which to base the final development of test methods. Special regard will be had to the evaluation of the 'weak points' of heat volume indicators, such as measurements with low flows and/or low temperature differences between forward and return water.

PROJECT PLAN: Stage 1. Planning work concerning test equipment for hot water. Stage 2. Procurement and installation of equipment for test with hot water. Stage 3. Procurement of equipment for testing integrating devices. Stage 4. Studies concerning the properties of complete heat volume indicators and evaporation indicators. Stage 5. Determination of test methods.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0232, FUEL CONSERVATION WITH AIR TRANSPORTATION - A PRELIMINARY STUDY
A. GUSTAFSON, Aeronautical Research Inst., *Bromma, Sweden*

OBJECTIVE: 1. Survey of national and international suggestions and measures already taken to initiate fuel conservation within the air transport industry. 2. Identify and analyze the most promising means of reducing air transport fuel requirements with special attention on operating procedures with existing equipment. 3. Identify possible and suitable research projects that might follow.

INTENDED USE OF RESULTS: To give information about the possibilities for fuel conservation within air transportation. To form the basis for decision about possible follow-up research and development projects within the area.

SUPPORTED BY Sweden - Transport Research Delegation - Stockholm

8.0233, CHOICE OF THE FORM OF ENERGY FOR SPACE HEATING
A. WESTROM, Wahlings Installationsutv Ab, *Danderyd 1, Sweden*

The object of the investigation is to draw single and easy-to-understand guide regarding the choice of heating systems in buildings, in view of the different forms of energy such as gas, oil, coal, electric heating, district heating, etc. The guide is intended for the individual designer, client, etc., and will include: 1. A list of what must be considered in choosing a heating system. 2. An analysis of different general solutions, one of the aspects considered being future flexibility (systems capable of conversion to different forms of energy). 3. Rules regarding the way in which operating costs are to be calculated in order that comparisons between different systems may be realistic. 4. Forecasts regarding energy prices.

SUPPORTED BY Sweden - Council for Building Research

8.0234, LOW-ENERGY VENTILATION SYSTEMS FOR WORKSHOPS BASED ON DISPLACEMENT FLOW
R. OLINGSBERG, Bahco Ventilation Ab, *Enkoping 1, Sweden*

This application refers to a study of a new low-energy ventilation system primarily intended for workshops with air pollution and/or excess heat. This system differs from conventional systems of mixing type insofar as it is low-impulse system which retains and amplifies the natural stratification which occurs in most workshops. This takes place by means of a displacement flow from special low-turbulence units located directly in the zone of occupation.

The system has been tested in a model and extremely favourable results were obtained.

The project is intended to comprise a study of the system in a full-scale plant. Preliminary measurements indicate satisfactory stratification effects and agreement with the model tests.

Continued measurements and possible improvements of the technology will be used to chart out the efficiency of the system for different types of pollutions and to provide source material for continued design work.

It seems likely that the air change in workshop premises can be reduced considerably by means of displacement flow technique at the same time as a better work environment and considerable savings in energy are obtained.

SUPPORTED BY Sweden - Council for Building Research

8.0235, VENTILATION REQUIREMENTS
B. ERIKSSON, Building Research Institute, *Gavle, Sweden*

The purpose of this project is to shed light on the current ventilation requirements for various types of premises, particularly blocks of flats. The project will be implemented partly through field studies with measurements and interviews and partly as a laboratory test in which medical aspects will be studied. Collaboration will take place with the National Institute of Radiation Protection for the examination of radon contents. The work will be carried out Gavle where 25 one-family houses and 25 flats in multi-family houses are included in the field studies.

SUPPORTED BY Sweden - Council for Building Research

8.0236, OUTDOOR CLIMATE
M. GLAUMANN, Building Research Institute, *Gavle, Sweden*

This project aims at studying the outdoor climate of buildings with regard to: climate criteria for planning purposes, data for the existing close-range climate, and possibilities for influencing the close-range climate through ground treatment and building design.

The problems will be processed from the following aspects: 1. the desire to achieve a good environment, 2. the desire to reduce the energy requirements of the building, 3. the desire to utilize solar and wind energy, etc.

SUPPORTED BY Sweden - Council for Building Research

8.0237, ENERGY CONSERVATION IN BUILDINGS
O. LARSSON, Building Research Institute, *Gavle, Sweden*

A bulletin ('Save heat') dealing with heat production, temperature levels, ventilation, control, hot-water consumption, additional insulation, windows, etc., with calculations of profitability for various measures is being drawn up in collaboration with the Department of Building Technology at the Royal Institute of Technlogy.

The participation of the National Swedish Institute for Building Research in an investigation in Tensta, being carried out by the collaboration group for energy supply to buildings, also forms parts of this project.

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8.0238, DAYLIGHT LABORATORY
H.A. LOFBERG, Building Research Institute, *Gavle, Sweden*

This laboratory, which is housed in the School of Architecture Building at the Royal Institute of Technology, is built up around an artificial sky dome. Daylight and sunlight, indoors and outdoors, are studied in the laboratory. The work in progress includes studies of outdoor daylight levels and heat problems connected with windows for a 'CIE (International Committee on Illumination) Code of good practice on daylighting' in collaboration with CIE TC-4.2 Daylight.

Source material for daylight and solar planning in built-up areas is now being produced. The Swedish Meteorological and Hydrological Institute (SMHI) solar time registrations are being processed to provide a probability for sunlight during the day and during the year for ten localities in Sweden.

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8.0239, THE CLIMATE LABORATORY AT LUND
B. LOFSTEDT, Building Research Institute, *Gavle, Sweden*

This laboratory is housed in the School of Architecture at the Lund University of Technology. The location facilitates collaboration, particularly with the Department of Building Function Theory and the Department of Building Science.

The environmental aspects which are studied in the laboratory include indoor climate factors and climate factors in the building surroundings as well as light and sound conditions. A climate chamber, which can also be used for certain lighting studies, and a sound-proof chamber are available for creating reproducible investigation situations. The measurement equipment comprises a 100-channel data logging system. Sound analysis equipment with tape recorders has comprehensive measuring equipment for physiological measurements.

SUPPORTED BY Sweden - Council for Building Research

8.0240, URBAN AREA BUILDING TECHNOLOGY AND MUNICIPAL ENERGY CONSERVATION
T. MANSSON, Building Research Institute, *Gavle, Sweden*

This program is aimed, inter alia, at studying the prerequisites for research on municipal supply engineering and its relationship with communal planning. Questions on energy conservation on a local level will be mainly concentrated to: 1. mapping out the energy flows for the various municipalities or developing methods for a mapping out operation of this type, 2. mapping out the development of the various building patterns, 3. developing methods for analyses of consequences, and 4. studying the relationship between the development of the urban building sector and the municipal planning.

SUPPORTED BY Sweden - Council for Building Research

8.0241, LABORATORY FOR AIR FLOW ENGINEERING
A. SVENSSON, Building Research Institute, *Gavle, Sweden*

The external laboratory work consists of system and component tests in full scale and the development of simulator models. The laboratory is constructed so as to permit studies of conditions in various types of rooms, in which it is also possible to simulate various indoor climates.

The work applies to the development of a thermistor anemometer which can be used for measuring a large number of measurement points.

A preliminary draft has also been drawn up for rules in conjunction with controlling room climates.

SUPPORTED BY Sweden - Council for Building Research

8.0242, THE HUMAN LABORATORY
UNKNOWN, Building Research Institute, *Gavle, Sweden*

The human laboratory at Gavle will provide the Department with double the capacity for studying the effects of room climate on comfort and work capacity. This will, in turn, have considerable significance for solving energy problems as well as solving certain work environment problems.

SUPPORTED BY Sweden - Council for Building Research

8.0243, DIFFERENT TYPES OF REGIONS, PERSONAL TRANSPORT AND CONSUMPTION OF ENERGY
L. NORDSTROM, Gothenburg University, *Gothenburg, Sweden*

OBJECTIVES: To acquire increased knowledge of how the consumption of energy is affected by changes in the settlement pattern as regards commuter traffic. Studies will initially be made of current energy consumption in different types of regions.

APPROACH: A scientific programme will be specified in the autumn of 1976. Considering the envisaged ambition level, the project can be expected to take 1 1/2 to 2 1/2 years to complete. The necessary data will be compiled mainly from official statistics. Considerable time will be spent on model construction.

INTENDED USE OF RESULTS: To supply decision-makers with improved basic data when considering possible measures in order to reduce the consumption of energy in connection with commuter traffic. This should also increase the chances of including the energy problem in future societal and traffic planning.

SUPPORTED BY Sweden - Transport Research Delegation - Stockholm

8.0244, ECONOMIC MANAGEMENT OF ENERGY IN EXISTING FOOD SHOPS
L.O. GRUDEBORN, Ingenjorsbyran Provent Ab, *Gothenburg, Sweden*

The object of this project is to investigate, in a representative selection of food shops, whether economic management of energy is possible. The parameters which influence the energy balance, such as the type of heating system, ventilation flows, lighting, temperature regulation, the placing of refrigerated and deep-freeze display cabinets and the effect these have on the temperature, etc. will be taken into account. Shops which have ex-

ceptionally high or low energy consumption will receive special study. If possible, a classification will be made into systems groups with regard to the constituent parameters.

The work is to be regarded as a pilot project and will serve as the basis for an assessment of whether more comprehensive work is to be done in the daily necessities sector, and will also serve as the basis of assessment with regard to further research into management of energy in other building sectors.

SUPPORTED BY Sweden - Council for Building Research

8.0245, INVESTIGATION OF THE PROPERTIES OF VARIOUS WALL DESIGNS AND FLOOR STRUCTURES WITH SPECIAL REGARD TO THEIR ENERGY SAVING CHARACTERISTICS

P. NILSSON, P. Nilssons Arkitektkontor, *Gothenburg, Sweden*

This project comprises an investigation concerning the properties of various wall designs and floor structures with special regard to their energy saving characteristics e.g. density, weight, reflecting power, economy.

The objective is to investigate the heat-insulating capacity of wall designs and floor structures, with a view to determining properties which are of importance in this respect. Such properties are for instance air density and the risks of thermal bridges forming between various structural parts e.g. studs, windows, joints, junctions between horizontal and vertical units.

The results of the project will be presented in a manual which will give simple and elucidative information about these properties, concluding in an economic evaluation. This evaluation must be seen in the light of the provisions laid down in Svensk Byggnorm 1975 with the supplement No. 1.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0246, AN INVESTIGATION IN THE ENERGY CONSERVATION SECTOR - PROGRAM WORK

T. ABRAHAMSSON, R. Nilsson Konstruktionsbyra, *Gothenburg, Sweden*

This application refers to program studies for projects within the energy conservation sector. We propose the following projects: 1. A model for energy analyses for various types of buildings. Application example. 2. A field investigation of the effects of energy conservation measures such as additional insulation, modernization of control equipment, replacement of oil burners, etc. 3. Treatment and cooling of exhaust air with the aid of partial pressure differentials. Literature studies and practical experiments to investigate whether or not the partial pressure differential between the exhaust air and the outdoor air can be used to reduce the outdoor air requirements, etc. 4. Ventilation of industrial premises. Literature studies and practical experiments with a new ventilation system based on using the stratification of the air caused by temperature differences. 5. A field investigation of the effects of heat recovery and ventilation plants, such as heat pump, Econovent and Ecoterm plants. 6. Energy recovery from industrial drier plants with high-temperature and high-humidity exhaust air. A technical-economic analysis and practical test measurements.

SUPPORTED BY Sweden - Council for Building Research

8.0247, ENERGY CONSERVATION BY MEANS OF HEAT RECOVERY IN VENTILATION PLANTS - FIELD STUDY

T. ABRAHAMSSON, R. Nilsson Konstruktionsbyra, *Gothenburg, Sweden*

Heat recovery in ventilation plants with the aid of recuperative or regenerative heat exchangers or heat pumps has come more and more to the fore in recent years. The source material for calculating the heat recovery is, however, composed of data produced on a theoretical or laboratory basis. This project aims at investigating the energy recovery for the three energy recovery principles mentioned above in 6 existing plans. The study also aims at charting out the investment and operational costs for the plans. These costs will be compared with the corresponding costs if the plants were not provided with equipment for heat recovery.

The study will be carried out during the winter of 1976-1977.

SUPPORTED BY Sweden - Council for Building Research

8.0248, APPLIED ENERGY-CONSERVATION AND RESOURCE-CONSERVATION IN A ONE-FAMILY HOUSE - IMPLEMENTATION PROBLEMS IN THE WORK AND DESIGN PROCESS

H. EEK, Styrgruppen Ab I Efem, *Gothenburg, Sweden*

This project shows how technical supply and energy conservation has been achieved in a house by means of a combination system. This is the result of a design approach which aims at getting the component parts to collaborate so as to achieve a well-balanced and optimum total solution from the energy and resource conservation point of view.

The project is broken down into two stages: 1. Recording, documenting, analyzing and communication-implementation problems in the work and design process; 2. The function and operation of the combination system will mainly be studied through practical experience but also through measurements.

The aim is to summarize the experiences from this project and indicate future development paths which appear possible in accordance with the practical experience obtained.

SUPPORTED BY Sweden - Council for Building Research

8.0249, SOURCE MATERIAL FOR PFE 78 (BASIC DOCUMENT FOR SWEDISH ENERGY R&D PROGRAM 1978-1981) SUBPROGRAM 04 - HEAT PUMPS SYSTEMS

B. BACKSTROM, Wahlings Bygginstallationer, *Gothenburg, Sweden*

To produce source material for PFE 78 (energy-policy decision 1978) concerning the subprogram 'heat pumps systems' in accordance with the directives issued by DFE (Energy R&D Commission) 1976-06-30.

SUPPORTED BY Sweden - Council for Building Research

8.0250, ENERGY USE IN FOOD PRODUCTION

U. JONSSON, Food Preservation Institute, *Gothenburg 16, Sweden*

The study will provide a basis for concrete estimates of energy requirements in the food-producing system (LPS).

From the viewpoint of energy, the study should embrace a clarifying and operational analysis of the structure of the LPS-system. The analysis should thus include a survey of the energy flow as well as the mass flow, particularly where waste products and by-products are concerned. Furthermore, the energy flow should be described both in terms of quantity and quality (terms of entropy). A number of energy efficiency criteria should be laid down, which would make it possible to compare various process alternatives.

Finally, efficiency analyses should be made as complements to the time-independent energy analyses.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0251, SYSTEMATIC INVESTIGATION OF THE ROOM TEMPERATURE IN EXISTING BUILDINGS

E. ABEL, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

Climate plants for buildings are normally selected and designed using calculations directed towards systematically varying climate affecting variables, such as solar radiation and outdoor air conditions, as a basis. In a real building, in which the occupants are active, the room climate is also affected by other variables which cannot be taken into consideration today when carrying out calculations. The more important of these non-calculable variables include the possibility for affecting the climate offered by opening windows and the effects on the room climate of the reduction of the internal heat load obtained by evening out stochastic load variations by means of storage. The room temperature will be measured and recorded continuously during a period of a year in approximately 100 office rooms. Comparison with the room temperature obtained when carrying out calculations in accordance with the accepted calculation models will be used to investigate whether the non-calculable variables have such an affect that they should be taken into consideration and whether continued research is necessary in this area.

SUPPORTED BY Sweden - Council for Building Research

8.0252, THE USE OF ENERGY IN MULTI-FAMILY HOUSES - PROGRAM WORK
L. AGREN, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

PURPOSE: Stage 1, a description of the present position: to study and document a series of type cases of users in multi-family houses with a view to charting out attitudes, knowledge and habits in conjunction with the use of energy in the dwelling.

Stage 2, action program: -to chart out the conditions which lead to improved energy economization. Studies of the possibilities available to the user for influencing his or her energy consumption.

METHOD - IMPLEMENTATION: Regular interviews, supplemented with various studies and simple measurements. The questionnaires are structured but are not fixed. The conversations will be permitted to lead to new questions and will be used as a means for establishing the attitude of the individual. The heat, water and electricity consumptions will be measured to support the interview materials.

RESULTS: The relationship between dwelling habits and energy consumption. The relationship between the design, the use and the energy consumption of the buildings. A presentation of the interest, knowledge, attitudes and possibilities of influencing their own energy consumption of the users.

SUPPORTED BY Sweden - Council for Building Research

8.0253, THE USE OF LOW-VALUE HEAT FOR HEATING BY MEANS OF HEATED CEILINGS
B. BACKSTROM, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

This experiment aims at studying the heat transfer between pipes and sheet metals in a heated ceiling in which low-value heat from, for example, a heat pump is used and at carrying out an inventory of the adaptability of possible ceiling designs to a system of this type.

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8.0254, THE INFLUENCE OF HEAT SOURCES ON FLOW AND TEMPERATURE FIELDS IN VENTILATED PREMISES
N. FROSSLING, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

Computer calculations of air velocities and temperature distribution will be used to investigate the effects on comfort in premises resulting from variations in the location of the supply air unit, in the supply air temperature, the location of heat sources and the geometry of the premises. A method for turbulent two-dimensional flow in which the influence of the turbulence is described by solving two transport equations for the turbulence quantities will be used in the calculation. A study will be made on the possibilities available for developing a calculation method for 3-dimensional flow. The applicants have documented experience of turbulence calculation. This would appear to be a prerequisite for implementing a project of this type.

SUPPORTED BY Sweden - Council for Building Research

8.0255, DRYING OF PULP FLAKES IN SUPERHEATED STEAM AND PRESSURE - 'BACK-PRESSURE DRYING', SYSTEM HEDSTROM
B. HEDSTROM, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

The new drying technique evidently provides potentially great possibilities of saving energy. For a standard production of 100,000 t/year the use of back-pressure drying instead of conventional drying means saving about Skr 3 M/year. Contrary to what is the case with conventional drying of flakes, there is no separate consumption of oil for drying where the new technique is used. The investment costs of a back pressure drying system are no higher than that of a conventional drying system.

However, there remains a great deal of work to be done before the whole of the branch will be able to profit from the use of the new drying method. Thus, all sorts of pulps commonly used are to be examined in terms of cycle of drying, quality of pulp, and paper technical properties. Different types of pulps, such as chemical, thermomechanical, mechanical, and semi-mechanical pulps are to be examined. Even other applications are to be studied, such as drying of bark, sawdust, and return fibers, in combination with sterilization.

The results of the projects are anticipated to be of use where new or already existing equipment for drying of pulp flakes is concerned.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0256, ENERGY CONSERVATION - NOISE REDUCTION IN EXISTING BUILDINGS
W. KIESSLING, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

PURPOSE: To investigate to what extent noise-protection and heat-insulation measures can be coordinated and implemented to provide better dwelling and work environments in existing buildings. To investigate to what extent the ventilation of the building is affected by these measures. To draw up standardized planning and work measures for improving noise protection and heat economy in normal constructions and for various building categories. To assess the costs for alternative measures in conjunction with or without a link-up to other improvement and rebuilding work.

IMPLEMENTATION: The studies are mainly intended to embrace buildings from the 1930s and the period immediately after. Buildings from other periods may, however, be used for the pilot project if this is found suitable with regard to the bodies administering the properties and on condition that the problems are of interest in principle. The project requires collaboration between specialists in various fields and bodies responsible for administering properties found suitable and with the interest and resources for implementing the proposed measures. The group behind the project has access to architects, structural engineers, acousticians, services engineers and residential building administrators. Other experts will be used as required. The present work plan comprises 6 stages during a period of 3 years.

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8.0257, ENERGY CONSERVATION IN EXISTING BUILDINGS - THE EXTERNAL WALL AS A SOLAR COLLECTOR - HEAT IN AIR GAPS
W. KIESSLING, Chalmers Univ. of Technology, School of Architecture, *Gothenburg 5, Sweden*

The purpose is: to investigate whether sufficiently large quantities of solar heat can be generated in air gaps behind external wall slabs to make it profitable to utilize the heat as additional energy for heating the building; to map out the factors which limit these heat quantities; to develop a method for calculating the heat quantities.

Measurements will be carried out in existing buildings and at the CTH (Chalmers University of Technology) Field Station.

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8.0258, SOURCE MATERIAL FOR PFE 78 (BASIC DOCUMENT FOR SWEDISH ENERGY R&D PROGRAM 1978-1981) - ENERGY CONSERVATION & BUILDING PLANNING (ABBREV)
W. KIESSLING, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

To produce source material for PFE (energy-policy decision 1978) concerning the subprogram 'energy conservation and building planning' in accordance with the directives issued by DFE (Energy R&D Commission) 1976-06-30.

SUPPORTED BY Sweden - Council for Building Research

8.0259, THERMAL INSULATION OF PLASTIC HALLS - STAGE II
L.E. LARSSON, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

The project entitled 'Thermal insulation of plastic halls,' Stage II aims at charting by means of models and full-scale field experiments how thermal insulation for plastic halls can best be designed and, by measuring the radiation properties and airtightness of plastic sheets, to provide material for a careful analysis of the thermal balance in a plastic hall and to provide source material for improving the plastic sheeting. The investigations will take place in an existing experimental hall. The measurements of the radiation properties will embrace light transmission determination and emission determinations. The airtightness of the sheets will be determined under different conditions for the sheet samples. The project is scheduled to start on January 1, 1976 and to continue for 20 months. The time will be broken down into various project parts so that the field experiments are mainly carried out during the cold months of the year. The material tests will continue throughout most of the project time and will take place partly in parallel with the field experiments. The last months are required for compiling data and writing reports.

The project results are expected to provide valuable information on the more suitable design of thermal insulation and plastic halls. Material manufacturers and hall manufacturers may find solutions to heating problems and thus increase the possibilities of using plastic halls in Sweden and abroad.

SUPPORTED BY Sweden - Council for Building Research

8.0260, EXPERIMENTAL DEVICE FOR PREHEATING AND COOLING VENTILATION AIR

H. LJUNGMAN, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

The purpose of this experiment is to determine how much cooling and heating output can be obtained per cubic meter of air flow and square meters of sheet metal area. The study entails allowing the sun to preheat or allowing water to cool (by means of evaporation) the air in the same air intake.

SUPPORTED BY Sweden - Council for Building Research

8.0261, HEATED ROADS - RELATIONSHIPS BETWEEN ENERGY CONSUMPTION, DEGREE OF SERVICE, DESIGN, CLIMATE HEATING STRATEGY

R. MAGNUSSON, Chalmers Univ. of Technology, School of Civil Engineering, *Gothenburg 5, Sweden*

The aim is to determine how the energy consumption and snow-clearing service varies depending on the location of the heating coils, the design of the roadbed and material used in the roadbed, the climate conditions and strategies in conjunction with the heat supply. Measurements of temperatures, heat flows, moisture contents, etc. when the supplied heat output, air temperature and wind velocity are varied, will be carried out on transportable pilot roads both in the laboratory and in the field. The results will be compared with theoretical calculations. h s way, light r various tional and

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nce of snow clearing and ground heating obtained by the municipal services departments and suchlike in Swedish municipalities will also be collected and processed. In this way, light will be shed on the requirements on snow-clearing service for various road surfaces and the reasons for variations in plant, operational and maintenance costs for various design options.

SUPPORTED BY Sweden - Council for Building Research

8.0262, EVALUATION OF TAXI-SYSTEM PERFORMANCE BY SIMULATION

A. OTTEBLAD, Chalmers Univ. of Technology, School of Electrical Engin., *Gothenburg 5, Sweden*

OBJECTIVE: To establish how the following factors affect the energy consumption and the service level of a taxi-system. 1. Improved vehicle-localization. 2. Computer-allocation of travels. 3. Shared-taxi: (two passengers with different goals can share the same taxi).

APPROACH: Computer simulation of taxi-systems with different quantities of the factors mentioned above. The simulated systems are supposed to work in a city of the size of Gothenburg (about 500,000 pop.) during peak hours (about 1,400 trips per hour). The different systems are loaded with the same customers, and it is examined how many cars are needed in order to give the customers a reasonable service level.

INTENDED USE OF RESULTS: This study is a preliminary study, supposed to show if it is meaningful to develop the taxi-systems of today in the directions mentioned above.

SUPPORTED BY Sweden - Transport Research Delegation - Stockholm

8.0263, OPTIMUM DISPOSITION OF HEAT ENERGY WITHIN FOREST INDUSTRY PROCESSES

G. ROSENBLAD, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

The energy crisis of 1973 had a severe effect on energy and equipment costs within the forest industry sector. New increases in costs may well be anticipated in future, especially for electric power, which has so far not been affected to the same extent. These circumstances call for additional attention towards optimum use of energy in relevant processes.

The changes indicated above will have affected earlier optimum solutions and choice of process parameters within the forest industry sector. New process variants may become economically interesting, such as increase of producible back pressure energy with a gas turbine, utilization of heat down to a lower temperature level by use of other kinds of evaporation surfaces, an additional number of evaporation stages in series, back pressure drying according to Hedstrom (Project No. 76-4252 of the National Swedish Board for Technical Development), etc.

Starting from economic conditions of future interest, the project aims at finding prerequisites of optimal process parameters in terms of connections kept as general as possible, thereby making these results last even for the distant future.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0264, OXYGEN BLEACHING

O. SAMUELSON, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

Oxygen bleaching is at present becoming more and more accepted all over the world, primarily thanks to its advantage in point of environmental management and economy. An investigation concerning energy requirements indicates that oxygen bleaching saves a considerable amount of energy, largely owing to the fact that less electric power is required for production of bleaching chemicals, but also in that the liquid can be burnt.

In order to make oxygen bleaching generally accepted and to ensure that more energy is saved and that the discharge of spent bleach liquid (including toxic chlorinated compounds) is reduced, systematic long-term research is required. So far, too little has been seen of this kind of research and hardly any regard has been given to problems like the effect of recirculation of spent bleach liquid and introduction of spent cooking liquid, important issues in point of energy and environmental management. The project concerns studies of these and other parameters, involving systematic laboratory experiments, and aims at eludicating, as far as possible, the effect of tracer metals, which are of great importance to the process.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0265, RIDE-SHARING IN PRIVATE VEHICLES

Y. WESTERLUND, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

OBJECTIVE: To assess the potential for increased ride-sharing in work trips and estimate related benefits (energy savings, improved environment etc.). To attain an increased knowledge of the principles and methods for organizing ride-sharing programs.

APPROACH: The first phase of the study is a theoretical preparation for a second, more practically oriented, phase to include the conduct and evaluation of demonstration projects. The first phase includes studies of: previous experience in ride-sharing in Sweden and abroad; present degree of ride-sharing in Sweden; motivations for and attitudes toward ride-sharing conditions that

affect potential ride-sharing programs (technical, economical, institutional, etc); strategies to stimulate ride-sharing.

INTENDED USE OF RESULTS: The results from the demonstration projects will make a base for recommendations to increase the degree of ride-sharing in Sweden.

SUPPORTED BY Sweden - Transport Research Delegation - Stockholm

8.0266, THE USE OF SUNSHADES FOR WINDOWS TO CONSERVE ENERGY PROCESSING OF MEASUREMENTS FROM THE CHALMERS FIELD STATION, FISKEBAC

A.M. WILHELMSEN, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

One way of rapidly reducing the heating cost in existing buildings is to improve the thermal insulation properties of the windows. Supplementing existing double-glazed windows with a certain type of sunshade can improve both the thermal insulation capacity and the heat reflection capacity and of the windows.

The screening coefficient and the thermal insulation effects of a number of ordinary sunshade types have been measured in a double-glazed pivotted window together with general climatic data during the periods September 1, 1974 to April 30, 1975 at the Chalmers University of Technology (CTH) field station at Fiskeback. This data has been recorded on magnetic tapes.

By 'using' the tested sunshades in the computer in a manner predetermined by the weather, it is possible to study which energy savings could have been made during the test period by supplementing the double-glazed window with sunshades of various types.

SUPPORTED BY Sweden - Council for Building Research

8.0267, HEAT PUMP AND MULTIZONE PLANT IN LARGER SCHOOLS

P. JANSSON, Halmstad Electricity Works, *Halmstad, Sweden*

The object of this project is to evaluate the heating installations in schools - their operational conditions and economy of operation. Measurements and statistics relating to energy as the basis of evaluation. Measurements will be carried out over four years, 1974-1978.

SUPPORTED BY Sweden - Council for Building Research

8.0268, LOW-ENERGY ONE-FAMILY HOUSES

C. HARRYSSON, Modulent Konstruktioner Ab, *Hassleholm 1, Sweden*

This project aims at investigating how a low-energy one-family house should be designed. Heat balance and energy measurements have been carried out on two type houses built by the firm in accordance with the designs in force up until now.

A theoretical investigation will be carried out on the basis of the measurements to show how various design changes affect the energy requirements. In particular, insulation technology, window types, building orientation, control equipment, heat recovery from ventilation air and the possibilities of recovering heat from domestic water will be studied in conjunction with this.

Accumulating systems for cheaper net energy and district heating systems for group and terrace house estates are of particular interest.

Using the measurements and the theoretical investigations as a basis, a low-energy pilot house will be built. This will be subjected to heat balance and energy measurements analogous to the measurements carried out on the type house mentioned above.

The project will be led and implemented by a control group within the company, consisting of the company's experts within the fields concerned. The measurements on the buildings and the theoretical investigations will be carried out in collaboration with Department of Building Science at the Lund University of Technology. Work directly connected with heating, ventilation and sanitation matters will take place in collaboration with VVS-teknik, Malmo. The costs for developing a new heating system are not included in the application.

SUPPORTED BY Sweden - Council for Building Research

8.0269, METHOD FOR LOWERING THE ENERGY CONSUMPTION OF REDUCTION PROCESSES BY USE OF PLASMA TECHNIQUE

S. SANTEN, Ab Svenska Kullagerfabriken, *Hofors, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0270, ENERGY-SAVING SYSTEM FOR HEATING AND VENTILATION BY CIRCULATION OF AIR THROUGH NILCON BEAMS

S. NILSSON, Nilcon Engineering Ab, *Kallered, Sweden*

The Nilcon unit, which is based on a prestressed concrete construction system, consists of two components, a loadbearing cassette component and a lock component. Owing to the construction of the Nilcon unit, special advantages can be obtained relating to the use of circulating air for heating and ventilation purposes, one of the reasons being that no ducts are needed for the distribution of hot air and ventilation air. The basic features of a heating and ventilation system based on the Nilcon beam have been tested in a number of building types (single-family houses, blocks of flats, schools).

The need for considerably reduced energy costs (cuts in excess of 30%) has resulted in various ideas for the improvement of the system. In order that the system may be finally developed, it is necessary to test certain theoretical and practical basic data relating to the dimensioning of the heating plant and to the adaption of the apparatus to the Nilcon system. The object of this project is to test different solutions for the reduction of heat transmission losses and ventilation losses and for the utilization of solar radiation and low-heat water from district heating plants in the optimum manner. Reduction of the energy requirement must not have an adverse effect on dwelling comfort.

It is planned to carry out the project in three integrated subprojects: Project A: Detailed tests to provide data for the dimensioning of heating plants and apparatus; Project B: Development of hot air unit; Project C: Full-scale tests.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0271, LOW-ENERGY AND LOW-RESOURCE CONSTRUCTIONS - A DEMONSTRATION OF A SYSTEMS SOLUTION

S. ANDERSSON, Found. for Indus. & Ecol. Cons, *Landskrona, Sweden*

The public debate on energy and the environment in recent years has shown that our present pattern of life must be changed in a direction towards forms which economize on energy and resources. By combining a number of measures for energy efficiency and resource economy in a single system, we want to demonstrate that it is already possible to build dwellings which are attractive both from the national economic point of view and from the point of view of the individual user. The various measures consist of more or less tested technical solutions which are unique in themselves but which will be shown to be attractive as a system. The building in question will be constructed in such a way that experiments can be carried out concerning the combine use of premises. The design will consist of an open building system. A detailed evaluation will be made of the results obtained. This application refers to funds for planning and designing a detailed application to BFR and for the period immediately following such an application.

SUPPORTED BY Sweden - Council for Building Research

8.0272, STUDY OF HEAT LOSSES AT THE SANDNARP SCHOOL, HALMSTAD, AFTER INSTALLATION OF BREAKING SWITCHES IN WINDOWS

N.E. LINDSKOUG, S. Hedly, *Lerum, Sweden*

This study involves installation, in a detached wing of the Sandnarp School, Halmstad, of circuit breaking switches (magnet switches) in all the windows that will open. The idea is that these

switches, via a weak-current circuit, should turn off the electric heaters of a room, as soon as a window is opened. As a result of this, energy which is supplied to the room will not disappear out of the opened window.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0273, EVALUATION OF CLASSROOM VENTILATION AT THE LOMBOLO SCHOOL IN KIRUNA

J. DAHL, Univ. of Lulea, *Lulea, Sweden*

Air conditioning systems, which adapt the quantity of outdoor air to the actual requirements via body and light heating and which are, consequently, low on energy have been installed for the classrooms at Lombolo junior level and intermediate level school in Kiruna.

The purpose of the investigation is to document operational and operation-economic conditions in the form of measurement results obtained through a suitably designed study. The outdoor air, exhaust air, room, supply and return temperatures will be recorded continuously during a school term. The measurement results will be supplemented with careful air quantity and water quantity measurements, and will be compared with theoretically calculated ventilation outputs, operational economy and practical operational values. If the investigation indicates positive results for the system, the results should provide valuable guidelines for coming designs.

SUPPORTED BY Sweden - Council for Building Research

8.0274, ENERGY CONSERVING THERMAL INSULATION

R. HENRIKSSON, Agricultural College of Sweden, *Lund 6, Sweden*

Theoretical analyses are to be carried out on thermal insulation in animal stables with regard to all enclosing surfaces and with regard to ventilation. The objective is to be able to provide constructive directives with a view to saving energy in an economic manner. In a later part, the investigation is intended to establish the faults which are made when installing thermal insulation so as to be able to provide directives which will ensure that the insulation has the intended effect.

The project embraces: 1) A calculation of economic thermal insulation with regard to the varying heat and moisture production of the animals. 2) A determination of the actual thermal insulation values for various building constructions in animal stables with regard to the workmanship. 3) Drawing up guidelines for thermal insulation with regard to all enclosing surfaces, ventilation and real thermal insulation value. 4) Drawing up directives for insulation work.

SUPPORTED BY Sweden - Council for Building Research

8.0275, WIND SCREENS FOR GREENHOUSES

UNKNOWN, Agricultural College of Sweden, *Lund 6, Sweden*

A considerable proportion of the greenhouse stock in Sweden is located in flat, windy countryside such as Skane and along the west coast. Bearing in mind the fact that heating costs for market gardening have more than tripled in the last few years, the need to reduce consumption for these particularly exposed facilities is extremely large.

The purpose of this project is to shed light on lee effects and practical heat savings with the aid of various types of artificial wind shelters. Shadowing effects will also be recorded and an evaluation will be carried out for various areas in Sweden with regard to statistical meteorological data.

SUPPORTED BY Sweden - Council for Building Research

8.0276, INVESTIGATION PROGRAMME CONCERNING ENERGY ECONOMY IN GREENHOUSES

J. ALEMO, Univ. of Agricultural Forestry, *Lund 6, Sweden*

The fuel consumption for heating greenhouses is considerable. This is the reason why, in recent years, a number of ideas aimed at reducing heat consumption have been launched in step with rising oil prices. The Department of Agricultural Building Technology, the Agricultural College of Sweden, and the Department of Building Construction, the Lund Institute of Technology, therefore find it important that thorough analysis be made of the theoretical and practical issues relating to energy consumption in greenhouses.

The object of this project is to provide data which may serve as basis for the continuation of a research activity programme within this field.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0277, PROGRAM WORK FOR SIMULATING AND CARRYING OUT MEASUREMENTS ON BUILDINGS WITH UNCONVENTIONAL ENERGY SYSTEMS

B. ADAMSON, Univ. of Lund, School of Technology, *Lund 7, Sweden*

Program work for: Investigating the possibilities for designing general simulation program for buildings with unconventional energy systems with solar heat collectors, storage, greenhouses, composting rooms, heat pumps etc.

The design of the R and D programs concerning: 1. Simulation studies of buildings with unconventional energy systems. 2. Studies of how full-scale pilot houses with unconventional energy systems should be designed.

SUPPORTED BY Sweden - Council for Building Research

8.0278, LOW-ENERGY CONSTRUCTION

B. ADAMSON, Univ. of Lund, School of Technology, *Lund 7, Sweden*

Within the framework for the project 'Low-resource construction', the Department of Building Function Theory intends to carry out work concerning energy conservation in conjunction with the buildings (heating, ventilation and lighting).

This work consists of: 1. An inventory of heat exchange systems, low-energy lighting systems, control systems, systems for making use of solar and sky radiation, low-energy greenhouse designs for compost reactors, local energy storage systems. 2. Writing a universal computer program covering heat balance calculations for building designs containing the systems mentioned above. 3. Carrying out calculations using the computer program mentioned above for optimizing purposes and for systems studies.

This work is broken down in the joint project description into projects with the designations BKL 1... BKL 15.

SUPPORTED BY Sweden - Council for Building Research

8.0279, METERING CENTRE FOR STUDIES INTO ENERGY

B. ADAMSON, Univ. of Lund, School of Technology, *Lund 7, Sweden*

This project refers to the construction and running-in of a measuring centre in accordance with the Energy Programme Commission (EPK) report of January 1975, Ds I 1975:1, Appendix 4, Appendix 3.

The project includes the beginning of the program development which is required for utilizing the centre.

In addition, the project will include the design of a suitable organization for the measuring centre and, in conjunction with constructing and running-in the centre, the participation in a number of projects concerning the use of energy in buildings.

SUPPORTED BY Sweden - Council for Building Research

8.0280, LOW-ENERGY PROJECT FOR ONE-FAMILY HOUSES

B. ADAMSON, Univ. of Lund, School of Technology, *Lund 7, Sweden*

The purpose of this project is to create a low-energy house using technology known today and generally available components combined with energy-conscious architectural planning.

Solar heat is utilized through the windows in the sourthern external wall. Room thermostats, a variable air flow and fixed sunshades are used to avoid excess temperatures indoors.

Measurements will be carried out in the house and in a reference building during the 1976/77 and 1977/78 winter seasons. The building will be uninhabited during the first year.

SUPPORTED BY Sweden - Council for Building Research

8.0281, FURTHER DEVELOPMENT OF COMPUTER PROGRAM CONCERNING ENERGY FOR ONE-FAMILY HOUSES

B. ADAMSON, Univ. of Lund, School of Technology, *Lund 7, Sweden*

An increased exchange of material with Japanese research and technology in the field of climate conditioning and services is extremely important. Professor K. Kimura at Waseda University has proposed a Japanese research worker who has spent the last three years in the technical research institute of a major Japanese firm, for collaboration at the Department of Building Function Theory for a period of two years. His duties there would be partly to work out computer programs for air-air and air-water heat pumps, solar heat collectors with storage units and heat storage in the ground, and partly to draw up a summary of the present position with regard to research and technology in Japan concerning climate conditioning in buildings.

SUPPORTED BY Sweden - Council for Building Research

8.0282, RESEARCH INTO THERMAL CLIMATE

B. ADAMSON, Univ. of Lund, School of Technology, *Lund 7, Sweden*

Theoretical and experimental investigations concerning: transfer of energy through areas of glass --- calculation of room temperatures and cooling requirements --- calculation of annual heating requirements and heating powers --- convective transfer of heat at room surfaces ---convection in rooms and temperatures and air movements in conjunction with heating by means of hot room surfaces.

Mathematical models and computer programs for the calculation of the energy and power requirements of rooms and buildings for heating and cooling purposes will be developed and experimentally verified within the framework of the above subproject. The models and computer programs will be used in order to study the effect of different factors on the annual energy requirement in buildings. They will also be of use in designing buildings and heating and cooling installations.

SUPPORTED BY Sweden - Council for Building Research

8.0283, LOW-ENERGY BUILDING

B. ADAMSON, Univ. of Lund, School of Technology, *Lund 7, Sweden*

The Department of Building Science intends to carry out work within the framework for the project 'Low-resource building' concerning energy conservation in conjunction with buildings (heating, ventilation and lighting).

This work consists of: 1. An inventory of heat exchange systems, low-energy lighting systems, control systems, systems for utilizing solar and sky radiation, low-energy greenhouse designs, composting reactors, local energy-storage systems. 2. Writing a universal computer program for thermal balance calculation for building designs embracing the systems inventoried above. 3. Carrying out calculations with the above mentioned computer program for optimization and system studies.

SUPPORTED BY Sweden - Council for Building Research

8.0284, INFORMATION AND ANALYSIS ACTIVITIES CONCERNING ENERGY RESEARCH AT THE DEPARTMENT OF BUILDING SCIENCE, LUND INSTITUTE OF TECHNOLOGY

B. ADAMSON, Univ. of Lund, School of Technology, *Lund 7, Sweden*

This grant refers to personnel reinforcement with a laboratory engineer on half-time for calculation, processing and presentation work for the following: Annual Report 1975/76: Heat losses for extremely well insulated floor constructions on the ground during a normal year; Proposal for low-energy foundation designs; A low-energy single family house in Sweden (STR); Low-energy houses - a study of possibilities.

SUPPORTED BY Sweden - Council for Building Research

8.0285, THE SOUTH BALTIC HOUSE - OPTIMUM USE OF WATER AND ENERGY IN A HOUSEHOLD

L. ANDERBERG, Univ. of Lund, School of Technology, *Lund 7, Sweden*

In conjunction with the project 'The South Baltic House' the Department of Water Resources Engineering intends: A. to quantify the order of size of the measures which give the best results from the optimum conservation viewpoint. B. to study applicable technology through literature studies and through contracts. C. to indicate possible approaches for the continuation of the program.

SUPPORTED BY Sweden - Council for Building Research

8.0286, ADDITIONAL INSULATION - THERMAL BRIDGES, MOISTURE, MOVEMENTS AND DURABILITY

A.C. ANDERSSON, Univ. of Lund, School of Technology, *Lund 7, Sweden*

Additional insulation in buildings will be essential if the government energy program is to be implemented. Additional insulation can be carried out externally, internally or in cavity constructions. External additional insulation should not entail any physical problems when correctly carried out. There may be some risk of damage to any plaster applied on top of the additional insulation.

Internal additional insulation and, to a certain extent, insulation in cavity constructions may entail undesirable consequences in the form of increased heat flow through thermal bridges, a risk for condensation in window recesses, joints and electrical wiring, increased movements between external and internal constructions due to moisture and temperature, impaired frost durability in the external layer and risk for damage to the foundations due to frost heave. These problems will be studied in the project. In addition, the long-term durability of urea foam will be investigated.

The project will begin by concentrating on the calculation of the effects of thermal bridges in heat losses. The results of this calculation are important and will be published as soon as possible.

The moisture problems will be studied by means of laboratory measurements and calculations.

Other problems, i.e. movements, frost durability, frost damage and long-term durability of urea foam will be primarily studied by means of theoretical calculations.

SUPPORTED BY Sweden - Council for Building Research

8.0287, COOPERATION BETWEEN SMALL AND MEDIUM SIZE COMPANIES IN MATERIALS MANAGEMENT AND PHYSICAL DISTRIBUTION

S. BJERNINGER, Univ. of Lund, School of Technology, *Lund 7, Sweden*

OBJECTIVE: To achieve a reduction in energy consumption, road net load and material handling costs by developing cooperation models for management and physical distribution for companies in a region dominated by small and medium sized companies.

APPROACH: This project concerns the main study comprising the construction of a specified cooperation model including testing of the model in a chosen region. Computer simulation of the model will be performed and an implementation method developed. The model is expected to be implemented by June 1977.

INTENDED USE OF RESULTS: The result, including the implementation method, should be applicable to small and medium sized companies in general.

SUPPORTED BY Sweden - Transport Research Delegation - Stockholm

8.0288, PROGRAM FOR STUDING RESOURCE-CONSERVING MEASURES IN DWELLINGS - CONDITIONS AND HUMAN CONSEQUENCES

C. BOALT, Univ. of Lund, *Lund 7, Sweden*

The purpose is to present a more detailed definition of the design of the Department's R and D program within the framework for the project designated 'The South Baltic House'.

The program work entails: 1. Literature and project studies with the aim of identifying and structuring problem types which are linked to the use dwellings whose technical solutions have been changed with regard to ecological requirements. 2. Consideration of research strategies, discussions of theoretical models and methods suitable for use in this context. 3. Selecting certain part-systems for detailed study (e.g., hygiene and waste issues and room design).

The application refers to programs for: 1. Continued in-depth general studies; 2. Laboratory or field studies of technical part-solutions in application; 3. The Department's participation in and follow-up of the project 'The South Baltic House'.

SUPPORTED BY Sweden - Council for Building Research

8.0289, USER ASPECTS ON LOW-RESOURCE CONSTRUCTION

C. BOALT, Univ. of Lund, School of Technology, *Lund 7, Sweden*

User aspects on low-resource construction is included as a sub-project in the project entitled 'Low-resource construction - a joint project in conjunction with the South Baltic House.' This sub-project, run by the Department of Building Function Theory, aims at 1) analyzing the types of changes in dwelling conditions brought to the fore by resource conservation measures, 2) shedding light on the consequences for dwelling conditions of various types of resource conservation measures.

The design of the project entails problem inventory and problem analysis based on studies of literature and implemented attempts at low-resource construction. The conditions for various dwelling activities in which the activities are seen as a system of relationships between man and the built environment form the basis for the project. Against background of problem analysis and in collaboration with other departments involved in the total project, certain sub-systems will be selected for more detailed study. Methods will be developed and tested for studying the attitude, behaviour, assessments and allocations of priority of the users in relation to different resource conservation measures. These studies will be implemented as laboratory or field studies. The results of the present stage of the project are intended to provide an improved understanding of the user consequences and to provide source material for further research and information activities.

SUPPORTED BY Sweden - Council for Building Research

8.0290, ENERGY ANALYSIS OF BUILDING MATERIAL TRANSPORTS

L. FERNVALL, Univ. of Lund, School of Technology, *Lund 7, Sweden*

The purpose of this project is to attempt, by means of an introductory study, to investigate whether the energy analyses which have been carried out in other areas can be applied to transport. Together with an investigation of the relevant transport alternatives for distributing building materials, the present investigation will provide a basis for a model which will make it possible to assess the energy consumption of various transport solutions.

The project will be broken down into three stages: 1. Literature studies and an introductory investigation of energy analysis methods. 2. An investigation and compilation of relevant transport alternatives. 3. Attempts to apply energy analyses to the transport area.

SUPPORTED BY Sweden - Council for Building Research

8.0291, A WAY OF DISTRIBUTING FUEL COSTS IN BLOCKS OF FLATS AND SIMILAR BUILDINGS - PROJECT PHASE 2

H. HELGESSEN, Univ. of Lund, School of Technology, *Lund 7, Sweden*

Project phase 1 was carried out in 1975/76 with funds allocated by the National Swedish Board for Technical Development. The results of the project work, which was performed at the Lund Institute of Technology, showed such promising prospects that it now seems justified to initiate phase 2. This aims at developing a number of prototypes, which will be installed in a block of flats belonging to HSB (the National Association of Tenants' Savings and Building Societies). The results obtained from this block of flats during one heating season will then be compared to those obtained from one which has not been fitted with this equipment.

Parallel to this technical evaluation, there will be a psychological and social evaluation including interviews with tenants as to their reactions to the system.

The intention is also to interest, during allocation time, some potential customer.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0292, A WAY OF DISTRIBUTING FUEL COSTS IN BLOCKS OF FLATS AND SIMILAR BUILDINGS

H. HELGESSEN, Univ. of Lund, School of Technology, *Lund 7, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0293, THE SOUTH BALTIC HOUSE - URBAN BUILDING STUDIES

B. HULTEN, Univ. of Lund, School of Technology, *Lund 7, Sweden*

These studies are intended to lead to experiments dealing with the local supply of solar heat for heating purposes and the local supply of water to a neighborhood block as well as testing the requirements which emanate from waste water seepage. The emphasis will be on solar heating and spatial design. House types and flat solutions will be studied as will sections, entrance conditions, etc.

SUPPORTED BY Sweden - Council for Building Research

8.0294, ENERGY CONSERVATION IN AN EXISTING BUILDING - A CASE STUDY

L.H. JENSEN, Univ. of Lund, School of Technology, *Lund 7, Sweden*

Measurements will be made of an 8-storey multi-family house with mechanical exhaust air and single pipe radiation system in Malmo, in the extreme south of Sweden.

The aim is to study the heating and ventilation system and to determine the distribution of the energy for the different forms of use. In addition, a study will be made of the possible saving of energy by accurate adjustment and improved regulation. The effect of wind, the regulation of indoor temperatures and the use of hot water from taps will be made the subject of a special study.

SUPPORTED BY Sweden - Council for Building Research

8.0295, COMPUTER CONTROL OF CLIMATE PROCESSES

L.H. JENSEN, Univ. of Lund, School of Technology, *Lund 7, Sweden*

The purpose of this project is to produce the basic knowledge required for computer control of climate processes and to establish the technical limits and costs involved. Comparisons will be carried out with conventional control engineering. Theoretic analysis will be combined with experiments in full-scale plants in the project.

A suitable object for study is the ASG large-scale terminal in Malmo (the first computer controlled climate plant in the Nordic countries). Experiments will be carried out on the spot or with the aid of another computer which is connected via the telecommunications network. The plant consists of two enthalpy exchangers, 2 refrigerators, 3 humidifiers, 8 heaters, 14 reheaters, 11 radiator groups, 1 domestic hot water system. There is also an office landscape for 141 occupants.

The project is broken down into five sub-projects: computer control of sub-processes, computer control of systems of sub-processes, self-adjusting regulators, low-energy control and computer adapted process design.

Human requirements on the indoor climate will be investigated in collaboration with Borje Lovstedt and David Wyon

at the National Swedish Institute for Building Research. The dependency of the total heating requirements of the plant on the outdoor climate can be investigated by means of a program in the computer.

SUPPORTED BY Sweden - Council for Building Research

8.0296, THERMAL INSULATION CAPACITY AND IMPERMEABILITY TO WIND

J. KRONVALL, Univ. of Lund, School of Technology, *Lund 7, Sweden*

The low-energy design of future buildings will require more exact forecasts concerning the thermal insulation capacity of the external walls and control of involuntary ventilation. This project aims at establishing how thermal bridges, connections, joints, etc., affect the thermal insulation capacity and at establishing the wind impermeability which can be practically achieved for various constructions. The project will also include drafting a method for testing the impermeability to wind of constructed buildings.

The project will begin with literature studies and inventories. Most of the work will consist of laboratory experiments and, to a lesser extent, field experiments.

The results are expected to be directly applicable to practical construction work and should be converted into bulletins or similar information when the documentation has been completed.

SUPPORTED BY Sweden - Council for Building Research

8.0297, ENERGY CONSERVATION IN EXISTING MULTI-FAMILY HOUSES THROUGH BUILDING CONSTRUCTION MEASURES

A. OLSSON, Univ. of Lund, School of Technology, *Lund 7, Sweden*

The project is broken down into the following parts: 1. An inventory of building component types and a discussion on building construction measures. Existing building components in multi-family houses will be grouped by type and age. A quantitative allocation will be calculated between the types. The energy conservation measures consist of increased thermal insulation and increased tightness. The consequences and effects of a gradually increased energy conservation will be discussed for each building component. 2. A study of insulation and tightness in existing houses. Houses from four different localities in Sweden will be selected. Measurements will be carried out on the thermal resistance, tightness and surface temperatures of the building components. The users will be interviewed on the climate in the flats. 3. A study of energy conservation measures in rebuilding projects which have been carried out. The various projects will be studied with regard to the workmanship, results, economy and methods. 4. Laboratory tests and proposals for solutions for a number of selected typical houses. The manner in which various building components react to changes in insulation and increased tightness will be studied by simulating outdoor and indoor climates in the laboratory. A general discussion will be held on the esthetic, building construction and economic viewpoints connected with additional insulation and increased tightness. Complete solutions, which will be studied on the basis of the viewpoints mentioned above will be proposed for the objects covered by the project.

SUPPORTED BY Sweden - Council for Building Research

8.0298, THE SOUTH BALTIC HOUSE - COORDINATION AND PROGRAM WORK THROUGH CARL-HUGO OLSSON

C.H. OLSSON, Univ. of Lund, School of Technology, *Lund 7, Sweden*

In a first stage, when the departments at the Lund University of Technology and BPA are to implement program work for a further application for grants from BFR, it is essential that information work and coordination be arranged. The post applied for here is intended to provide this information exchange and to coordinate the work carried out at the departments.

Since the work involved here is closely linked to the research work carried out by the applicant, it is not possible to draw a clear boundary between coordination and research work. Because of this, an application is also made to cover applicant's own research work.

SUPPORTED BY Sweden - Council for Building Research

8.0299, CONCLUDING BLUE-FLAME BURNER TESTS

B. REENSTIERNA, Univ. of Lund, School of Technology, *Lund 7, Sweden*

Description of and motives for continuation of work: Completion of testing equipment for blue flame burners. Purchase and installation of servo-equipment for computer controlled operation programmes. Analysis of the causes of disturbances in the processes of combustion, like coke layers on the turbulator and spray nozzle. Analysis of the effect of low gas velocities. Field tests with burners. Some burners will be installed in conventional boilers. Follow-up of tests. Evaluation of tests.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0300, PRELIMINARY PROJECTION OF TEST RIG WITH AIR HEAT EXCHANGER

G. TYLLERED, Univ. of Lund, School of Technology, *Lund 7, Sweden*

The work involves a preliminary projection of an air-air heat exchanger test rig for a maximum of 3,000 cubic meters per hour (c. 1 kg/s), for a temperature range of minus 20 up to plus 150 degrees C, and for varying relative air humidity. There should be a considerable need for a test rig like this, since both industry and the housing sector are trying to save energy by use of heat exchangers. It is thus important to be able to determine and predict, with accuracy, their performance characteristics. The work may well be continued.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0301, POTENTIAL ENERGY ECONOMY THROUGH THE APPLICATION OF MECHANICAL VAPOUR COMPRESSION FOR EVAPORATION AND DISTILLATION

R. WIMMERSTEDT, Univ. of Lund, School of Technology, *Lund 7, Sweden*

The unit operations of evaporation and distillation are responsible for a large proportion of energy consumption within the chemical pulp and petroleum industries. Efforts to save energy within these fields should therefore be centered on these unit operations.

Ability to apply mechanical vapour recompression is suggestive of good energy economy potential.

The funds applied for are partly to pay for a pilot plant, where possibilities for application of mechanical vapour compression will be studied in practical terms. This subproject is part of a more extensive project aimed at studying the prospects of this method.

Project costs exceeding the amount applied for will be covered by the Department's own resources.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0302, MEASURING ENERGY CONSUMPTION IN A LOW-ENERGY HOUSE

E. MORAWETZ, Euroc Ab, *Malmo 1, Sweden*

The purpose is to study the technical-economic prerequisites for energy conservation in private dwelling houses through the use of solar energy, heat recovery from exhaust air and waste water, the reduction of heat losses through transmission and ventilation. This study will be carried out in an experimental house at Limhamn (Malmo) during the period October 1975 to September 1976. Extensive measurements will be carried out on the heating and climate conditioning system which has been installed. The energy consumption achieved will be calculated from the measurement data obtained and compared with the energy consumption measured for the house during normal operation.

A careful cost follow-up of the heating and climate conditioning system in the house covering development, material and installation costs will provide a possibility for comparing the energy cost savings made with the procurement cost for various types of system equipment.

If funds are granted, the project will be implemented in collaboration with I. Hoglund, Department of Building Technology, the Royal Institute of Technology.

SUPPORTED BY Sweden - Council for Building Research

8.0303, A STUDY OF THE EFFECT OF VARIOUS CLEANING METHODS ON BOILER EFFICIENCY

B. GRUNDSELL, V V S Teknik Ab, *Malmo 19, Sweden*

Incomplete combustion entails deposits on the flue-gas parts of the boiler. This gradually impairs the boiler efficiency.

Four different methods for removing these deposits will be investigated in this project: The working methods, material consumption, time consumption, effect in conjunction with cleaning and long-term effect will be covered.

The four methods included in the investigation are: the steam method, which means a total cleaning of the heating surfaces of heat and steam boilers by cooling the water section of the boiler and supplying steam to the furnace section at the same time; mechanical cleaning, where various tools are used to remove the deposits mechanically; chemical cleaning using liquid agents, where the deposits are dissolved by adding chemical substances to water; chemical cleaning with solid substances in powder form, which are injected in conjunction with combustion.

SUPPORTED BY Sweden - Council for Building Research

8.0304, HEAT PUMP INSTALLATION IN THE SYDKRAFT DISTRICT OFFICE AT KARLSHAMN, HEAT PUMP INSTALLATION IN AN OFFICE BUILDING, & ENERGY MEASUREMENTS

K. NORBACK, Sydsvenska Kraft Ab, *Malmo 5, Sweden*

Sydkraft's office at Karlshamn is approximately 10 years old and is equipped with a conventional oil-fired boiler, water radiators and with supplementary electrically heated additional air. This project aims at carrying out measurements using today's heating system and thus determining the actual heating requirements. If possible, a change will then be carried out to a recirculating ventilation system. The water radiators will be adapted to the lower supply temperature which a heat pump provides. A heat pump and automatic control equipment will be installed. The existing oil-fired system will provide additional heating. Continued measurements will be carried out on the performance of the heat pump plant.

SUPPORTED BY Sweden - Council for Building Research

8.0305, MEASUREMENTS OF THE EFFICIENCY OF HEAT PUMP SYSTEMS IN VARIOUS DETACHED HOUSES

K. NORBACK, Sydsvenska Kraft Ab, *Malmo 5, Sweden*

Measurements will be carried out on approximately 7-8 detached houses during the winter season using heat pumps of various manufactures and various systems. Measurements will normally be carried out at 48 hour intervals for heat pump operation and direct electric heat operation respectively. The electric heat will be obtained from separate electric radiators with built-in thermostats. The electric energy, temperatures, operating times, etc., will be measured. The efficiency of the heat pump installation will be evaluated.

Measurements will, if possible, also be carried out separately on the heat pump with regard to its heat factor.

The measurement results obtained will be analyzed and an assessment will be made of where measures should be applied to obtain a better output in the heat pump. Collaboration with an institute of technology such as the Royal Institute of Technology would be desirable in conjunction with the last two tasks mentioned above.

SUPPORTED BY Sweden - Council for Building Research

8.0306, HEAT PUMP INSTALLATIONS IN TWO EXISTING HOUSES WITH CONVENTIONAL OIL-FIRED BOILERS AND WATER RADIATORS - AIR-WATER SYSTEM

K. NORBACK, Sydsvenska Kraft Ab, *Malmo 5, Sweden*

Sydkraft has carried out relative measurements on heat pumps of air-air type only up until now (with one exception). The advantages of air-water systems are so numerous that heat pumps of this type should be tested and analyzed. It is proposed that systems of this type be installed, tested and evaluated in two existing private houses belonging to two engineers employed in the heating engineering department at Sydkraft. The radiator surfaces will probably also have to be increased. Domestic hot water will be taken from the heat pumps. Additional heat will be supplied electrically or from the ordinary oil-fired boilers. The heat qualities, electrical energy, additional heat and temperatures will be measured. In addition, the houses will be included in the relative measures to be carried out in relationship to the direct electric heating mentioned above.

SUPPORTED BY Sweden - Council for Building Research

8.0307, MEASURING OF CRACKS AND SURFACE DEFECTS IN CONTINUOUS CASTING OF BILLETS, MEANS OF REDUCING ENERGY CONSUMPTION WHEN HEATING & ROLLING

T. ROBINSON, Ab Atomenergi, *Nykoping 1, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0308, HEAT AND CLIMATE MEASUREMENTS IN FLATS - CRITICAL STUDY OF WHETHER INDIVIDUAL HEAT CONSUMPTION CAN BE MEASURED IN AN EQUITABLE MANNER

U. NYBERG, Energisystem Projekt Ab, *Osterskar, Sweden*

In addition to building construction measures and improvements of central heating systems in multi-family houses with a view to reducing the energy consumption, interest has also centered on the question of whether individual metering and charging for heat consumption might contribute to energy conservation.

The difficulties involved in measuring the heat consumption in various flats within a block in an equitable manner are, however, considerable.

The present project proposes a critical feasibility study of whether or not it is possible to carry out individual measurements equitably, and how this should be done. Heat overflow between flats, the difference between supplied and consumed heat, experiments from heat measurements, prerequisites for measuring room climates and questions concerning control possibilities will be dealt with in the study.

SUPPORTED BY Sweden - Council for Building Research

8.0309, MORE EFFECTIVE WET PRESSING IN THE PRODUCTION OF PULP AND PAPER

O. LANGAARD, Billeruds Ab, *Saffle, Sweden*

In the production of paper and sheets of pulp, water is removed partly by self drainage and vacuum suction (wire section), partly by mechanical pressing (press section), and finally by drying.

A project with the object of knowledge development of the pressing operation was commenced during 1975 at Billeruds AB, Research Center. The project which is expected to last 3 years will comprise fundamental studies of pressing, development of sophisticated measuring equipment to laboratory scale and half technical scale, and optimization of pressing techniques regarding some pulp paper grades.

The project is divided into three subprojects, a) Development of equipment and methodology for the characterization of the pressability of different types of pulp. The endeavour is to elucidate and determine the permeability and compressibility of the fibre material at varying dryness and different states of compression. b) Systematic investigations of the way in which the chemical environment around the fibres influences pressability. c) Detailed studies of the dynamic pressing process in a press loop constructed at the Center. The effects of speed, press roll loading, the presence of felt on one side or both sides, rewetting and different pinch breadth conditions will be tested and analysed for different types of paper of varying weights.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0310, HEATING SYSTEM FOR SAVING OF ENERGY AND COSTS

L.O. ANDERSSON, R L I Byggdata, *Saltsjobaden, Sweden*

SUMMARY OF PROJECT: This heating system is a further development of grant 71-1236/U962 concerning heat transfer in hollow core slabs. This project has resulted in patents and applications for patents in a number of countries and agreements with a Scandinavian manufacturer of concrete elements.

PRINCIPLE: Hollow core slabs in pretensioned concrete may be used for heating buildings where ventilation rate and energy generation are comparatively low. Depending on mass, thermal conductivity, and heat storage capacity of the hollow core slab, energy will be delivered continuously or discontinuously to the slab. Energy sources will be waste heat and/or low-rate electrical energy.

Potential cut of energy cost: c. 30 percent. Potential cut of energy consumption: c. 15 percent.

GOAL: The goal of the development work is to minimize running expenses and installation costs and to utilize waste heat in a simple manner.

WORKING PROGRESS: I. Full-scale tests with hollow core slabs regarding the fundamental technique of heat transfer. II. To adapt existing computer program to results, according to I. III. Analysis of suitable control systems. IV. Pilot project.

The results of the project may well prove useful for heating purposes in residential blocks as well as office buildings, etc.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0311, ANALYSIS OF ENERGY CONSUMPTION AT A MINE (UDDEN)

I. MAGNUSSON, Boliden Company, *Skelleftehamn, Sweden*

Mining in Sweden is often carried out at small units, geographically scattered over a large territory. This accounts for the summary character of internal statistics when it comes to the distribution of energy consumption. The combined energy consumption of these mines is, however, considerable. The aim of the project in hand it to make - for one typical mine - a fairly thorough analysis of the distribution of energy consumption and of the effect that various parameters have on this consumption. The intention is to increase the reliability of the material on which to base the investigations, with the purpose of efficient energy utilization.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0312, PYROLYSIS OF WASTE

A. GRAMER, Thapper & Nordlund Ab, *Soderhamn, Sweden*

The continuously rising demand for energy, with the ensuing increase of costs, has enforced a number of solutions to alternative energy recovery systems. The object of this project is to make a preliminary investigation of the possibilities of recovering energy from waste in an economical manner. The principal aim of this preliminary investigation is to study alternative solutions to the following problems in order to find out: whether pre-treatment is necessary in the case of feeding waste into the furnace; whether certain separation of iron from waste is necessary; whether the feeding air should be pre-heated or whether oxygen should be used; how to pre-heat the feeding air; whether clear gas or tarry gas should be separated in the case of unloading the furnace; various possibilities of combinations in the case of connection to a district heating plant;

Furthermore, the investigation will include an economic comparison with other systems on the market.

If the results of this preliminary investigation prove satisfactory, it will be followed up by a project concerning the development of a prototype plant for waste recovery.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0313, INVESTIGATION CONCERNING ENERGY CONSUMPTION IN STEEL AND METAL WORKS

R. HARDELL, Sikob Ab, *Sollentuna, Sweden*

By analysing the energy consumption of steel and metal works, this project aims at finding ways and means on which to base R&D efforts that will allow better utilization of energy within this branch of industry. The following efforts have been planned for the next phase: A. An analysis of the energy consumption of three more works, largely according to the present plans. The development of methods is envisaged to be completed hereby, and it should be possible to present methods that are generally applicable. B. A follow-up of the analysis accomplished at Granges Oxelosunds Jernverk. Evaluations of present proposals for better utilization of energy are to be made. A proposal as to what measures to take will be submitted, including an estimate of costs. C. Generally applicable methods for recovering secondary heat will be studied, for instance by getting in touch with companies in this branch of industry. Possibilities of applying already known techniques for heat recovery will be investigated. The necessity for R&D efforts with regard to untested techniques will be studied.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0314, CHOICE OF HEATING SYSTEM - A PRELIMINARY STUDY

T. ROSENTHAL, Dalab Installationsberakn. Ab, *Solna, Sweden*

The purpose of this preliminary study is to investigate whether any significant differences can be calculated in energy consumption between various heating systems for dwellings. A project will be implemented completely theoretically through calculations using the building research computer program BRIS.

SUPPORTED BY Sweden - Council for Building Research

8.0315, GUIDELINES FOR CONTROLLING AIR VOLUMES IN VENTILATION PLANTS

C. NAUMBURG, Theorells Kontroll Ab, *Solna, Sweden*

This project consists of processing the guidelines drawn up by S. Myklebost, Norwegian Building Research Institute (NBI) within the framework for the Nordic Ventilation Group (NVG).

The processing aims at adapting the original to Swedish conditions and nomenclature. It is proposed that the report should, like several other reports drawn up within NVG, be published in the form of Bulletins from the National Swedish Institute for Building Research.

SUPPORTED BY Sweden - Council for Building Research

8.0316, COSTS FOR ADJUSTING THE AIR FLOWS IN VENTILATION PLANTS

C. NAUMBURG, Theorells Kontroll Ab, *Solna, Sweden*

Guidelines for adjusting the air flows in ventilation plants, drawn up within the Nordic Ventilation Group (NVG), are presented in Bulletin 3:1976 published by the National Swedish Institute for Building Research.

Adjustment work carried out in accordance with these guidelines entails increased costs and takes time. Consequently, NVG has decided that the consequences involved should be mapped out in more detail in each country.

SUPPORTED BY Sweden - Council for Building Research

8.0317, DEVELOPMENT OF THERMAL FOIL

R. COLLIN, Ab Takvarme, *Solna 2, Sweden*

AB Takvarme is a Swedish company which produces and markets a system for heating buildings, where the heat-generator is a metallic foil fitted to the ceiling. The foil itself is heated through connection to the ordinary mains of the building, and the building is heated by the radiation emitted from the foil. The energy consumption of this system is 15-20% lower than that of

conventional systems with radiators. Installation costs for an ordinary house are, however, at present somewhat higher than those associated with systems with electric radiators, primarily owing to the fact that the volume of production does not yet allow utilization of automated production.

The higher installation costs are an obstacle to a rapid change-over to this heating method. One way of reducing these is the development of a less expensive metallic foil than the one used today. The object of the project is therefore to find a foil which is based on inexpensive materials and will produce about the same power, at the same working temperatures, as does the foil used today.

Development work is done in collaboration with the Department for Heat and Furnace Technology, the Royal Institute of Technology, and the Institute for Metal Research, Stockholm.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0318, EXPERIMENTS CONCERNING HEAT RECOVERY FROM A RESTAURANT KITCHEN

Y. LINDBLAD, Y. Lindblads Kons. Ing. Byra, *Spanga*, *Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0319, EMA 333 - A SYSTEM FOR HEATING SMALL HOUSES

B. TREHN, Carl & Bengt Trehn & Partners, *Stjarnhov*, *Sweden*

The object of the project is a preparatory study in order to make an assessment and evaluation of the system, with particular stress on durability and operation, including requirement specifications of the system as a whole, and the relations between different system elements, as well as standards and data of the technical supply system and its products. construction of a small house, where the system is fully developed (a prototype house).

ADDENDA: Performing organization: Carl & Bengt Trehn, Kommanditbolag.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0320, SOURCE MATERIAL FOR PFE 78 (BASIC DOCUMENT FOR SWEDISH ENERGY R&D PROGRAM 1978-1981) SUBPROGRAM 01 - EXTERNAL SUPPLY SYSTEMS

H. GEDUNG, Angpanneforeningen, *Stockholm*, *Sweden*

To produce source material for PFE 78 (energy-policy decision 1978) concerning the subprogram 'external supply systems' in accordance with the directives issued by DFE (Energy R&D Commission) 1976-06-30.

SUPPORTED BY Sweden - Council for Building Research

8.0321, METHOD FOR EVALUATING ENERGY CONSERVING MEASURES IN BUILDINGS

J.E. JONSSON, Arne Johnsson Ingenjorsbyra Ab, *Stockholm*, *Sweden*

This project aims at drawing up a method which will increase the possibilities for selecting the correct energy conserving measures in buildings from a number of conceivable measures of this type.

General and complete cost relationships for various operations and additions of an energy conserving nature will be drawn up. Relationships will be drawn up describing how the costs vary when, for example, the interest rate, energy costs and certain local conditions are changed. The results will be compiled in simple charts with the aid of which the profitability of a given measure in a given situation can be assessed with a very small work contribution.

Examples of combinations of improvement measures in older properties will be drawn up with the aid of the evaluation model for certain values for energy cost forecast, interest rates, and investment level.

The research work will be carried out in collaboration with a reference group in the National Board of Public Building. This collaboration will be linked to an ongoing development project. The results obtained from this project will be utilized directly in the research work described here.

SUPPORTED BY Sweden - Council for Building Research

8.0322, AN ATTEMPT AT SYSTEMATIC EXPERIENCE FEEDBACK IN CONJUNCTION WITH SEMINAR ACTIVITIES

U. RENGHOLT, Assn. of Heating Engineers, *Stockholm*, *Sweden*

In order to promote and develop experience feedback within the heating, ventilation and sanitation sector, the Swedish Association of Heating and Ventilating Engineers intends to improve and systematize the information which is generated or processed within the activities of the Association. The aim is to collect experience from members and their activities in a more systematic manner, to process, analyze and compile these results, to present them in the form of compilations of experience for functionally associated system parts and to publish the more important results via the various publication channels of the Association. This process will take place by stages.

The project embraces experimental activities at seminars connected with the annual meeting of the Association. The grant refers to the extra work which the attempt at systematized experience feedback entails.

SUPPORTED BY Sweden - Council for Building Research

8.0323, FOLLOWING UP AND REVISING 'R&D PROGRAM CONCERNING MUNICIPAL ENERGY PLANNING AND ITS RELATIONSHIP WITH PHYSICAL COMMUNAL PLANNING'

K.E. TENGROTH, Assn. of Local Authorities, *Stockholm*, *Sweden*

This project refers to following up and revising the Swedish Council for Building Research 'R&D program concerning municipal energy planning and its relationship with physical communal planning.'

The work embraces: 1. Checking the program with regard to on-going and planned projects. 2. Proposals for new projects. 3. Defining demarcations vis-a-vis allied R&D programs. 4. Initiating the development and research work within the program field.

This work will result in a development and investment plan which can be included in PFE 78 (Basic document for Swedish Energy R&D Programme 1978-1981). The presentation will be adapted to the directives in force for PFE 78.

SUPPORTED BY Sweden - Council for Building Research

8.0324, AN INVENTORY OF ENERGY CONSERVATION MEASURES WHICH HAVE BEEN CARRIED OUT IN THE ENGINEERING INDUSTRY

T. WAHLBERG, Assn. of Metallurgical Indust., *Stockholm*, *Sweden*

A questionnaire investigation has been carried out as has an interview series with a follow-up of energy conservation measures at a number of representative companies within the engineering industry.

The project has been extended due to the fact that the questionnaire provided so much interesting data that the interview work has become more extensive than planned. In addition, certain standard values must be produced concerning general costs for heating, ventilation etc.

SUPPORTED BY Sweden - Council for Building Research

8.0325, PROGRAM WORK FOR ENERGY RESEARCH CONCERNING BUILDING CONTRACTS

G. OLOFGORS, Council of Building Research, *Stockholm*, *Sweden*

A delegated survey of current energy R & D requirements and accessible R & D environments must be carried out in the field of contracts. The main line of approach for this survey is dealt with the following the points, amongst others, in the EPK Committee Report:

In the house building sector, the drying out of building carcasses with the wet building methods which dominate today,

requires considerable amounts of energy. There are several lines of approach here for R & D projects. In addition to contributions towards directly improving the efficiency of the drying-out process, analyses of the energy requirements of various building methods are also required to design solutions which can reduce the energy requirements to a noticeable degree. The need for year-round construction, desirable from both employment and economic view points, is also connected to the energy requirements for drying out. Bearing such needs in mind, the planning process can be used as a point of departure for finding totally different possibilities for reducing the energy consumption, mainly redistributing the various phases in the building process throughout the year and redistributing the working hours.

In the construction sector, which is markedly more machine-intensive than the house building sector, the operation of the machines is responsible for most of the energy consumption. The most obvious measure is to reduce the energy consumption by reducing the consumption of machine hours in the production methods, such as excavation hauls and transport work, which are extensive in construction work. Projects of this type may entail the development of refined computer programs for controlling the work cycle.

SUPPORTED BY Sweden - Council for Building Research

8.0326, BIOLOGICAL PULP

K.E. ERIKSSON, Forest Products Research Lab, *Stockholm, Sweden*

The aim of this project is to affect white root fungi by genetic or other means in order that they may eliminate part of the lignin out of wood chips while the chips are still stored. The biological pulp obtained in this manner can then be submitted to the normal mechanical processing or boiling. The consumption of milling energy as well as chemicals is hereby expected to be less than usual.

To achieve this, a bench-type compost apparatus is being constructed which will allow chips processing on a 2-3 kg scale by means of new and old white-root mutants and controlled wood degradation.

New fungi suitable for biological pulp production will be developed and tested with regard to int. al. optimum growth conditions and ability to delignify and defiber various types of wood. Studies will include tests concerning controlled fiber separation as well as microscopic examinations.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0327, OPTIMUM STRATEGY FOR ENERGY-ECONOMICAL DEFIBERING AND BEATING OF WOOD CHIPS AND PULP WITHIN FOREST INDUSTRY

C. FELLERS, Forest Products Research Lab, *Stockholm, Sweden*

The defibering and beating of a fibre bundle will be simulated in vibrator where the sample concerned is run through a well-defined load test. Primarily four different loads: pure shearing, bending, tension, and compression are to be examined. The amplitude and frequency range of the load will be varied within wide intervals. This is to show what effect different material parameters (fibre orientation, yield, manufacturing processes) and environment have on the energy absorption of the sample and on the breaking process. This breaking process will be characterized by use of an electron miroscope.

Tests already carried out indicate that improvement of defibering efficiency and increase of bonding capacity will allow the yield limit of the sulphate process to be extended. It would seem at present that the most realistic way of meeting these demands is to change or modify the defibering and beating technique.

The project outlined above will provide the necessary information on which to base such measures. Besides achieving the specific purpose of reducing the power consumption of defibering and beating processes, this investigation will extend substantially our general knowledge of the defibering process itself, which will be of great importance to the TMP-field and also to high-concentration beating.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0328, DEVELOPMENT OF CONTROL SYSTEMS FOR MORE EFFICIENT UTILIZATION OF ENERGY WITHIN THE PULP AND PAPER INDUSTRY

V. KAUL, Forest Products Research Lab, *Stockholm, Sweden*

The project aims at developing control systems which will allow more efficient utilization of energy (including secondary heat) within the pulp and paper industry. Particular consideration is given to the techno-economic balance between energy and other important factors from the viewpoint of production - primarily the volume of production and environmental protection. The project will also result in methods for rational evaluation of potential improvements for energy saving purposes in different process steps.

The project will lead to the development of planning and control methods which should be applicable even within other process industries.

The results of the project should be applicable, where existing plants are concerned, fairly soon after the conclusion of the project.

The problem of coordinating mill operations, which the project is to deal with, is complicated and may be divided into two aspects. One aspect is to find operational methods which will allow efficient long-term utilization of energy. The other aspect of the problem is to find operational methods which in the short term will reduce energy losses when disturbances and other sudden interruptions of the production process occur.

Work is done in collaboration with a reference plant.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0329, ENERGY RESEARCH FOR SWEDISH FIBER BUILDING BOARD INDUSTRY

S. NORDIN, Forest Products Research Lab, *Stockholm, Sweden*

Manufacture of fiber building board and the corresponding process machines is an industry of considerable importance to Sweden and Swedish export. By measuring the energy balances of various process elements when manufacturing hardboard, medium density fiber building board, and insulating board, this investigation intends to provide a decision basis for energy-economical measures.

The effect of certain process variables on the energy balances of process elements is to be studied. Certain new process technique for saving energy is to be tested in this connection, especially where manufacture of insulating board is concerned.

The project involves a surveying pilot study of energy saving measures within the field concerned.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0330, DECREASE OF ENERGY CONSUMPTION WITH RESPECT TO MODIFIED BLEACHING SEQUENCES FOR CHEMICAL PULP

A. TEDER, Forest Products Research Lab, *Stockholm, Sweden*

Earlier studies of energy consumption have concentrated on direct use of electrical energy and steam in conventional bleaching plants. In the closed bleach plant of the future, with new bleaching equipment, conditions might be different, an aspect which is to be investigated. Furthermore, regard is to be had to energy consumed in production of bleaching chemicals and destruction of bleach plant waste liquors, as well as to the effect of unbleached mass lignin content on the total energy balance of the factory.

The project is primarily an investigation where, to a large extent, a computer is to be used in connection with energy balance calculations, etc.

The objective of the project is to carry out an energy analysis of various new processes and to make modification of product demands with respect to bleaching of chemical pulp (sulphate pulp). The project also aims at indicating bleaching processes and bleaching sequences optimized in point of energy.

The results of the project will be of great value to forest industry, especially where production of bleached chemical pulp is concerned, as well as to manufacturers of bleaching equipment. Furthermore, the results may well be applicable also to other process element techniques within pulp industry.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0331, THE FUNCTION AND SIGNIFICANCE OF THERMOSTATIC VALVES FOR ENERGY CONSUMPTION IN BLOCKS OF FLATS

L. JENSEN, H S B S Riksforbund, *Stockholm, Sweden*

The object of this project is to investigate thermostatic valves for hot water radiators in blocks of flats.

The project is broken down into two main parts. Part I refers to investigations of function of various brands of thermostatic valves. The control properties of the valves will be investigated in a laboratory at the Lund University of Technology under various conditions, e.g., with additional heat in the room, with varying inlet temperatures, pressure drops, radiator sizes, etc.

Part II refers to the measurement of the energy consumption required for heating dwelling houses using, on the one hand, thermostatic valves and, on the other, conventional, manually controlled radiator valves. In five identical blocks of flats in Landskrona, all with the same climatic conditions, thermostatic valves will be installed in three blocks with a total of 150 flats while two blocks, with a total of 100 flats, will be used as reference objects. Heat volume indicators will be installed for the heating systems in the two groups. The premises will be adjusted before the tests are started.

The users' opinions on the heating standard under the various conditions will be collected by means of interviews.

SUPPORTED BY Sweden - Council for Building Research

8.0332, CONSUMPTION OF WATER IN FLATS WITH AND WITHOUT INDIVIDUAL HOT-WATER METERING

S. NILSSON, H S B S Riksforbund, *Stockholm, Sweden*

Multi-family houses in Sweden usualy pay for hot water without regard for the individual consumption in each flat. In other words, the users have no direct personal advantage from saving water. A considerable proportion of the energy consumption of the flats derives, however, from the production of hot water.

The objective for this research project is to map out thecold-water and hot-water consumption in flats in conjunction with collective and individual charges respectively for the hot water. The project will be carried out by installing hot-water meters in 3 housing areas of different character, a 3-storey house with tenant-owner flats, a high-rise house with rented flats and tenant-owner detached houses and row houses. All in all, the consumption is measured in 456 dwelling units.

At the same time, the total cold-water and hot-water consumption is measured in three extremely similar reference areas without individual charges.

The measurements are carried out in the Gothenburg area and will continue during an 18 month period.

Bearing in mind the marked increase in energy costs during recent years and the high water costs, the results of this project will be of considerable value for all housing administrations in Sweden and for state and municipal authorities engaged in these issues.

SUPPORTED BY Sweden - Council for Building Research

8.0333, THE FUNCTION AND SIGNIFICANCE OF THERMOSTATIC VALVES FOR ENERGY CONSUMPTION IN MULTI-FAMILY HOUSES, STAGE 2

S. NILSSON, H S B S Riksforbund, *Stockholm, Sweden*

Stage 2 refers to the measurement of the energy consumption used for heating in multi-family houses, partly with thermostatic valves and partly with conventional manually controlled radiator valves. Thermostatic valves are installed in three out of five blocks of flats in Landskrona. The other two blocks are used as reference objects.

Heat quantity meters for the heating system are installed for all five blocks. In addition, the water quantity for radiator systems, the supply temperature, the return temperature, the mean value for the exhaust air temperature and the room temperature in a representative flat in each group are measured. The outdoor temperature, the solar radiation and wind velocity are also measured. Readings will take place once an hour and will be recorded in the measurement centre at LTH (Lund Institute of Technology) via the telephone network. The opinion of the users on the heating standard under various conditions will be collected by means of interviews and investigations.

SUPPORTED BY Sweden - Council for Building Research

8.0334, STUDY OF THE PREREQUISITES FOR INVESTIGATING THE EFFECTS OF THE STATE GRANT FOR ENERGY CONSERVATION MEASURES IN RESIDENTIAL BUILDINGS

S. BJORKLOF, Hospital Planning Institute, *Stockholm, Sweden*

This preliminary study aims at charting out the statistics bases basic material and compilations - for investigating the possibilities of measuring the effects of the state grants for energy conservation measures in residential buildings. The report is intended to contain: 1) An evaluation of the usability of the existing material for a larger investigation and, if necessary a proposal for improving coming source material. 2) A proposal for organizing a continued study. 3) An elucidation of a number of measurement problems as a prelude to a further study. 4) An overall cost estimate of a follow-up of this type. The preliminary study, which is estimated to be concluded in two months, is to be directed by a project leader together with a research worker with a knowledge of statistics. Technical experts will also be used. number of authorities and other institutions will be visited.

SUPPORTED BY Sweden - Council for Building Research

8.0335, LOW-TEMPERATURE SYSTEMS (70 DEGREES C - 50 DEGREES C) IN EXISTING BUILDINGS

E. WAHLMAN, Hugo Theorells Ingeniorsbyra, *Stockholm, Sweden*

A technical-economic investigation of the possibilities for utilizing low-temperature (approx. 50 - 70 degrees C) waste heat for space heating and for heating domestic hot water in existing buildings.

The intention is to investigate whether existing buildings of varying ages, building types and standards, including both multi-family houses and detached one-family houses, have excessively dimensioned heating systems.

In the case of systems which are not over-dimensioned, the investigation is aimed at establishing the additional power and energy required at available waste heat temperatures of, for example, 70 degrees C and 50 degrees C respectively. Which method should be used for additional heating? Should this take place locally in each room, building, peak heating centre or at the waste heat production unit?

A cost estimate will be made of the various possibilities and the operational cost and profitability will be assessed.

SUPPORTED BY Sweden - Council for Building Research

8.0336, CONNECTION BETWEEN SOLIDIFICATION STRUCTURE, COLD-WORKING PROPERTY, AND FINAL PROPERTIES OF COPPER

R. SUNDBERG, Iron Masters Association, *Stockholm, Sweden*

PROGRAM: Energy Utilization in Industrial Processes.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0337, TRANSPORT STRUCTURE AND REGIONAL ORGANIZATION

M. ENGSTROM, Nordic Inst. Urban & Reg. Plan, *Stockholm, Sweden*

OBJECTIVE: To investigate the possibilities of adapting (in the short run) the interregional passenger and freight transport to shortage of fuel in periods of energy crises in the near future.

APPROACH: The main issue is to collect and organize basic data in this specific field. The data involves figures of the transport work of different means of transportation, cabin factors, load factors, cross transportation, empty haulage transports, parallel transportation, capacity, availability, etc. By modelling alternative organizational changes in the system of transportation, different measures to save energy are investigated.

The study is coordinated with the Transport Research Delegation's project number 75/76-82.

INTENDED USE OF RESULTS: A base for decisions how to meet energy crises in the transportation field without any serious damages in other sectors of the society.

SUPPORTED BY Sweden - Transport Research Delegation - Stockholm

8.0338, LOCATION OF LEAKS IN HEATING PIPES LAID IN CULVERTS

R. STENBERG, Orrje & Co. Scandiaconsult, *Stockholm, Sweden*

A survey of present technique and equipment for the location of leaks in heating pipes laid in culverts. Investigation of the possibilities of improving this technique and applying other methods, e.g. the use of temperature difference probes. Practical tests with such methods. If it is found necessary, planning of development work for new appliances is also envisaged.

SUPPORTED BY Sweden - Council for Building Research

8.0339, PROGRAM INVESTIGATION, DEVELOPMENT AND INVESTMENT PLAN FOR R AND D IN THE FIELD OF CLIMATIZATION PRINCIPLES FOR BUILDING SYSTEMS

D. SODERGREN, P. Petersson Konstruktionsbyra, *Stockholm, Sweden*

The reduction in heat consumption in buildings which is the aim of the present energy policy should, in the case of new buildings, result in such modest heat losses that a deficit will occur in the heat balance during a very limited number of hours each year. When a room is used, the involuntary heat emission from occupants and from electric energy should more than compensate the heat losses through walls and windows. The possibility of controlling the room temperature by means of a heating element will then become limited. There is, consequently, every reason to seek other methods for controlling the room temperature and an obvious choice is to use the air as a heat carrier for both supply and removal of heat. An air flow through the room is, in any case, required for hygienic reasons.

This research project aims at mapping out the R & D requirements in the field mentioned and the specification of sub-objectives and final results in the form of a development plan.

SUPPORTED BY Sweden - Council for Building Research

8.0340, R & D PROGRAM STUDY - CLIMATE HYGIENE (FOLLOW-UP)

D. SODERGREN, P. Petersson Konstruktionsbyra, *Stockholm, Sweden*

This application refers to work involved in following up the project for a program study which was concluded in January 1976.

The work includes adjusting the research program so as to take the comments and replies received into consideration, drawing up an investment plan, collaborating with BFR and DFE regarding the design and presentation of the program, etc.

SUPPORTED BY Sweden - Council for Building Research

8.0341, SOURCE MATERIAL FOR PFE 78 (BASIC DOCUMENT FOR SWEDISH ENERGY R&D PROGRAMME 1978-1981) SUBPROGRAM 11 - CLIMATE REQUIREMENTS

D. SODERGREN, P. Petersson Konstruktionsbyra, *Stockholm, Sweden*

To produce source material for PFE 78 (energy-policy decision 1978) concerning the subprogram 'climate requirements' in accordance with the directives issued by DFE (Energy R&D Commission) 1976-06-30.

SUPPORTED BY Sweden - Council for Building Research

8.0342, SEASONAL AND CLIMATIC VARIATIONS IN THE ENERGY CONSUMPTION OF INDUSTRY

L. SJUNNESSON, Steam Users Association, *Stockholm, Sweden*

For statistical purposes, methods for correcting the energy demand of residential and office buildings, with regard to climatic variations, have been available for a long time. There is, however, no such method where the energy demand of industries is concerned.

It is therefore urgent to find out whether it is possible to produce such a method, for one thing because it would allow a fair distribution of oil to the country and to the respective industries in case of rationing.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0343, THE DEMAND FOR ENERGY FOR HEATING DWELLINGS

K.G. MALER, Stockholm School of Economics, Economic Research Institute, *Stockholm, Sweden*

This project aims at collecting the data required for numerically formulating a model of linear programming type which describes the selection of heating systems in the housing stock. This model will be included as a component in a larger model which will be used for related forecasts for a development of the Swedish energy system up until 2000 A.D.

SUPPORTED BY Sweden - Council for Building Research

8.0344, ENERGY SAVING THROUGH IMPROVED DEWATERING IN PULP AND PAPER MANUFACTURE

K. ROBERTS, Surface Chemistry Institute, *Stockholm, Sweden*

The increase of energy costs has heightened awareness of the necessity for energy economy. Among the energy requiring processes in the forest products industries, is the drying of pulp and paper sheets after passing through the press rollers. If the dry matter content of the incoming sheets is increased by 5% (from 25 to 30%), energy savings corresponding to about 50 kg oil/ton paper will be achieved. Difficulties associated with dewatering depend to a considerable degree on the increased concentration of dissolved pollutants in the backwater systems.

Preliminary investigations indicate that dewatering difficulties can be reduced by adding cationic polymers. At the Swedish Institute for Surface Chemistry, studies concerning the effect of cationic polymers on dewatering of biological sludge show that disolved and colloidal compounds contained in the sludge play an important role. These observations have proved useful for the purposes of determining optimized proportions and selecting a suitable polymer for a certain kind of sludge.

This project aims at using similar techniques, in order to study, in 'realistic environment', reactions between cationic polymers and dissolved compounds contained in forest-industry backwaters (e.g. lignin sulphonates, resin acids, fatty acids, xylan).

The results of the project are expected to allow optimization of both the dosage and type of polymer to be added for effective dewatering on the paper-machine, with preservation of good formation.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0345, PROGRAM STUDY, PART 2 - PILOT HOUSE FOR COORDINATED R AND D CONCERNING LOW-ENERGY HOUSES

N.E. LINDSKOUG, Sven Tyren Ab, *Stockholm, Sweden*

PURPOSE: To make a concrete application of the previously presented system (with project number 760338-3) for implementing tests using low-energy houses.

SUPPORTED BY Sweden - Council for Building Research

8.0346, ENERGY FORECAST STUDIES

N.E. LINDSKOUG, Sven Tyren Ab, *Stockholm, Sweden*

This application is herewith presented at the suggestion of Stefan Sandesten, research secretary. The application refers to calculations of forecast alternatives for energy supply for indoor comfort purposes and for households on the basis of the work carried out by us for the energy forecast commission.

SUPPORTED BY Sweden - Council for Building Research

8.0347, PREPARATORY WORK FOR A PILOT HOUSE PROJECT AT TABY

N.E. LINDSKOUG, Sven Tyren Ab, *Stockholm, Sweden*

The program work for 'Pilot house for coordinated research on low-energy houses' will, if a project is to be implemented, be followed by period of organizational work. This work will mainly consist of the following questions: 1. Change of plans towards a smaller number of pilot house versions with more replicas. 2. Contacts with the services industry in Sweden with a view to their participating in the design work, and the cost and operational estimates. 3. The question of guarantees to the purchaser. 4. Following up questions related to measurements in the preliminary design stage.

SUPPORTED BY Sweden - Council for Building Research

8.0348, THE AIRTIGHTNESS OF BUILDINGS

P.O. NYLUND, Sven Tyren Ab, *Stockholm, Sweden*

A considerable quantity of data for the airtightness of building components is available. Draft standards have been drawn up but are not generally accepted. As far as is known, airtightness has not been correlated to observed involuntary ventilation. Tight houses provide long-term (2000 A.D.) possibilities for gain on the order of SKr 1,000 000,000 per year. The step to heat recovery ventilation systems for dwellings provides further possibilities for gains of the same size. However, tight dwellings comprise a prerequisite for this. The next step is advanced program control of the indoor climate, which also provides a savings potential of roughly the same order but which also requires tight houses and (preferably) supply air.

Case studies in which tightening technology - field tests and laboratory measurements using a guarded box with gas analysis - requirement levels - purchasing regulations are studied should, combined with a compilation of the literature, provide an essential addition to knowledge in this important matter. There are strong indications that an efficient tightening technology is already available.

The collaboration between an institute of technology and a large firm of consultants, both of which have long experience of these problems, provides excellent conditions for practically useable results.

SUPPORTED BY Sweden - Council for Building Research

8.0349, AIRTIGHTNESS IN BUILDINGS

P.O. NYLUND, Sven Tyren Ab, *Stockholm, Sweden*

A considerable quantity of data for the airtightness of building components is available. Draft standards have been drawn up but are not generally accepted. As far as is known, airtightness has not been correlated to observed involuntary ventilation. Tight houses provide long-term (2000 A.D.) possibilities for gain on the order of SKr 1,000 000,000 per year. The step to heat recovery ventilation systems for dwellings provides further possibilities for gains of the same size. However, tight dwellings comprise a prerequisite for this. The next step is advanced program control of the indoor climate, which also provides a savings potential of roughly the same order but which also requires tight houses and (preferably) supply air.

Case studies in which tightening technology - field tests and laboratory measurements using a guarded box with gas analysis - requirement levels - purchasing regulations are studied should, combined with a compilation of the literature, provide an essential addition to knowledge in this important matter. There are strong indications that an efficient tightening technology is already available.

SUPPORTED BY Sweden - Council for Building Research

8.0350, THE ENERGY PROFILE OF BUILDING PRODUCTION

S. JACOBSSON, Svenska Byggnadsentreprenorf., *Stockholm, Sweden*

This project aims at analyzing the energy consumption on building sites, at mapping out the effects of various practical measures on the energy consumption in the construction stage so as to reduce this consumption and improve energy conservation.

Some 40 building sites - multi-family houses, one-family houses, administrative buildings and simple industrial buildings - will be studied in depth during the period November-April. The buildings selected are concentrated to 7 localities with different climatic conditions (Malmo, Gothenburg, Stockholm, Malardalen, Sundsvall, Umea and Luela). An 'energy journal' will be kept for each site.

The site managers for the buildings selected will be brought together during the course of the project to discuss the energy consumption and possible energy saving measures based on the energy data collected.

The purpose is also to implement the energy conservation measures which are brought to light and to document their effects. Experiences and ideas from the various work groups will be distributed to all of the groups through project coordination measures.

SUPPORTED BY Sweden - Council for Building Research

8.0351, ENERGY TECHNICAL PILOT STUDIES WITHIN THE WOOD, PAPER, AND PULP FIELD

G. LUTHMAN, Swedish Inst. of Technology, *Stockholm, Sweden*

The project will give surveys of important fields of activities within the forest industry and indicate problems or possibilities on which R & D efforts should be centered. The objectives are to contribute to better energy economy and to specify the measures which should be taken.

APPROACH: Energy studies concerning: 1. Applications of steam, gas turbines and distribution of distant heating. 2. Closed systems for pulp mills, particularly bleaching and oxygen cooking. 3. Milling and beating. 4. Biological methods for production of pulp.

Work has resulted in the fulfillment of a number of research projects and also made clear that certain fields of activities are for the present of minor importance from the viewpoint of energy. Furthermore, another survey concerning energy economical production of pulp has been included in investigation work.

The results of the project are expected to prove valuable for the forest industry, both from the short and long-term angle. The outline of the various prospects will form the basis of product-oriented development efforts. Other STU-supported projects have been initiated in the course of investigation work.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0352, ENERGY-ECONOMICAL PULP PRODUCTION

G. LUTHMAN, Swedish Inst. of Technology, *Stockholm, Sweden*

The aim of this investigation is to evaluate, co-ordinate, and make plans for energy savings by use of more rational technical processes for defibering part of mechanical pulp production, and later also for chemical pulp production.

Analyses and plans are made in close contact with the project 76-3221 and with the aid of the same reference and steering group.

Investigation work is well under way and a final report is expected about March 1, 1977.

The results are likely to affect the development of forest-industry processes, the result being better energy economy. The project is expected to lead to development efforts in fields where technical applications demand more profound awarness.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0353, IMPROVEMENT OF THE EFFICIENCY OF REFRIGERATING MACHINES
S. NILSSON, Technology Innovation Inst., *Stockholm, Sweden*
ADDENDA: Performing organization: Inst. for Innovationsteknik.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0354, ENERGY SUPPLY OPTIONS IN A LONG-TERM PERSPECTIVE - INDOOR COMFORT, STAGE 1 AND STAGE 2 (PART)
N.E. LINDSKOUG, Tyrena Foretagsgrupp Ab, *Stockholm, Sweden*

This project refers to energy forecast studies aimed at the turn of the century. Four completely different types of supply using primary energy will be studied. The part of the study covered by this application concerns dwellings and premises of all types. The main task is to adapt ongoing parallel studies to the framework for the present study. (The Energy R&D Commission).

SUPPORTED BY Sweden - Council for Building Research

8.0355, THE INDUSTRIAL BUILDING STOCK AND ENERGY CONSUMPTION FOR CLIMATE CONDITIONING
N.E. LINDSKOUG, Naringsl. Energiforskn. Stift., *Stockholm 1, Sweden*

Just as the volume of premises used for general purposes was practically unknown before the energy conservation commission started work, the structure of the premises used in industry is, at present, practically totally unknown. Estimates indicate that approximately 20% of the energy consumption in industry may be for the heating and lighting of premises. The volume of premises can scarcely increase over a long period at the same rate as the production volume and energy consumption. The specific energy consumption for premises should rather show a declining trend. Consequently, the influence of the premises on the total energy consumption trend is marked and should be investigated.

This project is a first step towards a better knowledge of the premises used in industry. Questionnaires and interviews will be implemented during a short, intensive period with the aim of providing rough grading of the stock of premises in four main types with total volumes and principal characteristics with regard to energy.

SUPPORTED BY Sweden - Council for Building Research

8.0356, DESIGN OF ELECTRICAL PLANTS FROM THE ENERGY CONSERVATION POINT OF VIEW (CHARTING OUT R & D REQUIREMENTS)
G. KALL, Hans Hedlund & Co. Ab, *Stockholm 19, Sweden*

This research work aims at presenting a program for research and development in the field of 'Design of electric energy plants in premises from the energy conservation point of view.' By premises here is meant office buildings, hospitals, schools, industrial buildings, etc. The electric energy consumption in these premises constitutes a considerable part of the total energy consumption within the sector designated 'other buildings.'

The research work will embrace problem analysis and is intended to deal with the following areas amongst others: 1. A presentation of current design methods for electrical energy plants. 2. Requirements for planning material, aids and coordination. 3. Requirements for the development of methods regarding plant design and computer programming. 4. Possibilities for using other research within the subject field.

SUPPORTED BY Sweden - Council for Building Research

8.0357, ELECTRICITY CONSUMPTION CALCULATIONS - DIRECTIVES FOR CALCULATING ELECTRICITY CONSUMPTION IN BUILDINGS
G. KALL, Hans Hedlund & Co. Ab, *Stockholm 19, Sweden*

This research work aims at producing directives for carrying out electricity consumption calculations for energy conserving measures in buildings and embraces the following tasks: 1. Specification of reqirements on and objectives for electricity consumption calculations. 2. Selection of suitable calculation variables. 3. Presentation and calculation procedures. 4. Collection, processing and compilation of guide values for various calculation variables. 5. Presentation of type examples. 6. Proposal for supplementary energy measurements and method development.

SUPPORTED BY Sweden - Council for Building Research

8.0358, SPECIAL PROCESSING OF THE IDLA REGISTERS, STAGE 1 - ENERGY ISSUES
G. ROSBERG, Central Bureau of Statistics, *Stockholm 27, Sweden*

A special processing of the IDLA (integrated data processing of loan applications) registered for the years 1970-1975 with the aim of obtaining data for buildings of interest from the energy point of view. This source material is intended for use in conjunction with R and D planning in the energy sector and for possible continued studies. (questionnaire investigations).

SUPPORTED BY Sweden - Council for Building Research

8.0359, EFFECTS OF VARIOUS SYSTEMS FOR RATIONING OF FUELS USED IN TRANSPORTATION
P. BOHM, Univ. of Stockholm, *Stockholm 50, Sweden*

OBJECTIVE: This project aims at analysing the economics of various systems for rationing of transportation fuels during so-called peace-time crises. This being the case, interest is focused on the capabilities of the different rationing systems in the allocation of the reduced quantities of fuels to different ends in order to achieve an efficient allocation and a suitable welfare distribution in the new situation.

APPROACH: This problem will be analysed using economic theories such as welfare theory, theories of perfect and imperfect competition and so on.

INTENDED USE OF RESULTS: The analysis is meant to give a theoretical and empirical basis for formulating rules or criteria for decisions which the public authorities have to make when there is a risk of a crisis of this type.

SUPPORTED BY Sweden - Transport Research Delegation - Stockholm

8.0360, ECONOMIC CALCULATIONS FOR EVALUATING ENERGY CONSERVING MEASURES IN THE BUILDING SECTOR
J. SEIMER, Univ. of Stockholm, *Stockholm 50, Sweden*

This project deals partly with a questionnaire investigation where the actual behavior connected with the economic assessments in the field is mapped out and partly with a theoretic study where various technical-physical characteristics in various energy-conserving measures in the building sector are compared with preconditions and limitations associated with traditional economic assessment methods.

The result of these two project operations will comprise economic assessment methods which are well adapted to the building sector and which, in turn, will make more efficient energy conservation possible. In addition, a knowledge will be gained of the actual behavior associated with simpler economic assessments/priority allocations.

SUPPORTED BY Sweden - Council for Building Research

8.0361, PILOT HOUSE FOR PRACTICAL TESTING OF ENERGY CONSERVING HEAT SYSTEMS
H. BROSENIUS, Royal Institute of Technology, *Stockholm 70, Sweden*

This project aims at applying and testing a number of arrangements developed by Professor H. Brosenius on a laboratory scale for low-energy heating of one-family houses. These will be applied and tested in an inhabited one-family building and the project will be carried out in collaboration between the applicant and the project leader. These arrangements all aim at providing

flexibility in the heating system, i.e. the use of various energy forms without giving rise to investment expenses. An individual water accumulator in each one-family house will act as a collector for heat energy (electric energy, particularly low-tarriff nighttime electricity, oil heating, fuel heating, solar heating, etc).

The arrangements tested on laboratory scale include: 1) One accumulator which can be heated electrically in each house combined with a fuel-fired (in the long-term possibly connected to the district heating) boiler, common to up to ten one-family houses.

2) An insulation system for the distribution pipework between the joint boiler and the individual one-family houses. 3) Various accumulator designs aimed at promoting efficiency. 4) A number of different hot-water heating arrangements suitable for connection to the accumulator. 5) An arrangement for using the heat in the exhaust air. 6) Side-effects from 5.

The details of the various systems are presented in separate appendix and sub-appendices.

SUPPORTED BY Sweden - Council for Building Research

8.0362, HEAT PUMP PLANTS IN DWELLING HOUSES
J.A. BUBENKO, Royal Institute of Technology, *Stockholm 70, Sweden*

The purpose of this project is to map out the various factors which influence the design and application of heating systems in conjunction with the choice of heat pump plants. The problem will be studied from the following aspects: (1) energy conservation effects, (2) economy, (3) building engineering factors, (4) reliability, (5) operational maintenance.

The aim is that this research should result in a report on the present position concerning the use of heat pump plants in Sweden. A detailed program for research into questions concerning the use of heat pumps from the aspects mentioned above will be based on the results obtained through the studies and analyses of the existing material.

SUPPORTED BY Sweden - Council for Building Research

8.0363, THE INFLUENCE OF HEAT PUMP APPLICATIONS ON POWER SYSTEM PLANNING AND OPERATION
J.A. BUBENKO, Royal Institute of Technology, *Stockholm 70, Sweden*

SUMMARY OF PROJECT: The purpose of this project is to investigate the effects of heat pump application on a large scale in the electrical power system. The matters to be investigated in detail include the design of the distribution networks, the capacity of the production system and the need for primary sources of energy. In conjunction with this, it is necessary to map out the characteristics of heat pumps and their dependency on the external and internal climates and on the building construction. The simultaneity and superimposition of the heat pump load must also be investigated. A model which can simulated the electrical power and electrical energy requirements of the heat pump will be required for this investigation.

The present application refers to funds for mapping out and developing simulation models for a heat pump together with a control system and additional heat, models for the building and for the internal and external climates.

SUPPORTED BY Sweden - Council for Building Research

8.0364, CEILING HEATING - A CRITICAL COMPARISON WITH OTHER SYSTEMS FOR HEATING PREMISES
R. COLLIN, Royal Institute of Technology, *Stockholm 70, Sweden*

Heating premises by means of a large heating area with a low temperature and a low mass has a number of advantages compared with other types of heating systems. The purpose of the present investigation is partly to provide a critical comparison with conventional heating systems and partly to provide source material for further development of the system.

An existing mathematical model will be modified and verified through measurements in a test room. Comparisons with other systems can then take place through simulations using the model. In addition, a housing area will be followed up by means of measurements and by investigating how the inhabitants used their heating plants.

SUPPORTED BY Sweden - Council for Building Research

8.0365, STEEL WORKS OF THE FUTURE - A STUDY ON ENERGY
S. EKETORP, Royal Institute of Technology, *Stockholm 70, Sweden*

The study, which is to be regarded as Stage O in a development chain aimed at improving processes from the viewpoint of energy, will comprise a survey of combinations of problems, on which to base a project phase.

The principal objective is to assess potential energy savings as regards the production of different kinds of steel and to present solutions as to the ways and means of achieving such savings.

The result of the study will serve as a basis for a project phase, which in its turn will result in a project catalogue of desirable R & efforts.

The project has been concluded and a final report is available in English.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0366, STEEL WORKS OF THE FUTURE - A STUDY OF ENERGY
S. EKETORP, Royal Institute of Technology, *Stockholm 70, Sweden*

OBJECTIVE: To investigate possibilities of reducing the energy consumption of the iron and steel industry by means of new processes and process elements and by improvement of already existing processes. The complete project will embrace seven phases.

The objective of project phase 1 is to make a survey of the possibilities to reduce, through research and development, the energy consumption of the iron and steel industry. This survey should aim at finding within process technology, new processes and process elements that require less energy. Or, more precisely, the goal is to set up process chains involving processes and process elements, proposed within the framework of the project, as well as the best techniques available today. The project work also involves preparing of a list of R&D projects to be carried out, in order to make possible the realization of the processes and process elements concerned.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0367, PILOT STUDY CONCERNING THE PROCESS 'BAL', AN ENERGY-ECONOMICAL GAS PURIFYING PROCESS WITH A WIDE RANGE OF APPLICATION
P. HAGQVIST, Royal Institute of Technology, *Stockholm 70, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0368, ENERGY-SAVING WOOD CHIPS REFINING
N. HARTLER, Royal Institute of Technology, School of Chemical Engineering, *Stockholm 70, Sweden*

Within the forest industry there are a large number of energy intensive subprocesses. Mechanical processing in order to expose and make flexible separate cellulose fibres is part of a number of different production processes, like production of pulp for fibreboard manufacture, refining of wood chips to mechanical pulp, refining of partially boiled chips into semi-chemical pulp, refining of screened reject and beating of exposed fibres prior to paper manufacture.

These various applications represent the essential parts of pulp, paper and fibreboard manufactuue, and this mechanical processing is a most energy-demanding method. Thus 2,000 kwh/ton of pulp are consumed in a chips refining.

The object of the project is to find a technique for the mechanical processing of chips which is much more economica

in the use of energy, and still preserve functionally justified product properties.

Both theoretical calculations and experimental investigations to laboratory scale will be carried out.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0369, ENERGY RESEARCH AT THE SCHOOL OF ARCHITECTURE, ROYAL INSTITUTE OF TECHNOLOGY

B. HIDEMARK, Royal Institute of Technology, School of Architecture, *Stockholm 70, Sweden*

A prerequisite for energy conservation is that the results of R and D work within various disciplines be combined and applied to relevant buildings. Consequently, the School of Architecture defines its task as follows: 1. to design a research program which makes it possible to survey energy problems and to combine the efforts of researchers in various fields 2. to analyze and propose improvements in the utilization of energy in existing and planned buildings, to study the relationship between behavior patterns and energy consumption as a basis for designing and operating dwellings and work places 3. to carry out comprehensive analyses on a town planning level of various urban systems in order to test the demands made on natural resources and, in the last stage, on energy in a long-term perspective 4. to shed light on the social effects of various methods for energy conservation in the physical environment.

SUPPORTED BY Sweden - Council for Building Research

8.0370, PROGRAM STUDY ON ECOLOGY HOUSES WITH PARTICULAR EMPHASIS ON ENERGY MATTERS

B. HIDEMARK, Royal Institute of Technology, *Stockholm 70, Sweden*

Program study on ecology houses commissioned by the Swedish Council for Building Research, Energy Committee.

SUPPORTED BY Sweden - Council for Building Research

8.0371, SOURCE MATERIAL FOR PFE 78 (BASIC DOCUMENT FOR SWEDISH ENERGY R&D PROGRAM 1978-1981) SUBPROGRAM 12 - OTHER USER REQUIREMENTS

B. HIDEMARK, Royal Institute of Technology, School of Architecture, *Stockholm 70, Sweden*

To produce source material for PFE 78 (energy-policy decision 1978) concerning the subprogram 'other user requirements' in accordance with the directives issued by DFE (Energy R&D Commission) 1976-06-30.

SUPPORTED BY Sweden - Council for Building Research

8.0372, SYNTHESIS OF COMPLEXING AGENTS FOR THE EXTRACTION OF METAL IONS

S. HOGBERG, Royal Institute of Technology, Inst. of Organic Chemistry, *Stockholm 70, Sweden*

Liquid-liquid extraction can be envisaged to play a central role in the future of the hydrometallurgical exploitation of low-grade ores, the reclamation of scrap metal, the processing of industrial waste products, and the elimination of environmental pollution, specifically the removal of heavy metal ions from municipal and industrial wastewater. Today there exist only a few commercial metal ion specific reagents suitable for liquid-liquid extraction. However, they do not satisfy the particular requirements put forward by the Hymle project which is concerned with process development in the hydrometallurgical area, a project sponsored by the National Swedish Board for Technical Development.

A group of synthetic chemists is now being formed at the Royal Institute of Technology with the task of producing new reagents designed specially for the Hymle project.

The first assignment is to develop a reagent that would make it possible to separate zinc from iron in strongly acidic leach solutions containing sulfuric acid. If this urgent problem were solved, it would have substantial technological and economic consequences. In designing this 'tailor-made' reagent, maximum advantage will be taken of the differences in the co-ordination chemistry of the two metal ions. A reagent series that is considered to have the necessary properties is being developed.

The results of the project will be used in the process development for metal extraction from poor and/or complex raw materials.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0373, BUILDING AND SERVICES MEASURES FOR ENERGY CONSERVATION IN OLD BUILDINGS

I. HOGLUND, Royal Institute of Technology, *Stockholm 70, Sweden*

This project aims at establishing, by means of measurements, the energy consumption in an old building and at presenting the effects and profitability of various measures carried out on the building and on the services with a view to saving energy. The objective is also to study how various factors such as financing, cost coverage and rent charges affect decision-making in energy matters within a housing enterprise. 3-story slab buildings dating from the 1940's and located at Ulvsunda will comprise the object. The buildings are administered by AB Familjebostader in Stockholm. Preliminary calculations indicate that it should be possible to reduce the oil consumption considerably by means of various operation measures and measures carried out on the services as well as improvements in the thermal insulation of the building enclosures. It is estimated that the measurements will continue for two years and will cover three buildings together with the boiler plant.

SUPPORTED BY Sweden - Council for Building Research

8.0374, MEASURING CENTRE FOR ENERGY RESEARCH - A STUDY

I. HOGLUND, Royal Institute of Technology, *Stockholm 70, Sweden*

This project aims at providing source material for decisions for the construction of a measuring centre in accordance with the Riksdag decision of the spring 1975 in connection with energy conservation. An effort will be made to achieve collaboration with departments and institutions inside or outside the Royal Institute of Technology.

The long-term planning of the Department includes several R and D projects of a full-scale character. These are intended to shed light on various possibilities for conserving energy in buildings. The Department's resources for collecting measurement values and for data processing must be reinforced if the planned activities are to be carried out.

The planned measuring centre will consist of a central minicomputer or terminal and a number of measuring activities require measuring stations adapted to various measuring situations and the project is intended to shed light on the possibilities for building such measuring stations from a number of internally compatible basic units. This study will be carried out in collaboration with the Department of Electrical Measurements, which has considerable experience in this field.

The design of the entire system and the choice of central computer will be investigated in collaboration with the Computer Centre at the Royal Institute of Technology and the Department of Building Science at Lund University of Technology.

SUPPORTED BY Sweden - Council for Building Research

8.0375, POWER AND ENERGY REQUIREMENTS FOR CLIMATE CONDITIONING IN BUILDINGS

E. ISFALT, Royal Institute of Technology, *Stockholm 70, Sweden*

The general efforts to dampen energy consumption for climate conditioning in buildings must entail a change in the approach adapted in designing the services. Up until now, designs have been carried out on the 'safe side' and indoor climate requirements have been specified categorically. This has meant that the design has not given rise to any major problems but the consequences in practice have been excessively large power consumptions for rapidly controlling temperatures to a given value. Several investigations indicate that the margins can be considerably reduced and that less power can be used in a way which

harmonizes with the natural temperature variations of the building. This leads to the questions of how the requirements are to be modified and what risks for insufficient or excessive indoor temperatures are linked to various specifications of requirements. In order to be able to assess this, the nature of the climate must be studied in detail as must its influence on the building. A total view must be applied in order to survey the problems involved. Collaboration between meteorologists and heating engineers is essential.

SUPPORTED BY Sweden - Council for Building Research

8.0376, ENERGY ANALYSIS APPLIED TO THE SWEDISH TRANSPORTATION SYSTEM

I. KORDI, Royal Institute of Technology, *Stockholm 70, Sweden*

The aim of the project is to give a brief outline on the energy effectiveness of the Swedish transportation system. The objective of the first stage (preliminary study) is to develop and describe a useful method and to investigate the quality of available data. Information will also be gathered regarding international experiences of energy analysis.

SUPPORTED BY Sweden - Transport Research Delegation - Stockholm

8.0377, INVENTORY OF R&D PROJECTS CONCERNING THE MEASUREMENT OF ENERGY CONSUMPTION IN PILOT HOUSES

E. OFVERHOLM, Royal Institute of Technology, School of Architecture, *Stockholm 70, Sweden*

This application refers to the preparation of an CIB-S 17 meeting in Berlin in the autumn of 1977: Measurements of energy consumption by buildings.

The subject will be dealt with in two ways: A presentation will be made of pilot houses or other buildings in which energy consumption is studied, including a presentation of the measurement results.

The R&D methodology will be discussed with the emphasis on how measurement values from pilot houses can be analyzed and generalized.

SUPPORTED BY Sweden - Council for Building Research

8.0378, WORKING CLIMATES IN CONJUNCTION WITH HIGH AIR TEMPERATURES AND SIMULTANEOUS HIGH HEAT RADIATION - A LITERATURE STUDY

F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

Heat loads occur in many work places in Swedish industry. In order to be able to assess the affects of heat loads on human beings, heat indices have been drawn up. These indices do not, however, take intermittent, discontinuous and/or extremely marked heat exposures into account to any great extent. In order to be able to design suitable industrial ventilation systems and also to obtain an idea of the future energy use for climate conditioning in industrial premises, a knowledge of the effects which these climate factors have on human beings is essential.

It is proposed that a project which aims at studying the working climate in conjunction with high heat loads should be carried out within the framework for the long-term project at the Department. A literature study in the relative subject field providing a survey of the research position and providing source material for planning the coming project is, consequently, important.

SUPPORTED BY Sweden - Council for Buiiding Research

8.0379, INFORMATION

F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

In the energy norms issued by the National Swedish Board of Urban Planning, and which are intended for publication as a supplement to the Swedish Building Standards (SBN), the following regulations on the maximum acceptable (mean) values for buildings are included. The application of this norm concerning the U-values entails a number of problems, including the following: 1. The influence of the window ratio. 2. The influence of the shape of the building (optimum shape). 3. High-rise or low-rise buildings. 4. Heat emission from foundations.

In addition, the rules give rise to problems concerning energy requirements: 1. Solar radiation. 2. Calculation of annual energy requirements for buildings, etc.

The Department of Heating and Ventilation Engineering at the Royal Institute of Technology intends to arrange an Information Day, dealing with the issues mentioned above, in an attempt to provide increased information on the Department's work.

SUPPORTED BY Sweden - Council for Building Research

8.0380, ENERGY HANDBOOK I

F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

In the long-term program adopted on September 12, 1975 for the Department of Heating and Ventilation Engineering, a proposal for the production of an energy handbook has been included. The handbook is to be produced in several parts, the first of which should, according to the proposal, deal with problems connected with intermittent heating.

The energy gains to be made from adjusting the heat system for a building have been dealt with in several articles in the Swedish and foreign technical press. Energy gains which are greater than those possible in most cases are frequently given. This may well mislead consumers, particularly since the prerequisites for the gains involved are not specified with any great clarity.

The real gains with regard to the actual time constants of the building should be given in a simple manners in a (brief) handbook dealing with this matter.

SUPPORTED BY Sweden - Council for Building Research

8.0381, SOILING IN VENTILATION SYSTEMS

F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

Soiling in ventilation systems and ventilation system components means, in certain cases, impaired operational economy or reduced function. The National Board of Urban Planning has, in the draft for the Swedish Building Standards (SBN) 75, proposed that requirements be made on cleaning doors in exhaust air systems, etc. so that ventilation systems can be cleaned. The source material available for these requirements is not, however, sufficient to permit an assessment of, for example: 1. suitable cleaning intervals with regard to economy and function, 2. the dependency of soiling on various factors (the design, air velocities, dust contents, etc., of the system), 3. the influence of soiling on the air distribution in the system.

The purpose of this project is to produce source material of the type described.

SUPPORTED BY Sweden - Council for Building Research

8.0382, TIGHTNESS TESTING OF VENTILATION EQUIPMENT AND SITE-ASSEMBLED AIR CONDITIONING

F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

According to VVS-AMA 1972 (Swedish standard publication concerning heating, ventilating and sanitary engineering), ventilation equipment and site-assembled air conditioning units must be tightness tested. A curve specified in AMA also gives the highest permissible leakage. The AMA text and values have, in the main, been accepted as standards in Swedish Building Standards (SBN) 75, Chapter 52:21. In neither case has a testing method been specified or proposed.

Proposals for testing methods have been produced at the Department through the Department's collaboration within the Nordic Ventilation Group. In addition, a Czechoslovakian testing method is available. Before any of these testing methods are proposed for use, it is important that they be tested, for example, in a laboratory and that an evaluation of the measurement accuracy be made for the three methods.

SUPPORTED BY Sweden - Council for Building Research

8.0383, CHANGES IN DUCT TIGHTNESS
F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

Ventilation ducts are tightened against air leakage in a number of different ways. Some tightening methods may reduce the efficiency obtained in the use of the ducts. This entails increased costs per unit air treated and used. It also leads to reduced air flows and, consequently, impaired environment.

This project entails an investigation of the factors which affect the 'aging cycle' indicated above. An increased knowledge of the conditions connected with ventilation duct tightening and the durability of such tightening may also provide improved design material. Designs are calculated at present for a certain maximum leakage (in accordance with VVS-AMA (Swedish standard publication concerning heating, ventilating and sanitary engineering)) without regard to the changes in the leakage flows due to changes in temperature, moisture and sealants with time. The influence of these factors will be tested partly in the form of laboratory tests during a period of two years and partly in the form of field tests during a period of 3 years.

SUPPORTED BY Sweden - Council for Building Research

8.0384, LONG-TERM PROGRAM - LABORATORY PREMISES
F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

Taking over the National Swedish Institute for Building Research Laboratory at Fisksjoang in conjunction with moving the Department to Gavle.

SUPPORTED BY Sweden - Council for Building Research

8.0385, SOILING OF HEAT EXCHANGERS FOR RADIATORS AND VENTILATION AIR HEATERS
F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

Soiling of heat exchangers connected to district heating networks leads to reduced temperature drops and increased water flows on the hot water side. This leads, in turn, to increased operational costs.

In order to compensate for these undesirable effects of soiling, heat exchangers are designed with additional surface areas. The size of this addition has been investigated for heat exchangers intended for domestic hot water heating in a Swedish Council for Building Research (BFR) Report 'Soiling of heat exchangers for hot water heating'. The results of this investigation are not, however, directly applicable to heat exchangers for radiators and ventilation air heaters. Since these heat exchangers transfer energy quantities which are 3 to 4 times greater than those transferred in conjunction with hot-water heating, an investigation concerning the soiling of the heat exchangers would appear to be an important supplement to the previous investigation.

SUPPORTED BY Sweden - Council for Building Research

8.0386, RETURN AIR
F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

The use of return air in ventilation plants can mean considerable energy savings in a simple manner. The proportion of return air which can be permitted in various situations, e.g. in industrial premises (but also in offices etc. in which a certain proportion of return air is already used) has not yet been mapped out. In order to start work rapidly with a view to determining suitable or acceptable return air proportions, a preparatory study of the literature within this field should be carried out. This should be combined with calculations (rough estimates) so as to provide a basis for assessing the gains which can be made through increased return air used. It is proposed that the results of the literature study be presented at a symposium held at the Royal Institute of Technology during December 1976. This work has been included amongst the tasks which Nordiska kommitten for byggnadsbestammelser (Nordic Committee of Building Regulations) considers important to have studied in the near future.

SUPPORTED BY Sweden - Council for Building Research

8.0387, ENERGY ABSORPTION FROM WASTE WATER
F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

The energy in waste water comprises a sizeable part of the energy losses from a dwelling or block of dwellings. In the case of blocks of flats, this energy may comprise 30 percent of the energy requirements of the flats for heating, ventilation and hot water. The waste water has, however, a low temperature (approx. 30 degrees C). This does not provide advantageous conditions for the use of a heat exchanger. There are several ways of raising the temperature level, particularly in the secondary circuit in a heat-transfer plant which operates on waste water. A heat pump is an example of a temperature-raising device of this type. The device described in the present application is another. One of the disadvantages of heat pump plants for the purpose in question here is that the heat surfaces they have to work with quickly become soiled by the waste water. The soiling risk will be extremely low in the proposal presented here.

SUPPORTED BY Sweden - Council for Building Research

8.0388, THE INFLUENCE OF ALPHA VALUES ON ENERGY REQUIREMENTS FOR CLIMATE CONDITIONING
F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

In his thesis presented during 1975, Dr. Jan Wieczynski, Warsaw, dealt inter alia with the influence of alpha values (for walls) on room climate and cooling capacities. A comparison of the results arrived at in this thesis with the corresponding results calculated according to BRIS would be of considerable value.

SUPPORTED BY Sweden - Council for Building Research

8.0389, FENESTRATION WITH REGARD TO ENERGY CONSERVATION
F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

Various types of fenestration are studied with regard to climate and the use of energy within the framework for the new Building Norm (SBN-75). A practical and esthetic evaluation is also carried out for the alternatives which are most advantageous from the energy conservation point of view. This will make possible a better utilization of the fenestration area permitted in SBN-75 - an area which is considerably smaller than those used at present in our most common building types.

SUPPORTED BY Sweden - Council for Building Research

8.0390, THERMAL TRANSMITTANCE IN INTERNAL WALLS
F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

The thermal transmittance from one room to another in a building cannot be calculated with the aid of simple approximate formulae due to the fact that the internal walls have a more complicated thermal exchange with the room air, the external wall elements and surrounding rooms. A calculation of the actual thermal transmittance must be carried out with the aid of a computer. We propose that a number of calculations of this type be carried out, with reference to winter conditions when a steady state prevails, so as to map out the preconditions for heat measurement.

SUPPORTED BY Sweden - Council for Building Research

8.0391, SOURCE MATERIAL FOR PFE 78 (BASIC DOCUMENT FOR SWEDISH ENERGY R&D PROGRAM 1978-1981) SUBPROGRAM 02 - BUILDING & INTERNAL SUPPLY SYSTEMS
F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

To produce source material for PFE 78 (energy-policy decision 1978) concerning the subprogram 'building and internal

supply systems' in accordance with the directives issued by DFE (Energy R&D Commission) 1976-06-30.

SUPPORTED BY Sweden - Council for Building Research

8.0392, DIRECTIONAL OPERATIVE TEMPERATURE
K.P. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

The introduction of directional operative temperature - draft for Swedish Building Standards (SBN) 75 - means, inter alia: 1. the present U-values must be subjected to critical scrutiny; 2. the design basis for, inter alia, the choice of radiators; 3. economic consequences with regard to window types and window sizes etc. should be scrutinized.

In order to provide heating, ventilation and sanitation consultants in the field with a possibility of implementing the necessary designs etc. a manual should be drawn up. This project aims at producing such manual.

SUPPORTED BY Sweden - Council for Building Research

8.0393, USE OF STEAM JET PUMP FOR RECOVERING WASTE HEAT FROM DISTILLATION PROCESSES
F. SETTERWALL, Royal Institute of Technology, *Stockholm 70, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0394, HEAT PUMPS FOR THE EXISTING HOUSING STOCK - OPERATIONAL STUDIES
G. BERKOWICZ, Platzer Bygg Ab, *Sundbyberg, Sweden*

This project aims at following the operation of two heat pump plants installed in two multi-family houses under realistic conditions. The heat pumps use outdoor air as a heat source and emit heat to the existing heating system for heating radiator water and domestic hot water. The peak load in cold periods is covered by existing oil-fired boilers.

The operational studies are intended to embrace the measurement of power and energy requirements for the heat pumps, their evaporator fans and additional heat plants, measurements of temperature and pressure conditions in the refrigerant system, water temperatures in the domestic hot water system and heating system, running times and defrosting functions during two winter seasons. Sound level measurements will also be carried out.

The measurement values, together with other operational results, will be used to follow up and improve, by means of the necessary modifications, the operational economy of the plants and also to provide a knowledge (through the BFR report together with other measurements results) of deficiencies and of design improvements which can be carried out and thus to create source material for a more regular use of the heat pump plants in existing houses and in newly constructed houses.

Theoretical studies indicate that an energy saving of up to 50% is fully realistic for heating by means of heat pumps. Practical applications carried out so far show a somewhat fragmented picture in which cause and effect have been unsatisfactorily chartered and analyzed.

SUPPORTED BY Sweden - Council for Building Research

8.0395, HEAT RECOVERY IN ONE-FAMILY HOUSES - ENERGY MEASUREMENT
P. REINHOLD, Sten Olsson Ingeniorsbyra Ab, *Sundsvall, Sweden*

33 dwelling houses are to be constructed within the Sidsjo area in Sundswall. 12 of these houses will be provided with heat recovery units of the Climax type. 21 of them will be constructed with a heating plant without heat recovery. The purpose of the project is to evaluate the energy saving within each house type. The project includes carrying out climate measurements within four split-level houses plus 2 houses with 1/2 stories and of carrying out energy measurements in 6 houses which have not been equipped with heat recovery systems.

The measurements will be carried out over a period of one year partly by means of continuous temperature plotters and partly by means of point measurements and by interviews with the houseowners.

The results of the project will be compiled in table form and will be evaluated by the project leader.

The national Swedish Institute for Building Research will be used for special measurements such as air change measurements in accordance with the trace gas method. The cost of these measurements has been included in the application.

The measurements will be carried out in conjunction with a proposal received from the Institute's climate group dated January 15, 1975 and submitted to the Sundsvall real estate office, Sundsvall.

SUPPORTED BY Sweden - Council for Building Research

8.0396, HEAT RECOVERY - METHOD AND INSTALLATION
J. WEITMAN, Radscan Ab, *Taby, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0397, LOW-ENERGY ONE-FAMILY HOUSES - A PROGRAM STUDY FOR INFORMATION, NORRLAND (NORTHERN SWEDEN)
J.A. JONSON, Ab Norrland Byggtjanst, *Umea, Sweden*

14 one-family houses are to be permanently constructed as a project in conjunction with the NOLIA Fair (The Norrland Industrial Fair) in Umea in 1977. The construction of these houses is linked to energy conservation. The intention is that the manufacturers of one-family houses will develop these houses for their normal production on the basis of a given program and of advanced technical information provided, inter alia, in conjunction with a programming conference, on the possibilities for energy conserving measures and solutions.

When the houses have been built, a symposium and a number of conferences and information activities on energy conservation will be arranged in Umea in conjunction with the Fair. The intention here is that an interdisciplinary follow-up of the project be implemented. The objective for the entire project is to achieve low-energy houses -particularly for Norrland - within the framework for the normal production of the one-family house manufacturers, to increase knowledge and to disseminate information on the possibilities for saving energy, inter alia, through designs which are rational from the energy conservation point of view. A project group with representatives for Umea Municipality, Umea University, the Norrland Building Centre and NOLIA has been formed for the project.

This application refers to a grant for the programming conference mentioned above and a grant for a program study for the information activities, the symposium and the follow-up work.

SUPPORTED BY Sweden - Council for Building Research

8.0398, MAPPING OUT ENERGY CONSUMING MEASURES IN CONJUNCTION WITH WINTER BUILDING
J.A. JONSON, Ab Norrland Byggtjanst, *Umea, Sweden*

There may be certain possibilities for conserving energy in conjunction with winter building, particularly in conjunction with various heating measures. The energy consumption in conjunction with winter building must be mapped out in order to be able to assess where such savings are possible and to what extent they can be made. This project embraces mapping out, systematizing and problem analysis operations with regard to energy consumption of this type and is based on material and knowledge obtained in conjunction with previous winter building investigations.

SUPPORTED BY Sweden - Council for Building Research

8.0399, CONTROL OF THE REFRIGERATION CYCLE IN GLASS-MAKING
C. HELGESSON, Infrarodteknik Ab, *Vanersborg, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0400, THERMO-TECHNICAL INVESTIGATION OF THE POSSIBILITIES TO TAKE ENERGY-ECONOMICAL MEASURES WITHIN MANUAL GLASS INDUSTRY

S. LINZANDER, Glass Research Institute, *Vaxjo, Sweden*

The glass-making process requires large quantities of energy. Manual glass industry (MG) is mainly occupied in discontinuous melting by use of various kinds of furnaces with relatively low efficiency. The increase of fuel costs calls for a reduction of the demand for energy.

It is therefore considered necessary to carry out an investigation, embracing an inventory of existing operation data and thermotechnical measurements on representative furnace units. The aim of the investigation will be: 1. To find out what measures should be taken to reduce the energy consumption of existing furnace units. Thus furnaces should be operated in a more appropriate way, including better instrumentation, adequate burners, well-dimensioned recuperators, improved insulation, optimal pot dimension in proportion to furnace chambers and production, 2. To serve as a basis when it comes to selecting the most suitable type of furnace for new installations, for certain standardization of furnace equipment, and for constructive improvements. 3. To form the basis of calculations and indicate conditions for utilization of waste gas, especially in waste heat boilers (gas temperatures, gas volumes, waste gas contents of batch components like dust and condensable products).

MG's trade association suggests that an investigation of this sort should be carried out by the Institute for Glass Research with the aid of experts on heating technique from outside.

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

8.0401, BENEFITS TO BE OBTAINED FROM CAR SHARING

P.H. BLY, Ministry of Transport, Transport & Road Research Lab., *Crowthorne, England, United Kingdom* (085774 (HRB NO.))

The benefits are being calculated arising from the encouragement of car sharing in urban areas in peak periods: effect on public transport, congestion, car use in off peak, travel costs and time, and fuel consumption. /IRRD/IRF/

ADDENDA: Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY United Kingdom - Department of The Environment - London

8.0402, OPERATING CHARACTERISTICS OF HEAVY GOODS VEHICLES

A.R. CAWTHORNE, Ministry of Transport, *Crowthorne, England, United Kingdom* (085763 (HRB NO.))

Measurements of the factors affecting fuel usage in heavy goods vehicles are being used to develop a computer simulation which can be used to optimize vehicle and route characteristics with a view to reducing the fuel consumed in freight transport. The model will be used to demonstrate the relative advantages of vehicle. Route and schedule changes from the points of view of overall economics and fuel conservation. /IRRD/IRF/

Document provided to S.S.I.E. by the H.R.I.S.

SUPPORTED BY United Kingdom - Department of The Environment - London

8.0403, FUEL CONSERVATION - PLANT SUPPORT

L.C. LONG, Exxon Petroleum Company Ltd., *Oxford, England, United Kingdom*

DESCRIPTION: The objective of the program is to identify areas where there is scope for energy conservation; to define improvements and assist in the implementation of improvement projects. The scope of the program covers company-owned refineries and terminals but also includes technical service and assistance to customers. The program covers a complete evaluation of energy consumption throughout the manufacturing and industrial processes. These include heat and energy requirements from the need to heat petroleum storage tanks through direct process firing and space heating to the recovery of condensate, lagging and insulation and electricity consumption. In this latter sector special attention is drawn to peak energy requirements and tariff structures. Maximum demand charges represent a considerable influence on energy costs. Analysis of combustion efficiency and net thermal efficiency are fundamental to the program and the influence of combustion control instrumentation will be evaluated to determine the optimum method of controling air/fuel ratio.

ADDENDA: Estimated calendar year funding reported as 1975 $150,000.

SUPPORTED BY United Kingdom - Esso Petroleum Co. Ltd. - London

8.0404, IMPLICATIONS OF AN OIL RESOURCE SHORTAGE FOR URBAN PASSENGER TRANSPORT

D. MALTBY, Univ. of Salford, *Salford, England, United Kingdom* (125922 (HRB NO.))

Objectives are to examine: 1) The effects of higher crude oil costs on passenger travel in urban areas. 2) The energy consumption characteristics of existing and potential urban passenger transport systems. 3) The implications for investment in urban passenger transport of an oil resources shortage. A system for monitoring car ownership nationally, and car ownership, highway network traffic movements and public transport movements in Merseyside County Council is being established. Possible scenarios in an oil shortage situation are being developed for testing transport investment proposals in Merseyside County Council. This work is being done through co-operation with the local authorities in Merseyside. /IRRD/IRF/

ADDENDA: Document provided to S.S.I.E. by the H.R.I.S. This project also supported by: British Rail Engineering Limited.

SUPPORTED BY United Kingdom - Science Research Council - London

8.0405, A STUDY OF OPPORTUNITIES TO INCREASE THE EFFICIENCY OF ENERGY CONVERSION AND CONSUMPTION

UNKNOWN, Internat. Res. & Tech. Corp., *Arlington, Virginia* 22302

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

9. ENERGY SYSTEMS AND OTHER ENERGY RESEARCH

9.0001, GROUP DYNAMICS AND INFORMATION TRANSMISSION IN THE NUCLEAR POWER PLANT DEBATE

H. NOWOTNY, European Center for Soc. Welf., *Vienna, Austria* 1060

The program of work shall be to verify the hypotheses developed under the previous contract. This shall be done by more detailed analyses of case studies and in-depth interviews with members of opposition movements.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

9.0002, VENEZUELAN FOREIGN POLICY

F. TUGWELL, Claremont College, Undergraduate School, *Claremont, California* 91711 (1722-620013)

Treats the origins and conduct of Venezuelan foreign policy with special emphasis on the country's petroleum policy and its relations with the United States.

SUPPORTED BY U.S. Dept. of State, Bur. of Intelligence & Res.

9.0003, MODELLING AND PERFORMANCE SIMULATION OF SINGLE AND COMPOSITE POWER SYSTEM ELEMENTS
G.J. BERG, Univ. of Calgary, *Calgary, Alberta, Canada*

Static frequency changer for induction motor drive applications. Theoretical and experimental studies of SCR controlled induction motors. Model representation of inhomogenous dynamic loads for power system performance studies by simulation. Power system planning - development and evaluation of long term expansion strategies subject to specific constraints.

SUPPORTED BY Canada - University of Calgary - Calgary, Alberta

9.0004, ENERGY SUPPLY AND DEMAND MODELS AND BASIC CHEMICAL ENGINEERING PROCESSES
D. QUON, Univ. of Alberta, School of Graduate Stu. & Res., *Edmonton, Alberta, Canada*

CURRENT RESEARCH AND OBJECTIVES: 1) Canadian Energy Supply and Demand Models -- a natural gas supply model and an interfuel fuel substitution have been developed. Current work is on an allocation model. 2) Representation of Basic Chemical Engineering Processes by Low Order Models -- emphasis is on retention of basic dynamic behavior of the physical system while being simple enough to be used for control and simulation purposes.

SUPPORTED BY Canada - National Research Council - Ottawa, Ontario

9.0005, HIGH-POWER MOLECULAR LASERS
J. TULIP, Univ. of Alberta, *Edmonton, Alberta, Canada*

High-Repetition-Rate TEA Laser. Isotope Separation. High-Pressure Pulsed-Discharge Laser Using Isotope Preionization. Supersonic CO Laser Using a Mach 3 Wind Tunnel. Industrial CO2 Laser Using Photoionized Discharge.

SUPPORTED BY No Formal Support Reported

9.0006, CONTINUATION OF THE PREPARATION AND ANALYSIS OF OUTPUT/INPUT ENERGY RATIOS FOR FOOD PRODUCTS PRODUCED IN ONTARIO
P.H. SOUTHWELL, Univ. of Guelph, School of Engineering, *Guelph, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

9.0007, CANADA'S NUCLEAR ENERGY PROGRAMME
C.E. FRANKS, Queens University, *Kingston, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

9.0008, RESEARCH AND DEVELOPMENT WORK CONCERNING ELECTRODYNAMIC MAGNETIC LEVITATION - PHASE III
UNKNOWN, Queens University, Inst. of Guided Ground Transp., *Kingston, Ontario, Canada*

SUPPORTED BY Canada - Ministry of Transport - Ottawa, Ontario

9.0009, CHARACTERIZATION OF IRON MINERALS BY MEANS OF A REACTOR WITH A CURRENT CROSS
F. AJERSCH, Univ. of Montreal, Polytechnic School, *Laval, Quebec, Canada*

Addenda: Performing organization: Ecole Polytechnique.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

9.0010, DEVELOPMENT OF A REPORT ON THE ASSESSMENT OF POWER PLANT SITING BY ENERGY DEMAND REGIONS
UNKNOWN, Acres Consulting Services Ltd., *Niagara Falls, Ontario, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

9.0011, DEVELOPMENT OF AN ENERGY SECTOR FOR THE CANADIAN DISAGGREGATED INTERDEPARTMENTAL ECONOMETRIC (CANDIDE) MODEL OF CANADIAN ECONOMY
UNKNOWN, Informetrica Limited, *Ottawa, Ontario, Canada*

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

9.0012, MINERAL AND ENERGY RESOURCE EVALUATION PROBABILISTIC METHODS
F.P. AGTERBERG, Dept. Energy Mines & Resources, Regional & Econ. Geology Div., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: Preparation of a book which will attempt to bring together and provide a perspective for those methods which, in one way or another, aim to predict the places and modes of occurrence of undiscovered mineral resources.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

9.0013, COORDINATION AND MONITORING OF FEDERAL PROGRAMS
B.D. COOK, Dept. Energy Mines & Resources, Office of Energy Res. & Devel., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To coordinate and monitor the federal energy R and D programs and expenditures.

WORK: In order to fulfill the coordination and monitoring functions, the Office of Energy R and D engages in a wide variety of activities. The staff monitors and assesses: the nature and scope of energy activities in federal agencies, grants and contracts for energy and D, progress in ongoing activities, the results of terminated projects, the distribution of energy R and D funds, the development of scientific manpower, the energy R and D effort at provincial, federal and international levels, the need for federal intervention, the R and effort in each of three time frames to ensure that short, medium and long terms R and D needs are met, the relationship between energy policy objectives and R and D programs.

The staff acts as secretariat to the Interdepartmental Panel on Energy R and D and prepares annual reports for Ministers on the status and future requirements of the federal energy R and D program.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

9.0014, GEOCHEMICAL DATA SYSTEMS
R.G. GARRETT, Dept. Energy Mines & Resources, Regional & Econ. Geology Div., *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To investigate and develop efficient means of acquiring, storing, processing, interpreting and presenting exploration and applied geochemical data.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

9.0015, IMPROVEMENT OF SYSTEM LOAD FACTORS
A.R. SCOTT, Dept. Energy Mines & Resources, *Ottawa, Ontario K1A OE8, Canada*

OBJECTIVE: To develop techniques and mechanical devices for improving system load factors.

WORK: Investigation of methods and development of equipment for improving system load factors.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

9.0016, SASKATCHEWAN ENERGY RESOURCES
R.G. GILLIES, Saskatchewan Research Council, *Saskatoon, Saskatchewan, Canada*

PROGRAM OF RESEARCH OR STUDY: Continuing data collection and analyses for reserves, production, and consumption of energy commodities in Saskatchewan.

PURPOSE: To use in formulating an energy policy for the province.

SUPPORTED BY Canada - University of Regina - Regina, Saskatchewan

9.0017, STUDY OF THE DYNAMICS OF ENERGY POLICY PLANNING AND THE ECONOMIC GROWTH IN CANADA
J. RAHN, Laval University, School of Science, *St. Foy, Quebec, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

9.0018, SCENARIOS OF FUTURE RENEWABLE ENERGY RESOURCES AND TO EXPLORE AND ANALYSE POLICIES AND STRATEGIES OF THE FEDERAL GOVERNMENT (ABBREV)
UNKNOWN, Delphic Consulting Limited, *Victoria, British Columbia, Canada*

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

9.0019, APPLICATION OF INPUT-OUTPUT TECHNIQUE TO THE ALLOCATION OF ENERGY RESOURCES
E.E. ROBERTSON, Biomass Energy Institute Inc., *Winnipeg, Manitoba, Canada*

DESCRIPTION: We have developed a methodology based on Input-Output commodity technology which permits calculation of direct and indirect energy of different kinds required to produce $1000 of various goods and services. The data base used is that of input-output tables compiled by Statistics Canada. Statistics are currently available for fourteen energy commodities in physical as well as monetary units. The particular methodology developed in this project allows incorporation of information which is available from outside input-output sources to improve upon initial energy coefficients. It has been tested on 41 (industry) x 85 (commodity) aggregation employing the input-output table for 1966. The results obtained are being analyzed for consistency and and validity. Once the test is completed, the energy coefficients will be calculated for as much as a two hundred commodity aggregation. The methodology clarified the 'net energy' impact and socio-economic repercussions of energy decisions. In addition, it will facilitate development of a more useful 'energy economics' in conjunction with international groups active in this field. The objective of the project is to develop a sophisticated, quantitatively oriented tool to assist in choosing between alternative policies for optimum development and use of energy resources.

ADDENDA: Estimated calendar year funding reported as 1975 $15,000.

SUPPORTED BY Canada - Department of Energy, Mines and Resources - Ottawa

9.0020, ELECTRIC CAR COMPETITION
J.E. MCCANNELL, Manitoba Research Council, *Winnipeg, Manitoba, Canada*

PROGRAM OF RESEARCH OR STUDY: Phase 1 - 1975-76. Build prototype electric cars at two community colleges.

ADDENDA: This project is also supported by: Manitoba Hydro and Manitoba Motor Vehicle Branch.

SUPPORTED BY Canada - University of Regina - Regina, Saskatchewan

9.0021, ENERGY SOURCES FOR THE OEEC -- PILOT PROJECT
UNKNOWN, Academy of Technical Sciences, *Copenhagen, Denmark*

Initiative provided by the General Directorate for Research, Science, and Education of the OEEC commission.

The ideological background is desired in order to be able to provide a certain spectrum of technically and economically feasible development possibilities for energy systems in the OEEC countries.

The purpose of the project is to analyze various choices of levels of energy consumption in the OEEC and of alternative energy systems. An assessment will be made of the economic, social, and environmental consequences associated with the choice among various energy supply systems and energy demands.

SUPPORTED BY Denmark - Danish Government - Copenhagen

9.0022, LONG-TERM PATTERNS OF DEVELOPMENT IN THE DANISH COMMUNITY UNDER VARIOUS CONDITIONS OF ENERGY CONSUMPTION AND SUPPLY
UNKNOWN, Niels Bohr Institute, *Copenhagen, Denmark*

On the basis of the energy panel held by the Niels Bohr Institute on the initiative of IFIAS (International Federation of Institutes of Advanced Study) the effect of the energy crisis on various countries in relation to their degree of dependence on imported energy was discussed. The decision was made to initiate a multidiscipline energy research project, for which Thorkil Kristensen and Sven Bjornholm will represent Denmark.

The purpose of the project is to investigate the possible course of development in the Danish Community under various assumptions regarding the country's energy consumption and supply.

SUPPORTED BY Denmark - Danish Government - Copenhagen

9.0023, DENMARK'S FUTURE ENERGY SUPPLY
A. JENSEN, Technical Univ. of Denmark, Inst. of Math. Statis. & Anal., *Copenhagen, Denmark*

Initiative provided by the Minister of Trade through Professor Arne Jensen's membership in the Committee for Analysis and Prognosis for the Energy Sector in the Ministry of Trade. The ideological background consists of the concept used in long-term planning within K.T.A.S., and an attempt will be made through the latter project to transfer this concept over into the energy area. The purpose of the project is to utilize the strategic long-term planning within the public utilities sector in order to contribute to methods that can be used to crystallize the long desired energy policy of the interplay between norms and political objectives through a series of calculations of the consequences. This will provide a basis for possible decisions involving limitations for replacing the efforts herefore made toward optimization.

SUPPORTED BY Denmark - Danish Government - Copenhagen

9.0024, ATOMIC POWER ECONOMY
UNKNOWN, Technical Univ. of Denmark, *Copenhagen, Denmark*

One prerequisite for the use of atomic power on a large scale is that it be economically competitive with other energy sources. For this reason the research on the conditions that influence atomic power economy is of great significance. 1) a continuous updating of the relevant data on atomic power economy; 2) further development of methods of computing atomic power economy (including compiling of the necessary computer programs); 3) economic research based on the data collected and the methods developed.

SUPPORTED BY Denmark - Danish Government - Copenhagen

9.0025, SYSTEMS-DYNAMIC ANALYSIS OF DENMARK'S ENERGY CONSUMPTION IN THE NEXT FIFTY YEARS
UNKNOWN, Technical Univ. of Denmark, Physics Laboratory, *Copenhagen, Denmark*

The ideological and social background of the project in question can be referred to the Planning Council for the Research Action Program.

The purpose of the project is to develop system-dynamic simulation models that can shed light on the consequences for the Danish community of various energy policy decisions for various delivery situations and prices for the various energy resources.

SUPPORTED BY Denmark - Danish Government - Copenhagen

9.0026, ANALYSIS OF COMMERCIAL POSSIBILITIES FOR INCREASED ELECTRICITY PRODUCTION BY COUNTER-PRESSURE
UNKNOWN, Danish Boiler Society, *Hellerup, Denmark*

SUPPORTED BY Denmark - Danish Government - Copenhagen

9.0027, ECONOMIC RESEARCH ON THE ABILITY OF THE NUCLEAR POWER PLANT TO COMPETE UNDER DANISH CONDITIONS
UNKNOWN, Atomic Energy Commission, *Roskilde, Denmark*

Within the energy debate, a certain uncertainty is being expressed regarding the competitive position of the nuclear power plant versus the conventional plant in the economic sense.

In spite of the great amount of discussion already engaged in, there seems to be a need for a clarification with impartial technical and economic experts of the economic aspects that are connected with the decision of whether nuclear power plants are to be built in Denmark.

SUPPORTED BY Denmark - Danish Government - Copenhagen

9.0028, ELECTRICAL ENGINEERING AND ORGANIZATION - ELECTRICAL TRADES IN DENMARK
UNKNOWN, Roskilde University Center, *Roskilde, Denmark* 4000

The purpose of the project is the investigation of the significance of various energy technologies for changes in the forms of organizations within the community with regard to the planning of future energy technologies in the production of electricity. This is being coordinated with economist Charles Edquist from the Swedish Energy and Society projects.

SUPPORTED BY Denmark - Danish Government - Copenhagen

9.0029, SOCIO-ECONOMIC STUDY OF THE POLICY ASPECTS OF CHANGING FUELS IN THE UNITED STATES
UNKNOWN, Internat. Inst. for Env. & Dev, *Washington, District of Columbia* 20036

SUPPORTED BY Canada - Department of The Environment - Ottawa, Ontario

9.0030, INTERNATIONAL MODEL
J. WAELBROECK, World Bank, *Washington, District of Columbia* 20433

The international model developed under this research project examines the relations between five regions of the world economy: Africa, Asia, Latin America, Middle East, and the developed countries. Each developing region is represented by an activity analysis model; the development countries are represented by a trade welfare function. The model is solved using a new fixed point algorithm capable of solving large general equilibrium systems. Current work on the model comprises: 1. Testing the computational properties of the algorithm. 2. Investigating the impact of alternative tariff policies. 3. Studying the impact on developing countries of high oil prices and slower growth in the developed countries.

SUPPORTED BY World Bank - Washington, D.C., U.S.A.

9.0031, COMPLETING A PROGRAM OF RAPID TRANSMISSION OF RESEARCH RESULTS
RITTIG, Technische Ueberwachungs Ver, Inst. for Reactor Safety, *Cologne, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0032, A SUPER-RESONANT TEST AND EVALUATION DEVICE UTILIZING A PRELIMINARY AMPLIFIER MECHANISM
G. GUTMANN, Krautkraemer Gmbh, *Cologne 41, Nordrhein Westfal., Federal Republic of Germany* 5000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0033, USE OF OFFSHORE STATIONS TO PRODUCE ENERGY
BEHRENDT, Dornier System Gmbh, *Friedrichshafen, Baden Wuertt., Federal Republic of Germany* 7990

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0034, PROGRAM STUDY FOR FUTURE ENERGY SYSTEMS
W. TANNER, Dornier System Gmbh, *Friedrichshafen, Baden Wuertt., Federal Republic of Germany* 7990

MAIN OBJECT: Conversion, transport and storage of energy.

FIELD: System analysis studies.

OBJECTIVE: Selection and description of technologies and strategies for substituting crude oil and natural gas by new energy carriers: outline proposal for a R & D program to reinforce the efforts to become increasingly independent of depletable energy resources.

WORK PROGRAM: a) Technological aspects: The possible secondary energy systems are investigated as to whether or not they meet the requirements of: safety, environmental protection and economy; for: production, conversion, transport, distribution, storage, utilization and handling of the secondary energy. b) Alternatives for energy supply systems. An evaluation of the technological and economic impact of the new energy carriers results in modelling qualitative energy supply systems for the future as the synthesis of conventional and new components. c) R & D Program; Considering the state of the art an outline for a R & D program is proposed, specified for cost and time requirements.

REFERENCE TO OTHER PROJECTS: ET 17 has an identical objective.

STATUS: Report, printed in 6 parts, will be published by the end of April 1975.

ADDENDA: Subcontractor: Lurgi, Frankfurt/Main, Steag, Essen. Performing organization: Dornier System GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0035, INVESTIGATION OF FREQUENCIES OF SEISMIC WAVES AT DIFFERENT TRAVEL TIMES
G. DOHR, Preussag, *Hannover, Niedersachsen, Federal Republic of Germany* 3000

OBJECTIVE: Basic principles for all calculation procedures should be investigated, in which the frequency content of seismic

waves is very important (deconvolution, reflection picking, determination of absorption, problems of multiple reflections). For this purpose, investigations about frequency spectra of seismic waves in relationship to travel time shall be done with seismic field recordings and recordings from well surveys.

WORK PROGRAM: a) Study of literature and of theoretical solutions to these problems. b) Examination of the seismic material, discussion of the procedures. c) Special display of selected data. d) Attempt to improve on theoretical solutions, algorithm of programs. e) Programming of solution proposed, given in item d); comparison of the theoretical results with field measurements.

STATUS: Literature study and preparatory theoretical investigations have been completed. Selection of seismic recordings and special displays of selected data have been started. Parallel to this, a model seismic work was carried out with a three layer model. The influence of an imbedded layer with different thickness on the reflected and transmitted P- and S-waves were to be investigated and plotted. Furthermore, the theory of absorption and dispersion of body waves has been extended in a special paper (the work of Dr. Engelhardt, TU Braunschweig). The investigations are carried out in cooperation with Geophysical Institute of Technical Universities at Clausthal, Berlin, and Braunschweig.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0036, DEVELOPMENT OF A THEORETICAL PHASE SEPARATION MODEL FOR WATER DISTILLATION AND COMPARISON OF THEORY WITH EXPERIMENTAL RESULTS

F. MAYINGER, Technical Univ. of Hannover, Inst. for Process Techniques, *Hannover, Niedersachsen, Federal Republic of Germany* 3000

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0037, CREATION OF AWARENESS OF ENERGY

H. BONNENBERG, Ingenieurgesellschaft Bonn., *Juelich 1, Nordrhein Westfalen, Federal Republic of Germany* 5170

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0038, ACCOMPANYING STUDIES TO THE GENERAL ENERGY RESEARCH PROGRAM

T. BOHN, Juelich Nuclear Res. Ctr., *Juelich 1, Nordrhein Westfalen, Federal Republic of Germany* 5170

DESCRIPTION OF PROJECT: OBJECTIVE: System analytical study of the problem areas of energy and environment analysis of alternative possibilities of development of the energy system in the BRD, proceeding from the primary and secondary energy to the final energy consumption.

WORK PROGRAM: In individual studies, the following main topics will be dealt with: Regenerative energy sources for the energy supply in the future. Design of energy models. Alternatives and further development possibilities for secondary energy systems. Integration possibilities of solar energy into the existing energy system. Analysis of future development of energy requirements.

STATUS: The AGF/ASA Program Study, 'Regenerative sources of power for the energy supply of the future' is being financed by ET 4044 additionally, and will be published in April 1976. Based on the results of this study analysis has been begun of the possibilities to integrate secondary energy carriers made available through the use of solar energy into the existing energy supply system. Work on the energy model for BRD has been continued. For the sector 'Energy Supply' development of an optimization model has begun, which determines the optimal structure of covering the total energy requirements, taking into consideration the seasonal variations of supply and demand of several primary energy carriers. This model was applied in the framework of a cost-profit-analysis in order to analyze, in particular, the possibilities of heat-power-coupling. The program study on secondary energy system was completed in the beginning of 1975. The customary and newly developed secondary energy carriers are being further investigated based on the results of the study. Emphasis was placed on the possibility of application for long distance heating.

The survey for future development of energy requirement was based on a comprehensive sector, - as well as a product analysis with special consideration given to the sector, households. The work was begun on Jan. 1, 1976.

ADDENDA: Performing organization: Kerforschungsanlage Julich GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0039, AGF/ASA-PROGRAM STUDY - REGENERATIVE SOURCES OF POWER FOR THE ENERGY SUPPLY OF THE FUTURE

M. MELISS, Juelich Nuclear Res. Ctr., *Juelich 1, Nordrhein Westfalen, Federal Republic of Germany* 5170

DESCRIPTION OF PROJECT: OBJECTIVE: Determination of the technical level of knowledge of the possibilities of utilizing the regenerative energy sources of the sun, wind, geothermal, sea energy, tides, waves and water. Investigation into the supply potential of all the energy sources for the world wide energy supply, with the main point on the energy supply of the Federal Republic of Germany.

Summary of the present technical status of usage possibilities. Analysis of utilization aspects, in particular the ecological consequences. Analysis of the costs of the proposed energy-conversion system. Evaluation of the theoretical, technical and economical utilization potential. Comparison and program proposals for research and development.

ADDENDA: Performing organization: Kernforschungsanlage Julich GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0040, PERFORMING THE ASSIGNMENTS IN THE SCOPE OF THE ENERGY RESEARCH PROGRAM 1974-1977

H.J. STOECKER, Juelich Nuclear Res. Ctr., *Juelich 1, Nordrhein Westfalen, Federal Republic of Germany* 5170

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0041, PLANNING THE ADVANCEMENT OF BILATERAL COLLABORATION WITH OTHER COUNTRIES IN ORGANIZING SCIENTIFIC RESEARCH AND TECHNOLOGICAL DEVELOPMENT

LAUE, Nuclear Physics Society Gfk, *Karlsruhe, Baden Wuerttemberg, Federal Republic of Germany* 7500

Addenda: Supporting Agency: Bundesministeriums Fuer Forschung und Technologie. Performing Organization: Gesellschaft Fuer Kernforschung MBH (GFK).

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0042, MICROBIAL, BIOCHEMICAL AND PHYTOPLANKTONICAL STUDIES ON THE DEGREE OF SELF-PURIFICATION IN RIVERS FOR THERMAL DISCHARGES

K. REIMANN, Bavarian Biol. Res. Inst., *Munich, Bayern, Federal Republic of Germany*

Degradation tests on organic matter (sewage, organic compounds) at various temperatures between 5 and 40 degrees C. Studies on velocities of self purification in a respirometer (sapromat of VOITH) as basis for comparison with natural conditions, in an aquarium with endless circulating water measuring BOD, actual oxygen through O2-electrodes, and pH. Influence of temperature on photosynthesis and respiration of green algae.

ADDENDA: Performing organization: Bayerische Biologische Versuchs-anstalt.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

9.0043, AUTOMIZING AND EDP OF THE U.S. - IMPULSE TEST(RECONSTRUCTING ERRORS)
R. WERNEYER, Fraunhofer Society, Inst. for Non Dest. Test Proc., *Saarbruecken 11, Saarland, Federal Republic of Germany* 6600

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0044, THE POSSIBLE FUTURE POLITICAL ECONOMIC AND COMMERCIAL DEVELOPMENTS WITH A VIEW TO USING ELECTRICAL ENERGY AND SATISFYING ITS NEEDS
H. MARKMANN, Federation of Labor, Economic & Social Science Inst, *4000 Dusseldorf, Federal Republic of Germany*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0045, ESTIMATE OF THE RESULTS OF ALTERNATIVE STRATEGIES OF ENERGY ECONOMICS USING DYNAMIC SIMULATION, IN COOPERATION WITH THE INTEREST GROUPS
M. FISCHER, Fraunhofer Society, Inst. for Sys. Anal. & Res., *7500 Karlsruhe 1, Federal Republic of Germany*

Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0046, ISOLATED OPTICAL EVENTS IN SOLIDS COINCIDENT WITH NUCLEAR EVENTS
K. LUCHNER, Univ. of Munich, *8000 Munchen 22, Bayern, Federal Republic of Germany*

Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0047, X-RAY SCATTERING FROM THE DISTORTION FIELD OF DEFECTS - COMPTON SCATTERING
H. PEISL, Univ. of Munich, *8000 Munchen 22, Bayern, Federal Republic of Germany*

Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0048, NEUTRON SCATTERING FOR THE INVESTIGATION OF PHASE TRANSFORMATIONS AND DISTORTION FIELDS IN CRYSTALS
H. PEISL, Univ. of Munich, *8000 Munchen 22, Bayern, Federal Republic of Germany*

Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0049, PROGRAM STUDIES - ENERGY SUPPLY
T. BOHN, Juelich Nuclear Res. Ctr., *8000 Munich, Federal Republic of Germany*

MAIN OBJECTIVE: Conversion, transport and storage of energy.

FIELD: System analysis studies.

OBJECTIVE: Proposals for a research and development program for the advancement of the technological development of the several secondary energy systems.

WORK PROGRAM: Analysis of the importance of the secondary energy carriers in respect of the enlargement of the energy supply of the Federal Republic of Germany in the future. Detailed analysis of the demand for the several secondary energy carriers. Analysis of the technological development of the generation, distribution, storage and use of the several secondary energy systems. Outlining the unsolved technological problems for economical realization of the various secondary energy systems. Investigation of the necessary development costs.

REFERENCE TO THE OTHER PROJECTS: Project ET 23 has an identical objective.

ADDENDA: Subcontractor: 1) Messerschmidt-Bolkow-Blohm; 2) TUV Rheinland; 3) KA-Plan; 4) Bonnenberg and Drescher. Performing organization: KFA Julich GmbH.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0050, SPECIAL CONSTRUCTION-RELATED R&D PROGRAM FOR UTA-25
UNKNOWN, Maschinenfabrik Augs. Nur. AG, *8000 Munich, Bayern, Federal Republic of Germany*

Addenda: Supporting agency: Bundesministeriums Fuer Forschung und Technologie.

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

9.0051, PRICE OF ENERGY, LOCATIONS OF INTERNATIONAL OPERATIONS AND FOREIGN COMMERCE - EXPLORATORY STUDY
P. MAILLET, Lille University, Interuniv. Center for Research, *Lille, France* 59046

Study of the effects of the increase in the price of energy on localized industries and on the current international exchange of industrial products.

The research will take into account equally the other factors capable of affecting these two elements, especially change in relations between industrial countries and countries in the process of developing under the influence of government decisions, the strategy of multinational corporations which establish for themselves autonomous economic zones, the eventuality of the generalization of the aggregation of raw materials obviously supporting the production of energy.

As a first step, one should try to evaluate the effects of energy price supports on the costs of production of the principal industrial branches (sectors of productions or groups of products), to obtain the criteria for localized corporations, to classify countries according to their energy trade outlook. In such a mannner one should end up with three typologies. 1. Countries; 2. Production sectors or product groups; 3. Corporations in order to define each case-type in each of the aggregates.

In a second step, one should define a central scenario which one will analyze in a detailed fashion (Subject: How a new equilibrium in international relations and in foreign commerce will be established). Next, one should study alternative scenarios, defined by variation from the central scenario by and strategic element (modalities of recycling petro-dollars, rate of discovery of sources of energy competing with petroleum; Attitudes - dispersed or united - of the countries buying and selling energy). We will indicate how such scenarios could be used in the preparation of policy.

SUPPORTED BY France - National Science Research Center - Paris

9.0052, NEW HYDRAULIC AND POUZZOLANIC BINDERS - CHEAPLY MADE
UNKNOWN, Coal Fields Research Center, *Paris, France* 75007

OBJECTIVE: Autothermal fabrication of hydraulic and pouzzolanic binders that can be used in road work. These can be used for obtaining calibrated construction blocks through calcination in water-bearing lime and shale mixtures whose latent

heat can thus be tapped. By using these binders, we should be able to economize on Portland cement and fat lime, two products whose fabrication consumes much energy.

PROCEDURE: We used the technique of fluidization of mixtures introduced through the wet method. Two 200 kg binder samples containing a maximum of 20% regular lime were used for this test; one in the northern Pas de Calais for use in fabricating blocks, the other in a road construction program for treating two types of gravel.

The results were technically favorable but showed that to be economically worthwhile, these binders should have a higher proportion of regular lime and a cost price significantly lower than that of slaked lime.

We also studied the cost of an industrial pilot unit and did an economic study of the cost price of the binder produced; we concluded that present investments cannot support an acceptable cost price because of the limits on output caused by the wet method.

The data gathered support the belief that production by calcination of mixtures introduced in the dry state can yield a product containing more regular lime and an acceptable cost price. We will again begin fabrication using the 0.5 m diameter pilot unit at the Marienau station and will analyze the products in the laboratory.

N.B.: This notice invalidates and replaces notice 0 68 registered at the end of the first half of 1975.

ADDENDA: Project location: Station Experimentale de Marienau. Supporting Agency: Ministere de l'Industrie et de la Recherche. Performing Organization: Centre d'Etudes et Recherches des CHARbonnages de France (CERCHAR).

SUPPORTED BY France - Ministry of Industry & Research - Paris

9.0053, CENTRALIZING AND PROCESSING INFORMATION

UNKNOWN, Electricite de France, *Paris, France* 76008

Choosing new equipment for measuring, transmitting, and making information on the monitoring and management of production plants available to the person in charge.

Addenda: Supporting agency and Performing organization: Electricite De France, Direction Des Etudes et Recherches.

SUPPORTED BY France - Electricite de France - Paris

9.0054, SIMULATING, OPTIMIZING, AUTOMIZING, AND OPERATING SYSTEMS THAT ACCUMULATE HEAT AND PRODUCE STEAM

UNKNOWN, Electricite de France, *Paris, France* 76008

Combine electricity and steam production through heat energy accumulation and by making it responsive to changes in the load curve. Analyze how units operate under variable conditions. Optimize and automize.

Apply this to the selling of steam at Chalampe. Contribute to work developing and operating a pilot commercial accumulation point. Optimize and automize.

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

9.0055, URBAN ELECTRIC VEHICLES

UNKNOWN, Electricite de France, *Paris, France* 76008

TEST TRACTION CHAIN COMPONENTS: Experimental study under realistic operational conditions of ways vehicles are used; problems of component reliability and maintenance, particularly for batteries; specific consumption; and service quality of electric vehicles. Energy sources: Evaluating prototype batteries and experimental results; working with manufacturers; agreement for improving performance (length of life).

ENGINE AND CONTROL MECHANISMS: Develop and test 6.20-80 KW systems in vehicles.

SUBSIDIARY PARTS: Charge indicators, feeders.

CHARGERS: Study complete and partial rapid recharging. Evaluate existing prototypes.

SUPPORTED BY France - Electricite de France - Paris

9.0056, URBAN ELECTRIC VEHICLES

UNKNOWN, Electricite de France, *Paris, France* 76008

TEST TRACTION CHAIN COMPONENTS: Experimental study under realistic operational conditions of ways vehicles are used; problems of component reliability and maintenance, particularly for batteries; specific consumption; and service quality of electric vehicles.

ENERGY SOURCES: Evaluating prototype batteries:

ADDENDA: Performing organization: Electricite de France.

SUPPORTED BY France - Electricite de France - Paris

9.0057, ENERGY AND INTERNATIONAL LOCALITIES - PROSPECTIVE RELATIONS BETWEEN INDUSTRIALIZED COUNTRIES AND THE THIRD WORLD

I. SACHS, Internat. Center for Res. & Dv, *Paris, France* 25006

Taking into account briefly and in average terms the evolution resulting from the increase in the price of petroleum, this research will study the role of technological variables applied to energy in industrial specializations on a worldwide scale.

In the first place, we will examine the spatial redistribution of industries resulting from the change of relative positions of categories of countries in the international industrial division as a function of their conventional energy supplies or rapidly exploitable supplies.

The research will study equally the technological choices suitable for promoting different forms of energy - renewable and nonrenewable -and their implications on the industrial localities.

At the end of this research we will be able to illuminate the political definition of energy and technology which integrates the industrial demands of the third world, and the necessity of rational management of resources and natural environment.

SUPPORTED BY France - National Science Research Center Paris

9.0058, PROBLEMS CREATED BY HEAVY GASES IN INSULATORS

M. ROUX, Ministry of Equipment, Building Ind. Sci. & Tech. Ctr, *Paris, France*

Goal: Explain the cause of heat conductivity variations in alveolar insulating materials containing heavy gases by controlling the diffusion of the gas outside of the cells. Try to find protection methods enabling us to control and limit the effects of this diffusion.

Method: Accelerate gas diffusion by thermally aging foam extract gas trapped in cells. Measure the concentration of different foam gases according to time. Establish a correlation with thermal conductivity measurements by theoretically studying the effect of gas composition changes on conductivity.

Apparatus: Gas extraction apparatus. Mass spectrometer of the C.E.N.-Grenoble physical-chemical study and analysis service (Service d'Etudues et d'Analyses Physico-Chimiques du C.E.N.-Grenoble). Dymatech conductimeter of the Lyon Leather Technology Center (Centre Technique De Cuir).

Progress: We have finished the bibliographical study and perfecting an apparatus for extracting the gas contained in cells. A study of conditions that can accelerate diffusion enabled us to determine storage temperatures of 20 degrees C and 80 degrees C.

1975 program: We will study a family of foams (polyurethane foams). Variations in the composition of heavy gas trapped in cells will be studied, using mass spectrometry on foams with isothermal aging at 20 degrees C to 80 degrees C. This is to be done at different times: Taking one sample per day for the first 4 days, taking one sample per week for the first month, taking one sample per month for the first 3 months. The samples will be cylindrical with a 50 mm diameter and a 15 mm thickness. This shape will enable us to measure the correct thermal conductivity and correlate it with gas composition variations. A series of samples will be stored in metallic tubes of the same diameter in order to test the effects of an airtight barrier on the development of the foam.

SUPPORTED BY France - Ministry of Equipment & Housing - Paris

9.0059, ORGANIC ELECTROCHEMICAL SYNTHESIS
UNKNOWN, Natl. Scientific Res. Center, *Paris, France* 75700

Our objective is to develop methods that are more specific than chemical methods.

For example: the functionalization of simple olefins; de-aromatization and re-aromatization of precious substances; hydroxylation and oxidation of aromatic hydrocarbons and phenols in quinones; amino acid synthesis; diolefin dimerization.

ADDENDA: Supporting agency and performing organization: Centre National de la Recherche Scientific.

SUPPORTED BY France - National Science Research Center - Paris

9.0060, PHOTOCHEMISTRY
UNKNOWN, Natl. Scientific Res. Center, *Paris, France* 75700

The development of photochemistry is related to adequating the source of the reaction to wavelength.

The following will be examined: study new syntheses through photochemistry; improve existing processes related to industry.

ADDENDA: Supporting agency and performing organization: Centre National de la Recherche Scientific.

SUPPORTED BY France - National Science Research Center - Paris

9.0061, ELECTROSYNTHESIS
UNKNOWN, Natl. Scientific Res. Center, *Paris, France* 75700

Electrochemical production of compounds of interest from the energy point of view.

ADDENDA: Supporting agency and performing organization: Centre National de la Recherche Scientific.

SUPPORTED BY France - National Science Research Center - Paris

9.0062, ENERGY CRISIS AND PROSPECTIVE LIFESTYLES
P. MARECHAL, Research & Documentation Ctr., *Paris, France* 75013

Establishment of a list of goods and services likely to be affected by the energy crisis and the new ideas of world-wide economics.

METHODS: Analysis of publications and interviews of representatives of administrations, Chamber of Commerce, syndicates, etc.

After classification of the goods and services concerned, study the permissive conditions or the inhibiting factors concerning major evolutions.

METHODS: Interviews with responsible directors, confrontations with social groups.

Objective of first synthesis: To refine the scenarios; To single out the underlying logic for the permissive or restrictive conditions (this would also be concerned both with the structural conditions of the economic organizations and the types of mentality).

Inquiry (of 60 households, by indirect conversation) in order to measure the tendency to adopt this or that type of logic. Interviews and inquiries will extend throughout the Basse Seine region.

SUPPORTED BY France - National Science Research Center - Paris

9.0063, ECONOMIC STUDIES
LORIERS, Atomic Energy Commission, Saclay Nuclear Res. Center, *Saclay, France*

Addenda: Supporting agency: Commissariat A L'Energie Atomique. Performing organization: Centre d'Etude Nucleaires de Saclay, Division de Metallurgie et d'Etude des Combustibles Nucleaires.

SUPPORTED BY France - Atomic Energy Commission - Paris

9.0064, ANALYSIS OF THE MEDIUM OF THE NATIONAL PRESS REGARDING NUCLEAR PROBLEMS
F. FAGNANI, Atomic Energy Commission, Dept. of Protection, *92 Fontenay aux Roses, France* 92260

OBJECTIVE: The anticipated project includes the study of the following: (1) Analysis of the evolution and determinants of the attitude of the medium of the written (French) press regarding nuclear energy problems. (2) Study of the evolution of developed themes, positions taken, and the relative importance of the themes appearing in the newspaper during the years 1965-1976. (3) Interrelationships among themes, relative to the environment in general, scientific popularization, and energy problems. (4) Social base of the clientele of this medium of the press.

METHOD: (1) Systematic abstract of published issues and statisti-cal analysis according to a reading grid. (2) Interview of a sample of specialized journalists. (Translated.)

ADDENDA: Performing Organization: Commissariat a l'Energie Atomique.

SUPPORTED BY International Atomic Energy Agency - Vienna, Austria

9.0065, THE FUTURE ROLE OF CRITICAL NATURAL RESOURCES IN US/CANADA RELATIONS
A.O. HERO, World Peace Foundation, *Boston, Massachusetts* 02108

The overall objective of this research is to assess the issues that have become increasingly contentious in the US/Canada bilateral relations regarding the development and trade of resources.

The basis of this policy research is to conceptualize an analytical framework for categorizing issues. The conceptualization of resource issue categories will be accomplished by conducting a literature survey of the resource positions of the US and Canada. The survey will focus on three main topics: 1) domestic resources, 2) resource trade and 3) policy trends.

Seven resources will be selected for in-depth analysis on the basis of the established framework. The resources will be selected for their potentially strategic role in future Canada/US relations. A tentative resource list, subject to modification, includes the following resources: 1) uranium, 2) asbestos, 3) potash and phosphate rocks, 4) aluminum ores including bauxite, 5) nickel, 6) copper-zinc-lead, 7) forest products for pulp and paper produtions.

The economic and political aspects of issues highlighted in these case studies will be synthesized to identify areas of contention in US/Canada relations. Alternative policies will be generated by listing the array of proposed solutions to the identified issues or disagreements.

SUPPORTED BY U.S. Natl. Science Foundation, Div. Adv. En. Resou. Res. Tech

9.0066, STRATEGICAL STUDIES CONCERNING THE DUTCH ENERGY POLICY
A.J. BOGERS, Central Org. Adv. Appl. Res., Centre for The Stu. Ener. Prob, *Apeldoorn, Netherlands*

The studies concern in particular: a) Defining the short and long term energy supply and consumption of the Netherlands; b) Formulating energy research and development projects; c) Evaluation of scientific data; d) Technology assessment.

SUPPORTED BY Netherlands - Central Organ. Advan. Applied Res. - The Hague

9.0067, INTERDISCIPLINARY ENERGY PROJECT (IEP)
H. BREZET, Delft Univ. of Technology, *Delft, Netherlands*

The IEP Group aims at suggestions for a new policy as regards the system of electric power supply, because the present system displays the following deficiencies: (1) application of alternative power sources is hardly feasible; (2) use and extension of the present system is restricted, as it relies on four basic as-

sumptions: (1) availability of raw materials: (2) unimpeded supply of raw materials; (3) unimpeded transport facilities for electric power; (4) timely political decisions on future extensions in terms of available capacity.

The group is not convinced of the validity of those assumptions, particularly not their long-term validity.

The group is looking for a solution of these problems that may be achieved, technically and organizationally, in order to distribute optimally a limited amount of available capacity.

SUPPORTED BY Netherlands - Delft University of Technology

9.0068, ANALYSIS AND ASSESSMENT OF BEHAVIOR OF WORLD MODELS

O. RADEMAKER, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

OBJECTIVES: a) Analysis and Assessment of behaviour and patterns of behaviour of World Models; b) Studies concerning stabilizing and optimizing control; c) Inventory of activities regarding world models on information, instruction, and education.

Addenda: Supporting agency and performing organization: Technische Hogeschool Eindhoven.

SUPPORTED BY Netherlands - Eindhoven University of Technology

9.0069, ENERGY ANALYSIS

M.A. SPLINTER, Eindhoven Univ. of Technology, *Eindhoven, Netherlands*

OBJECTIVES: 1. Developing a methodology for the calculation of the investments of energy in products, based on current industrial economics. 2. Calculation of the energy content of water.

ADDENDA: Supporting agency: Technische Hogeschool Eindhoven. Performing organization: Technische Hogeschool Eindhoven, Afdeling Bedrijfskunde.

SUPPORTED BY Netherlands - Eindhoven University of Technology

9.0070, NUCLEAR POWER AS A SOCIAL AND TECHNICAL PROBLEM IN AN ENERGY SUPPLY SYSTEM

H.J. GROENEWOLD, State University of Groningen, Inst. for Peace Research, *Groningen, Netherlands*

The working party concerned studies energy problems, focussing on technical aspects and social implications of nuclear power. The group's major reports are published in 'Wetenschap en Samenleving' (Science and Society), nos. 1 (1972) and 7/8 (1974).

SUPPORTED BY Netherlands - Association of Scientific Research - Maarssen

9.0071, INTERACTIVE ENERGY MODEL FOR POLICY ANALYSIS AND PLANNING OF ENERGY SUPPLY AND DEMAND

J. KLABBERS, Psychological Research Lab., *Nijmegen, Netherlands*

Work is conducted in association with: Regionalized World Model Project (M. Mesarovic, Systems Research Center, Cleveland, USA, and E. Pestel, Hannover, Germany, directors).

Since February 1974 SSRG is developing an interactive energy model. Currently an interactive energy supply model is available with parameters for the U.S., Germany and The Netherlands.

Next national energy planning will be analysed, considering the Dutch energy situation (organization) applying interactive mode of analysis. The project will focus on Individual and Group decision making, taking into account organizational constraints, dealing with actual decision-makers, and consequently analyse the possible evolutions of energy supply and demand for a time horizon 1975-2000.

Criteria for analysis: - individual/group control skill; energy costs; energy availability; safety; pollution, etc.

SUPPORTED BY Netherlands - Catholic University of Nijmegen

9.0072, DEMAND AND SUPPLY OF NATURAL GAS IN THE FUTURE

W. TAKENS, V E G Gas Institute N.V., *Rijswijk 2100, Netherlands*

Determination of the availability of energy sources and of prices now and in the future.

A mathematical approach is involved.

The purpose is the estimation of future measures which have to be taken to prevent a shortage of fuel gas.

Addenda: Supporting agency and performing organization: VEG Gasinstituut N.V.

SUPPORTED BY Netherlands - V E G Gas Institute N.V. - Rijswijk

9.0073, A PROJECT OF ROCRIN (ROTTERDAM'S ONDERZOEK CRISIS IN NEDERLAND) SOME CONSEQUENCES OF THE OIL CRISIS FOR THE DUTCH LABOR RELATIONS (ABBREV)

W. ALBEDA, Erasmus Univ. of Rotterdam, *Rotterdam, Netherlands*

The oil crisis came at a time when the Dutch system of labour relations was undergoing deep seated changes. The crisis put the whole system under pressure. The question is whether these pressures did reveal something of the new attitude of union leaders, and the reaction of the employers' side. The objective of the project of which this is part is to analyse the social and political aspects of the recent oil crisis phenomena in The Netherlands (ROCRIN).

SUPPORTED BY Netherlands - Central Organ. Advan. Pure Res. - The Hague

9.0074, ACTION OF PRESSURE GROUPS DURING THE THREE MONTHS OF ENERGY CRISIS IN THE NETHERLANDS (1973)

R.W. HOMMES, Erasmus Univ. of Rotterdam, *Rotterdam, Netherlands*

The study is an analysis of the actions of three different pressure groups in the fall of 1973 related to the perceived effect of the shortage of energy. The actions (cooperative or organistic versus governmental actions) are related to: a) perception of the seriousness of the crisis; b) evaluation of the governmental actions: and related to organisational determinants (cohesion, kind of leadership, communication channels).

Techniques of research: Documentation analysis; Secondary analysis; Interviews with 'key-respondents.'

The three pressure groups are: 1) Automobile-organisations; 2) Hotel-organisations; 3) Environment-organisations.

SUPPORTED BY Netherlands - Central Organ. Advan. Pure Res. - The Hague

9.0075, COMPARISON OF INVESTMENT COSTS IN A NUCLEAR POWER BASED ECONOMY AND A CONVENTIONAL FUELS BASED ECONOMY IN WESTERN EUROPE

P.R. ODELL, Erasmus Univ. of Rotterdam, Economic Geography Institute, *Rotterdam, Netherlands*

SUPPORTED BY Netherlands - Erasmus University of Rotterdam

9.0076, SUPPLY OF INDIGENOUS CONVENTIONAL ENERGY AND THE IMPLICATIONS FOR POLITICAL RELATIONSHIP AND ENERGY POLICY PLANNING IN WESTERN EUROPE

P.R. ODELL, Erasmus Univ. of Rotterdam, Economic Geography Institute, *Rotterdam, Netherlands*

The proposed research is concerned with the investigation of a radically different alternative for the energizing of the Western European economy in the period up to the year 2000. This alter-

native hypothesis is that indigenous conventional energy resources p especially of oil and natural gas - are capable of meeting Europe's needs over this period. The research is then further concerned with the implications of this alternative energy strategy for the political relationships between the countries of western Europe, especially in respect to multi-lateral and integrated approaches to energy policy planning and development.

The energy supply potential will be modelled using simulation and other appropriate techniques. From this work rank-ordered potential energy production schedules for a series of years in the study period will be established. For the political investigations, energy self-sufficiency will be assumed not only to be desirable but also of the utmost priority. Earlier approaches to and models of European cooperation/integration possibilities will be systematically examined for their relevance to the energy sector and an attempt made to define areas of conflict and of co-incidence between national and European approaches to the problem.

SUPPORTED BY Netherlands - Central Organ. Advan. Pure Res. - The Hague

9.0077, THE DUTCH MINISTRY FOR ECONOMIC AFFAIRS (IN TURBULENT ENVIRONMENTS)
G.H. SCHOLTEN, Erasmus Univ. of Rotterdam, *Rotterdam, Netherlands*

An empirical research project meant to clarify the degree of organizational anticipation and adaptation to environmental turbulences; how to isolate the impact of sudden changes in the environment from the normal cyclical movements in the organization; how to find the specific impact of the oil crisis 1973; the increase of anticipatory capacity because of the crisis experiences. The project refers to the Dutch Ministry for Economic Affairs. Methods: interviewing high officials; documents; literature.

The whole research project of which this is a part, tries to analyze the social and political aspects of the recent crisis phenomena in The Netherlands (ROCRIN).

SUPPORTED BY Netherlands - Central Organ. Advan. Pure Res. - The Hague

9.0078, SYSTEM DYNAMICS ANALYSIS OF THE FEASIBILITY OF PROJECTED ENERGY AND MATERIAL FLOW IN THE NETHERLANDS
R.O. BEIJDORFF, Central Org. Adv. Appl. Res., *The Hague, Netherlands*

A disaggregation of the World III model by Meadows and Forrester (M.I.T. Cambridge, Mass. USA) for regional Dutch circumstances. The projected energy and material flow in the Netherlands as expressed in policy-reports of the department of economic affairs, is analysed and tested in a causal loop diagram and flow diagram, stressing the political and physical variables as limiting factors. Results of the project will be published in a final report and in a computer programme.

SUPPORTED BY Netherlands - Council for Science Policy - The Hague

9.0079, ECONOMY OF MATERIALS IN THE NETHERLANDS IN THE FUTURE
J.A. OVER, Future Shape of Tech. Found., *The Hague, Netherlands*

The principal objective of the investigation is: a scouting of the possible factors influencing the future Dutch economy, regarding raw materials and energy consumption.

The sub-objectives are: a) Tracing and defining parameters useful for governmental and industrial decision-makers to develop long term planning in the field of raw materials-economy for the future. Also the interrelations between the materials economy and its environment are considered. The National situation in The Netherlands will be studied against the background of global developments. b) Indicating what types of scientific research may offer a substantial contribution to the tracing of other parameters as expressed in paragraph a) for policy and decision making. c) Stimulating research workers to improve the methodology and quality of information.

The materials to study are: aluminium, lead, zinc, glass, brick, concrete, wood, paper, polyethylene, PVC and nylon.

Two aspects will be considered: a) The supply of raw materials; b) The use or consumption of raw materials. To achieve a stable raw materials economy, modification may have to be made in both supply and consumption.

Complying with the needs being the principal driving force of the materials-flow, the consumption factor is more complicated than the supply. This first study therefore aims at a comprehensive treatment of the first steps in the chosen material line raw material-semi-manufactured product.

The application of the above mentioned materials will be studied. But only four types of products will be considered: a) Large domestic electrical equipment; b) Passenger-cars; c) Single family houses; and d) Packing materials.

SUPPORTED BY Netherlands - Royal Institute of Engineers - The Hague

9.0080, ENERGY SYSTEMS STUDIES
R. VANDERWART, Reactor Center, Bureau of Energy Systems, *The Hague, Netherlands*

Planned studies in the field of energy systems analysis, energy input-output analysis and energy systems modelling, based on existing capabilities within RCN; co-ordination by Bureau of Energy Systems.

SUPPORTED BY Netherlands - The Netherlands Government - The Hague

9.0081, EUROPEAN ENERGY POLICY
UNKNOWN, Tilburg University, John F. Kennedy Institute, *Tilburg, Netherlands*

This Colloquium has focused on policy-planning with respect to the production and consumption of electric energy during the medium term future in EC member countries as well as attempts in the EC to harmonize, coordinate and unify policy-planning processes. These problems have been explored in the context of four pressing background factors: the policy-planning requirements of a group of countries with high and rising levels of energy consumption, but with poor resources; the anticipated multiparty power conflicts over energy; the well-recognized 'quality of life' problems; and the continued depletion of fossil energy sources. The central purpose of the Colloquium has been to explore, analyze, and suggest solutions to the multifaceted problems associated with policy-making in the field of electric energy.

SUPPORTED BY Netherlands - Tilberg University - Tilberg

9.0082, GLOBAL ENERGY
UNKNOWN, Tilburg University, John F. Kennedy Institute, *Tilburg, Netherlands*

The general goal of the Project is to acquire a better understanding of energy problems and their interrelations with the international economic order by exploring a global approach to energy planning.

SUPPORTED BY Netherlands - Tilberg University - Tilberg

9.0083, POLISH AND DUTCH ENERGY POLICIES - THE IMPACT OF EAST-WEST DETENTE AND THE PRESENT ENERGY CRISIS
F.A. VONGEUSAU, Tilburg University, John F. Kennedy Institute, *Tilburg, Netherlands*

1. General evaluation of the impact of the oil crisis on our national economies: a) Poland; b) Netherlands. 2. Relationship between the costs of energy and the rate of growth during the post-war period: a) Poland; b) Netherlands 3. Security of Energy Supplies. (1) Forecasts with respect to oil-imports on the medium and long term. a) Poland; b) Netherlands. (2) Forecasts and policies concerning an increase of self-sufficiency in covering energy needs. a) Poland; b) Netherlands. 4. Possibilities for East-West/Polish-Dutch cooperation in energy: a) The Polish perspective; b) The Dutch Perspective. c) Evaluation of possibilities for trade and cooperation.

SUPPORTED BY Netherlands - Tilberg University - Tilberg

9.0084, SYSTEM ANALYSIS OF ENERGY FACTORS
W. VANGOOL, State University at Utrecht, *Utrecht, Netherlands*

The objectives are: a) Analysis of the available amount of 'alternative' energy in The Netherlands in relation to storage systems and patterns of consumption. b) Energy accounting of materials.

Addenda: Supporting agency and performing organization: Rijksuniversiteit Utrecht.

SUPPORTED BY Netherlands - State University at Utrecht

9.0085, WORLD DYNAMICS MODEL VALIDATION
M.S. ELZAS, Wageningen Ctr. of Agric. Sci., *Wageningen, Netherlands*

Summary of project: See title of project and the Report I of the Club of Rome.

Addenda: Supporting and performing organization: Landbouwhogeschool.

SUPPORTED BY Netherlands - Agricultural University at Wageningen

9.0086, MEASURING BUS FOR INDOOR CLIMATE
C.A. BOMAN, Building Research Institute, *Gavle, Sweden*

The material resources of the measuring unit include a measuring bus equipped for field studies of the outdoor climate and of the indoor climate in buildings in use. In addition, the bus is used in conjunction with studies of materials and designs which have previously been developed or tested within the Institute. New methods for field measurements are tested and developed in connection with this.

SUPPORTED BY Sweden - Council for Building Research

9.0087, THE FUNCTION AND PHYSICAL STRUCTURE OF THE URBAN AREA
G. CARLESTAM, Building Research Institute, *Gavle, Sweden*

The main purpose of this project is to create instruments for improved economizing on meagre resources - money, time, nature, health. One of the questions made within the framework for the project is: are today's urban area environments and local communal systems unnecessarily wasteful of energy in relation to the consumption yield and the environmental damage caused? The project also aims at developing a method for analyses of consequences. This will make it possible to analyze, in a more all around way, various location and design decisions when a local communal system is developed, rebuilt or retained.

SUPPORTED BY Sweden - Council for Building Research

9.0088, SWEDEN'S FUTURE ENERGY USE AND ENERGY SUPPLY IN A HISTORICAL AND GLOBAL PERSPECTIVE
K.E. ERIKSSON, Gothenburg University, Centre for Interdisc. Studies, *Gothenburg, Sweden*

OBJECTIVE: To suggest an alternative development for the Swedish energy system during the period 1985-2000. This alternative development should be constructed according to principles that have as their aim to realize the global goals of human solidarity and ecological responsibility. Energy system is to be understood in a very broad sense.

APPROACH: The study is divided into two parts. The first part gives a background description of the Swedish energy system and its development during three decades, the 1870's, the 1920's and the 1960's. Studies are also made of the energy systems of some other countries, among them England and Ghana.

The second part of the study describes a possible situation in the 2020's for the Swedish energy system compatible with the given principles and suggests a development during 1985-2000 that may lead to such a situation.

INTENDED USE OF RESULTS: In the general energy debate which will take place before the political decision on the country's energy policy.

SUPPORTED BY Sweden - Energy Research & Develop. Commission - Stockholm

9.0089, ENERGY-ORIENTED RESEARCH - OUTLINE PROGRAM
W. KIESSLING, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

In the autumn of 1975 an agreement was reached between the Swedish Council for Building Research (BFR) and the Department of Building Construction at Chalmers University of Technology (CTH) on a planning framework for energy R & D at the department. This meant that the Department undertook to devote a certain amount of its personnel resources to energy-oriented research. Two applications for grants for minor projects were submitted to the Council during the early autumn but were rejected since the projects were deemed to lack coordination with remaining energy R & D in Sweden.

This indicated that a more detailed program work was essential before the resources could be devoted to project research. The program work, which has mainly embraced literature studies and contacts with other energy R & D institutions, has resulted in a report 'Outline program for energy-oriented research at the Department of Building Construction, CTH,' submitted to BFR in March 1976.

This application refers to the direct costs incurred by the Department in conjunction with the outline program, primarily salaries for staff working on the program. This work volume does not include the planning and program writing work carried out directly for the projects included in the outline program.

SUPPORTED BY Sweden - Council for Building Research

9.0090, TEROTECHNOLOGY
B. MCHUGH, Chalmers Univ. of Technology, *Gothenburg 5, Sweden*

OBJECTIVE: An analysis of the advantages of using terotechnological principles within the energy field.

APPROACH: Terotechnology is the science of design, construction, installation and operation of the technical systems. It is related to the reliability and availability sciences.

Within this project the present use of terotechnology will be investigated and the possible advantages of applying terotechnological principles to different problems in the energy field analysed. Necessary R&D efforts will be estimated.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

9.0091, LOW-RESOURCE CONSTRUCTION - A JOINT PROJECT IN CONJUNCTION WITH THE SOUTH BALTIC HOUSE (WATER AND WASTE HANDLING)
L. ANDERBERG, Univ. of Lund, School of Technology, *Lund 7, Sweden*

The Department of Water Resources Engineering intends, within the framework for the total project, to deal with water and waste handling.

SUPPORTED BY Sweden - Council for Building Research

9.0092, INTERACTIVE USER-ORIENTED COMPUTER MODEL OF THE SWEDISH ENERGY SYSTEM
L. THORNQVIST, Univ. of Lund, School of Technology, *Lund 7, Sweden*

OBJECTIVE: To develop a computerized simulation model of the Swedish energy production system.

APPROACH: Starting from earlier development work on computer and systems techniques, a model is being developed according to the specific needs of the Board. The model will consist of the following main components: Energy forms, energy conversion processes, energy storage elements, energy transport and energy resources. Every main component will be represented to known as well as hypothetical subcomponents.

SUPPORTED BY Sweden - Board for Energy Source Development - Stockholm

9.0093, COSTS OF ENERGY, TRANSPORT, EXTERNAL ORGANIZATION OF WORK, EXPLORATORY STUDIES OF CHANGES & ADAPTATION IN SWEDISH MANUFACTURING INDUSTRY

G. TORNQVIST, Univ. of Lund, *Lund 7, Sweden*

OBJECTIVE: To show how increases in energy prices would influence the transport/economic conditions of Swedish manufacturing companies. To analyse the need and possibilities for adaptation mainly as regards the external organization of work.

APPROACH: The study will proceed in 3 steps with focus being placed on: 1) How does an increasing energy price affect the transport cost of manufacturing companies located in different parts of the country? 2. What possibilities do manufacturing companies have to adapt, in the long run, to considerably higher energy prices than today? 3. What changes in the regional organization of production are probable as a consequence of higher energy prices? (Includes calculations of the correspondent transport work.)

The study will mainly rely on transport/economic calculations and experiment with models of the systems under investigation. The study is planned as a complement to the Transport Research Delegation's project with number 81/76-82.

PROGRESS: This is the second stage out of three.

INTENDED USE OF RESULTS: The results will be relevant for public planning authorities with responsibility for issuing guidelines for increased readiness against future fuel-price rises as well as for transport producers planning the future supply of transport services.

SUPPORTED BY Sweden - Transport Research Delegation - Stockholm

9.0094, PROGRAM WORK FOR A COMPUTERIZED ENERGY INFORMATION PROJECT

A. STERN, Building Documentation Inst, *Stockholm, Sweden*

This application refers to the program work for a computerized energy information project. The project concerns the dissemination of information in the energy sector with the aid of a data base, supplementary information and procurement services and an abstract publication in the energy sector.

The program work embraces a presentation of the experience obtained from the present activities of the Swedish Institute of Building Documentation in this sector, a study of the need for supplementing the Institute's present collection, drawing up criteria for the material which is to be included in the data base with regard to subject, time and form, an assessment of the quantity, a description of the service activities, a description of the prerequisites for the abstract magazine - form, layout, periodicity, distribution - the development of a system for the data base, a proposal for charges, a structural plan, a time schedule and cost estimate of the activities.

SUPPORTED BY Sweden - Council for Building Research

9.0095, ENERGY FORECAST MODEL FOR SWEDEN - COMPUTER RUNS

H. JUNG, Council of Building Research, *Stockholm, Sweden*

This project refers to a computer running of an energy forecast model for Sweden. The input values are in accordance with N.E. Lindskoug's presentation to the Council for Energy Conservation of the National Board of Urban Planning as well as supplementary values resulting from the BFR (Swedish Council for Building Research) energy commission. The DFE (Energy R&D Commission) study in accordance with EFA 2000 (the DFE study on Swedish Energy supply alternatives in the year 2000) will be complied within the calculations. In addition to the normal presentation of results from EPM calculations, the net, gross and primary energy results will also be presented in accordance with the BFR directives.

SUPPORTED BY Sweden - Council for Building Research

9.0096, SUPPLEMENTATION OF PROGRAM STUDY ON ENERGY PLANNING AND PHYSICAL COMMUNITY PLANNING

O. OLSSON, K Konsult, *Stockholm, Sweden*

The views and comments received on the original projects will be taken into consideration in the supplement. In addition, current projects within the EPD activities at Gavle will be presented. The work will be carried out in collaboration with Stefan Sandesten, BFR. The work organization was discussed with Sandesten at a meeting held on March 10, 1976.

SUPPORTED BY Sweden - Council for Building Research

9.0097, MODELS FOR OPTIMAL ENERGY PREPAREDNESS

C. BERGSTROM, Univ. of Stockholm, *Stockholm 50, Sweden*

OBJECTIVE: To study the social efficiency of various measures intended to decrease the sensitivity of the economy to embargoes and other disturbances in the supply of energy.

APPROACH: The project includes on the one hand planning models for the efficient allocation of scarce energy resources in situations of acute shortage (liner programing models with various objective functions), and on the other hand an analysis of measures which may be taken in advance, such as stockpiling and international agreements.

PROGRESS: A report on the allocation models will be submitted in June 1977. A preliminary report on investment models (stockpiling etc.) will be submitted in August 1977.

INTENDED USE OF RESULTS: Planning of stockpiling and allocation of energy resources in Sweden in situations of energy shortage.

SUPPORTED BY Sweden - Energy Research & Develop. Commission - Stockholm

9.0098, THE DISTRIBUTION OF POWER, THE MARKET STRUCTURE AND PRICING ON THE INTERNATIONAL OIL MARKET

O. BJORK, Univ. of Stockholm, *Stockholm 50, Sweden*

OBJECTIVE: To illuminate the factors which determine supply and pricing policy for crude oil and oil products on the international market. To analyse the present tendencies for development including cartell activities, prospecting and the expansion of capacity.

APPROACH: To attempt to trace the course of events during recent years and the present tendencies in this market with regard to owner relationships in the various stages of refining, cartell cooperation, market shares and the development of costs and prices. To examine the existing models for the oil market and work in progress in this area.

PROGRESS: A preliminary report will be submitted in August 1977.

INTENDED USE OF RESULTS: As a basis for assessing the consequences for Swedish energy supply and energy policy of the future development of the oil market.

SUPPORTED BY Sweden - Energy Research & Develop. Commission - Stockholm

9.0099, THE EFFECTS OF VARIOUS SYSTEMS OF ENERGY TAXATION

A. CARLING, Univ. of Stockholm, *Stockholm 50, Sweden*

OBJECTIVE: To analyse the effects on economic efficiency and income distribution of the now existing system for energy taxation and of various alternative systems. In addition certain measures intended to stimulate energy saving investments should be evaluated.

APPROACH: Studies are made of the influence of energy taxes on costs in different sectors (industry branches, the transport sector, etc.) and of the possibilities of factor substitution in different time perspectives. The incidence of energy taxation on various groups of households (income groups, households in different regions, etc.) is also studied.

PROGRESS: Results will be submitted in three or four short reports from May to December 1977, starting with a study of energy-intensive industry.

INTENDED USE OF RESULTS: As a basis for evaluation propositions for energy tax reform.

SUPPORTED BY Sweden - Energy Research & Develop. Commission - Stockholm

9.0100, ENERGY FLOW STUDY OF THE ISLAND OF GOTLAND

A.M. JANSSON, Univ. of Stockholm, Zoological Institute, *Stockholm 50, Sweden*

OBJECTIVE: To demonstrate a combined energy, economic and ecological system approach to a system of man and nature.

APPROACH: This approach emphasizes the development of system models with the goal of integrating the major sub-systems of the region. These subsystems include industry, agriculture, forestry, nature and tourism. Of prime concern are the fossil fuel, electrical, photosynthetic, and natural mechanical energy flows along with associated economic flows for evaluation of the models. These models can be used for simulation and analysis. The project is supported by the Energy Research and Development Commission and the Swedish National Science Research Council (NFR).

PROGRESS: Data collection and model to be completed by July, 1977. Report to be published in fall, 1977.

INTENDED USE OF RESULTS: Popular version of report to be read by politicians, planners, decision makers, and local residents. Technical report will be of interest to researchers interested in modeling, energy analysis theory, regional science and ecological planning.

SUPPORTED BY Sweden - Energy Research & Develop. Commission - Stockholm

9.0101, THE INFLUENCE OF ENERGY PRICES ON THE ALLOCATION OF PRODUCTION AND INCOME AMONG NATIONS

S. KJELLMAN, Univ. of Stockholm, *Stockholm 50, Sweden*

OBJECTIVE: To make a survey of models of international energy and commodity flows as a basis for research projects concerning the relationship between national energy policy, international cooperation in the energy sector and the international allocation of resources and incomes.

APPROACH: (1) A historical study of how patterns of trade and costs for oil supplies have developed during the 1960's and 70's for various groups of nations (especially LDC's) (2) A survey of quantitative models for world trade and their applicability to problems of energy supply and rising energy prices.

PROGRESS: A preliminary report will be submitted in March 1977.

INTENDED USE OF RESULTS: As a basis for decisions concerning more specialized Swedish research projects in this area.

SUPPORTED BY Sweden - Energy Research & Develop. Commission - Stockholm

9.0102, THE PRICE AND INCOME ELASTICITY OF THE HOUSEHOLDS' DEMAND FOR ENERGY

A. LUNDIN, Univ. of Stockholm, *Stockholm 50, Sweden*

OBJECTIVE: To survey methods and results from studies of household demand for electricity and fuels in various countries and to determine the feasibility of estimating price and income elasticities for energy in Sweden.

APPROACH: A survey and inventory to determine the nature of methods and data required to make reliable estimates of elasticities of demand for different kinds of energy. If such a study of the Swedish household sector is feasible, then a plan specifying analytical methods and procedures for collecting data should be made.

PROGRESS: The main report will be submitted in February 1977. It is suggested that continuing work will include estimations for Sweden for 1977 (based on the crude time series data now available) as well as long term development of methods for more ambitious studies.

INTENDED USE OF RESULTS: As a basis for judging effects on energy use of various conservation measures (energy taxes etc.)

SUPPORTED BY Sweden - Energy Research & Develop. Commission - Stockholm

9.0103, THE EFFECTS OF CHANGES IN THE STRUCTURE OF PRODUCTION ON EMPLOYMENT AND THE USE OF ENERGY

A. SOHLMAN, Univ. of Stockholm, *Stockholm 50, Sweden*

OBJECTIVE: To study the influence upon the use of energy of changes over time in the composition of final demand. Effects the reallocation between the sectors in the economy and among the various industries.

APPROACH: Input - output calculations for various intervals of time using the EPM forecasting model for different demand alternatives from the Long-Term Planning Commission and the Employment Commission.

PROGRESS: The main report was submitted in January 1977. Minor supplementary reports will be submitted during February and March.

INTENDED USE OF RESULTS: Background material for projections of energy demand and for long term planning.

SUPPORTED BY Sweden - Energy Research & Develop. Commission - Stockholm

9.0104, EFFECTS ON EMPLOYMENT OF REDUCTIONS IN THE RATE OF GROWTH OF ENERGY USE

A. SOHLMAN, Univ. of Stockholm, *Stockholm 50, Sweden*

OBJECTIVE: To study the effects on employment of changes in energy prices and energy taxes and of long term constraints on the use of energy. Main emphasis on employment effects in various regions and various industrial sectors. The problems are studied in a 'medium term' perspective - structural effects over 10-20 years.

APPROACH: Changes in industrial structure on a national level are analysed using the EPM forecasting model (input-output and linear programming technique). A number of case studies will be carried out concerning regional and local labor markets and their dependence on energy-intensive production.

PROGRESS: Preliminary reports will be submitted during the spring and summer of 1977.

INTENDED USE OF RESULTS: For planning of regional employment policy and for evaluation of different kinds of energy conservation measures.

SUPPORTED BY Sweden - Energy Research & Develop. Commission - Stockholm

9.0105, MODIFIED WING TRAWL BOARD

K. CALLBO, Innovation Thomas Nilsson Ab, *Stockholm 7, Sweden*

SUPPORTED BY Sweden - National Board F. Technical Development - Stockholm

9.0106, OPTIMIZATION MODEL FOR OVERALL MUNICIPAL ENERGY PLANNING

J.A. BUBENKO, Royal Institute of Technology, *Stockholm 70, Sweden*

SUMMARY OF PROJECT: This publication refers to the continued work to be carried out on the above-mentioned project during the period from July 1, 1976 to June 30, 1977.

The objective is to develop a technical-economic model based on land use which evaluates the economic consequences of various energy supply systems. The planned research work is to be directed towards two fields: (1) Model formulation: The following aspects are to be studied in this field: a) The need for and availability of source material for forecasts; b) The formulation of and solution methods for load forecasts, energy system planning, the relationship between energy system planning and economy and the relationship between land use and energy requirements; c) The possibilities for reflecting the gradual development of the

energy systems in the model. (2) The development of computer routines for dealing with the issues described in 1b and 1c above.

A detailed program is included in the appended report 'Optimization model for overall municipal energy planning' drawn up by the Research Group for Electrical Energy Systems, the Royal Institute of Technology, January 1975.

SUPPORTED BY Sweden - Council for Building Research

9.0107, ENERGY SYSTEM ANALYSIS - THE NEED OF SIMULATION - MEASUREMENT AND EVALUATION
J.A. BUBENKO, Royal Institute of Technology, *Stockholm 70, Sweden*

The objective of this project is to investigate the need for simulation, measurement and evaluation in conjunction with full-scale tests.

A draft for a uniform simulation and measurement programme is to be drawn up. This draft will be presented at a symposium to which the representatives of the institutions, organizations and authorities concerned will be invited.

SUPPORTED BY Sweden - Council for Building Research

9.0108, 1976 ANNUAL REPORT OF THE DEPARTMENT OF HEATING AND VENTILATION, ROYAL INSTITUTE OF TECHNOLOGY, STOCKHOLM, SWEDEN
F. PETERSON, Royal Institute of Technology, *Stockholm 70, Sweden*

The production of an annual report for the Department activities, mainly concerning research within the heating, ventilation and sanitation sector but also concerning basic and advanced tuition where this type of research is involved.

SUPPORTED BY Sweden - Council for Building Research

9.0109, DEVELOPMENT TRENDS FOR THE STRUCTURAL ELEMENTS OF BUSINESS AND ECONOMICS WHICH ARE RELEVANT TO THE ENERGY PROBLEM
D. SCHROEDER, Prognos AG, *Basel, Switzerland*

SUPPORTED BY Germany - Federal Ministry of Research and Technology - Bonn

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Canada - Department of National Defense - Ottawa, Ontario
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Canada - Department of The Environment - Ottawa, Ontario
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Canada - National Research Council - Ottawa, Ontario
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Canada - New Western Oil Sands Limited - Vancouver
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Canada - Ontario Provincial Government - Toronto
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Canada - Petroleum Research Institute - Calgary
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Canada - University of Calgary - Calgary, Alberta
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France - Electricite de France - Paris
3.0089, 3.0090, 3.0091, 3.0092, 3.0093, 3.0094, 3.0095, 3.0197, 3.0198, 3.0199, 3.0200, 3.0201, 3.0202, 3.0203, 3.0204, 3.0205, 3.0206, 3.0207, 3.0208, 3.0209, 3.0210, 3.0211, 3.0363, 3.0364, 3.0365, 3.0366, 3.0367, 3.0368, 3.0369, 3.0370, 3.0371, 3.0372, 3.0373, 3.0374, 3.0375, 3.0376, 3.0377, 3.0472, 3.0473, 3.0474, 3.0475, 3.0476, 3.0477, 3.0478, 3.0479, 3.0480, 3.0481, 3.0482, 3.0483, 3.0484, 3.0485, 3.0486, 3.0487, 3.0488, 3.0489, 3.0490, 3.0491, 3.0492, 3.0493, 3.0494, 3.0495, 3.0496, 3.0497, 3.0498, 3.0611, 3.0612, 3.0613, 3.0614, 3.0615, 3.0616, 3.0617, 3.0618, 3.0619, 3.0620, 3.0621, 3.0622, 3.0623, 3.0624, 3.0625, 3.0626, 3.0627, 3.0628, 3.0629, 3.0630, 3.0631, 3.0632, 3.0633, 3.0634, 3.0697, 3.0698, 3.0699, 3.0700, 3.0701, 3.0702, 3.0703, 3.0704, 3.0705, 3.0744, 3.0745, 3.0746, 3.0888, 3.0889, 3.0890, 3.0891, 3.0892, 4.0104, 4.0105, 4.0106, 4.0107, 4.0108, 4.0109, 4.0110, 5.0128, 5.0129, 5.0130, 5.0131, 5.0132, 5.0133, 5.0134, 5.0135, 5.0136, 5.0137, 5.0138, 5.0139, 5.0140, 5.0141, 5.0142, 5.0143, 5.0144, 5.0145, 5.0146, 5.0147, 5.0148, 5.0149, 5.0150, 5.0151, 5.0152, 5.0153, 5.0154, 5.0155, 5.0156, 5.0157, 5.0158, 5.0159, 5.0160, 5.0161, 6.0105, 6.0106, 6.0107, 6.0108, 6.0109, 6.0110, 6.0111, 6.0112, 6.0113, 6.0114, 6.0115, 6.0116, 6.0117, 6.0118, 6.0119, 6.0120, 6.0121, 6.0122, 7.0077, 7.0078, 7.0079, 8.0128, 8.0129, 9.0053, 9.0054, 9.0055, 9.0056.

France - Federated Union of Petroleum Industries - Paris
8.0143.

France - Ferrous Metallurgy Research Inst.- St. Germain-laye
1.0547, 1.0548, 1.0549, 1.0550.

France - French Government - Paris
1.0201, 1.0256, 1.0265.

France - General Delegation for Scientific & Technical Res.
1.0200, 1.0202, 1.0203, 1.0204, 1.0205, 1.0213, 1.0218, 1.0257, 1.0258, 1.0259, 1.0260, 1.0261, 1.0262, 1.0263, 1.0264, 1.0266, 4.0092, 4.0093, 4.0094, 4.0095, 4.0097, 4.0098, 4.0099, 4.0100, 4.0101, 4.0102, 4.0103, 4.0111, 4.0121, 4.0123, 4.0125, 4.0126, 4.0127, 4.0128, 4.0129, 4.0130, 4.0131, 4.0132, 4.0135, 5.0123, 5.0124, 5.0125, 5.0176, 8.0145.

France - Institute of Transportation Research - Val de Marne
8.0123, 8.0125, 8.0146.

France - Ministry for The Quality of Life & Environ. - Paris
6.0124, 6.0129, 8.0126.

France - Ministry of Equipment & Housing - Paris
4.0112, 4.0113, 4.0114, 5.0162, 8.0130, 8.0131, 8.0132, 8.0133, 8.0134, 8.0135, 8.0136, 8.0137, 8.0138, 8.0139, 9.0058.

France - Ministry of Industry & Research - Paris
1.0206, 1.0209, 1.0210, 1.0211, 1.0212, 1.0551, 1.0552, 1.0553, 1.0554, 4.0115, 4.0116, 4.0117, 4.0118, 4.0119, 4.0120, 4.0122, 5.0126, 5.0127, 6.0123, 8.0141, 8.0147, 8.0148, 9.0052.

France - National Science Research Center - Paris
1.0207, 1.0208, 5.0163, 5.0164, 5.0165, 5.0166, 5.0167, 5.0168, 8.0127, 8.0140, 9.0051, 9.0057, 9.0059, 9.0060, 9.0061, 9.0062.

France - National Space Studies Center - Paris
4.0133, 4.0134.

France - Petroleum Institute - Rueil - Malmaison
1.0215, 1.0216, 1.0217, 1.0219, 1.0220, 1.0221, 1.0222, 1.0223, 1.0224, 1.0225, 1.0226, 1.0227, 1.0228, 1.0229, 1.0230, 1.0231, 1.0232, 1.0233, 1.0234, 1.0235, 1.0236, 1.0237, 1.0238, 1.0239, 1.0240, 1.0241, 1.0242, 1.0243, 1.0244, 1.0245, 1.0246, 1.0247, 1.0248, 1.0249, 1.0250, 1.0251, 1.0252, 1.0253, 1.0254, 1.0255, 4.0124, 5.0169, 5.0170, 5.0171, 5.0172, 5.0173, 6.0125, 6.0126, 6.0127, 6.0128, 8.0144.

France - Transportation Research Institute - Acueil
8.0124, 8.0142.

Germany - Federal Ministry of Economics - Bonn
1.0165, 1.0402, 1.0407, 1.0412, 1.0413, 1.0415, 1.0416, 1.0417, 1.0418, 1.0421, 1.0424, 1.0427, 1.0430, 1.0431, 1.0433, 1.0434, 1.0435, 1.0436, 1.0437, 1.0440, 1.0441, 1.0445, 1.0447, 1.0449, 1.0455, 1.0456, 1.0457, 1.0458, 1.0459, 1.0460, 1.0461, 1.0462, 1.0463, 1.0501, 1.0502, 1.0503, 1.0510, 1.0511, 1.0521, 1.0522, 1.0523, 1.0525, 1.0526, 1.0527, 1.0528, 1.0530, 6.0075, 7.0044, 7.0045, 7.0046, 7.0047, 7.0051, 7.0052.

Germany - Federal Ministry of Research and Technology - Bonn
1.0164, 1.0166, 1.0167, 1.0168, 1.0169, 1.0170, 1.0171, 1.0172, 1.0173, 1.0174, 1.0175, 1.0176, 1.0177, 1.0178, 1.0179, 1.0180, 1.0181, 1.0182, 1.0183, 1.0184, 1.0185, 1.0186, 1.0187 1.0188, 1.0189, 1.0190, 1.0191, 1.0192, 1.0193, 1.0194, 1.0195, 1.0196, 1.0197, 1.0198, 1.0199, 1.0381, 1.0382, 1.0383, 1.0384, 1.0385, 1.0386, 1.0387, 1.0388, 1.0389, 1.0390, 1.0391, 1.0392, 1.0393, 1.0394, 1.0395, 1.0396, 1.0397, 1.0398, 1.0399, 1.0400, 1.0401, 1.0403, 1.0404, 1.0405, 1.0406, 1.0408, 1.0409, 1.0410, 1.0411, 1.0414, 1.0419, 1.0420, 1.0422, 1.0423, 1.0425, 1.0426, 1.0428, 1.0429, 1.0432, 1.0438, 1.0439, 1.0442, 1.0443, 1.0444, 1.0446, 1.0448, 1.0450, 1.0451, 1.0452, 1.0453, 1.0454, 1.0464, 1.0465, 1.0466, 1.0467, 1.0468, 1.0469, 1.0470, 1.0471, 1.0472, 1.0473, 1.0474, 1.0475, 1.0476, 1.0477, 1.0478, 1.0479, 1.0480, 1.0481, 1.0482, 1.0483, 1.0484, 1.0485, 1.0486, 1.0487, 1.0488, 1.0489, 1.0490, 1.0491, 1.0492, 1.0493, 1.0494, 1.0495, 1.0496, 1.0497, 1.0498, 1.0499, 1.0500, 1.0504, 1.0505, 1.0506, 1.0507, 1.0508, 1.0509, 1.0512, 1.0513, 1.0514, 1.0515, 1.0516, 1.0517, 1.0518, 1.0519, 1.0520, 1.0524, 1.0529, 1.0531, 1.0532, 1.0533, 1.0534, 1.0535, 1.0536, 1.0537, 1.0538, 1.0539, 1.0540, 1.0541, 1.0542, 1.0543, 1.0544, 1.0545, 1.0546, 1.0601, 1.0602, 1.0603, 1.0604, 1.0605, 1.0606, 1.0607, 1.0608, 2.0011, 2.0012, 2.0013, 3.0011, 3.0012, 3.0013, 3.0014, 3.0015, 3.0016, 3.0017, 3.0018, 3.0019, 3.0020, 3.0021, 3.0022, 3.0023, 3.0024, 3.0025, 3.0026, 3.0027, 3.0028, 3.0029, 3.0030, 3.0031, 3.0032, 3.0033, 3.0034, 3.0035, 3.0036, 3.0037, 3.0038, 3.0039, 3.0040, 3.0041, 3.0042, 3.0043, 3.0044, 3.0045, 3.0046, 3.0047, 3.0050, 3.0051, 3.0052, 3.0053, 3.0054, 3.0055, 3.0056, 3.0057, 3.0058, 3.0059, 3.0061, 3.0062, 3.0063, 3.0179, 3.0180, 3.0181, 3.0182, 3.0183, 3.0184, 3.0185, 3.0188, 3.0189, 3.0190, 3.0191, 3.0192, 3.0309, 3.0310, 3.0311, 3.0312, 3.0313, 3.0314, 3.0315, 3.0316, 3.0317, 3.0318, 3.0319, 3.0320, 3.0321, 3.0322, 3.0323, 3.0324, 3.0325, 3.0326, 3.0327, 3.0328, 3.0329, 3.0330, 3.0331, 3.0332, 3.0333, 3.0334, 3.0335, 3.0336, 3.0337, 3.0338, 3.0339, 3.0340, 3.0341, 3.0342, 3.0343, 3.0344, 3.0345, 3.0346, 3.0347, 3.0348, 3.0349, 3.0350, 3.0351, 3.0352, 3.0353, 3.0354, 3.0355, 3.0441, 3.0442, 3.0443, 3.0444, 3.0445, 3.0446, 3.0447, 3.0448, 3.0449, 3.0450, 3.0451, 3.0452, 3.0453, 3.0454, 3.0455, 3.0456, 3.0457, 3.0458, 3.0459, 3.0460, 3.0461, 3.0462, 3.0463, 3.0464, 3.0542, 3.0543, 3.0544, 3.0545, 3.0546, 3.0547, 3.0548, 3.0549, 3.0550, 3.0551, 3.0552, 3.0553, 3.0554, 3.0555, 3.0556, 3.0557, 3.0558, 3.0559, 3.0560, 3.0561, 3.0562, 3.0563, 3.0564, 3.0565, 3.0566, 3.0567, 3.0568, 3.0569, 3.0570, 3.0571, 3.0572, 3.0573, 3.0574, 3.0575, 3.0576, 3.0577, 3.0578, 3.0579, 3.0580, 3.0581, 3.0582, 3.0583, 3.0584, 3.0585, 3.0586, 3.0587, 3.0588, 3.0589, 3.0590, 3.0591, 3.0592, 3.0593, 3.0594, 3.0595, 3.0596, 3.0597, 3.0598, 3.0599, 3.0600, 3.0601, 3.0652, 3.0654, 3.0655, 3.0656, 3.0657, 3.0658, 3.0670, 3.0671, 3.0672, 3.0673, 3.0674, 3.0675, 3.0676, 3.0677, 3.0678, 3.0679, 3.0680, 3.0681, 3.0682, 3.0683, 3.0730, 3.0765, 3.0802, 3.0803, 3.0804, 3.0805, 3.0806, 3.0807, 3.0808, 3.0809, 3.0817, 3.0818, 3.0819, 3.0820, 3.0821, 3.0822, 3.0823, 3.0824, 3.0825, 3.0826, 3.0827, 3.0828, 3.0829, 3.0830, 3.0831, 3.0832, 3.0833, 3.0834, 3.0835, 3.0836, 3.0837, 3.0838, 3.0839, 3.0840, 3.0841, 3.0842, 3.0843, 3.0844, 3.0845, 3.0846, 3.0847, 3.0848, 3.0849, 3.0850, 3.0851, 3.0852, 3.0853, 3.0854, 3.0855, 3.0856, 3.0867, 3.0868, 3.0869, 3.0870, 3.0872, 3.0873, 3.0874, 3.0875, 3.0876, 3.0878, 3.0879, 4.0001, 4.0065, 4.0066, 4.0067, 4.0068, 4.0069, 4.0070, 4.0071, 4.0072, 4.0073, 4.0074, 4.0075, 4.0076, 4.0077, 4.0078, 4.0079, 4.0080, 4.0081, 4.0082, 4.0083, 4.0084, 4.0085, 4.0086, 4.0088, 4.0089, 4.0090, 5.0048, 5.0049, 5.0050, 5.0051, 5.0052, 5.0053, 5.0054, 5.0055, 5.0056, 5.0057, 5.0058, 5.0059, 5.0060, 5.0061, 5.0062, 5.0063, 5.0064, 5.0065, 5.0066, 5.0067, 5.0068, 5.0069, 5.0070, 5.0071, 5.0072, 5.0073, 5.0074, 5.0075, 5.0076, 5.0077, 5.0078, 5.0079, 5.0080, 5.0081, 5.0082, 5.0083, 5.0084, 5.0085, 5.0086, 5.0087, 5.0088, 5.0089, 5.0090, 5.0091, 5.0092, 5.0093, 5.0094, 5.0095, 5.0096, 5.0097, 5.0098, 5.0099, 5.0100, 5.0101, 5.0102, 5.0103, 5.0104, 5.0105, 5.0106, 5.0107, 5.0108, 5.0109, 5.0110, 5.0111, 5.0112, 5.0113, 5.0114, 5.0115, 5.0119, 5.0120, 5.0121, 5.0122, 6.0072, 6.0073, 6.0074, 6.0076, 6.0077, 6.0078, 6.0079, 6.0080, 6.0081, 6.0082, 6.0083, 6.0084, 6.0085, 6.0086, 6.0088, 6.0090, 6.0093, 6.0094, 6.0095, 6.0096, 6.0097, 6.0098, 6.0099, 6.0100, 7.0032, 7.0033, 7.0034, 7.0035, 7.0036, 7.0037, 7.0038, 7.0039, 7.0040, 7.0041, 7.0042, 7.0043, 7.0048, 7.0049, 7.0050, 7.0053, 7.0054, 7.0055, 7.0056, 7.0057, 7.0058, 7.0059, 7.0060, 7.0061, 7.0062, 7.0063, 7.0064, 7.0065, 7.0066, 7.0067, 7.0068, 7.0069, 7.0070, 7.0071, 7.0072, 7.0073, 7.0074, 7.0075, 7.0076, 8.0084, 8.0085, 8.0086, 8.0087, 8.0088, 8.0089, 8.0090, 8.0091, 8.0092, 8.0093, 8.0094, 8.0095, 8.0096, 8.0097,

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Germany - High Temperature Nuclear Power Plants - Manheim
3.0871.

Germany - Max Planck Society - Munchen
2.0014, 2.0015, 2.0016, 2.0017, 2.0018, 2.0019, 2.0020, 2.0021, 2.0022, 2.0023, 2.0024, 2.0025, 2.0026, 2.0027, 2.0028, 2.0029, 2.0030, 2.0031, 2.0032, 2.0033, 2.0034, 2.0035, 2.0036, 2.0037, 2.0038, 2.0039, 2.0040, 2.0041, 2.0042, 2.0043, 2.0044, 2.0045, 2.0046, 2.0047.

Germany - Ministry for Sp. Const. Meth. & Urb. Plan. - Bonn
8.0099.

Germany - Ministry of Defense - Bonn
5.0116, 5.0117, 5.0118.

Germany - Nuclear Research Society - Frankfurt
3.0060, 3.0877.

International Atomic Energy Agency - Vienna, Austria
1.0296, 2.0001, 2.0048, 2.0049, 2.0063, 3.0001, 3.0002, 3.0003, 3.0004, 3.0006, 3.0009, 3.0048, 3.0049, 3.0157, 3.0158, 3.0159, 3.0160, 3.0161, 3.0172, 3.0173, 3.0174, 3.0175, 3.0176, 3.0177, 3.0178, 3.0186, 3.0187, 3.0298, 3.0529, 3.0537, 3.0651, 3.0653, 3.0662, 3.0663, 3.0664, 3.0722, 3.0723, 3.0727, 3.0728, 3.0731, 3.0754, 3.0758, 3.0759, 3.0761, 3.0762, 3.0763, 3.0764, 3.0766, 3.0767, 3.0799, 3.0857, 3.0858, 3.0859, 3.0860, 3.0861, 3.0862, 3.0863, 6.0018, 6.0019, 6.0060, 6.0061, 6.0062, 6.0087, 6.0089, 6.0091, 6.0092, 6.0101, 6.0103, 6.0104, 6.0132, 6.0133, 6.0134, 6.0135, 6.0136, 6.0137, 6.0138, 6.0139, 6.0140, 6.0141, 6.0142, 6.0163, 6.0164, 6.0165, 6.0166, 6.0167, 6.0168, 6.0169, 6.0170, 6.0171, 6.0172, 6.0177, 6.0179, 6.0180, 6.0181, 6.0182, 6.0183, 6.0184, 9.0001, 9.0042, 9.0064.

Israel - Hebrew University of Jerusalem
4.0151, 4.0152.

Israel - Israel Institute of Technology - Haifa
4.0143, 4.0144, 4.0145, 4.0146, 4.0147, 4.0148.

Israel - Israeli Government - Jerusalem
4.0150.

Israel - Ministry of Commerce & Industry - Jerusalem
1.0609, 4.0137, 4.0138, 4.0139, 4.0140, 4.0141, 4.0142.

Israel - National Council for Research & Develop - Jerusalem
5.0178.

Israel - U.S. Israel Binational Science Foundation- Tel Aviv
4.0136, 4.0149.

Italy - National Electric Energy Agency - Rome
5.0179, 5.0180, 5.0181, 5.0182, 5.0183, 5.0184, 5.0185, 5.0186, 5.0187, 5.0188, 5.0189, 5.0190, 5.0191, 5.0192, 5.0193, 5.0194, 5.0195, 5.0196, 5.0197, 5.0198, 5.0199, 7.0080, 7.0081, 7.0082, 7.0083, 7.0084, 7.0085, 7.0086, 7.0087, 7.0088.

Italy - National Research Council - Rome
2.0050.

Japan - Japanese Government - Tokyo
8.0149.

Netherlands - A K Z O N.V. - Arnhem
1.0284, 1.0287, 4.0159, 5.0215, 6.0152, 8.0153, 8.0185.

Netherlands - Agricultural University at Wageningen
4.0192, 4.0195, 4.0196, 4.0197, 4.0198, 4.0199, 5.0254, 8.0216, 9.0085.

Netherlands - Anglo Dutch Offshore Concrete - Rijswijk
1.0277.

Netherlands - Association of Scientific Research - Maarssen
9.0070.

Netherlands - B.V. Neratom - The Hague
3.0167, 3.0954.

Netherlands - Catholic University of Nijmegen
1.0626, 4.0183, 4.0184, 9.0071.

Netherlands - Central Organ. Advan. Applied Res. - The Hague
1.0614, 1.0615, 1.0616, 3.0430, 4.0158, 4.0162, 4.0163, 4.0164, 4.0165, 4.0187, 4.0189, 5.0206, 5.0207, 5.0208, 5.0209, 5.0210, 5.0211, 5.0212, 5.0213, 5.0214, 5.0219, 5.0221, 5.0222, 5.0223, 5.0224, 5.0251, 6.0145, 7.0089, 7.0094, 8.0151, 8.0152, 8.0158, 8.0217, 9.0066.

Netherlands - Central Organ. Advan. Pure Res. - The Hague
9.0073, 9.0074, 9.0076, 9.0077.

Netherlands - Council for Science Policy - The Hague
9.0078.

Netherlands - D A F Truck B.V. - Eindhoven
5.0234, 8.0166.

Netherlands - Delft Hydraulics Laboratory - Delft
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