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RADIOACTIVE WASTE MANAGEMENT: A BIBLIOGRAPHY FOR THE INTEGRATED DATA BASE PROGRAM

1981 EDITION

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RADIOACTIVE WASTE MANAGEMENT: A BIBLIOGRAPHY FOR THE INTEGRATED DATA BASE PROGRAM

1981 Edition

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UNION CARBIDE CORPORATION
for the
DEPARTMENT OF ENERGY

CONTENTS

ABSTRACT

This is the second in a series of literature references compiled on waste generation and treatment, characteristics, inventories, and costs. Documents were collected, abstracted, and indexed into a searchable information file, which was then sorted, indexed, and printed for this bibliography. This volume contains over 200 references to nuclear waste management, the majority of which are 1979-1980 publications. Each reference is categorized by waste origin (commercial, government, institutional, and foreign) and by subject area: (1) high-level waste, (2) low-level waste, (3) transuranic (TRU) waste, (4) airborne waste, (5) Remedial Action Program (formerly utilized sites, surplus facilities, and mill tailings), (6) isolation, (7) transportation, (8) spent fuel, (9) fuel cycle centers, and (10) general, nonspecific waste. Six indexes are provided to assist the user in locating documents of interest: author, author affiliation (corporate authority), subject category, publication description, keyword, and permuted title. Machine (computer) searches of these indexes can be made specifying multiple constraints if so desired.

This bibliography will be periodically updated as new information becomes available. In addition to being used in searches for specific data, the information file can also be used for resource document collection, names and addresses of contacts, and identification of potential sources of data.

INTRODUCTION

This bibliography of over 200 references is the second in a series of updates generated in direct support of the Integrated Data Base project at the Oak Ridge National Laboratory (ORNL). Volumes 1 and 2, printed in September 1980, included 1100 references to the literature up to and including 1979, plus indexes. These references spanned a 25-year period and were arranged in chronological sequence, starting with 1954. In addition to references to the current literature, Volume 3 contains some citations of earlier documents that were not included in the first publication. This data base is concerned with radioactive waste sources, inventories, characteristics, generation and treatment, and associated costs. Each reference is categorized by origin:

- Commercial
- Government
- Institutional
- Foreign

and by broad subject category:

- High-level waste
- Low-level waste
- TRU waste
- Airborne waste
- Remedial Action Program
  - UMTRAP (Uranium Mill Tailings Remedial Action Program)
  - FUSRAP (Formerly Utilized Sites Remedial Action Program)
  - SFMP (Surplus Facilities Management Program)
- Isolation
- Transportation
- Spent fuel
- Fuel cycle centers
- General

Each reference also includes an abstract, a list of keywords, and comments as appropriate (e.g., foreign language, translation, availability from the National Technical Information Service). References are listed in this bibliography by subject category and arranged alphabetically within each category, first by corporate author, then by individual author, and finally by title if an author is not identified. Each citation has been assigned a record reference number by which it is identified in the indexes. The following indexes are provided:

- Author
- Author affiliation (corporate author)
- Subject category
- Keyword
- Publication description
- Permuted title

These indexes can be machine searched, including the origin field, specifying multiple constraints if so desired. For example, "Defense AND TRU waste AND volume" will locate references dealing with volumes of TRU waste generated by defense activities.

For the generation of this bibliography, documents pertaining to nuclear waste management were collected, analyzed, abstracted, indexed, and input into a computerized file. In addition, searches were made of the automated information files of references (data bases) available at ORNL. Examples of the data bases searched include those widely available such as the Energy Data Base (EDB) of the U.S. Department of Energy (DOE) and data bases compiled by ORNL information specialists such as Low-Level Waste Technology, Nuclear Waste Isolation, and Remedial Actions. The search strategies were written in such a way as to include all the references pertaining to a subject with as few out-of-scope references as possible (recall-precision trade-off). We chose maximum recall with manual deletion of out-of-scope references.

The searches were performed using Boolean logic (with AND and OR operators). The search logic was tailored to the data base being searched, and keyterms were chosen by manual selection from all pertinent data bases. An example of some of the terms and logic used for the Energy Data Base is:

Field:	Radioactive Waste	OR
	Mill Tailings	OR
	Spent Fuels	OR
	Decommissioning	OR
	Radioactive Waste Processing	OR
	Radioactive Waste Management	OR
	. . . . .	OR
	. . . . .	OR
	AND	
Field:	Volume	OR
	Cost	OR
	Inventories	OR
	Economic Analysis	

The above logic will call out those publications including at least one item in both fields.

The results of the searches were manually scanned for out-of-scope material and duplicates. Those in scope were checked for accuracy and content, indexed into subject category and origin, and keyworded to make the format from the separate sources uniform.

Additions will be made to this information file, which is supported by an automated data base and will be searched upon request. The services of the information center are free to DOE-funded researchers. Others will be assessed a fee to cover the charges for searches and referred to the National Technical Information Service in Springfield, Virginia, for documents. All inquiries for information services should be addressed to:

Carol Johnson
IDB Information File
Radiation Effects Information Center
Information Center Complex/Information Division
Oak Ridge National Laboratory
P.O. Box X
Oak Ridge, Tennessee 37830

Telephone: FTS 626-6611
Commercial (615) 576-6611

We welcome any suggestions for additional references to add to this bibliography in future volumes, either older material that was overlooked or newer material that was not in the data bases we have searched. Please send suggestions to Carol Johnson at the above address.

SAMPLE REFERENCE

A - Record number of the reference in this bibliography

B - Author

C - Author affiliation

D - Title

E - Publication description and date

F - Comments

G - Abstract

A 25
B Carter, W.L.; Finney, B.C.; Alexander, C.W.; Blomeke, J.C.; McNair, J.M.
C Oak Ridge National Laboratory, Oak Ridge, TN

D SPENT FUEL AND WASTE INVENTORIES AND PROJECTIONS
E ORO-778: 88 pp. (1980)

F Forty-four tables contain information of commercial and DOE waste sources, inventories, and volume projections. Available from NTIS.

G Current inventories of commercial spent fuels and both commercial and U.S. Department of Energy radioactive wastes were compiled, based on judgements of the most reliable information available from Government sources and the open literature. Future waste generation rates and quantities to be accumulated over the remainder of this century are also presented, based on a present projection of U.S. commercial nuclear power growth and expected defense-related activities. Spent fuel projections are based on the current DOE/EIA estimate of nuclear growth, which projects 180 GW(e) in the year 2000. It is recognized that the calculated spent fuel discharges are probably high in view of recent reactor cancellations; hence adjustments will be made in future updates of this report. Wastes considered, on a chapter-by-chapter basis, are: spent fuel, high-level wastes, transuranic wastes, low-level wastes, mill tailings (active sites), and remedial action wastes. The latter category includes mill tailings (inactive sites), surplus facilities, formerly utilized sites, and the Grand Junction Project. For each category, waste volume inventories and projections are given through the year 2000. The land usage requirements are given for storage/disposal of low-level and transuranic wastes, and for present inventories of mill tailings.

ORIGIN: Commercial; Government

KEYWORDS: VOLUME; INVENTORIES; MILL TAILINGS; FORECASTING; SPENT FUELS; HIGH-LEVEL RADIOACTIVE WASTES; TRANSURANIUM ELEMENTS; LOW-LEVEL RADIOACTIVE WASTES; SPENT FUEL STORAGE; US DOE; PROJECTIONS

1
Khandler, M.K., and J.E. Stewart; Cordon International Corporation, Torrance, CA

RADWASTE REDUCTION TECHNIQUES FOR LWR GASEOUS EFFLUENTS.
CONF-750411; Nuclear Energy Maturity, Vol. 8, Reprocessing, Transport, and Waste Disposal, Proceedings of a Symposium, Paris, April 21-25, 1975. Pergamon Press, Oxford, (pp. 148-171), 379 pp. (1976)

All light water reactors, both pressurized water reactors and boiling water reactors, produce radioactive gases which must be treated prior to their release to the environment. The techniques to reduce this radioactivity, short term storage and removal, are described while considering safety, cost optimization, reliability and regulatory requirements. (Auth)

ORIGIN: Commercial

KEYWORDS: REVIEWS; WASTE PROCESSING; REACTORS; GASES; RADIOACTIVE WASTES; WASTE STORAGE; SAFETY; COST; REGULATIONS; PWR TYPE REACTORS; GASEOUS WASTES; INTERIM STORAGE; LWR TYPE REACTORS; BWR TYPE REACTORS

2
Altomare, P.M., M. Barbier, N. Lord, and D. Nainan; Mitre Corporation, McLean, VA, METREK Div.

ASSESSMENT OF WASTE MANAGEMENT OF VOLATILE RADIONUCLIDES.
ORP/CSD-79-2; MTR-7719 (1979)

Available from EPA, Washington, DC.

A review of the technologies for waste management of the volatile radionuclides of iodine-129, krypton-85, tritium, and carbon-14 is presented. An estimate of the quantities of these volatile radionuclides produced in the nuclear power industry is given. The various technologies which may be used, or which are under investigation, to immobilize these nuclides and to contain them during storage and in disposal are discussed. Also, the alternative disposal options as may be applied to isolate these radioactive wastes from the human environment are presented. The report contains information which was available through approximately January 1978.

ORIGIN: Commercial

KEYWORDS: CARBON-14; EXPERIMENTAL DATA; IODINE-129; KRYPTON-85; LEACHATES; LEACHING; NUCLEAR INDUSTRY; RADIOACTIVE EFFLUENTS; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE MANAGEMENT; RADIOACTIVE WASTE PROCESSING; RADIOACTIVE WASTE STORAGE; SOLUBILITY; SORPTION; TECHNOLOGY ASSESSMENT; TRITIUM; VOLATILITY; VOLUME

AIRBORNE WASTE

3
Alexander, B.M.; Mound Facility, Miamisburg, OH

INCINERATION OF LWR-TYPE WASTE IN THE MOUND CYCLONE INCINERATOR: A FEASIBILITY STUDY. MLM-2792: 26 pp. (1980)

Information is given in tables, diagrams, and photographs

A feasibility study was conducted based on known characteristics of LWR waste and on operating data compiled for the Mound Cyclone Incinerator since 1975. Feed spiked with several isotopes found in LWR waste was burned in the laboratory-scale cyclone incinerator, and samples collected and analyzed. From these data, the applicability of cyclone incineration was demonstrated, and an efficient scrub liquor composition was chosen for the offgas treatment system. A Health Physics survey of the incinerator system after incineration of 220 uCi of beta/gamma activity showed no exposure readings above background levels. Supplemental experiments were also performed to determine the effect of the chemical form of iodine on its volatility, as well as to calculate the cost-benefit reltionship for the addition of potassium iodide to scrub liquor.

ORIGIN: Government; Commercial

KEYWORDS: LABORATORY STUDIES; RADIOACTIVE WASTES; VOLUME REDUCTION; COMBUSTION; INCINERATION; IODINE; ECONOMICS; POTASSIUM; SCRUBBERS; COST BENEFIT ANALYSIS; FEASIBILITY STUDIES; LWR TYPE REACTORS; VOLATILITY; MOUND LABORATORY; OFF-GAS SYSTEMS

4
Davis, W., Jr.; Oak Ridge National Laboratory, Oak Ridge, TN

CARBON 14 PRODUCTION IN NUCLEAR REACTORS. Management of Low-Level Radioactive Waste, M.W. Carter, A.A. Maghissi, Pergamon Press, New York, NY, Ch. 2, (pp. 151-191), 1214 pp. (1979)

Quantities of C 14 that may be formed in the fuel and core structural materials of light-water cooled reactors (LWRs), in high-temperature gas-cooled reactors (HTGRs), and in liquid metal cooled fast breeder reactors (LMFBRs) have been calculated by use of the ORIGEN computer code. Information supplied by five LWR-fuel manufacturers pertaining to nitride nitrogen and gaseous nitrogen in their fuels and fuel rod void spaces was used in these calculations. Average nitride nitrogen values range from 3 to 50 ppm by weight in LWR fuels, whereas gaseous nitrogen in one case is equivalent to an additional 10-16 ppm. Nitride nitrogen concentrations in fast-flux test facility (FFTF) fuels are 10 to 20 ppm. The principal reactions that produce C 14 involve N 14, O 17, and (in the HTGR) C 13. Reference reactor burnups are 27,500 MWd per metric ton of uranium for boiling water reactors (BWRs), 33,000 MWd for pressurized water reactors (PWRs), about 95,000 MWd per metric ton of

heavy metal (MTHM) for HTGRs, and 24,800 MWd/MTHM for an LMFBR with nuclear parameters that pertain to the Clinch River Breeder (CRBR). Nitride nitrogen, at a median concentration of 25 ppm, contributes 21, 19, and 6 Ci of C/14Gw(e)-yr to BWR, PWR, and LMFBR fuels, respectively. The contribution of O 17 in BWR and PWR fuels is 4.0 and 3.5 Ci of C 14/GW(e)-yr, respectively, but it is less than 0.2 Ci/GW(e)-yr in blended LMFBR fuel. In the HTGR fuel particles (UO2 or ThO2), 10 Ci of C 14/GW(e)-yr will be formed from 25 ppm of nitrogen, whereas O 17 in the ThO2 will contribute an additional 2 Ci/GW(e)-yr. All C 14 contained in the fuels may be released in a gas mixture (CO2, CO, CH4, etc.) during fuel dissolution at the fuel reprocessing plants. However, some small fraction may remain in aqueous raffinates and will not be released until these are converted to solids. The gases would be released from the plant unless special equipment is installed to retain the C 14-bearing gases. Cladding metals and other core hardware will contain significnat quantities of C 14. Very little of this will be released from BWR, PWR, and LMFBR hardware at reprocessing plants; instead, the contained C 14, 30-70 Ci/GW(e)-yr for LWRs and about 13 Ci/GW(e)-yr for a CRBR, will remain within the metal, which will be retained on site or in a federal repository. The only core structural material of HTGRs will be graphite, which will contain 37-190 Ci of C 14GW(e)-yr, exclusive of that in the fuel particles, if the graphite (fuel block and reflector block) initially contains 0-30 ppm of nitrogen. All of this is available for release at a fuel reprocessing plant if the graphite is burned to release the fuel particles for further reprocessing. (Auth)

ORIGIN: Commercial

KEYWORDS: LWR TYPE REACTORS; HTGR TYPE REACTORS; LMFBR TYPE REACTORS; COMPUTER CODES; FUELS; NITROGEN-14; OXYGEN-17; BURNUP; SPENT FUEL ELEMENTS; GASEOUS WASTES; REPROCESSING; GRAPHITE; FORECASTING; THEORETICAL STUDIES; CLINCH RIVER BREEDER REACTOR; RADIOACTIVE WASTE MANAGEMENT

5

Shaffer, J.H., and J.O. Blomeke; Oak Ridge National Laboratory, Oak Ridge, TN

HYDRAULIC FRACTURING AS A METHOD FOR THE DISPOSAL OF VOLATILE RADIOACTIVE WASTES. ORNL/TM-6931: 17 pp. (1979)

This report proposes the further development of the hydrofracture process at the Oak Ridge National Laboratory for the permanent disposal of volatile radioactive wastes. The assessment of this method has included the disposal of I-129, C-14, Kr-85, and tritium. It is recommended that additional studies be made of the feasibility of injecting krypton, as an admixture with xenon, directly into the hydrofracture grout stream for disposal in deep,

impermeable shale formations. The annual production of Kr-85 from reprocessing 1500 metric tons of fuel would create a void of less than or equal to 1% when injected into the grout mixture used in a typical hydrofracture operation. (Auth)

ORIGIN: Government

KEYWORDS: REVIEWS; HYDRAULIC FRACTURING; RESEARCH PROGRAMS; US DOE; WASTE DISPOSAL; RADIOACTIVE WASTES; IODINE-129; CARBON-14; KRYPTON-85; TRITIUM; SHALES; SEDIMENTARY ROCKS; ORNL; REPROCESSING

6
Hower, R.B., B. Hekkala, and D.T. Pence; Science Applications, Inc., San Diego, CA

RADIOACTIVE AIRBORNE EFFLUENT MEASUREMENT AND MONITORING SURVEY OF REPROCESSING AND WASTE TREATMENT FACILITIES. COO-3049-9: 91 pp. (1977)

Tables show off-gas compositions of various radionuclides in different systems. Schematic diagrams and figures are included.

The installed and planned sampling and monitoring systems for several ERDA and commercial nuclear fuel reprocessing and high-level waste solidification facilities are described. Source terms, estimated concentrations, and probable monitoring requirements for commercial facilities are presented and discussed. The state-of-the-art technology for reprocessing and waste solidification sampling and monitoring is described and present limitations discussed. Ongoing advanced sampling and monitoring development programs are presented and discussed, and additional development needs identified. Recommendations are made for research and development in the areas of alarm monitoring, continuous monitors, and instrument reliability. (Auth)

ORIGIN: Commercial; Government

KEYWORDS: SAMPLING; MONITORING; FUEL REPROCESSING PLANTS; WASTE PROCESSING PLANTS; SOLIDIFICATION; RADIOACTIVITY; RADIONUCLIDES; METHODS; INSTRUMENTS; EQUIPMENT; REVIEWS; WASTE PROCESSING; WASTE MANAGEMENT; RADIOACTIVE WASTES; PLANNING; DESIGN; RECOMMENDATIONS

7
MacPhail, I.; UKAEA Atomic Energy Research Establishment, Harwell. Materials Development Div.

PROGRESS TOWARDS THE USE OF DISPOSABLE FILTERS. AERE-M-3012 (1979)

Available from NTIS, PC A01A/MF A01.

Thermally degradable materials have been evaluated for service in HEPA filter units used to filter gases from active plants. The motivation was to reduce the bulk

storage problems of contaminated filters by thermal decomposition to gaseous products and a solid residue substantially comprised of the filtered particulates. It is shown that while there are no commercially available alternatives to the glass fiber used in the filter medium, it would be feasible to manufacture the filter case and spacers from materials which could be incinerated. Operating temperatures, costs and the type of residues for disposal are discussed for filter case materials.

ORIGIN: Foreign

KEYWORDS: AIR FILTERS; COST; GASEOUS WASTES; PYROLYSIS; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE PROCESSING; RADIOACTIVE WASTE STORAGE; RADIOACTIVE WASTES; TEMPERATURE DEPENDENCE; POLLUTION CONTROL EQUIPMENT

8
Rhodes, D.W., W.A. Freeby, and J.D. Christian; Allied Chemical Corporation, Idaho Falls, ID

RUTHENIUM CONTAINMENT DURING FLUIDIZED BED CALCINATION OF COMMERCIAL HIGH-LEVEL WASTE. American Institute of Chemical Engineers Symposium Series 75(191):69-75 (1979)

Reprocessing spent nuclear fuel from commercial power reactors to recover plutonium and unburned uranium produces a highly radioactive first-cycle extraction waste. This high-level liquid waste will contain significant concentrations of Ru-106; approximately 1.9x10(E+6) Ci of Ru-106 will be in the waste processed daily in a 7.5-M.T.U./day plant based on fuel irradiated to 35,000 MWd/M.T.U. and cooled one year after discharge from the reactor (MWd/MTU-(Megawatt days/metric ton uranium)). During the solidification of the nitric acid waste solution containing the fission products, volatile and particulate ruthenium enters the off-gas stream and must be removed before the off-gas is released to the atmosphere. Laboratory measurements of ruthenium volatility using a 3-in.-diameter fluidized bed calciner and synthetic commercial reprocessing waste are reported. The results indicate that, by operating 500 degrees C with in-bed combustion heating, the ruthenium volatility can be limited to 2 x 10(E-3)% of that in the feed. Based on these laboratory results and data obtained during the calcination of high-level radioactive DOE defense wastes in the Waste Calcining Facility (a production unit) at the Idaho Chemical Processing Plant, decontamination factors to be expected for ruthenium across the individual off-gas devices were estimated and a conceptual off-gas cleanup system proposed. This off-gas cleanup system would provide a decontamination factor (DF) from calciner cyclone to stack 8400 for volatilized ruthenium would be 5 x 10(E+9) for particulate ruthenium; the overall

AIRBORNE WASTE

DF from feed to stack for ruthenium would be 5 x 10(E+8), and the daily release of ruthenium would be 4 mCi from the 7.5-M.T.U./day plant. (Auth)

ORIGIN: Commercial

KEYWORDS: WASTE PROCESSING; SPENT FUELS; REPROCESSING; HIGH-LEVEL RADIOACTIVE WASTES; RUTHENIUM-106; SOLIDIFICATION; OFF-GAS SYSTEMS; VOLATILE MATTER; CALCINATION; RESEARCH PROGRAMS; US DOE; CONTAINMENT; COMMERCIAL WASTES; SPENT FUELS; DECONTAMINATION; LIQUID WASTES

9
Kreiter, M.R., and A.M. Platt, (Comps.); Pacific Northwest Laboratory, Richland, WA

REPORT OF THE AD HOC STUDY GROUP ON INTEGRATED VERSUS DISPERSED FUEL CYCLE FACILITIES. BNWL-1906 Draft: 115 pp. (1975)

Integrated Fuel Cycle Facilities (IFCF) and Dispersed Fuel Cycly Facilities (DFCF) are compared for use in providing isolation of strategic materials and confinement of nuclear wastes. Materials considered were mixed plutonium and uranium oxide, HTGR fuel fabrication, fuel reprocessing, high-enrichment isotopic separation and interim waste storage. Although a choice of either alternative would not affect nuclear power generation patterns postulated up to the year 2,000, it was felt that IFCF advantages outweigh disadvantages.

ORIGIN: Commercial

KEYWORDS: REVIEWS; REPOSITORY; STORAGE FACILITIES; INTERIM STORAGE; COMPARATIVE EVALUATIONS; REPROCESSING; FABRICATION; SPENT FUELS; FUEL CYCLE CENTERS

10
Godfrey, W.L., R.L. Postles, and R.L. Frendberg; Allied-General Nuclear Services, Barnwell, SC

STUDIES AND RESEARCH CONCERNING BNFP. AGNS-35900-3.5-31: 77 pp. (1979)

A detailed material balance and economic model of radioactive waste-handling, the Waste Management Economic Model (WMEN), developed by Allied-General Nuclear Services is discussed. Linear statistical analysis techniques were used to develop empirical approximations to the WMEN computer algorithm and the basis for evaluating each scenario is the Net Present Cost (NPC) of all future expenditures. Of the 109 variables used by the computer model, the most economically important were identified and their behavior described.

ORIGIN: Commercial

KEYWORDS: THEORETICAL STUDIES; RADIOACTIVE WASTES; MATHEMATICAL MODELS; COMPUTERS; COST; WASTE MANAGEMENT; ECONOMICS; STATISTICS; RESEARCH PROGRAMS; US DOE; BARNWELL FUEL REPROCESSING PLANT

11
Weinstock, E.V., and B. Keisch; Brookhaven National Laboratory, Upton, NY

TECHNICAL SAFEGUARDS ISSUES FOR ALTERNATIVE FUEL CYCLES. NUREG/CR-1048: 169 pp. (1980)

Issues associated with proposed alternative fuel cycles are identified and technical safeguard issues are assessed. A chart of the fuel cycles showing their principal distinguishing characteristics is presented and certain safeguard features common to two or more fuel cycles are identified and discussed. The particular generic issues and the specific issues uniquely associated with each fuel cycle are also identified and further discussed.

ORIGIN: Commercial

KEYWORDS: RESEARCH PROGRAMS; US NRC; REVIEWS; FUEL CYCLE; COMPARATIVE EVALUATIONS; RISK ASSESSMENT; COST BENEFIT ANALYSIS; SAFEGUARDS

12
Botts, T.E., and J.R. Powell; Brookhaven National Laboratory, Upton, NY

WASTE MANAGEMENT PROCEDURES FOR FUSION BASED CENTRAL POWER STATIONS. BNL 50697 (1977)

Several early conceptual designs of fusion demonstration and commercial reactors are used in a discussion of radioactive waste streams, methods of handling these wastes, and their possible environmental effects. Comparisons are made between these waste streams and the fuel cycles of the light water reactor and the

liquid metal fast breeder reactor. Most radioactive waste in fusion reactors is generated through replacement of the inner blanket region. Because there is a high degree of uncertainty with regard to blanket lifetimes, there is some uncertainty concerning the activity levels that must be handled. However, in general, fusion reactors are expected to create larger physical amounts of radioactive waste with lower and shorter-lived activity than do fission plants. Material recycling of fusion blanket waste, for nuclear applications, seems feasible after a 100-yr holding time. (Auth)

ORIGIN: Commercial

KEYWORDS: THEORETICAL STUDIES; FUSION; WASTE MANAGEMENT; ENVIRONMENTAL IMPACTS; RECYCLING; THERMONUCLEAR REACTORS; COMPARATIVE EVALUATIONS; LWR TYPE REACTORS; LMFBR TYPE REACTORS

13
CEA, Paris, France

PRACTICAL GUIDLINES FOR RADIOACTIVE WASTE MANAGEMENT. GUIDE PRATIQUE DE GESTION DES DECHETS RADIOACTIFS. (1979)

In French. Available from INIS

This guide has been compiled with a view to obtaining a concise and practical document. It is presented in sectional form, providing for each center of the CEA the means available, with the identity of those responsible for implementing them. Each section includes the following information: organization chart of the radioactive decontamination department, classification of the wastes used, inventory of the constraints peculiar to the means employed, brief description of these means and cost of services. The information is restricted to the solid and liquid wastes contained in fission or activation products and in transuranic elements. Natural radioelements such as uranium, thorium or descendants have not been included.

ORIGIN: Foreign

KEYWORDS: CEA; COST; FRANCE; LIQUID WASTES; MANUALS; RADIOACTIVE WASTE MANAGEMENT; SOLID WASTES; FISSION PRODUCTS; TRANSURANIUM ELEMENTS

14
Department of Energy, London, UK

NUCLEAR ENERGY AND THE NUCLEAR INDUSTRY. NOTES PREPARED TO PROVIDE INFORMATION AND TO ANSWER QUESTIONS. INIS-MF-5514 (1979)

Information to contribute to the public debate about the future of nuclear energy in the UK.

Information is provided under the headings: "Contributions of Nuclear Power", "Energy Forecasts", "Nuclear Fuels and Reactor Types", "Cost", "Thermal

Reactor Strategy", "Planning Margin", "Safety", "Nuclear Licensing", "Unlike an Atomic Bomb", "Radiation", "Waste Disposal", "Transport of Nuclear Materials", "Emergency Arrangements at Nuclear Sites", "Siting of Nuclear Stations", "Security of Nuclear Installations", "World Nuclear Programmes", "International Regulation and Non-Proliferation", "IAEA Safeguards Arrangements in the UK", "INFCE", and "Uranium Supplies".

ORIGIN: Foreign

KEYWORDS: COST; ENERGY POLICY; FORECASTING; FUEL CYCLE; INTERNATIONAL COOPERATION; IAEA; LICENSING; NUCLEAR ENERGY; NUCLEAR FUELS; NUCLEAR INDUSTRY; NUCLEAR POWER; PLANNING; PROLIFERATION; PUBLIC RELATIONS; RADIATION PROTECTION; RADIOACTIVE WASTE DISPOSAL; REACTOR ACCIDENTS; REACTORS; RESERVES; SAFETY; SECURITY; SITE SELECTION; TRANSPORT; UNITED KINGDOM; URANIUM ORES

15
Johnson, L.J.; EG&G Idaho, Inc., Idaho Falls, ID; Los Alamos Scientific Laboratory, Los Alamos, NM

LOS ALAMOS SCIENTIFIC LABORATORY WASTE MANAGEMENT TECHNOLOGY DEVELOPMENT ACTIVITIES SUMMARY PROGRESS REPORT 1979. LA-8243-PR: 76 pp. (1980)

Summary reports on the Department of Energy's Nuclear Energy-sponsored waste management technology development projects at the Los Alamos Scientific Laboratory describe progress for calendar year 1979. Activities in airborne, low-level, and transuranic waste management areas are discussed. Work progress on waste assay, treatment, disposal, and environmental monitoring is reviewed. (Auth)

ORIGIN: Government

KEYWORDS: REVIEWS; WASTE MANAGEMENT; TRANSURANIUM ELEMENTS; LOW-LEVEL RADIOACTIVE WASTES; MONITORING; WASTE PROCESSING; WASTE DISPOSAL; ENVIRONMENT; LASL

16
Heckman, R.A.; Lawrence Livermore Laboratory, Livermore, CA

INTRODUCTION AND HISTORICAL PERSPECTIVE. IEEE Transactions on Nuclear Science NS-27(4):1258-1264 (1980)

Consideration is given to the sources of waste from the Nuclear Fuel Cycle; defining the temporal problem of nuclear waste disposal relative to other natural hazards; looking at current waste inventories; studying the history of nuclear waste management; and making some projections of future inventories.

ORIGIN: Commercial

GENERAL

KEYWORDS: INVENTORIES; WASTE DISPOSAL; WASTE MANAGEMENT; RADIOACTIVE WASTES; RISK ASSESSMENT; PROJECTIONS; FUEL CYCLE PACKAGING; REGULATIONS

17
Lipschutz, R.D.

RADIOACTIVE WASTE - POLITICS, TECHNOLOGY AND RISK. Ballinger Publishing Company, Cambridge, MA: 247 pp. (1980)

A review of the problems associated with radioactive waste management is presented. The book covers the nature and hazards of radioactivity; how radioactive wastes are generated; the history of U.S. radioactive waste management programs; what schemes for managing and disposing of wastes currently exist or have been proposed; and the current federal program and plans for disposing of radioactive wastes. Major radioactive waste management technologies described and critically analyzed include: waste solidification and packaging; surface storage; geologic isolation; seabed disposal; space disposal; ice disposal; and partitioning and transmutation.

ORIGIN: Commercial

KEYWORDS: RADIOACTIVE WASTES; WASTE MANAGEMENT; RISK ASSESSMENT; REVIEWS; WASTE DISPOSAL; SOCIAL ASPECTS; WASTE STORAGE; WASTE PROCESSING; PARTITION; TRANSMUTATION; SOLIDIFICATION;

18
MANAGEMENT OF COMMERCIALLY GENERATED RADIOACTIVE WASTE. DOE/EIS-0046F: 604 pp. (1980)

Sections on alternative disposal concepts, waste management operations, waste characteristics, treatment and transportation, and costs are presented in detail.

Volume 3 of the 'Final Environmental Impact Statement - Management of Commercially Generated Radioactive Waste" is presented. The volume summarizes public response to the draft Statement (DOE/EIS-0046D). Recommendations for revision of the draft Statement, provided through individual written comment and through the Hearing Board, are presented with a description of the way in which these comments were used during preparation of the final statement. Discussion of written comments and discussion of the Hearing Board recommendations are also presented.

ORIGIN: Commercial

KEYWORDS: WASTE MANAGEMENT; SOCIAL ASPECTS; US DOE; RESEARCH PROGRAMS; ENVIRONMENTAL IMPACT STATEMENTS; RADIOACTIVE WASTE DISPOSAL; PUBLIC OPINION; RECOMMENDATIONS; COST BENEFIT ANALYSIS; COST; CHARGES; PROJECTIONS; INVENTORIES

19
NUCLEAR FUEL CYCLE. Bull. Assoc. Suisse Electr. 70 (22):1194-2000; Eighteenth Congress of the International Union of Producers and Distributers of Electrical Energy (UNIPEDE), Warsaw, Poland, June 11-15, 1979 (1979)

In French.

A brief summary using diagrams of extraction, preparation, use and disposal of nuclear fuel, and a discussion of the major developments which have occurred since 1956. Present prospects in the three most sensitive areas of: supply of natural uranium, uranium enrichment, and the reprocessing of irradiated fuels, are discussed.

ORIGIN: Foreign

KEYWORDS: AVAILABILITY; ECONOMICS; ENRICHED URANIUM; FORECASTING; FUEL CYCLE; NATURAL URANIUM; NUCLEAR MATERIALS MANAGEMENT; ORE ENRICHMENT; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE PROCESSING; RADIOACTIVE WASTE STORAGE; REPROCESSING; URANIUM-235; ACTINIDES; ORE PROCESSING; SEPARATION PROCESSES

20
Phillips, J.W., F. Feizollahi, and R.A. Martineit; NUS Corporation, Rockville, MD

WASTE INVENTORY REPORT FOR REACTOR AND FUEL FABRICATION FACILITY WASTES. CONF-791103; American Nuclear Society Meeting, San Francisco, CA, November 12, 1979; Trans. Am. Nucl. Soc. 33:433-435 (1979)

A table shows calculated waste-volumes and waste-activities to obtain an average of a number of operating plants. A graph shows the effect that volume reduction practices would have on overall burial site life.

Existing commercial nuclear facilities were surveyed to determine actual wastes produced (with the exception of spent fuel and high-level waste), and to develop projections of future waste production through the year 2000 based on present or developing technology. Using data from 29 operating nuclear power reactors and 7 facilities involved in fabrication of LWR fuel, the chemical, physical and radioactive characteristics of the wastes are defined and projections of waste volumes and activities are calculated. Basic liquid-waste processing and various solidification techniques and their effect on overall waste volumes are also discussed. Assuming volume reduction and solidification techniques are used, average LWR and fuel fabrication facility waste volumes are analyzed to determine the overall effect on burial site life.

ORIGIN: Commercial

KEYWORDS: BWR TYPE REACTORS; CHEMICAL PROPERTIES; FUEL FABRICATION PLANTS; INVENTORIES; NUCLEAR POWER PLANTS; PHYSICAL PROPERTIES; PWR TYPE REACTORS; RADIOACTIVE WASTE PROCESSING;

GENERAL

VOLUME; NUCLEAR FACILITIES

21
Fulkerson, W., R.M. Davis, T.J. Wilbanks, W.R. Mixon, J.W. Michel, and C.V. Chester; Oak Ridge National Laboratory, Energy Division, Oak Ridge, TN

ENERGY DIVISION, ANNUAL PROGRESS REPORT. ORNL-5638: 232 pp. (1980)

Available from NTIS, Springfield, VA

This sixth annual report of the ORNL Energy Division covers work done during FY 1979 and is organized according to the division's organizational structure. Each section was involved to a varying degree in five areas of work: analysis and assessment, technology development, models and data, emergency technology and civil defense, and research utilization. One aspect of environmental and resource assessment continuing in 1979 was related to the preparation of Environmental Impact Statements for uranium mining, milling and fuel fabrication facilities. Completion of an ORNL staff analysis predicting severe esthetic damage was coincident with, and perhaps instrumental in, the rejection of a Greene County NY site for a nuclear power plant. In an examination of a uranium fuel cycle facility, test data taken at an in-situ solution mine indicated that aquifer restoration following mining can be accomplished in an economic and timely way. Data on abandoned mine problems was collected, and analysis of regional environmental impacts of national energy scenarios continued. Under one scenario, energy use and oil imports would increase by 50% by 1990, nuclear power by a factor of 3 and coal use would double. ORNL was also responsible for regional projections of employment and population, for water availability analysis and for developing plausible energy facility siting patterns at the county level for the entire U.S. For EPA Regions 4 and 5, it was concluded that most environmental issues related to energy level are long-standing and would persist in this, or any other reasonable scenario. In the area of civil defense, several publications focused on individual initiative of citizens, long-term exosure risks and home-made fallout meters. The program includes studies of foreign civil defense efforts. Analyses for two nuclear environmental impact statements were completed. A planned workshop will cover the current information on environmental decontamination.

ORIGIN: Government

KEYWORDS: REVIEWS; FALLOUT; NUCLEAR POWER PLANTS; MINING; AQUIFERS; ENVIRONMENTAL IMPACTS; MODELS; URANIUM; ORES; FUEL CYCLE; ECONOMICS; COAL; INSTRUMENTS; RECOMMENDATIONS; DECONTAMINATION; SITE SELECTION; SAFETY; EMERGENCY PLANS; ORNL

22
Trabalka, J.R., S.I. Auerbach, and L.D. Eyman; Oak Ridge National Laboratory, Oak Ridge, TN

TECHNICAL NOTE: THE 1957-1958 SOVIET NUCLEAR ACCIDENT IN THE URALS. Nuclear Safety 21(1):94-99 (1980)

In an earlier article by Stratton et. al., a theory was given that the major airborne release of fission wastes in the Soviet Union in the winter of 1957-1958 was the result of unusual localized fallout from a Soviet atmospheric weapons test. This article critizes that theory and rejects this interpretation. The authors suggest that the evidence points to an accident involving the high-level radioactive waste storage of plutonium.

ORIGIN: Foreign

KEYWORDS: HIGH-LEVEL RADIOACTIVE WASTES; USSR; FALLOUT; RADIATION ACCIDENTS; EXPLOSIONS; FISSION PRODUCTS; POPULATION RELOCATION; AIR POLLUTION; PLUTONIUM; WASTE STORAGE; NUCLEAR WEAPONS; CESIUM-137; STRONTIUM-90; ISOTOPIC SEPARATION

23
Trabalka, J.R., L.D. Eyman, and S.I. Auerbach; Oak Ridge National Laboratory, Oak Ridge, TN

ANALYSIS OF THE 1957-1958 SOVIET NUCLEAR ACCIDENT. Science, 209(4454):345-353 (1980)

An analysis of the Soviet radioecology literature appears to confirm the presence of an extensive environmental contaminaiton zone in Cheliabinsk Province of the Soviet Union, associated with an accident in the winter of 1957 to 1958 involving the atmospheric release of fission wastes. The contamination zone is estimated to contain 10(E+5) to 10(E+6) curies of Sr 90 (reference radionuclide); a relatively small fraction of which may have been dispersed as an aerosol. Radioactive contamination appears to have resulted in resettlement of the human population from a significant area (100-1000 sq kilometers). A plausible explanation for the incident is the use of now-obsolete techniques for waste storage and Cs 137 isotope separation. A NH4NO3 waste-explosion case provides a seemingly credible dispersal mechanism and is consistent with observations of Cs 137 separation in the terrestrial contamination zone. However, the source of the contamination was not unequivocally attributable to a single event, and its exact nature must await release of more information by the Soviet Union. Many different types of accidents could be postulated to explain the atmospheric or liquid release of radioactive materials from a Soviet military plutonium production site, but most would not be credible in the light of U.S. practice or experience.

ORIGIN: Foreign

KEYWORDS: HIGH-LEVEL RADIOACTIVE

WASTES; USSR; FALLOUT; RADIATION ACCIDENTS; EXPLOSIONS; FISSION PRODUCTS; POPULATION RELOCATION; AIR POLLUTION; PLUTONIUM; WASTE STORAGE; NUCLEAR WEAPONS; CESIUM-137; STRONTIUM-90; SEPARATION PROCESSES; ISOTOPIC SEPARATION

24
Blomeke, J.O.; Oak Ridge National Laboratory, Oak Ridge, TN

ORIGIN, MAGNITUDE, AND TREATMENT OF RADIOACTIVE WASTES.
CONF-791185-1; ANS Student Chapter Seminar, College Station, TX, November 5, 1979 (1979)

Available from NTIS, PC A03/MF A01

Radioactive wastes in solid, liquid, and gaseous forms are generated wherever radioactive materials are handled. Unlike conventional industrial wastes, most of them are not amenable (within presently available technology) to treatment that can destroy their toxicity. They become innocuous only through natural decay, and many of the isotopes of concern decay so slowly that they must be isolated from the environment for hundreds of thousands of years. The primary objective of nuclear waste management is to protect man and his environment from these materials by providing containment by means that are available within present for near-future technology. The origin and nature of the wastes are reviewed, and the methods of treatment that are in use or that soon can be made available are described.

ORIGIN: Commercial; Government; Institutional

KEYWORDS: DATA; DECAY; FLOWSHEETS; FORECASTING; FUEL CYCLE; GRAPHS; LECTURES; MILL TAILINGS; RADIOACTIVE WASTE MANAGEMENT; RADIOACTIVE WASTE PROCESSING; SOLIDIFICATION; SPENT FUELS; TRANSMUTATION

25
Carter, W.L., B.C. Finney, C.W. Alexander, J.O. Blomeke, and J.M. McNair; Oak Ridge National Laboratory, Oak Ridge, TN

SPENT FUEL AND WASTE INVENTORIES AND PROJECTIONS. ORO-778: 88 pp. (1980)

Forty-four tables contain information of commercial and DOE waste sources, inventories, and volume projections. Available from NTIS, PC A05/MF A01.

Current inventories of commercial spent fuels and both commercial and U.S. Department of Energy radioactive wastes were compiled, based on judgements of the most reliable information available from Government sources and the open literature. Future waste generation rates and quantities to be accumulated over the remainder of this century are also presented, based on a present projection of U.S. commercial

nuclear power growth and expected defense-related activities. Spent fuel projections are based on the current DOE/EIA estimate of nuclear growth, which projects 180 GW(e) in the year 2000. It is recognized that the calculated spent fuel discharges are probably high in view of recent reactor cancellations; hence adjustments will be made in future updates of this report. Wastes considered, on a chapter-by-chapter basis, are: spent fuel, high-level wastes, transuranic wastes, low-level wastes, mill tailings (active sites), and remedial action wastes. The latter category includes mill tailings (inactive sites), surplus facilities, formerly utilized sites, and the Grand Junction Project. For each category, waste volume inventories and projections are given through the year 2000. The land usage requirements are given for storage/disposal of low-level and transuranic wastes, and for present inventories of mill tailings.

ORIGIN: Commercial; Government

KEYWORDS: VOLUME; INVENTORIES; MILL TAILINGS; FORECASTING; SPENT FUELS; HIGH-LEVEL RADIOACTIVE WASTES; TRANSURANIUM ELEMENTS; LOW-LEVEL RADIOACTIVE WASTES; SPENT FUEL STORAGE; US DOE; PROJECTIONS

26
Heeb, C.M., R.L. Aaberg, B.M. Cole, R.L. Engel, W.E. Kennedy, Jr., and M.A. Lewallen; Pacific Northwest Laboratory, Richland, WA

SURVEY OF LWR ENVIRONMENTAL CONTROL TECHNOLOGY PERFORMANCE AND COST. PNL-2287 (1980)

Available from NTIS, PC A90/MF A01

This study attempts to establish a ranking for species that are routinely released to the environment for a projected nuclear power growth scenario. Projections of releases for several fuel cycle scenarios are described, areas are identified where alternative control technologies may be implemented, and the available alternative control technologies are discussed. The release factors were used in a computer code system called ENFORM, which calculates the annual release of any species from any part of the LWR nuclear fuel cycle given a projection of installed nuclear generation capacity. This survey of fuel cycle releases was performed for three reprocessing scenarios (stowaway, reprocessing without recycle of Pu and reprocessing with full recycle of U and Pu) for a 100-year period beginning in 1977. The radioactivity releases were ranked on the basis of a relative ranking factor, which in turn is based on the 100-year summation of the 50-yr population dose commitment from an annual release of radioactive effluents. The nonradioactive releases were ranked on the basis of dilution factor. The twenty highest ranking radioactive releases were identifed and each of these was

analyzed in terms of the basis for calculating the release and a description of the currently employed control method. Alternative control technology is then discussed, along with the available capital and operating cost figures for alternative control metods.

ORIGIN: Government; Commercial

KEYWORDS: ALDEHYDES; AMMONIA; BWR TYPE REACTORS; CARBON-14; CESIUM-137; CHEMICAL EFFLUENTS; COBALT-60; COST; CURIUM-244; DUSTS; FEED MATERIALS PLANTS; FUEL CYCLE; FUEL FABRICATION PLANTS; FUEL REPROCESSING PLANTS; HEXANE; HYDROFLUORIC ACID; IODINE-131; ISOTOPE SEPARATION PLANTS; KRYPTON; NITRIC ACID; NITROGEN OXIDES; ORE PROCESSING; PERFORMANCE; PLUTONIUM-238; PWR TYPE REACTORS; RADIOACTIVE EFFLUENTS; RADON-222; STRONTIUM-90; SULFUR OXIDES; TRITIUM; URANIUM-232; URANIUM MINES; XENON

27
Harmon, K.M.; Pacific Northwest Laboratory, Richland, WA

INTERNATIONAL PROGRAM SUPPORT. PNL-3000-1; Nuclear Waste Management Quarterly Progress Report January Through March 1979, (pp. 6.1), 73 pp. (1979)

Progress toward the development and maintainence of an information system covering nuclear waste management research and development programs and technology in other nations continued during the second quarter of FY 1979. Significant documents were collected, reviewed, and summarized, and the report, PNL-2941, "Summary of National and International Radioactive Waste Management Programs," was prepared and cleared for publication.

ORIGIN: Commercial

KEYWORDS: RESEARCH PROGRAMS; US DOE; REVIEWS; WASTE MANAGEMENT; RADIOACTIVE WASTES; INFORMATION; INTERNATIONAL COOPERATION

28
Clark, L.L., and A.D. Chockie; Pacific Northwest Laboratory, Richland, WA

FUEL CYCLE COST PROJECTIONS. NUREG/CR-1041: 205 pp. (1979)

This report estimates current and future costs associated with the light water reactor nuclear fuel cycle for both once-through and thermal recycle cases. Using a range of future nuclear power generating scenarios, process flows are developed for each segment of the nuclear fuel cycle. Capital and operating costs are estimated and are combined with the process flows to generate unit cost projections for each fuel cycle segment. The unit costs and process flows are combined in the NUCOST program to estimate fuel cycle power costs through the

year 2020. The unit costs are also used to estimate the fuel costs of an individual model PWR and BWR. (Auth)

ORIGIN: Commercial

KEYWORDS: THEORETICAL STUDIES; ECONOMICS; FUEL CYCLE; REACTORS; COMPUTER CODES; MATHEMATICAL MODELS; PWR TYPE REACTORS; BWR TYPE REACTORS; BREEDER REACTORS; COST; FORECASTING; CAPITAL; OPERATING COST; COST ESTIMATES; NUCLEAR FUELS; WASTE STREAMS

29
Lewallen, M.A., and C.H. Bloomster; Pacific Northwest Laboratory, Richland, WA

THORIUM/URANIUM ENVIRONMENTAL CONTROL TECHNOLOGY. PNL-330 PT5; Pacific Northwest Laboratory Annual Report for 1979 to the DOE Assistant Secretary for Environment, Part 5 - Environmental Assessment, Control, Health and Safety, (p. 48), 113 pp. (1980)

The objectives of the thorium/uranium Environmental Control Technology project are to: 1) identify the major waste effluents associated with the mining, milling, and refining of thorium and low-grade uranium; 2) identify existing environmental control technologies for these effluents and determine their cost and the current levels of control; and 3) identify environmental control technologies that could be used to meet more stringent control standards and determine their costs as a function of the level of control. All three of these objectives are completed for thorium, and a summary report is being issued. Cost results are presented in tabular form. The uranium part of the project is now focused on the first objective. The deposits to be included in the study are: 1) Chattanooga Shale in Tennessee; 2) Bokan Mountain deposits in Alaska; and 3) Thomas Caldera in Utah. This work will be completed during FY 1981.

ORIGIN: Commercial

KEYWORDS: US DOE; RESEARCH PROGRAMS; REVIEWS; THORIUM; URANIUM; MINING; MILLING; NONRADIOACTIVE WASTES; RADIOACTIVE WASTES; ENVIRONMENTAL IMPACTS; GEOLOGIC DEPOSITS; COST; COST ESTIMATES

30
Lewallen, M.A., and C.M. Heeb; Pacific Northwest Laboratory, Richland, WA

LIGHT WATER REACTORS (LWR) ANALYSIS. PNL-330 PT5; Pacific Northwest Laboratory Annual Report for 1979 to the DOE Assistant Secretary for Environment, Part 5 - Environmental Assessment, Control, Health and Safety, (pp. 46-47), 113 pp. (1980)

An analysis of radioactive and non-radioactive substances projected to be released to the

environment from the operation of all facilities in the light water reactor (LWR) nuclear fuel cycle from 1977 to 2076 was completed. Annual releases for some 250 non-radioactive substances and 175 radioisotopes were computed. Three nuclear generation scenarios were chosen, including the once-through, reprocessing without recycle, and reprocessing for full uranium and plutonium recycle options. The set of substances was ranked according to a ranking criterion based on the 100-year sum of releases. The twenty highest radioactive and the twenty highest nonradioactive substances were selected for more detailed analysis which included a description of the present method of controlling each release and an assessment of available alternative methods for reducing effluents. When cost information was available, the cost of implementing the alternative system was also considered. In general, the most serious radioactive effluents came from the reactors and reprocessing plants, while the most serious non-radioactive effluents came from the head end of the fuel cycle (i.e. mining, milling, and enrichment).

ORIGIN: Commercial

KEYWORDS: US DOE; RESEARCH PROGRAMS; THEORETICAL STUDIES; RADIOACTIVE WASTES; NONRADIOACTIVE WASTES; LWR TYPE REACTORS; FUEL CYCLE; REPROCESSING; URANIUM; PLUTONIUM; COMPARATIVE EVALUATIONS; COST; EFFLUENTS; WASTE MANAGEMENT; PROJECTIONS

31

Weakley, S.A., D.E. Blahnik, J.K. Young, and C.H. Bloomster; Pacific Northwest Laboratory, Richland, WA

ENVIRONMENTAL CONTROL TECHNOLOGY FOR MINING, MILLING, AND REFINING THORIUM. PNL-3253: 253 pp. (1980)

The purpose of this report is to evaluate, in terms of cost and effectiveness, the various environmental control technologies that would be used to control the radioactive wastes generated in the mining, milling, and refining of thorium from domestic resources. The technologies, in order to be considered for study, had to reduce the radioactivity in the waste streams to meet Atomic Energy Commission (10 CFR 20) standards for natural thorium's maximum permissible concentration (MPC) in air and water. Further regulatory standards or licensing requirements, either federal, state, or local, were not examined. The availability and cost of producing thorium from domestic resources is addressed in a companion volume. The objectives of this study were: (1) to identify the major waste streams generated during the mining, milling, and refining of reactor-grade thorium oxide from domestic resources; and (2) to determine the cost and levels of control of existing and advanced environmental control technologies for these waste streams. Six potential domestic deposits of thorium oxide, in addition to

stockpiled thorium sludges, are discussed in this report. A summary of the location and characteristics of the potential domestic thorium resources and the mining, milling, and refining processes that will be needed to produce the reactor-grade thorium oxide is presented in section 2. The wastes from existing and potential domestic thorium oxide mines, mills, and refineries are identified in section 3. Section 3 also presents the state-of-the-art technology and the costs associated with controlling the wastes from the mines, mills, and refineries. In Section 4, the available environmental control technologies for mines, mills, and refineries are assessed. Section 5 presents the cost and effectiveness estimates for the various environmental control technologies applicable to the mine, mill, and refinery for each domestic resource.

ORIGIN: Commercial

KEYWORDS: COST; MAXIMUM PERMISSIBLE CONCENTRATION; MILLING; MINING; ORE PROCESSING; POLLUTION CONTROL; WASTE MANAGEMENT; RADIOACTIVE WASTES; TECHNOLOGY ASSESSMENT; THORIUM; THORIUM CYCLE; THORIUM OXIDES; ACTINIDES

32
Perrigo, L.D., J.R. Divine, G.R. Hoenes, and L.G. Faust; Pacific Northwest Laboratory, Richland, WA

THE IMPACT OF DECONTAMINATION ON LWR RADIOACTIVE WASTE TREATMENT SYSTEMS. NUREG/CR-0986; PNL-3297: 125 pp. (1979)

Increasing radiation levels around the primary coolant systems of some nuclear reactors in the U.S. have resulted in undesirably high radiation doses to plant workers performing necessary maintenance and inspection tasks. This radiation is primarily from neutron-activated corrosion products, such as Cobalt-60, deposited on the surfaces of the primary coolant system. Chemical or mechanical decontamination of these surfaces is a possible solution. Study of the influence of the choice of decontamination method on the design of LWR radwaste treatment systems produced several observations: N-Reactor is the only operating power reactor in the U.S. that is currently ready for a full system decontamination, and only N-Reactor has a means to accommodate radwaste produced during decontamination. A concentrated chemical decontamination one-step process has been developed for the Dresden-1 Reactor using the proprietary concentrated reagent NS-1. Solidification of the processed decontamination waste, and the disposal of the large amounts of highly active concentrated wastes from the radwaste treatment system may be significant problems. Based on discussions with utilities, the materials of construction in current radwaste treatment systems may not be capable of handling the

chemicals from a concentrated process. Total storage volume for concentrated decontamination is not sufficient in existing systems. Greater attention should be placed on designing for decontamination, with occupational exposure and the ALARA philosophy being considered. As long as concentrated decontamination procedures are viable alternatives, fuel decontamination procedures should also be considered and developed. If dilute solution decontamination is to be considered, a demonstration of such a process is needed on both BWR and PWR systems. A better transfer of information is needed among the utilities, NSSS organizations, architect-engineering firms, chemical service companies and the NRC. Guidance criteria need to be developed for planning primary system decontamination. A detailed means of handling waste material resulting from leaks in the system during decontamination is necessary. Long-term benefits of reduced occupations exposure and increased operating efficiency should be balanced against the immediate costs (from $3,900,000 for a small hands-on maintenance facility to $38,000,000 for one completely remotely operated and maintained), including building modifications, reactor downtime and personnel exposure. Decontamination safety, including chemical toxicity, changes from normal operating procedures, fire prevention and work conditions must be addressed.

ORIGIN: Commercial

KEYWORDS: WASTE PROCESSING; WASTE MANAGEMENT; WASTE DISPOSAL; RADIOACTIVE WASTE FACILITIES; WASTE STORAGE; SOLIDIFICATION; RADIOACTIVITY; ELECTRIC UTILITIES; PUBLIC UTILITIES; DESIGN; US NRC; PLANNING; STANDARDS; RISK ASSESSMENT; LWR TYPE REACTORS; PERSONNEL; DECONTAMINATION; COOLING SYSTEMS; RECOMMENDATIONS

33
Platt, A.M.; Pacific Northwest Laboratory, Richland, WA

CHARACTERIZATION OF NUCLEAR WASTE. PNL-SA-7540: 6 pp. (1979)

The characteristics of various nuclear wastes are discussed. Commercial wastes - including spent fuel and reprocessing wastes, have characteristics similar to those of defense wastes, and both types will require disposal in geologic repositories. It is expected that the 5250 metric tons of spent fuel discharged through the end of 1978 will increase to about 100,000 tons by the end of 2000. If current activities in the defense sector continue until 1990, and if the high-level wastes are segregated and solidified, their volume will be about 27,000 cubic meters.

ORIGIN: Government; Commercial

KEYWORDS: US DOE; RESEARCH PROGRAMS; REVIEWS; DEFENSE WASTES; REPROCESSING; VOLUME; REPOSITORY; WASTE DISPOSAL; COMMERCIAL WASTES;

SPENT FUELS; STRONTIUM-90; CESIUM-137; FORECASTING; PROJECTIONS

34
Robinson, J.V.; Pacific Northwest Laboratory, Richland, WA

WASTE MANAGEMENT SYSTEM STUDIES. PNL-2378-4; Nuclear Waste Management Quarterly Progress Report October Through December 1978, (pp. 6.1-6.5), 51 pp. (1979)

Work is near completion on summarizing the geologic and seismic data base and mapping programs. Work continued also on summarizing the geologic investigation of the 270-km-long photolineament in Washington and Oregon. Costs of managing high-level and transuranic wastes from the light-water reactor (LWR) fuel cycle were estimated and an analysis was made of the potential radiological consequences of the accidental breach of a hypothetical waste repository. Work was also b gun on the development of an algorithm to optimize the depth of a geologic repository in terms of cost and safety. Work has been completed on: print media and television coverage of nuclear, solar, and coal issues; the relationship of human values and attitudes to the nuclear power conflict; DOE's communication process; and public attitudes toward waste disposal facilities. Work began on separate studies of five other nuclear waste management public issues.

ORIGIN: Commercial

KEYWORDS: RESEARCH PROGRAMS; REVIEWS; US DOE; GEOLOGY; SEISMOLOGY; WASHINGTON; OREGON; COST; HIGH-LEVEL RADIOACTIVE WASTES; TRANSURANIUM ELEMENTS; REACTORS; REPOSITORY; ACCIDENTS; SOCIAL ASPECTS; WASTE DISPOSAL; PUBLIC OPINION; WASTE MANAGEMENT; PUBLIC RELATIONS; LWR TYPE REACTORS

35
Hoyt, R.C., L.F. Grantham, R.L. Gay, and L.J. Jones; Rockwell International, Energy Systems Group, Canoga Park, CA

ENGINEERING ANALYSIS AND COSTS OF PRODUCT CONVERSION, REFABRICATION, WASTE TREATMENT, AND PLANT DECOMMISSIONING OF AN EXPORTABLE PYROCHEMICAL PROCESS. ESG-DOE-13286: 123 pp. (1979)

Numerous tables and figures are given, including breakdowns of various costs, flowsheets, and phase diagrams.

Engineering evaluations have been performed for portions of a fast breeder reactor (FBR) fuel cycle utilizing pyrochemical reprocessing. Results of engineering studies for (1) conversion of the metallic uranium-plutonium alloy reprocessing product to the oxide, (2) refabrication of the oxide product, and (3) waste management for the pyrochemical reprocessing

plant are summarized in this document. In addition, a preliminary economic evaluation for uranium-plutonium alloy conversion to an oxide, refabrication of the mixed oxide (MOX) fuel, reprocessing waste management, and decontamination and decommissioning of the EPP (Exportable Pyrochemical Process) facility is included. The EPP process is a more proliferation-resistent modification of the salt transport process, and thus is termed "exportable."

ORIGIN: Government

KEYWORDS: DECOMMISSIONING; REPROCESSING; NUCLEAR FACILITIES; FUEL CYCLE; RADIOACTIVE WASTE MANAGEMENT; WASTE PROCESSING PLANTS; THERMOCHEMICAL PROCESSES; LMFBR TYPE REACTORS; ECONOMICS

36
Crandall, J.L.; Savannah River Laboratory, Aiken, SC

NATIONAL PERSPECTIVE ON WASTE MANAGEMENT. DP-MS-80-73; CONF-800655-30; Twenty-first Annual Meeting of the Institute of Nuclear Materials Management, Palm Beach, FL, June 30, 1980. 47 pp. (1980)

Sources of nuclear wastes are listed and the quantities of these wastes per year are given. Methods of processing and disposing of mining and milling wastes, low-level wastes, decommissioning wastes, high-level wastes, reprocessing wastes, spent fuels, and transuranic wastes are discussed. The costs and safeguards involved in the management of these wastes are briefly covered in this presentation.

ORIGIN: Commercial

KEYWORDS: COST; HIGH-LEVEL RADIOACTIVE WASTES; LOW-LEVEL RADIOACTIVE WASTES; MILL TAILINGS; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE MANAGEMENT; REPROCESSING; SAFEGUARDS; SPENT FUELS; TRANSURANIUM ELEMENTS; VOLUME

37
Savannah River Laboratory, Aiken, SC

WASTE MANAGEMENT - SAVANNAH RIVER LABORATORY QUARTERLY REPORT, JULY-SEPTEMBER, 1978. DPST-78-125-3: 71 pp. (1978)

Information on the development programs at Savannah River Laboratory for the management of radioactive wastes from the operation of the Savannah River Plant (SRP) are presented. Eleven programs are in progress, eight of which deal with the long-term management of radioactive wastes, and three of which deal with the interim management. Progress for each of these programs are summarized in the report. The eleven programs are as follows: 1) Alternatives for Long-Term

Management of Solid Transuranium Waste at SRP; 2) Factors Affecting Osmosis in Geologic Media; 3) Precision of Cation Determination in Waste Sludge; 4) Alpha Waste Incineration and Off-Gas Treatment; 5) Slag Formation During Glass Melting; 6) Tests of Large-Scale Continuous Glass Melting at the Pacific Northwest Laboratories; 7) Brine Leaching of Glass Waste Forms; 8) Long-Term Heating Tests of Candidate Alloys for Waste Storage Canisters; 9) Chemical Decomposition of Oxalic Acid; 10) Sludge Dissolution Tests; and 11) Burial Ground Well Assays.

ORIGIN: Government

KEYWORDS: REVIEWS; RESEARCH PROGRAMS; US DOE; WASTE MANAGEMENT; TRANSURANIUM ELEMENTS; GEOLOGY; CHEMICAL ANALYSIS; SLUDGES; GLASS; RADIOACTIVE WASTE PROCESSING; LEACHING; CANISTERS; WELLS; SAVANNAH RIVER PLANT

38
Vesterhaugh, O., and B. Blomsnes; Scandpower Als, Norway

TRENDS IN NUCLEAR POWER COSTS IN SWEDEN. Cost Studies 24(293):75-77 (1979)

At the request of the Swedish Ministry of Industry, a study of the costs of nuclear power in Sweden was performed in early 1979. The purpose of the study was to determine the real and projected costs of electricity producod by nuclear power plants. The basis for the calculations was the currently planned Swedish nuclear power program consisting of 11 reactors of which 6 are operating, 2 waiting start-up permission, and the remainder under construction. The results of the study gave an average production cost of electrical energy by Swedish nuclear power reactors of about 18 mils/kWh in 1978. Costs are also forecast for 1985, 1990, and 2000.

ORIGIN: Foreign

KEYWORDS: SWEDEN; NUCLEAR ENERGY; NUCLEAR POWER PLANTS; NUCLEAR POWER; COST; ECONOMICS; COST ESTIMATES

39
U.S. Department of Energy

MANAGEMENT OF COMMERCIALLY GENERATED RADIOACTIVE WASTE - VOLUME 2. APPENDICES. DOE/EIS-0046F Vol. 2: 327 pp. (1980)

The appendices of the two volume report - Management of Commercially Generated Radioactive Waste - are presented. Included in these appendices are: Waste Management Systems Supplementary Data; Geologic Disposal Supplementary Information; Radiological Standards; Models Used in Dose Calculations; Radiologically Related Health Effects; Reference Environment for Assessing Environmental Impacts;

GENERAL

Reference Sites for Assessing Social and Economic Impacts; Hazard Indices; Comparison of Defense Program Waste to Commercial Radioactive Waste; Geologic Repository Design Considerations; Supporting Research and Development; Bibliography for Alternative Concepts; Wastes from Thorium-Based Fuel Cycle Alternatives; and Stability of Minerals that Could Contain Radionuclides.

ORIGIN: Commercial

KEYWORDS: WASTE MANAGEMENT; RESEARCH PROGRAMS; US DOE; RADIOACTIVE WASTES; WASTE DISPOSAL; GEOLOGY; MODELS; RADIATION EFFECTS; RADIATION HAZARDS; SOCIAL ASPECTS; ECONOMICS; RISK ASSESSMENT; REPOSITORY; DESIGN; THORIUM; BIBLIOGRAPHIES; MINERALS; FUEL CYCLE; ENVIRONMENTAL IMPACT STATEMENTS

40
U.S. Department of Energy, Washington, DC. Assistant Secretary for Nuclear Energy

NUCLEAR PROLIFERATION AND CIVILIAN NUCLEAR POWER. REPORT OF THE NONPROLIFERATION ALTERNATIVE SYSTEMS ASSESSMENT PROGRAM. VOLUME IX. REACTOR AND FUEL CYCLE DESCRIPTION. DOE/NE-0001/9F: 625 pp. (1980)

The nonproliferation alternative systems assessment program (NASAP) has characterized and assessed various reactor/fuel cycle systems. Volume IX provides, in summary form, the technical descriptions of the reactor/fuel cycle systems studied. This includes the stagus of the system technology, as well as a discussion of the safety, environmental, and licensing from a technical perspective. This information was then used in developing the research, development, and demonstration (RD and D) program, including its cost and time frame, to advance the existing technology to the level needed for commercial use. Wherever possible, the cost data are given as ranges to reflect the uncertainties in the estimates.

ORIGIN: Commercial

KEYWORDS: BWR TYPE REACTORS; COST; ECONOMICS; ENRICHMENT; ENVIRONMENTAL IMPACTS; FABRICATION; FBR TYPE REACTORS; FUEL CYCLE; SPENT FUEL ELEMENTS; GCFR TYPE REACTORS; HEAVY WATER MODERATED REACTORS; HTGR TYPE REACTORS; LICENSING; LMFBR TYPE REACTORS; MOLTEN SALT REACTORS; NUCLEAR MATERIALS; MANAGEMENT; NUCLEAR MATERIALS POSSESSION; NUCLEAR POWER PLANTS; NUCLEAR WEAPONS; PROLIFERATION; PWR TYPE REACTORS; RADIOACTIVE WASTE MANAGEMENT; REPROCESSING; RESEARCH PROGRAMS; SPENT FUELS; TECHNOLOGY ASSESSMENT; THORIUM; TOKAMAK TYPE REACTORS; TRANSPORT; URANIUM

41
Wilkinson, Sir Denys, (Chairman)

RADIOACTIVE WASTE MANAGEMENT ADVISORY COMMITTEE FIRST ANNUAL REPORT. ISBN 0-11-751479-9; First Annual Report of the Radioactive Waste Management Advisory Committee to the Secretaries of State for the Environment, Scotland and Wales (1980)

The first Annual Report of the Radioactive Waste Management Advisory Committee to the Secretaries of State for the Environment of Scotland and Wales is presented. The committee is a standing committee independent of Government and the nuclear industry, composed of scientists from a variety of disiplines, including the electrical generating industries and trades unions. Current radioactive waste management practices and research into radioactive waste processing and management is discussed. It is recommended that a nuclear waste disposal corporation be established, and recommendations for future work are also presented.

ORIGIN: Foreign

KEYWORDS: RESEARCH PROGRAMS; UNITED KINGDOM; RADIOACTIVE WASTES; WASTE MANAGEMENT; WASTE PROCESSING; RECOMMENDATIONS; PUBLIC RELATIONS; COST; VOLUME

42
Alternative Waste Form Peer Review Panel, Washington, DC

THE EVALUATION AND REVIEW OF ALTERNATIVE WASTE FORMS FOR IMMOBILIZATION OF HIGH LEVEL RADIOACTIVE WASTES. DOE/TIC-11219: 33 pp. (1980)

The objective of this study was to review the relative merits and potential of 15 alternative waste forms being considered for the solidification and disposal of radioactive wastes. The relative merits of 4 alternative presolidification processing approaches were also assessed in this study. A Peer Review Panel composed of 8 scientists and engineers representing independent, non-DOE laboratories from industry, government, and universities and the disciplines of materials science, ceramics, glass, metallurgy, and geology conducted the review. Data and reports used for the review were provided to panel members by the Department of Energy project teams and are listed in the bibliography. Recent results from the waste form research teams were presented to the Review Panel at a workshop on May 8, 1980.

ORIGIN: Commercial

KEYWORDS: US DOE; RESEARCH PROGRAMS; REVIEWS; WASTE PROCESSING; METHODS; SOLIDIFICATION; RADIOACTIVE WASTES; GLASS; CALCINATION; CERAMICS; COMPARATIVE EVALUATIONS

43
Poch, L.A., and T.D. Wolsko; Argonne National Laboratory, Argonne, IL

A REVIEW OF THE NUCLEAR WASTE DISPOSAL PROGRAM. ANL/EES-TM-68: 16 pp. (1979)

Technical Memo from Integrated Assessments and Policy Evaluations.

A survey and risk assessment of current radioactive waste management methods and waste disposal technologies are examined along with their possible advantages, disadvantages, and projected costs. Several areas of potential risk are identified and each of the technologies are compared in terms of their ability to deal with a particular risk.

ORIGIN: Commercial

KEYWORDS: RESEARCH PROGRAMS; US DOE; RISK ASSESSMENT; REVIEWS; WASTE MANAGEMENT; WASTE DISPOSAL; RADIOACTIVE WASTES; COST; METHODS; COMPARATIVE EVALUATIONS; COST ESTIMATES

44
Hill, K.M., G. Ridley, and D.G. Adler; Atomic Fuels Processing Directorate, Harwell, United Kingdom

A DESIGN STUDY FOR A FISSION PRODUCT FIXATION PLANT AND STORAGE AT WINDSCALE. AERE-R 9416: 83 pp.

(1979)

An internal design study for a fission product fixation plant prepared in the period 1960-1961 by the United Kingdom Atomic Energy Authority (UKAEA) Engineering Group is presented. It covers many ideas then circulating in the UKAEA, and it has formed the source of a number of papers published subsequently. The study includes concepts, plant design, permanent storage of fission products, design of natural draught cooling, health and safety, and economics. It was reprinted in 1979 primarily for its historical significance.

ORIGIN: Foreign

KEYWORDS: RESEARCH PROGRAMS; UNITED KINGDOM; WASTE PROCESSING; FISSION PRODUCTS; RADIOACTIVE WASTES; WASTE PROCESSING PLANTS; THEORETICAL STUDIES; DESIGN; ECONOMICS; WINDSCALE

45
Crandall, D.B.; Bechtel National, Inc., San Francisco, CA

ALTERNATIVE WASTE DISPOSAL CONCEPTS - AN INTERIM TECHNICAL ASSESSMENT. ONWI-65: 225 pp. (1979)

This report is the final product of the Alternative Waste Disposal Concepts Study (AWDCS) conducted by Bechtel National, Inc., Nuclear Fuel Operations, under Subcontract E512-00100 with Batelle Project Management Division, Office of Nuclear Waste Isolation (ONWI), a prime contractor to the U.S. Department of Energy (DOE). The AWDCS is part of DOE's National Waste Terminal Storage (NWTS) program. ONWI's objectives under that program are (1) to identify and develop geologic sites for use as nuclear waste repositories and (2) to manage the development and application of specific supporting data and base technologies. The investigation and evaluation of alternative waste disposal technologies is required to satisfy the second objective and to comply with the NEPA process. The study (1) provides a preliminary identification and description of alternative waste disposal concepts, (2) combines them selectively with particular forms of spent fuel and waste into specific "cases," and (3) provides a preliminary comparative assessment of the cases with respect to radiological impact, environmental impact, degree of development, resource consumption, safeguards, and economics. This report provides a tentative ranking of the cases studied, based on the assessments made, and contains recommendations for additional work required to provide a more thorough definition of disposal concepts and a means for developing final evaluations of the alternatives. (Auth)

ORIGIN: Commercial; Government

KEYWORDS: REVIEWS; WASTE DISPOSAL; WASTE STORAGE; REPOSITORY; STORAGE FACILITIES; RISK ASSESSMENT; RADIATION EFFECTS; ENVIRONMENTAL IMPACTS; SAFETY; ECONOMICS; UNDERGROUND STORAGE; NWTS

46
Bocola, W.; Comitato Nazionale Energia Nucleare/SCK, Mol, Belgium

CHARACTERIZATION OF LONG-LIVED RADIO-ACTIVE WASTES TO BE DISPOSED IN GEOLOGICAL FORMATIONS. PART I - RADIATION, THERMAL AND RADIOTOXICITY PROPERTIES. CNEN-RT/PROT(79)18: 45 pp. (1979)

Information is clearly shown in numerous tables and figures.

High level solid radioactive wastes, cladding hulls and alpha wastes from reprocessing and mixed oxides fuel fabrication have been considered for disopsal in geological formations. On the basis of some initial assumptions, concerning the nuclear fuel performance, the reprocessing time and the partitioning of radionuclides in the different wastes considered, the radioactivity, the thermal power and the radiotoxicity hazards have been calculated by making use of the well known ORIGEN Code. The results of the calculations are reported in form of tables or figures for the total wastes and for the most important radionuclides or radioelements concerned. The author suggests that: high-level solid waste is indeed the most hazardous and the intensive attention paid to its management is justified; alpha wastes should be accorded the same attention as cladding hulls in conditioning and placement techniques; and the chemical agents listed herein, whose radioisotopes present the greatest biological hazards, are a good basis to reorientate experimental studies.

ORIGIN: Foreign

KEYWORDS: THEORETICAL STUDIES; RADIOACTIVITY; TEMPERATURE EFFECTS; THERMAL PROPERTIES; RADIONUCLIDES; TOXICITY; RISK ASSESSMENT; MATHEMATICAL MODELS; COMPUTER CODES; HIGH-LEVEL RADIOACTIVE WASTES; UNDERGROUND STORAGE; SOLID WASTES

47
Bocola, W.; Comitato Nazionale Energia Nucleare/SCK, Mol, Belgium

CHARACTERIZATION OF LONG-LIVED RADIO-ACTIVE WASTES TO BE DISPOSED IN GEOLOGICAL FORMATIONS, PART II - CHARACTERISTICS AND QUANTITITES OF THE CONDITIONED AND PACKAGED WASTES. CNEN-RT/PROT(79)19: 17 pp. (1979)

High-level radioactive wastes, cladding hulls, alpha wastes and iodine waste from spent fuel reprocessing and mixed oxides fuel fabrication are considered for disposal within geological formations. On the basis of some initial assumptions, the chemical and physical characteristics of the conditioned and packaged wastes have been evaluated and reported. Starting from the chemical composition the chemical toxicity hazard measure of the conditioned and packaged wastes has been calculated and compared with the radiotoxic hazard measure by ingestion. Finally the number of packages, the volume and the

weight of the conditioned and packaged long-lived radioactive wastes resulting from nuclear fuel cycle activities of a nuclear program of 300 GWe-year have been estimated.

ORIGIN: Foreign

KEYWORDS: THEORETICAL STUDIES; HIGH-LEVEL RADIOACTIVE WASTES; CLADDING; ALPHA PARTICLES; IODINE; REPROCESSING; SPENT FUELS; GEOLOGIC FORMATIONS; CHEMICAL PROPERTIES; PHYSICAL PROPERTIES; RISK ASSESSMENT; TOXICITY; INGESTION; VOLUME; INVENTORIES; BELGIUM

48
Plung, D.L., (Ed.); Exxon Nuclear Idaho Company, Inc., Idaho Falls, ID

TECHNICAL QUARTERLY PROGRESS REPORT, APRIL 1 - JUNE 30, 1979. ENICO-1013: 120 pp. (1980)

Third quarter 1979 progress is reported for the Idaho Chemical Processing Plant at the Idaho National Engineering Laboratory. Three areas are covered: 1) Production of special materials which reports the results of work on treatment & handling of high-level wastes, plant process improvement, & waste management methods & facilities development; 2) fuel cycle research and development in the Krypton-85 storage development program; and 30 other DOE supported projects, including work in the nuclear materials security program, the in-plant source term measurement program, and specialized fuel research - analytical support.

ORIGIN: Government

KEYWORDS: RESEARCH PROGRAMS; REVIEWS; FUEL CYCLE; OKLO REACTOR; IDAHO CHEMICAL PROCESSING PLANT; IDAHO; HIGH-LEVEL RADIOACTIVE WASTES; WASTE MANAGEMENT

49
Kirkbride, R.A.; Exxon Nuclear Idaho Company, Inc., Idaho Falls, ID

INVENTORY OF CALCINED WASTE STORED AT THE ICPP AS OF SEPTEMBER 1979. ENICO-1044: 37 pp. (1980)

Numerous figures and tables are included.

An option in the program for Long-Term Management of High-Level Idaho Chemical Processing Plant (ICPP) Wastes calls for retrieving calcined waste stored at ICPP and converting it to a more stable, less dispersible form. Waste solidification options include vitrification, pelletization, or conversion to a ceramic form. A calcine inventory, from December 1963 to September 1979, has been prepared based on calciner run and solids storage facilities information which gives the range of chemical compositions of calcined waste stored at ICPP. Information researched includes calciner startup data, waste

solution types and volumes calcined, calciner operating schedules, solids storage bin capacities, calcine storage bin distributor systems and solids storage bin thermocouple locations and temperature records. A recommendation for improving calcine inventory control is given. (Auth)

ORIGIN: Government

KEYWORDS: US DOE; REVIEWS; RESEARCH PROGRAMS; CALCINE; RADIOACTIVE WASTES; WASTE STORAGE; VOLUME; IDAHO; SOLIDIFICATION; VITRIFICATION; RECOMMENDATIONS; HIGH-LEVEL RADIOACTIVE WASTES; INVENTORIES; RETRIEVAL

50
Dickey, B.R.; Idaho National Engineering Laboratory, Idaho Falls, ID

LONG-TERM MANAGEMENT OF HIGH-LEVEL DEFENSE WASTES AT THE IDAHO CHEMICAL PROCESSING PLANT. American Institute of Chemical Engineers Symposium Series 75(191):93-99 (1979)

Plans and technology for the long-term management of existing and future high-level defense wastes generated at the Idaho Chemical Processing Plant (ICPP) are discussed. Current high-level waste management is reviewed, and a summary of the history of ICPP is presented. The types of radioactive wastes generated are briefly discussed, along with waste processing alterntives, conceptual design and cost estimates, and a risk assessment.

ORIGIN: Government

KEYWORDS: RESEARCH PROGRAMS; US DOE; REVIEWS; WASTE MANAGEMENT; HIGH-LEVEL RADIOACTIVE WASTES; WASTE PROCESSING; COST; RISK ASSESSMENT

51
Lawroski, H., N.A. Chipman, W.A. Freeby, G.G. Simpson, W.A. Rodger, and R.L. Frendberg; Idaho National Engineering Laboratory, Idaho Falls, ID; Nuclear Safety Associates, Bethesda, MA

WHAT WOULD HAPPEN IF HIGH-LEVEL NUCLEAR WASTES WERE STORED NEAR THE SURFACE OF THE EARTH. CONF-790204; Waste Management and Fuel Cycles 1979, Proceedings of a Symposium, Tucson, AZ, February 28, 1979, 22 pp. (1979)

Long-term near-surface storage of high-level defense radioactive wastes is reviewed. Specifically discussed is management of the wastes from recovery of highly enriched uranium fuels at the Idaho Chemical Processing Plant and concentrated intermediate-level wastes from the Idaho National Engineering Laboratory. These wastes are calcined and stored, while several options for final disposition are being examined in detail.

ORIGIN: Government

KEYWORDS: REVIEWS; IDAHO; IDAHO CHEMICAL PROCESSING PLANT; IDAHO NATIONAL ENGINEERING LABORATORY; LIQUID WASTES; HIGH-LEVEL RADIOACTIVE WASTES; INTERMEDIATE-LEVEL RADIOACTIVE WASTES; CALCINATION; STORAGE FACILITIES; RISK ASSESSMENT; DEFENSE WASTES; INTERIM STORAGE; COMPARATIVE EVALUATIONS

52
Heckman, R.A.; Lawrence Livermore Laboratory, Livermore, CA

DETERMINATION OF PERFORMANCE CRITERIA FOR HIGH-LEVEL SOLIDIFIED NUCLEAR WASTE FROM THE COMMERCIAL NUCLEAR FUEL CYCLE: A PROBABILISTIC SAFETY ANALYSIS. URCL-80927, Rev. 1: 12 pp. (1978)

To minimize the radiological risk from the operation of a waste management system for the safe disposal of high-level waste, performance characteristics of the solidified waste form must be specified. The minimum waste form characteristics that must be specified are the radionuclide volatilization fraction, airborne particulate dispersion fraction, and the aqueous dissolution characteristics. The results indicate that the pre-emplacement environs are more limiting in establishing the waste form performance criteria than the post-emplacement environs. The actual values of expected risk are sensitive to modeling assumptions and data base uncertainties. The transportation step appears to be the most limiting in determining the required performance characteristics. (Auth)

ORIGIN: Commercial

KEYWORDS: RESEARCH PROGRAMS; US DOE; WASTE MANAGEMENT; THEORETICAL STUDIES; HIGH-LEVEL RADIOACTIVE WASTES; SOLID WASTES; SOLIDIFICATION; RISK ASSESSMENT; VOLATILE MATTER; STATISTICS; MATHEMATICAL MODELS; WASTE TRANSPORTATION

53
Lang, G.P., and T.A. Parish; McDonnell Douglas Astronautics Co., St. Louis, MO; Texas University, Austin, TX

DETERMINATION OF PROCEDURES FOR TRANSMUTATION OF FISSION PRODUCT WASTES BY FUSION NEUTRONS. VOLUME 1. FINAL REPORT. EPRI-AP-1642 Vol. 1: 43 pp. (1980)

EPRI has funded several research projects to study the use of fusion neutrons for disposing of radioactive wastes. This report summarizes some of the research results and attempts to put fusion-based transmutation disposal into perspective. Specific areas which are addressed include: the chemical separations needed, the types of fusion reactors required, the effectiveness of transmutation for reducing toxicity, and the cost of developing and implementing the transmutation based disposal

system.

ORIGIN: Government

KEYWORDS: COST; HIGH-LEVEL RADIOACTIVE WASTES; NEUTRONS; RADIOACTIVE WASTE DISPOSAL; RESEARCH PROGRAMS; THERMONUCLEAR REACTORS; TRANSMUTATION

54
Blanco, R.E., (Program Manager), and A.L. Lotts, (Program Director); Oak Ridge National Laboratory, Oak Ridge, TN

HIGH-LEVEL WASTE PROGRAM PROGRESS REPORT FOR APRIL 1, 1980, THROUGH JUNE 30, 1980. ORNL/TM-7476 (1980)

Diagrams, micrographs, tables, and references are included.

Information is given for the following 5 tasks of the High-Level Waste Program: 1) Waste Management Analysis for Nuclear Fuel Cycles: As part of the continuing effort to update ORIGEN and its nuclear data libraries, a report was issued documenting broad-group macroscopic ANISN-formatted cross-section libraries to be used for fuel cycle shielding calculations. Final documentation of the P-T project has proceeded on schedule. 2) Fixation of Waste in Concrete: A leaching nomograph was developed to show the relationship between effective diffusivity, D(e), in cm2/s and leach factor, L, in g/cm2 day. Standard FUETAP concrete specimens containing high concentrations of Cm 244 continued to show much lower rates of radiolytic gas production than concrete cured under ambient conditions. 3) Study of Ceramic and Cermet Waste Forms: Operation of the large reactive spray calciner over a wide range of conditions has demonstrated its versatility and effectiveness in calcining wastes and additives in urea solutions. The development of leach testing and analytical methods applicable to radiotracer-containing cermets has been essentially completed. The leach testing program will be initiated upon the imminent completion of the radiotracer laboratory facilities. The role of galvanic coupling in cermet leach resistance and durability is being investigated. 4) Alternative High-Level Waste Forms Development: Parametric runs were made using the internal gelation method to determine process conditions when making spheres of the Synroc-B composition. Batches of Synroc-B microspheres were sintered to densities greater than 92% of theoretical at temperature as low as 1175 degrees C. 5) High-Level Waste Container Development: Compatibility testing of candidate container materials with a number of waste forms has begun. The overall experiment includes 15 potential canister metals and 6 waste forms. The first two capsules, one each containing metal matrix Al-Si and FUETAP, have been assembled and are in test. The other capsules are being loaded.

ORIGIN: Government

KEYWORDS: HIGH-LEVEL RADIOACTIVE WASTES; WASTE MANAGEMENT; FUEL CYCLE; WASTE PROCESSING; CERMETS; CERAMICS; CONTAINERS; DATA ANALYSIS

55
Blanco, R.E., and A.L. Lotts; Oak Ridge National Laboratory, Oak Ridge, TN

HIGH-LEVEL WASTE PROGRAM PROGRESS REPORT FOR JANUARY 1, 1980, THROUGH MARCH 31, 1980. ORNL/TM-7371: 25 pp. (1980)

Progress for the second quarter of FY 1980 on ORNL's High-Level Waste Program is presented. In the Waste Management Analysis for Nuclear Fuel Cycles project a report describing alternative fuel cycle PWR models for use with ORIGEN2 was published and problems with CANDU depletion calculations were resolved. Progress on the Fixation of Waste in Concrete project included the completion of a test that showed FUETAP concretes cured at 100 degrees C and 0.1 or 0.6 MPa had essentially the same physical properties as those cured at higher temperatures and pressures. Standard specimens containing high concentrations of Cm-244 showed little, if any, gasification after 1 month. A large (23-cm I.D.) spray calciner, was completed for the Study of Ceramic and Cermet Waste Forms project and it is operating satisfactorily. The Alternative High-Level Waste Forms Development project progress was highlighted with the completion of a sphere-forming system capable of producing 100-g batches of SYNROC spheres by internal gelation. Several runs were made to investigate feed compositions, forming, and washing conditions necessary to achieve the metal oxide composition in the dried spheres required by SYNROC-B. The High-Level Waste Container Development project began preparations for waste-container compatibility tests. Metal coupons of each candidate alloy material were fabricated and several waste forms have been completed.

ORIGIN: Government

KEYWORDS: REVIEWS; US DOE; HIGH-LEVEL RADIOACTIVE WASTES; WASTE MANAGEMENT; CONCRETES; TEMPERATURE EFFECTS; PHYSICAL PROPERTIES; CURIUM-244; PRESSURE EFFECTS; CALCINATION; CERAMICS; CONTAINERS; CANISTERS; SYNROC; RADIOACTIVITY; TECHNOLOGY ASSESSMENT

56
Forsberg, C.W.; Oak Ridge National Laboratory, Oak Ridge, TN

SEPARATION OF AMERICIUM, CURIUM, AND RARE EARTHS FROM HIGH-LEVEL WASTES BY OXALATE PRECIPITATION: EXPERIMENTS WITH SYNTHETIC WASTE SOLUTIONS. ORNL/TM-6445 (1980)

The separation of trivalent actinides and rare earths from other fission products in high-level nuclear wastes by

oxalate precipitation followed by ion exchange (OPIX) was experimetally investigated using synthetic wastes and a small-scale, continuous-flow oxalic acid precipitation and solid-liquid separation system. Trivalent actinide and rare earth oxalates are relatively insoluble in 0.5 to 1.0 M HNO3 whereas other fission product oxalates are not. The continuous-flow system consisted of one or two stirred-tank reactors in series for crystal growth. Oxalic acid and waste solutions were mixed in the first tank, with the product solid-liquid slurry leaving the second tank. Solid-liquid separation was tested by filters and by a gravity settler. The experiments determined the fraction of rare earths precipitated and separated from synthetic waste streams as a function of number of reactors, system temperature, oxalic acid concentration, liquid residence time in the process, power input to the stirred-tank reactors, and method of solid-liquid separation. The crystalline precipitate was characterized with respect to form, size, and chemical composition. These experiments are only the first step in converting a proposed chemical flowsheet into a process flowsheet suitable for large-scale remote operations at high activity levels. (Auth)

ORIGIN: Government

KEYWORDS: LABORATORY STUDIES; US DOE; RESEARCH PROGRAMS; WASTE PROCESSING; ACTINIDES; RARE EARTHS; FISSION PRODUCTS; SEPARATION PROCESSES; RADIOACTIVE WASTES; HIGH-LEVEL RADIOACTIVE WASTES; CHEMICAL PRECIPITATION; ION EXCHANGE; FLOWSHEETS

57
Olivier, J.D.; OECD Nuclear Agency, Paris

SEA DISPOSAL OF PACKAGED RADIOACTIVE WASTE. CONF-750411; Nuclear Energy Maturity, Vol. 8, Reprocessing, Transport, and Waste Disposal, Proceedings of a Symposium, Paris, April 21-25, 1975. Pergamon Press, Oxford, (pp. 355-371), 379 pp. (1976)

In addition to some background information on past sea disposal operations and on the capacity of the sea to receive radioactive waste, the paper describes the general framework set up for the authorization, organization and conduct of operations for the dumping of packaged solid radioactive waste on the sea-bed. This includes the definition of high level waste unsuitable for sea dumping and other recommendations for the operational control of sea dumping operations established by the IAEA following the adoption in 1972 of the London Convention on the Prevention of Marine Pollution from Dumping of Wastes and Other Matter. Details of NEA sea disposal operations (quantities, costs, position of the dumping area) are also given, together with an indication of future prospects in this field. (Auth)

ORIGIN: Foreign

KEYWORDS: REVIEWS; WASTE DISPOSAL; SEAS; REGULATIONS; INTERNATIONAL REGULATIONS; RADIOACTIVE WASTES; SOLID WASTES; MARINE DISPOSAL; COST; VOLUME; FRANCE

58
Ross, W.A., J.M. Rusin, and J.L. McElroy; Pacific Northwest Laboratory, Richland, WA

PROCESSES FOR PRODUCTION OF ALTERNATIVE WASTE FORMS. PNL-54-7414: 14 pp. (1979)

Various high-level radioactive wastes from processes and operations are described and a simple system is proposed for making comparisons. This system suggests that one goal for processes would be to reduce the number of processing steps, thereby providing less complex processing systems. The simplest processes of high-level radioactive waste treatment are cement and spent fuel encapsulation and the most complex processes are cermets and coated pellets in a metal matrix. It is recommended that more detailed evaluations of process complexity and waste form inertness should be made before a final waste form is selected.

ORIGIN: Government; Commercial

KEYWORDS: REVIEWS; HIGH-LEVEL RADIOACTIVE WASTES; RADIOACTIVE WASTES; COMPARATIVE EVALUATIONS; RECOMMENDATIONS; WASTE PROCESSING; ENCAPSULATION; CERMETS; CEMENTS; SPENT FUELS

59
Ross, W.A., and J.E. Mendel; Pacific Northwest Laboratory, Richland, WA

ANNUAL REPORT ON THE DEVELOPMENT AND CHARACTERIZATION OF SOLIDIFIED FORMS FOR HIGH-LEVEL WASTES: 1978. PNL-3060: 89 pp. (1979)

The efforts to develop and characterize solidified high-level waste forms at the Pacific Northwest Laboratory during FY 1978 are presented. Glass waste forms for defense wastes were emphasized in FY 1978, and investigations of the long-term behavior of power-reactor waste glass continued. The characterization of alternative waste forms, including crystalline forms, coated particles and metal matrixes is continuing, using the same techniques that are being used for waste glasses. A new and promising computer-based approach to waste glass development was initiated PNL in 1978, and the development of glass waste forms is nearing completion. Canister development efforts emphasized confirmation of computer codes by means of experimental data. The results of tests on simulated and actual high-level waste glasses continue to suggest that thermal devitrification has a relatively small effect upon mechanical and

chemical durabilities. Tests on radiation effects upon waste forms also continue to show changes to be relatively significant.

ORIGIN: Government

KEYWORDS: US DOE; RESEARCH PROGRAMS; WASTE PROCESSING; CANISTERS; DESIGN; HIGH-LEVEL RADIOACTIVE WASTES; SOLIDIFICATION; GLASS; DEVITRIFICATION; COMPUTER PROGRAMS; COMPUTER CODES; RADIATION EFFECTS; TEMPERATURE EFFECTS

60
Strickmann, G., and G. Modemann; Rhein.-Westf. Techn. Hochschule Aachen, Institut fur Elektrische Anlagen and Energlewirtschaft, Lehrauftrag Leistungsreaktoren, German Federal Republic

INVESTIGATION CONCERNING AN ECONOMICALLY OPTIMUM STRATEGY FOR THE DISPOSAL OF HIGHLY RADIOACTIVE WASTES. OLS-80-51: 134 pp. (1975)

Translated from the German

Liquid wastes from reprocessing of LWR fuel elements containing separated fission products are discussed. Separate disposal of actinides, low-level, intermediate-level, and power plant wastes were not considered. Technical-physical boundary conditions, which vary in their affect on fuel cycle cost distribution, were taken into account in order to be able to determine a cost-optimized strategy. Cost data were collected from 1972-1974. The authors are aware of cost increases caused by licensing costs, price increases, etc., and that for many readers it would make little sense at the present to publish detailed cost values for this portion of the disposal problem. Nevertheless, a large number of cost data and an extended evaluation of the cost structure are included. The authors hope to make possible a simpler, faster determination of the effects of concept changes, licensing costs, price changes, etc. on the cost structure and total costs, thus aiding in decision making for additional planning work in this area. The most significant result of this study was the indication of the relatively low sensitivity of the cost to certain changes in the process structure or the variation of individual process parameters. Furthermore, the part of the disposal scheme investigated here poses only a minor burden on nuclear power plants and cannot have a decisive effect on their economic practicality. Before the cost data is used it should be checked to see whether it can still satisfy the strategy of the process and the technical-physical boundary conditions, or whether it should be updated. Much more detailed studies have been carried out for the process steps of liquid storage and temporary storage during the years 1975-76 by NUKEM GmbH, Hanau. The investment costs determined in those studies agree well with those obtained here.

ORIGIN: Foreign

KEYWORDS: LIQUID WASTES; COST; REVIEWS; GERMAN FEDERAL REPUBLIC; HIGH-LEVEL RADIOACTIVE WASTES; FUEL CYCLE; LICENSING; PLANNING; DATA COMPILATION; REPROCESSING; LWR TYPE REACTORS; WASTE MANAGEMENT

61
Wodrich, D.D.; Rockwell Hanford Operations, Richland, WA

THE PROGRAM OF LONG-TERM MANAGEMENT OF HANFORD HIGH-LEVEL DEFENSE WASTE. American Institute of Chemical Engineers Symposium Series 75(191):100-104 (1979)

Radioactive waste has been generated at Hanford since 1944, with the bulk of the radionuclides in the waste coming from chemical processing of spent nuclear fuel to recover Pu, U, and Np. These high-level wastes have been stored as alkaline slurries in 156 underground tanks ranging in size from 1,000 to 50,000 gal. Because the tanks are deteriorating, the high-level wastes are currently being processed to convert them to less mobile forms which can be safely stored for long periods of time. Upon completion of the current waste solidification program in the early 1980's, the high-level waste inventory will consist of approximately: 3,000,000 gal. of liquids generated by ongoing activities, 8,000,000 gal. of residual liquors, 40,000,000 gal. of solids, and 3,000 capsules containing Sr 90 and Cs 137. Hanford's program to evaluate alternative methods and develop the technology to provide the long term safe management of those wastes is discussed. The three alternative methods considered are: 1) continuation of storage of high-level wastes in existing tanks as is, or with improvements; 2) to retrieve the waste, process it, and store it in deep geologic storage sites; and 3) to retrieve the waste, process it, and store it in new surface storage facilities. The five tasks of the technology development phase are 1) storage system integrity and engineered improvements; 2) waste retrieval; 3) waste processing; 4) waste storage; and 5) alternatives and assessments.

ORIGIN: Government

KEYWORDS: REVIEWS; WASTE STORAGE; HIGH-LEVEL RADIOACTIVE WASTES; SOLIDIFICATION; LIQUID WASTES; SOLID WASTES; VOLUME; CESIUM-137; WASTE MANAGEMENT; WASTE PROCESSING; STRONTIUM-90; URANIUM; NEPTUNIUM; PLUTONIUM; SLURRIES; INVENTORIES; HANFORD RESERVATION; UNDERGROUND STORAGE

62
Reep, I.E., and D.D. Wodrich; Rockwell Hanford Operations, Richland, WA

PROJECT PLAN FOR INSPECTION AND EVALUATION OF NUCLEAR FUEL SERVICES HIGH-LEVEL WASTE STORAGE

SYSTEM. RHO-LD-97: 73 pp. (1979)

The Nuclear Regulatory Commission has expressed the need for additional information concerning the condition of the high-level waste tanks and their contents at the Western New York State Nuclear Service center near West Valley, NY. This information is intended to be used in evaluating the safety of continued storage and in the development of alternatives for final disposition of the high-level waste. The specific kinds of information requested by the NRC and addressed in this plan are: condition of tanks and vaults; waste sludge level; waste heat generation rate; chemical and isotopic composition of the waste; extent of tank corrosion; capability of the soil surrounding the tanks to retain the waste in the event of a leak. The work required to obtain this information is broken down into five technical tasks, plus two support tasks. These tasks are briefly described.

ORIGIN: Government

KEYWORDS: THEORETICAL STUDIES; US NRC; US DOE; HIGH-LEVEL RADIOACTIVE WASTES; CONTAINERS; CORROSION; TANKS; RESEARCH PROGRAMS; SOILS; CHEMICAL COMPOSITION; SLUDGES; LEAKS; WASTE STORAGE

63
Rockwell International, Energy Systems Group, Richland, WA

TECHNICAL ASPECTS OF LONG-TERM MANAGEMENT ALTERNATIVES FOR HIGH-LEVEL DEFENSE WASTE AT THE HANFORD SITE. RHO-LD-141: 389 pp. (1980)

Figures, appendices, and tables included.

This report provides information on technical aspects of nine alternative methods for long-term management of the radioactive high-level waste at the Hanford site. The general alternatives, each including provisions for both in-tank and encapsulated wastes, range from continuing present action (storing the waste near the surface of the ground) to retrieving the waste and disposing of it deep underground in a mined geologic repository. Topics discussed are: description of Hanford high-level defense waste; descriptions of specific alternatives; modular process descriptions; cost estimated and resources requirements; and effluents and wastes. The report includes figures, appendices, numerous tables, an introduction and a summary.

ORIGIN: Government

KEYWORDS: CHEMICAL EFFLUENTS; COST; GEOLOGIC DEPOSITS; HANFORD RESERVATION; HIGH-LEVEL RADIOACTIVE WASTES; WASTE DISPOSAL; WASTE MANAGEMENT; TANKS; TECHNOLOGY ASSESSMENT; UNDERGROUND DISPOSAL; COST ESTIMATES

64
Schulz, W.W.; Rockwell International, Richland, WA

REMOVAL OF RADIONUCLIDES FROM HANFORD DEFENSE WASTE SOLUTIONS. RHO-SA-51; CONF-800607-30; American Nuclear Society Annual Meeting, Las Vegas, NV, June 8, 1980 (1980)

Available from NTIS, PC A05/MF A01

The Hanford high level defense wastes were characterized by their large volume (190,000 cu m) and varying content of inert and radioactive constituents. The water-soluble portion (140,000 cu m) of these wastes, which consists mainly of NaNo3 NaAl(OH)4, Na2Co3, and other sodium salts, contains a few milligrams of long-lived (T/1/2/ greater than or equal to 10 years) radionuclides per 1000 kg. There is probably economic incentive for long-term management of Hanford defense wastes to partition them into a small volume of highly radioactive material requiring high integrity immobilization and storage and a much larger fraction of low-level (e.g. less than 10 nCi/g) waste which can be economically and safely stored in bulk form. To aid in achieving this latter objective, an integrated series of aqueous separations processes (precipitataion, ion exchange, and solvent extraction methods) was designed to remove Cs 137, Sr 90, actinides, other multivalent cationic fission and activation products, and Tc 99 from the water-soluble wastes. Results of generally satisfactory laboratory-scale tests of radionuclide removal technology with actual Hanford wastes are described.

ORIGIN: Government

KEYWORDS: ACTINIDES; BENCH-SCALE EXPERIMENTS; CESIUM-137; CHEMICAL COMPOSITION; EXPERIMENTAL DATA; FISSION PRODUCTS; FLOWSHEETS; GRAPHS; HANFORD RESERVATION; HIGH-LEVEL RADIOACTIVE WASTES; ION EXCHANGE; PRECIPITATION; RADIOACTIVE WASTE PROCESSING; RADIOISOTOPES; SCAVENGING; SOLVENT EXTRACTION; STRONTIUM-90; TABLES; TECHNETIUM-99; VOLUME

65
Mitchell, M.E.; Rockwell International, Rockwell Hanford Operations, Richland, WA

PHYSICAL AND CHEMICAL CHARACTERISTICS OF CANDIDATE WASTES FOR TAILORED CERAMICS. DOE/ET/41900-2; ESG-DOE-13330: 29 pp. (1980)

Constituent concentrations, actual and estimated, are given in tables.

Ceramics may be specifically compounded for differing radioactive waste types depending on the chemical and physical characterics of the particular waste. These tailored ceramics offer an alternative to glass as an immobilization form. This report summarizes and integrates physical and chemical properties of a number of candidate wastes for this process. Included are

data on Savannah River Purex Process waste; Hanford bismuth phosphate, uranium recovery, redox, purex, evaporator and residual liquid wastes; Idaho Falls calcine; Nuclear Fuel Services Purex and Thorex wastes and miscellaneous waste from future reprocessing.

ORIGIN: Government

KEYWORDS: REVIEWS; PHYSICAL PROPERTIES; CHEMICAL PROPERTIES; CERAMICS; RADIOACTIVE WASTES; CONTAINMENT; WASTE MANAGEMENT

66
Crandall, J.L.; Savannah River Laboratory, Aiken, SC

HIGH LEVEL NUCLEAR WASTE.
DP-MS-80-39; CONF-800535-1; ASME Idaho Section Symposium, Idaho Falls, ID, May 29, 1980 (1980)

Available from NTIS, PC A03/MF A01

The DOE Division of Waste Products through a lead office at Savannah River is developing a program to immobilize all US high-level nuclear waste for terminal disposal. DOE high-level wastes include those at the Hanford plant, the Idaho Chemical Processing Plant, and the Savannah River Plant. Commercial high-level wastes, for which DOE is also developing immobilization technology, include those at the nuclear fuel services plant and any future commercial fuels reprocessing plants. The first immobilization plant is to be the defense waste processing facility at Savannah River, scheduled for 1980 project submission to congress and 1989 operation. Waste forms are still being selected for this plant. Borosilicate glass is currently the reference form, but alternate candidates include concerts, calcines, other glasses, ceramics, and matrix forms.

ORIGIN: Government; Commercial

KEYWORDS: BOROSILICATES; CALCINATION; CERAMICS; FUEL REPROCESSING PLANTS; GLASS; HIGH-LEVEL RADIOACTIVE WASTES; INVENTORIES; MATRIX MATERIALS; NUCLEAR FACILITIES; RADIOACTIVE WASTE PROCESSING; SLUDGES; SOLIDIFICATION; VITRIFICATION; SAVANNAH RIVER PLANT; RADIOACTIVE WASTE DISPOSAL

67
Chandler, J.R., D.R. Finch, and G.W. Becker; Savannah River Laboratory, Aiken, SC

ANALYSIS OF RADIONUCLIDES IN THE DEFENSE WASTE PROCESSING FACILITY.
Trans. Am. Nucl. Soc. 33:415-416; CONF-791103; American Nuclear Society Meeting, San Francisco, CA, November 12, 1979 (1979)

A flowsheet diagrams supernate filtration, and a graph shows the results of analysis of heat generated in stored waste.

The current reference process for

the Defense Waste Processing Facility (DWPF) at Savannah River Laboratory includes solidification of the highly radioactive components of the waste into a glass form and the generation of a salt cake from the water soluble components. This study characterizes the radioactive sources in the feed, process streams, glass waste, and salt cake of the facility, using the SHIELD system, a new computer system for calculating isotopic inventory, radiation sources, heat generation, shielding design, and dose assessment for the nuclear fuel cycle. One application of these results is the analysis of the time-dependent heat generation of the stored waste. The SHIELD system provides a method of quickly integrating design modifications into the model and updating the results.

ORIGIN: Government

KEYWORDS: COMPUTERIZED SIMULATION; FLOWSHEETS; HIGH-LEVEL RADIOACTIVE WASTES; INVENTORIES; RADIOACTIVE WASTE FACILITIES; RADIOACTIVE WASTE PROCESSING;; SOLIDIFICATION; SAVANNAH RIVER PLANT; GLASS; HEAT; SHIELDING; DESIGN

Work performed during the third quarter of FY 1980 at participating sites to immobilize high-level radioactive wastes is summarized. The on-going research program is broken-down into the 10 following work elements: 1) management and budget; 2) environmental and safety assessments; 3) other management support (i.e. cost-benefit assessments in support of conceptual and engineering studies); 4) in-situ storage or disposal; 5) waste retrieval; 6) separation and concentration; 7) waste form development and characterization; 8) process and equipment development; 9) canister development and characterization; and 10) onsite storage or disposal. Progress in each of these work element areas is summarized.

ORIGIN: Government

KEYWORDS: US DOE; RESEARCH PROGRAMS; REVIEWS; WASTE MANAGEMENT; HIGH-LEVEL RADIOACTIVE WASTES; COST; COST BENEFIT ANALYSIS; RISK ASSESSMENT; WASTE DISPOSAL; WASTE STORAGE; RETRIEVAL; SEPARATION PROCESSES; VOLUME REDUCTION; CANISTERS

68
Cornman, W.R.; Savannah River Laboratory, Aiken, SC

COMPOSITE QUARTERLY TECHNICAL REPORT LONG-TERM HIGH-LEVEL WASTE TECHNOLOGY APRIL - JUNE 1980. DP-80-157-2: 107 pp. (1980)

69
Topp, S.V.; Savannah River Laboratory, Aiken, SC

ALTERNATIVES FOR LONG-TERM MANAGEMENT OF DEFENSE RADIOACTIVE HIGH-LEVEL WASTE AT THE SAVANNAH

RIVER PLANT. DP-MS-77-22: 17 pp. (1977)

Different alternatives for the management of high-level defense wastes at the Savannah River Plant (SRP) are presented, and their probable relative costs, risks, and uncertainties are discussed. A preliminary listing of SRP alternatives, including a simple cost-risk analysis is given. The waste management alternatives are ranked in order of total cost effectiveness (the sum of the estimated managment costs and the estimated risk costs); however, a number of important considerations, such as compatibility between commercial and defense waste management, social issues, and public acceptance, are not included in the analysis. The 23 alternative plans for long-range management can be grouped into four main classes: 1) convert the waste to a highly leach-resistant form such as canned glass cylinders, and ship it to a Federal repository; 2) convert the waste to a highly leach-resistant form, and store the waste in an engineered surface facility at SRP; 3) reconstitute the waste to a slurry, and dispose of it in a bedrock cavern under the SRP site; and 4) continue storage in tanks with the waste as salt cake and sludge. Options 3 and 4 are the least expensive, but have the highest population dose risk; options 1 and 2, while more expensive by a factor of approximately 10, have lower population dose risks by factors ranging from 1.5 to 281.

ORIGIN: Government

KEYWORDS: US DOE; RESEARCH PROGRAMS; WASTE MANAGEMENT; THEORETICAL STUDIES; RISK ASSESSMENT; WASTE PROCESSING; WASTE STORAGE; COST BENEFIT ANALYSIS; GLASS; REPOSITORY; SLURRIES; TANKS; SLUDGES; COST; RADIATION DOSES; HIGH-LEVEL RADIOACTIVE WASTES; DEFENSE WASTES; SAVANNAH RIVER PLANT

70
Stone, J.A., S.T. Goforth, Jr., and P.K. Smith; Savannah River Laboratory, Aiken, SC

PRELIMINARY EVALUATION OF ALTERNATIVE FORMS FOR IMMOBILIZATION OF SAVANNAH RIVER PLANT HIGH-LEVEL WASTE. DP-1545: 98 pp. (1979)

An evaluation of available information on eleven alternative solid forms for immobilization of SRP high-level waste has been completed. Based on the assessment of both product and process characteristics, four forms were selected for more detailed evaluation: (1) borosilicate glass made in reference process, (2) a high-silica glass made from a porous glass matrix, (3) crystalline ceramics such as supercalcine or SYNROC, and (4) ceramics coated with an impervious barrier. The assessment includes a discussion of product and process characteristics for each of the eleven forms, a cross comparison of these

characteristics for the forms, and the bases for selecting the most promising forms for further study. (Auth)

ORIGIN: Government

KEYWORDS: LABORATORY STUDIES; RESEARCH PROGRAMS; US DOE; WASTE PROCESSING; CONTAINMENT; RADIOACTIVE WASTES; HIGH-LEVEL RADIOACTIVE WASTES; SAVANNAH RIVER PLANT; COMPARATIVE EVALUATIONS; BOROSILICATE GLASS; GLASS; CERAMICS; CALCINE; SYNROC; PHYSICAL PROPERTIES; SOLIDIFICATION; SOLID WASTES; WASTE PROCESSING; CHEMICAL PROPERTIES; METHODS

71
Savannah River Operations Office, Aiken, SC

LONG-TERM HIGH-LEVEL TECHNOLOGY PROGRAM - STRATEGY DOCUMENT. DOE/SR-WM-79-3, Rev.: 76 pp. (1980)

Tables and appendices give information on quantities and projections of High level wastes, comparisons of immobilization forms, and program milestones, funding sources, and budget breakdowns.

The Department of Energy's plans are described for long-term immobilization of the high-level radioactive wastes resulting from chemcial processing of nuclear reactor fuels and targets. Immobilization consists of containerizing the wastes and placing them in a repository to provide engineered barriers to the release of radionuclides. Many separate paths are being studied to determine the optimum immobilization forms and associated production methods and to predict radionuclide release rates in fabrication, shipment, and storage. While a unified program is being developed, it is likely that different immobilization methods will be used depending on waste and disposal site characteristics.

ORIGIN: Government

KEYWORDS: REVIEWS; WASTE MANAGEMENT; HIGH-LEVEL RADIOACTIVE WASTES; REPROCESSING; CONTAINMENT; RESEARCH PROGRAMS; UNDERGROUND STORAGE; PROJECTIONS; BUDGETS; VOLUME

72
Van Den Bossche, A., H.J. Endriss, H.J. Wingender, and H. Witte; UHDE, Federal Republic of Germany; NUKEM, Federal Republic of Germany

CONCEPTUAL DESIGN STUDIES FOR INTERMEDIATE STORAGE OF HIGH-LEVEL RADIOACTIVE WASTE. CONF-750411; Nuclear Energy Maturity, Vol. 8, Reprocessing, Transport, and Waste Disposal, Proceedings of a Symposium, Paris, April 21-25, 1975. Pergamon Press, Oxford, (pp. 311-313), 379 pp. (1976)

Conceptual design studies are being made for storage of the solidified high-level waste output

of a reference 1500 MT/yr light-water fuel reprocessing plant. The fuels in this plant are reprocessed after a burnup of 30,000MWd/MT and 150 days cooling time. The high-level waste storage facility should be located on the site of the reprocessing plant and should be designed to store the 25-yr lifetime output of the plant during this lifetime and an additional storage time of 50 yr thereafter. For calculation of the fission product inventory and decay heat, the input data were calculated using the ORIGEN computer code. These input data were used to calculate the time-dependent activity and heat generation of the high-level liquid waste during collection in a tank. Diagrams of the plant are included.

ORIGIN: Foreign

KEYWORDS: GERMAN FEDERAL REPUBLIC; DESIGN; WASTE STORAGE; THEORETICAL STUDIES; WASTE PROCESSING; REPROCESSING; HIGH-LEVEL RADIOACTIVE WASTES; SOLID WASTES; CALCULATIONS; COMPUTER CODES; TIME DEPENDENCE; AFTER HEAT; FISSION PRODUCTS; INVENTORIES; WASTE TRANSPORTATION

73
Clelland, D.W.; United Kingdom Atomic Energy Authority, Production Group, Risley, Warrington, England

CONCENTRATION AND STORAGE OF HIGHLY-ACTIVE WASTES FROM THE FIRST STAGES OF THE UNITED KINGDOM CIVIL NUCLEAR POWER PROGRAMME. Treatment and Storage of High-Level Radioactive Wastes, Proceedings of a Symposium, Vienna, October 8-12, 1962. International Atomic Energy Agency, Vienna, (pp. 63-91) (1963)

The general problems of highly-active waste disposal are discussed and in particular the United Kingdom system of concentrating and storing highly-active waste as acidic liquid concentrate is described. A speculative estimate is made of the amount of highly-active waste which will arise from reprocessing during the first two decades of the United Kingdom Civil Nuclear Power Programme and engineering design and technical problems associated with the safe and economic confinement of this material are examined. (Auth)

ORIGIN: Foreign

KEYWORDS: REVIEWS; HIGH-LEVEL RADIOACTIVE WASTES; UNITED KINGDOM; REPROCESSING; SAFETY; ECONOMICS; LIQUID WASTES; WASTE STORAGE; FORECASTING; WASTE PROCESSING

74
Godbee, H.W., and E.L. Compere

RADIOACTIVE WASTE MANAGEMENT AT THE HANFORD RESERVATION. Nuclear Safety 20(4):434-445 (1979)

A summary of the National Academy

of Sciences Report - Radioactive Wastes at the Hanford Reservation: A Technical Review - is presented. During the 30 years of plutonium production, the Hanford Reservation has accumulated large quantities of low and high level radioactive wastes. The high-level wastes have been stored in underground tanks, and the low-level wastes have been percolated into the soil. In recent years, some programs for solidification and separation of the high-level wastes have been initiated. The Hanford waste-management system was studied by a panel of the Committee on Radioactive Waste Management of the National Academy of Sciences. The panel concluded that Hanford waste-management practices were adequate at present and for the immediate future, but recommended increased research and development programs related to the long-term isolation of the wastes.

ORIGIN: Government

KEYWORDS: REVIEWS; RESEARCH PROGRAMS; US DOE; RADIOACTIVE WASTES; WASTE STORAGE; HIGH-LEVEL RADIOACTIVE WASTES; LOW-LEVEL RADIOACTIVE WASTES; WASTE DISPOSAL; WASTE MANAGEMENT; TANKS; SOILS; RECOMMENDATIONS; HANFORD RESERVATION

75
National Research Council, Washington, DC

RADIOACTIVE WASTES AT THE HANFORD RESERVATION - A TECHNICAL REVIEW. National Academy of Sciences, Washington, DC, 269 pp. (1978)

A review of the scientific and technological aspects of the management of radioactive wastes at the Hanford Reservation, WA, is presented. It is the result of a year-long study by an ad hoc panel of the Committee on Radioactive Waste Management (CRWM) of the National Academy of Sciences. Radiation hazards from Hanford Wastes are detailed, and the high- and low-level wastes are characterized. Monitoring practices are discussed along with the possible effects of accidents, sabotage, or climatic or geologic changes and the alternatives for the long term disposal of the wastes. The panel's major conclusions concerning the current waste management practices and their major recommendations for the future are itemized. Additional suggestions for research which the panel considers to be desirable are also included.

ORIGIN: Government

KEYWORDS: REVIEWS; RADIOACTIVE WASTES; HIGH-LEVEL RADIOACTIVE WASTES; LOW-LEVEL RADIOACTIVE WASTES; WASTE MANAGEMENT; WASHINGTON; MONITORING; RISK ASSESSMENT; WASTE DISPOSAL; RECOMMENDATIONS; HANFORD RESERVATION; UNDERGROUND STORAGE

76
Rice, E.E., and C.C. Priest; Battelle Columbus Laboratories, Columbus, OH

NUCLEAR WASTE PAYLOAD CHARACTERIZATION. NASA CR 161419; Analysis of Nuclear Waste Disposal in Space - Phase III, (pp. 3-1-3-55), 345 pp. (1980)

Tables and graphs show information on commercial and defense waste radionuclide inventories, projections of spent fuel discharges and reprocessing, and data on HLW for space disposal.

Work accomplished under the commercial and defense waste payload characterization activity is discussed. The waste form evaluation and selection processes are documented along with the physical characteristics of the chosen reference waste form (iron/nickel-based cermet matrix). The radionuclide inventories for the reference commercial waste and defense waste are defined in detail. A draft Containment Requirements Document was prepared during the study and is presented, along with the results of a parametric shielding and cooling analysis. Waste processing and payload fabrication for the reference space disposal concept are also discussed.

ORIGIN: Commercial; Government

KEYWORDS: NASA; RESEARCH PROGRAMS; HIGH-LEVEL RADIOACTIVE WASTES; EVALUATION; EXTRATERRESTRIAL DISPOSAL; WASTE DISPOSAL; THEORETICAL STUDIES; WASTE PROCESSING; DEFENSE WASTES; COMMERCIAL WASTES; SPENT FUELS

77
Sutherland, S.H., and D.E. Bennett; Sandia Laboratories, Albuquerque, NM

DEFENSE HIGH-LEVEL AND SPENT FUEL CHARACTERIZATION FOR GEOLOGIC WASTE REPOSITORIES. SAND79-0172: 32 pp. (1979)

Results of SANDIA-ORIGEN calculations are given for the total thermal output and radionuclide content, up to 100,000 years decay time, for defense high-level waste expected from the Savannah River Plant, the Hanford Reservation and the Idaho National Engineering Laboratory, and for one pressurized water reactor and five boiling water reactor spent fuel types. These results are expected to be of value in evaluating the potential for storing defense high-level waste and/or spent fuel in geologic waste repositories. (Auth)

ORIGIN: Government

KEYWORDS: THEORETICAL STUDIES; COMPUTER CODES; RADIONUCLIDES; TEMPERATURE EFFECTS; TIME DEPENDENCE; HIGH-LEVEL RADIOACTIVE WASTES; REPOSITORY; EVALUATION; US DOE; SAVANNAH RIVER PLANT; HANFORD RESERVATION; IDAHO NATIONAL ENGINEERING LABORATORY; PWR TYPE REACTORS; BWR TYPE REACTORS; SPENT FUELS; UNDERGROUND STORAGE

78
Chandler, J.R., D.R. Finch, and G.W. Becker, Jr.; Savannah River Laboratory, Aiken, SC

CALCULATION OF RADIONUCLIDES IN THE DEFENSE WASTE PROCESSING FACILITY. DP-MS-79-55: 15 pp. (1979)

Du Pont is developing a conceptual design for a facility to solidify high-level liquid waste generated by chemical processing of spent fuel at the Savannah River Plant. The radionuclide content and radiation souce spectra for the design basis solidified waste product and facility process streams have been determined using a detailed computer simulation of the facility. The computer simulation was performed using the SHIELD system, a new computational system for calculation of isotopic inventory, radiation emission, heat generation, shielding design, and dose assessment for the nuclear fuel cycle. The use of SHIELD has reduced the analysis of radionuclide concentrations within the Savannah River Plant fuel cycle to a single set of computer calculations.

ORIGIN: Government

KEYWORDS: THEORETICAL STUDIES; RESEARCH PROGRAMS; US DOE; RADIOACTIVE WASTES; WASTE PROCESSING; HIGH-LEVEL RADIOACTIVE WASTES; LIQUID WASTES; SOLIDIFICATION; COMPUTER PROGRAMS; WASTE PROCESSING PLANTS; DESIGN; SAVANNAH RIVER PLANT

79
Altomare, P.M., R. Bernardi, D. Gabriel, D. Nainan, W. Parker, and R. Pfundstein; Mitre Corporation, McLean, VA

ALTERNATIVE DISPOSAL CONCEPTS FOR HIGH-LEVEL AND TRANSURANIC RADIOACTIVE WASTE DISPOSAL. MTR-7718: 281 pp. (1979)

Various alternatives have been proposed for the disposal of high-level and transuranic radioactive waste generated from the nuclear electric power industry and the U.S. Defense program. The most advanced disposal option, and the one under active development, is the U.S. owned and operated deep-mined geologic repository. This report reviews the primary alternative concepts to the geologic repository, their present state-of-development and, to the extent possible, their environmental implications. The concepts included are: transmutation, extraterrestrial disposal, seabed disposal, ice sheet disposal, and other continental geologic disposal (matrix of drilled holes, etc.). Projections of radioactive waste quantities and the technologies for partitioning and fractionation of the waste are also discussed. This study reviewed information which was available through approximately January of 1978. (Auth)

ORIGIN: Government; Commercial

KEYWORDS: REVIEWS; WASTE DISPOSAL;

HIGH-LEVEL RADIOACTIVE WASTES; TRANSURANIUM ELEMENTS; REPOSITORY; GEOLOGY; TRANSMUTATION; WASTE PROCESSING; MARINE DISPOSAL; EXTRATERRESTRIAL DISPOSAL; GLACIERS; US EPA; PARTITION; FRACTIONATION; VOLUME; PROJECTIONS

80
Johnson, S.J., and W.I. Winters; Rockwell Hanford Operations, Chemical Sciences Group, Research and Engineering Division, Richland, WA

ACTINIDE ANALYTICAL PROGRAM FOR CHARACTERIZATION OF HANFORD WASTE. ARH-SA-296; CONF-771031; Twenty-first Conference on Analytical Chemistry in Energy Technology, Proceedings, Gatlinburg, TN, October 4-6, 1977. 10 pp. (1977)

The objective of this program has been to develop faster, more accurate methods for the concentration and determination of actinides at their maximum permissable concentration (MPC) levels in a controlled zone. These analyses are meeded to characterize various forms of Hanford high-level radwaste and to support characterization of product and effluents from new waste management processes. The most acceptable methods developed for the determination of Pu 239, Pu 238, Np 237, Am 241, and Cm 244 employ solvent extraction with the addition of tracer isotopes. Plutonium and neptunium are extracted from acidified waste solutions into Aliquat-336. Americium and curium are then extracted from the waste solution at the same acidity into dihexyl-N,N-diethylcarbamylmethyle ephosphonate (DHDECMP). After back-extraction into an aqueous matrix, these actinides are electrodeposited on steel disks for alpha energy analysis. Total uranium and total thorium are also isolated by solvent extraction and determined spectrophotometrically. (Auth)

ORIGIN: Government

KEYWORDS: METHODS; ACTINIDES; MAXIMUM PERMISSIBLE CONCENTRATION; CHEMICAL ANALYSIS; HIGH-LEVEL RADIOACTIVE WASTES; WASTE PROCESSING; WASTE MANAGEMENT; PLUTONIUM-239; PLUTONIUM-238; NEPTUNIUM-237; AMERICIUM-241; SOLVENT EXTRACTION; TRACERS; CURIUM; ELECTRODEPOSITION; RADIOCHEMISTRY; URANIUM; THORIUM; SPECTROMETRY; LABORATORY STUDIES; RADIOACTIVITY; HANFORD RESERVATION

81
Acres Consulting Services, Toronto, Ontario, Canada; RE/Spec, Inc., Rapid City, SD; Dilworth, Secord, Meagher and Associates Ltd., Pinawa, Manitoba; Whiteshell Nuclear Research Establishment; Wardrop (W.L.) and Associates, Ltd., Winnipeg, Manitoba, Canada

DISPOSAL CENTRE FOR IMMOBILIZED NUCLEAR WASTE. CONCEPTUAL DESIGN STUDY. AECL-6416: 127 pp. (1980)

This report describes a conceptual design of a disposal centre for immobilized nuclear waste. The surface facilities consist of plants for the preparation of steel cylinders containing nuclear waste immoblized in glass, shaft headframe buildings and all necessary support facilities. The underground disposal vault is located on one level at a depth of 1000 M. The waste cylinders are implaced into boreholes in the tunnel floors. All surface and subsurface facilities are described, operations and schedules are summarized, and cost estimates and manpower requirements are given.

ORIGIN: Foreign

KEYWORDS: COST; DESIGN; GLASS; HIGH-LEVEL RADIOACTIVE WASTES; PLANNING; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE FACILITIES; RADIOACTIVE WASTE PROCESSING; REPROCESSING; UNDERGROUND DISPOSAL; COST ESTIMATES; FUEL CYCLE CENTERS

82
Lewis, A.

MANAGEMENT OF COMMERCIALLY GENERATED RADIOACTIVE WASTES. Engineering & Mining Journal 182(2):104-109 (1981)

The U.S. Department of Energy's three volume Environmental Impact Statement entitled "Management of Commercially Generated Radioactive Waste" is reviewed. The DOE report reviews the state-of-the-art technologies and environmental impacts associated with waste disposal in mined geologic repositories. Cost estimates (in 1978 dollars) of repository construction and possible adverse public reactions to repositories are also discussed.

ORIGIN: Commercial

KEYWORDS: US DOE; REPOSITORY; RESEARCH PROGRAMS; REVIEWS; RADIOACTIVE WASTES; WASTE DISPOSAL; SOCIAL ASPECTS; COST; COMMERCIAL WASTES; PUBLIC RELATIONS; ENVIRONMENTAL IMPACT STATEMENTS

83
TRW, Energy Systems Planning Division, McLean, VA; Office of Nuclear Waste Isolation, Columbus, OH

ECONOMICS OF NATIONAL WASTE TERMINAL STORAGE. COST MODELING AND ANALYSIS. Y/OWI/SUB-78-42512/1; TRW

ISOLATION

97158-E002-RU-00: 161 pp. (1978)

Assumptions and cost center breakdown of total system costs for baseline cases are shown in tables. See also ONWI-12, 1979.

An economic analysis of the costs of geologic isolation of nuclear wastes conducted for the NWTS Program is described. Spent fuel disposal strategies in connection with a 380 GWe nuclear power capacity in the year 2000 scenario are emphasized, and encapsulated spent fuel is the only waste form considered. A reprocessing scenario examines and tracks costs, beginning with the outbound transportation segment from a reprocessing plant through geologic disposal, for all four waste categories--HLW, LLW, TRU, and cladding/hulls, and is based on a higher capacity of 480 GWe of installed nuclear power in the year 2000. THe principal results of this study are expressed in total system cost (undiscounted). A two-part computer model was developed by TRW to simulate the flow of materials and to aggregate costs related to these flows. Two baseline cases (spent fuel and reprocessing wastes) and 38 parametric variations of the spent fuel baseline are evaluated. In the spent fuel case, the Government received 96,000 MTU of which approximately 14,000 MTU required AFR storage. Repository capacity is reached in 2005; decommissioning activities extended cost collection to 2010. The total system cost is $7.86B. Principal components of this cost are transportation 36%, and geologic repository, 35%. In the reprocessing baseline case, the Government receives four types of reprocessing plant wastes equivalent to the output of 100,000 MTU. The postulated nuclear generation growth scenario, to 480 GWe in the year 2000, results in capacity being reached in 2008; decommissioning extends cost collection to 2013. The total system cost is $9.01B. The principal components are transportation, 60%, and geologic repository, 33%. The Maximum AFR capacity required was the underlying parameter that most affected total system costs for flow alternatives, which ranged from $5.15B to 10.96B. Transportation alternatives ranged from $7.21B to $8.34B; and transportation, from $2.17B to $4.40B. A long-range plan identifies additional measures which should be considered to develop a methodology for optimization on a national waste management system.

ORIGIN: Commercial

KEYWORDS: NWTS; COST; COST ESTIMATES; SPENT FUELS; REPROCESSING; DECOMMISSIONING; RADIOACTIVE WASTE DISPOSAL; UNDERGROUND STORAGE; WASTE TRANSPORTATION; HIGH-LEVEL RADIOACTIVE WASTES; LOW-LEVEL RADIOACTIVE WASTES; TRANSURANIUM ELEMENTS; CLADDING; MATHEMATICAL MODELS

84
TRW Energy Systems Group, McLean,

VA; Office of Nuclear Waste Isolation, Columbus, OH

ECONOMICS OF NATIONAL WASTE TERMINAL STORAGE. ONWI-12; TRW 97166-E001-RU-00: 40 pp. (1979)

This topical report integrates two separate studies performed in FY 1978: spent fuel pricing studies which have previously been reported in Y/OW/SUB-78/42512/2, and cost analysis studies reported in Y/OWI/SUB-78/42512/1. (Auth)

Two previously published independent works on pricing and costs in providing for the storage and disposal of spent fuel and reprocessing wastes were integrated to produce this report. New data on pricing estimates using the methodologies developed for the pricing studies to convert the cost analysis studies are presented. Included is a compilation of 44 economic study cases under varying assumptions with estimated one-time charges. The spent fuel study was based on the use of salt formations as the disposal media for spent fuel from commercial light water reactors. Five- and ten-year hold-up periods at the reactor were considered. The quantity of spent fuel resulting from the operation of 380 GWe by the year 2000 was used for the majority of the parametric cases with an additional projection for fuel resulting from a maximum of 148 GWe. Accomodation was made for spent fuel from foreign sources at about 3% of the U.S. receipts. Away from reactor storage was considered with repository scheduling assumed for 1985, 1988 and 1993. Retrievability was for 5, 13, and an indefinite number of years. Government ownership of all facilities except for transportation was assumed. In two cases, private ownership and operation of the AFR's was considered. Tradeoff effects showed little variation in prices even with radical changes in system characteristics. Major effects on the price came from parameter variations not having compensating economic effects, such as with indefinite retrievability with no credit for Pu or U recovery. Although government may eventually recover costs, it may have to provide a major portion for some years. Minimum costs per MTU occurred with short term retrievability, 10 yr AFR storage, and early availability of a repository. High cost/MTU occurred with short cooling delays, long term retrievability and late repository availability. The major cost in the case of disposal of reprocessing wastes was transportation; especially so with intermediate-level wastes because of large volumes and treatment similar to that required for high-level wastes. The Government's one-time charge excluding transportation, was $63.5/KgU for all four waste materials (high, intermediate-, and low-level wastes, and cladding wastes). A reprocessor at Barnwell, SC would pay $54.4/KgU for transportation to the Southwest U.S.

ORIGIN: Commercial

KEYWORDS: REVIEWS; ECONOMICS;

ISOLATION

COST; HIGH-LEVEL RADIOACTIVE WASTES; LOW-LEVEL RADIOACTIVE WASTES; WASTE MANAGEMENT; REPOSITORY; REPROCESSING; LWR TYPE REACTORS; SPENT FUELS; SALT DEPOSITS; INTERIM STORAGE; WASTE TRANSPORTATION; WASTE DISPOSAL; CLADDING; PLUTONIUM; URANIUM; ENCAPSULATION; DECOMMISSIONING; RETRIEVAL; INTERMEDIATE-LEVEL RADIOACTIVE WASTES; UNDERGROUND STORAGE; COST ESTIMATES; NWTS

85
Brown, R.W.; Office of Nuclear Waste Isolation, Columbus, OH

STANDARDIZED REPOSITORY AND ENCAPSULATION FACILITY COST ESTIMATES FOR COMPARATIVE EVALUATION AND PRICING STUDY. ONWI-110: 145 pp. (1980)

Information is presented in tables, graphs, and figures.

Assumptions, procedures, and calculations for cost estimates are presented for standardized and non-scenario repositories and co-located packaging facilities for the storage of spent fuel in domed salt, bedded salt, basalt and granite. Procedures regarding maxima/minima costs, selection of cost elements which are unaffected by different host media, and fixed and variable costs are discussed. The Cost Estimate Reconcilation Study and the technical documents supporting the GEIS provided source data to adjust basic cost information. Measured in January 1978 dollars, the undiscounted total cost estimate ranges from $1.8 billion to $3.3 billion depending upon the repository's geologic medium and life cycle from start of construction to completion of decommissioning. These data, combined with non-ONWI data, allowed others to conduct discounting and rate calculations. The ONWI estimates formed the baseline data for repository and encapsulation facility estimates contained in Confidence Rulemaking testimony.

ORIGIN: Commercial

KEYWORDS: US DOE; RESEARCH PROGRAMS; REPOSITORY; THEORETICAL STUDIES; CALCULATIONS; SPENT FUELS; SALT DOMES; SALT DEPOSITS; SEDIMENTARY ROCKS; BASALTS; GRANITES; IGNEOUS ROCKS; WASTE DISPOSAL; ONWI; COST ESTIMATES

86
Office of Nuclear Waste Isolation, Columbus, OH

NWTS WASTE PACKAGE PROGRAM PLAN, VOLUME 1. ONWI-96: 175 pp. (1980)

Figures and tables summarize many aspects of this report, including budget projections for the program.

This report describes the overall program strategy and schedule for work planned to develop the technology required to design, test, and produce waste packages for containing nuclear wastes, preserving the capability for safe retrieval and acting as a barrier

to radionuclide mobilization and release into the geologic system. The NWTS waste package includes direct and related work tasks on packaging spent fuel, commercial and defense high-level wastes, and transuranic waste.

ORIGIN: Commercial; Government

KEYWORDS: REVIEWS; PACKAGING; CONTAINERS; WASTE MANAGEMENT; TRANSURANIUM ELEMENTS; SPENT FUELS; HIGH-LEVEL RADIOACTIVE WASTES; UNDERGROUND STORAGE; RESEARCH PROGRAMS; NWTS; BUDGETS; COST; DEFENSE WASTES; COMMERCIAL WASTES

87
Hostetler, D.D., R.J. Serne, and A. Brandstetter; Pacific Northwest Laboratory, Richland, WA

STATUS OF SORPTION INFORMATION RETRIEVAL SYSTEM. PNL-3139: 54 pp. (1979)

A Sorption Information Retrieval System (SIRS) is being designed to provide an efficient, computerized, data base for information on radionuclide sorption in geologic media. The data bank will include Kd values for a large number of radionuclides occurring in radioactive wastes originating from the commercial nuclear power industry. Kd values determined to date span several groundwater compositions and a wide variety of rock types and minerals. The data system will not only include Kd values, but also background information on the experiments themselves. This will allow the potential user to retrieve not only the Kd values of interest but also sufficient information to evaluate the accuracy and usefulness of the data. During FY-1979, the logic structure of the system was designed, the soft-ware programmed, the data categories selected, and the data format specified. About 40% of the approximately 5000 Kd experiments performed by the Waste Isolation Safety Assessment Program (WISAP) and its subcontractors during FY-1977 and FY-1978 have been evaluated, coded and keypunched. Additional software improvements and system testing are needed before the system will be fully operational. A workshop requested by the Nuclear Energy Agency of the Organization for Economic Cooperation and Development was held to discuss potential international participation in the data system. (Auth)

ORIGIN: Commercial

KEYWORDS: REVIEWS; RESEARCH PROGRAMS; US DOE; INFORMATION; SORPTION; RADIONUCLIDES; DISTRIBUTION COEFFICIENT; ROCKS; MINERALS; GROUND WATER

88
Robinson, J.V.; Pacific Northwest Laboratory, Richland, WA

WASTE MANAGEMENT SYSTEM STUDIES.

ISOLATION

PNL-3000-7; Nuclear Waste Management Quarterly Progress Report July Through September 1980, (pp. 12.1-12.5), 120 pp. (1980)

During the fourth quarter of FY 1980, two reports based on work done at PNL for the International Nuclear Fuel Cycle Evaluation Working Group 7 were completed. One report on waste arisings has been published, and the other, which summarizes four release consequence analyses for geologic repositories, has been cleared for publication. A draft report describing an alternative disposal concept for radioactive waste referred to as near-surface geologic disposal was also completed. The report analyzes the viability of the concept in terms of mining technology, processing technology, economics, and long-term health and safety. In addition, three reports on an effort to provide standardized sections and methodologies for use in future Hanford EISs were submitted to the DOE Richland Operations Office, the second in the series "Commercial Nuclear Reactors and Waste: The Current Status" was published, a draft interim study by the Analytical Sciences Corporation on defining and characterizing waste management containment systems was submitted, and a draft report describing PNL's scoping analysis of the scenarios, questions, and issues that should be addressed by and integrated systems studies program was completed and sent to DOE.

ORIGIN: Commercial; Government

KEYWORDS: US DOE; RESEARCH PROGRAMS; REVIEWS; THEORETICAL STUDIES; REPOSITORY; RISK ASSESSMENT; WASTE MANAGEMENT; RADIOACTIVE WASTES; WASTE DISPOSAL; ECONOMICS

89
Rockwell International, Rockwell Hanford Operations, Richland, WA

TECHNICAL PROGRAM PLAN, BASALT WASTE ISOLATION PROJECT. RHO-CD-132 (Rev. 5): 114 pp. (1979)

Available from NTIS, PC A07/MF A01.

The Basalt Waste Isolation Project (BWIP) Program as administered by the DOE's Richland Operations Office and Rockwell Hanford Operations is described. Objectives, scope, and scientific technologies are discussed. Work breakdown structure of the project includes: project management and support, systems integration, geosciences, hydrology, engineered barriers, test facility design and construction, engineering testing, repository studies, and schedules. The budget of the program including operating and capital cost control is also included.

ORIGIN: Commercial; Government

KEYWORDS: BASALTS; BUDGETS; CAPITAL; DATA COMPILATION; DESIGN; ENGINEERING; ENVIRONMENTAL IMPACTS; GEOLOGY; HANFORD RESERVATION; HYDROLOGY; MAPS; OPERATING COST; ORGANIZATIONAL

MODELS; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE FACILITIES; RADIOACTIVE WASTE MANAGEMENT; RESEARCH PROGRAMS; TABLES; UNDERGROUND STORAGE; NUCLEAR FACILITIES; BWIP; NWTS

90
Rockwell International, Rockwell Hanford Operations, Richland, WA

BASALT WASTE ISOLATION PROJECT - FISCAL YEAR 1979. RHO-BWI-79-100: 254 pp. (1979)

The Basalt Waste Isolation Project annual report for FY 1979 is presented. The report summarizes key investigations in the following seven areas: 1) systems integration; 2) geosciences; 3) hydrologic studies; 4) engineered barriers; 5) near surface test facility construction; 6) engineering testing; and 7) repository engineering. Documents issued during the fiscal years of 1978 and 1979 are listed and the organization of the Basalt Waste Isolation Project is given.

ORIGIN: Government

KEYWORDS: RESEARCH PROGRAMS; US DOE; REVIEWS; GEOLOGY; BWIP; HYDROLOGY; WASTE DISPOSAL; WASTE MANAGEMENT; RADIOACTIVE WASTES; REPOSITORY

91
Hunter, T.O.; Sandia Laboratories, Albuquerque, NM

TECHNICAL ISSUES OF NUCLEAR WASTE ISOLATION IN THE WASTE ISOLATION PILOT PLANT (WIPP). SAND79-1117C: 10 pp. (1979)

The development of the Waste Isolation Pilot Plant is supported by a research and development program which addresses various technical issues for geologic isolation of nuclear waste in bedded salt. These issues include waste interaction with the host material, structural response of the rock, repository sealing, and methods for repository design and operation. This paper discusses the status of various laboratory and field investigations in this program, and presents a summary of recent results for selected issues. In addition, an overview of all activities and the relations of each to plans for implementation of WIPP is presented. These plans include full-scale experimentation with various waste forms in 1986. (Auth)

ORIGIN: Commercial; Government

KEYWORDS: WIPP; US DOE; RESEARCH PROGRAMS; REVIEWS; REPOSITORY; RADIOACTIVE WASTES; WASTE DISPOSAL; SALT DEPOSITS; LABORATORY STUDIES; FIELD STUDIES; DESIGN

ISOLATION

92
Sandia Laboratories, Albuquerque, NM; U.S. Geological Survey

BASIC DATA REPORT FOR DRILLHOLE WIPP 25 (WASTE ISOLATION PILOT PLANT - WIPP). SAND79-0279: 26 pp. (1979)

WIPP 25 was drilled on the eastern edge of Nash Draw (SW 1/4, Sec. 15, T22S, R30E) in Eddy County, New Mexico, to determine subsurface stratigraphy and examine dissolution features above undisturbed salt in the Salado Formation. Determination of dissolution rates will refine previous estimates and provide short-term (geologically) rates for WIPP risk assessments. The borehole encountered, from top to bottom, Pleistocene sediments (17' with fill material for pad), Dewey Lake Red Beds (215') Rustler Formation (333'), and 90' of the upper Salado Formation. A dissolution residue, 37' thick, is at the top of the Salado Formation overlying halite-rich beds. In addition to obtaining nearly continuous core from the surface to total depth (655'), geophysical logs were taken to measure acoustic velocities, density, radioactivity, and formation resistivity. An interpretive report on dissolution in Nash Draw will be based on combined borehole basin data, surface mapping, and laboratory analyses of Nash Draw rocks and fluids. The WIPP is to demonstrate (through limited operations) disposal technology for transuranic defense wastes and to then be converted to a repository. The WIPP will also provide research facilities for interactions between high-level waste and salt. (Auth)

ORIGIN: Government

KEYWORDS: RESEARCH PROGRAMS; US DOE; WIPP; NEW MEXICO; STRATIGRAPHY; GEOLOGY; SEDIMENTARY ROCKS; RISK ASSESSMENT; DISSOLUTION; SALT DEPOSITS; CORES; DISSOLUTION; REPOSITORY; HIGH-LEVEL RADIOACTIVE WASTES; GEOPHYSICAL SURVEYS; COST; DEFENSE WASTES

93
Sandia Laboratories, Seabed Program Division, Albuquerque, NM

SUBSEABED DISPOSAL PROGRAM PLAN VOLUME II: FY 80 BUDGET AND SUBTASK WORK PLANS. SAND80-0007/II: 65 pp. (1980)

This volume of the Subseabed Disposal Program Plan presents a breakdown of the master program structure by major activity. Each activity is described and accompanied by a specific cost plan schedule and a milestone plan. The costs have been compiled in the Cost Plan Schedules attached to each Subtask Work Plan. Milestone plans for FY 80, and the FY 1980 budget for the Subseabed Disposal Program summarized at the second level of the Work Breakdown Structure, are presented in tables. The milestones can be changed only with the concurrence of the Sandia Subseabed Program Manager.

ORIGIN: Government

KEYWORDS: US DOE; RESEARCH PROGRAMS; RADIOACTIVE WASTES; MARINE DISPOSAL; SEAS; COST; REVIEWS; OCEANOGRAPHY

94
Kibbe, R.K., and A.L. Boch; Science Applications, Inc., Oak Ridge, TN

TECHNICAL SUPPORT FOR GEIS: RADIOACTIVE WASTE ISOLATION IN GEOLOGIC FORMATIONS. COMMERCIAL WASTE FORMS, PACKAGING AND PROJECTIONS FOR PRECONCEPTUAL REPOSITORY DESIGN STUDIES, VOLUME 2. Y/OWI/TM-36/2 (1978)

Much of the information is shown in tabular form.

The second volume in this 23-volume series is presented. This volume contains the data base for waste forms, packages, and projections from the commercial waste as defined by the Office of Waste Isolation in "Nuclear Waste Projections and Source Term Data for FY 1977" (Y/OWI/TM-34). In addition, an alternative data base for repository design and analysis, waste forms, packages, and projections for commercial waste as defined by Battelle Pacific Northwest Laboratory is included. This data base consists of a reference case for use in the alternative design study and a definition of combustible wastes for use in mine fire and hydrogen generation analyses.

ORIGIN: Commercial

KEYWORDS: THEORETICAL DATA; WASTE DISPOSAL; UNDERGROUND DISPOSAL; DESIGN; GEOLOGIC FORMATIONS; FORECASTING; INVENTORIES; PACKAGING

95
Simon, R., (Editor), and S. Orlowski, (Editor)

RADIOACTIVE WASTE MANAGEMENT AND DISPOSAL. Proceedings of the First European Community Conference, Luxembourg, May 20-23, 1980. Harwood Academic Publishers, Brussels, Belgium: 693 pp. (1980)

The European Community's research and development program, "Management and Storage of Radioactive Waste", has the prime objective of finding effective means for ensuring the safety and protection of man and his environment against the potential hazards involved in the management of radioactive waste. The Commission organized this first international conference to present the results achieved during the past five years in all aspects of the program. This conference was limited to invited papers, presented by scientists involved in the European Community contract studies, and by members of the Commission's scientific staff. The topics covered by the conference are: 1) treatment and conditioning technology; 2) waste product evaluation; 3) engineering storage; and 4) geological

disposal in salt, granite, and clay formations.

ORIGIN: Foreign

KEYWORDS: HIGH-LEVEL RADIOACTIVE WASTES; WASTE MANAGEMENT; WASTE STORAGE; WASTE DISPOSAL; WASTE PROCESSING; SALT DEPOSITS; GRANITES; CLAYS; SEDIMENTS; SEDIMENTARY ROCKS; IGNEOUS ROCKS; LABORATORY STUDIES; THEORETICAL STUDIES; REVIEWS; FIELD STUDIES; EUROPE

96
Stearns-Roger Services, Inc., Denver, CO

TECHNICAL CONSERVATIONS IN NWTS REPOSITORY CONCEPTUAL DESIGNS - NATIONAL WASTE TERMINAL STORAGE NO. 1 - SPECIAL STUDY NO. 4. ONWI-222: 93 pp. (1980)

Information is illustrated in figures and tables.

Prior studies have developed conceptual designs for National Waste Terminal Storage Repositories 1 and 2. Due to the considerable detail and volume of the documents describing these designs, it is often difficult to identify and comprehend the substantial conservatisms contained within them. This study identifies and explains the major technicl conservatisms in these two conceptual designs in a concise and readily understandable format. The areas discussed include thermal loading of the geologic structure, rock mechanics and underground design, waste throughput capacity, hoisting systems, nuclear criticality safety, confinement of radioactive materials, occupational exposure and health physics, environmental effects, and cost estimates. Conservatisms are described in detail, qualified where possible, and compared to appropriate criteria. (Auth)

ORIGIN: Commercial

KEYWORDS: US DOE; RESEARCH PROGRAMS; ONWI; REPOSITORY; THEORETICAL STUDIES; DESIGN; GEOLOGY; ROCK MECHANICS; THERMAL PROPERTIES; GEOLOGIC STRUCTURES; RADIOACTIVE WASTES; WASTE DISPOSAL; SAFETY; COST; NWTS; COST ESTIMATES

97
U.S. Department of Energy, Columbus, OH

REPORT ON GEOLOGIC EXPLORATION ACTIVITIES. DOE-RL-C-14: 75 pp. (1980)

The geological exploration activities being carried out as part of the National Waste Terminal Storage (NWTS) Program, was established by US DOE to develop the technology and provide the facilities for the safe, environmentally acceptable isolation of civilian high-level and transuranic nuclear wastes, including spent fuel elements, for which the Federal government is

responsible. The principal programmatic emphasis is on disposal in mined geologic repositories. Explorations are being conducted or planned in various parts of the country to identify potential sites for such repositories. The work is being undertaken by three separate but coordinated NWTS project elements. Under the Basalt Waste Isolation Project (BWIP), basalt formations underlying DOE's Hanford Reservation are being investigated. Granite, tuff, and shale formations at the DOE Nevada Test Site (NTS) are being similarly studied in the Nevada Nuclear Waste Storage Investigations (NNWSI). The Office of Nuclear Waste Isolation (ONWI) is investigating domed salt formations in several Gulf Coast states and bedded salt formations in Utah and Texas. The ONWI siting studies are being expanded to include areas overlying crystalline rocks, shales, and other geohydrologic systems. The current status of these NWTS efforts, including the projected budgets for FY 1981, is summarized, and the criteria and methodology being employed in the explorations are described. The consistency of the overall effort with the recommendations presented in the Report to the President by the Interagency Review Group on Nuclear Waste Management (IRG), as well as with documents representing the national technical consensus, is discussed. (Auth)

ORIGIN: Government; Commercial

KEYWORDS: US DOE; RESEARCH PROGRAMS; REVIEWS; GEOLOGY; NWTS; HIGH-LEVEL RADIOACTIVE WASTES; SPENT FUELS; TRANSURANIUM ELEMENTS; REPOSITORY; BWIP; ROCKS; SITE SELECTION; IGNEOUS ROCKS; GRANITES; TUFFS; SEDIMENTARY ROCKS; BASALTS; SHALES; SALT DEPOSITS; SALT DOMES; WASHINGTON; NEVADA; UTAH; TEXAS; LOUISIANA; MISSISSIPPI; RECOMMENDATIONS; BUDGETS

98
Storch, S.N., and B.E. Prince; Union Carbide Corporation, Oak Ridge, TN

ASSUMPTIONS AND GROUND RULES USED IN NUCLEAR WASTE PROJECTIONS AND SOURCE TERM DATA. ONWI-24: 137 pp. (1979)

Assumptions and ground rules of long term domestic commercial nuclear waste projections published in studies by Union Carbide's Office of Waste Isolation, Arthur D. Little, Inc., and DOE are compared to those of the Commercial Waste Management Impact Statement, prepared by Battelle Pacific Northwest Laboratory. Target capacity growths associated with these projections range from 183 to 570 GW (e) for the year 2000. Each study regards the once-through (no recycle) fuel cycle as a reference case; however, fuel cycles employing reprocessing and various recycle strategies were also considered. The studies are compared with respect to characteristics and

packaging/shipment features of spent fuel and wastes generated from reprocessing and other fuel cycle activities. Issues associated with the interim storage of spent fuel are discussed along with the characteristics and issues relating to ore mill tailings and non-fuel cycle wastes. Finally, assumptions and limitations associated with certain computer codes (viz., ORIGEN, WASPR, AND DISFUL) employed in the four waste projection studies are outlined. Overall, the report is intended to serve as a guidebook in relating information contained in the published waste projection studies. (Auth)

ORIGIN: Commercial

KEYWORDS: US DOE; RESEARCH PROGRAMS; RADIOACTIVE WASTES; COMMERCIAL WASTES; VOLUME; COMPUTER CODES; COMPARATIVE EVALUATIONS; FORECASTING; FUEL CYCLE; INVENTORIES; MILL TAILINGS; SPENT FUELS; REPROCESSING; PROJECTIONS; INTERIM STORAGE

99
Heckman, R.A., F.D. Towse, D. Isherwood, T. Harvey, and T. Holdsworth; Lawrence Livermore Laboratory, Livermore, CA

HIGH LEVEL WASTE REPOSITORY SITE SUITABILITY STUDY - STATUS REPORT. NUREG/CR-0578: 290 pp. (1979)

A six-layer horizontal model was developed whose parameters and dimensions can be varied to simulate the natural environment of many potential repository sites. The geologic-hydrologic properties that influence groundwater flow rates and waste concentration, as well as variables that determine the configurations and lengths of flow paths were incorporated and analyzed. The mathematical models were developed to calculate the performance of hypothetical repository sites. The ORIGEN, WASTE, and BIODOSE programs were employed to calculate and evaluate the inventory of important nuclides, the amount of radioactive waste released, and the expected individual and population radiation doses, respectively. The analytical methods employed, the parameter data base used, and the preliminary results obtained are described.

ORIGIN: Commercial

KEYWORDS: RESEARCH PROGRAMS; US DOE; US NRC; MATHEMATICAL MODELS; REPOSITORY; THEORETICAL STUDIES; GEOLOGY; HYDROLOGY; WASTE MANAGEMENT; HIGH-LEVEL RADIOACTIVE WASTES; COMPUTER CODES; RADIATION DOSES; RISK ASSESSMENT; SITE SELECTION; RADIONUCLIDES; RADIONUCLIDE MIGRATION

100
Peel, J.W., and G.B. Levin; EG&G Idaho, Inc., Idaho Falls, ID

MANAGING LOW-LEVEL RADIOACTIVE WASTES: A PROPOSED APPROACH. CONF-801107; ANS International Conference, Washington, DC, November 17, 1980. American Nuclear Society, Washington, DC, (23 pp.) (1980)

In 1978, President Carter established the Interagency Review Group on nuclear waste management (IRG) to review the nation's plans and progress in managing radioactive waste. In its final report, issued in March 1979, the group recommended that the Department of Energy (DOE) assume responsibility for developing a national plan for the management of low-level wastes. Toward this end, DOE directed that a strategy be developed to guide federal and state officials in resolving issues critical to the safe management of low-level wastes. EG and G Idaho, Inc. was selected as the lead contractor for the low-level waste management program and was given responsibility for developing the strategy. A twenty-five member task force was formed which included individuals from federal agencies, states, industry, universities, and public interest groups. The Task Force identified nineteen broad issues covering the generation, treatment, packaging, transportation, and disposal of low-level wastes. Alternatives for the resolution of each issue were proposed and recommendations were made which, taken together, form the draft strategy. These recommendations are summarized in this document.

ORIGIN: Government; Commercial

KEYWORDS: CLASSIFICATION; FINANCIAL INCENTIVES; LIABILITIES; LOW-LEVEL RADIOACTIVE WASTES; PACKAGING; WASTE DISPOSAL; WASTE MANAGEMENT; WASTE PROCESSING; RECOMMENDATIONS; TRANSPORT; US DOE; VOLUME

101
Levin, G.B.; EG&G Idaho, Inc., Idaho Falls, ID

LOW-LEVEL WASTE MANAGEMENT. CONF-801107; American Nuclear Society International Conference, Washington, DC, November 17, 1980. American Nuclear Society, Washington, DC, (39 pp.) (1980)

An overview of the current situation in the United States and a look to the future of low-level waste management are presented. Current problems and challenges are discussed, such as: the need of additional disposal sites in the future; risks and costs involved in transport of low-level wastes; reduction of low-level waste volume through smelting, incineration, and storage for wastes containing nuclides with short half lives; development of a national policy for the management of low-level waste, and its implementation through a sensible system of regulations. Establishing a success with low-level waste management should

provide the momentum and public confidence needed to continue on and to resolve the technical and politically more difficult low-level waste problems.

ORIGIN: Commercial

KEYWORDS: COST; EVAPORATION; FORECASTING; GOVERNMENT POLICIES; INCINERATORS; LOW-LEVEL RADIOACTIVE WASTES; WASTE DISPOSAL; WASTE MANAGEMENT; WASTE PROCESSING; REGULATIONS; SITE SELECTION; SMELTING; TRANSPORT; UNDERGROUND DISPOSAL

102
MacBeth, P.J.; Ford, Bacon and Davis Utah Inc., Salt Lake City, UT

COMPARISON OF ALTERNATIVES FOR LOW-LEVEL RADIOACTIVE WASTE DISPOSAL. PB-296947; Low-Level Radioactive Waste Management, J.E. Watson (Ed.). (pp. 203-212); EPA-520/3-70-002; CONF-790209; Twelfth Health Physics Society Midyear Topical Symposium, Williamsburg, VA, February 12, 1979 (1979)

Available from NTIS, PC A99/MF A01

A comparative analysis of alternatives for disposal of low-level radioactive wastes has been performed for the US NRC. A systematic evaluation of all possible disposal mechanisms identifying options most viable for further analysis is presented. Generic reference disposal facility concepts for each viable alternative are evaluated to provide a consistent, meaningful comparison based on technological, economic, and sociopolitical factors. The results of the comparative analysis are presented in a convenient matrix format to facilitate intercomparisons and to promote understanding of the complexities of the tradeoffs involved in selecting waste disposal options. The concepts judged to be the most viable alternatives to the current practice in this country of disposal of low-level wastes by shallow land burial include improvements to shallow land burial, ocean disposal, intermediate depth burial (10-15 m deep), disposal in natural or mined cavities, and disposal in exposed or covered structures. Representative waste disposal facility of the evaluation, using reference waste volumes and facility lifetimes.

ORIGIN: Commercial

KEYWORDS: COMPARATIVE EVALUATIONS; COST; ENVIRONMENTAL IMPACTS; FEASIBILITY STUDIES; GROUND DISPOSAL; LOW-LEVEL RADIOACTIVE WASTES; MARINE DISPOSAL; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE FACILITIES; SAFETY; TABLES; THEORETICAL DATA; UNDERGROUND DISPOSAL

103
Gilbert/Commonwealth, Reading, PA

PROGRAMMATIC ASSESSMENT OF

RADIOACTIVE WASTE MANAGEMENT: NUCLEAR FUEL AND WASTE PROGRAMS. ORNL/SUB-80/13837/3: 118 pp. (1980)

Tables and figures included. Available from NTIS, PC A07/MF A01

Gilbert/Commonwealth (G/C) has performed an assessment of the waste management operations at Oak Ridge National Laboratory (ORNL). The objective of this study was to review radioactive waste management as practiced at ORNL and to recommend improvements or alternatives for further study. The study involved: (1) an on-site survey of ORNL radioactive waste management operations; (2) a review of radioactive waste source data, records, and regulatory requirements; (3) an assessment of existing and planned treatment, storage, and control facilities; and (4) identification of alternatives for improving waste management operations. Information for this study was obtained from both personal interviews and written reports. The ORNL waste management operations have maintained radioactive releases to the environment well below regulatory requirements and have been successful, in recent years, in consistently reducing emissions. This has been accomplished primarily by upgrading equipment and procedures. However, this upgrading must be an on-going activity because of: (1) the changing nature of ORNL activities; (2) an increase in radioactive burden on-site; (3) the age of existing facilities and equipment; and (4) changes in regulatory requirements. As a result of reviewing ORNL operations, specific suggestions are offered for resolving isolated problems. However, these suggestions should be considered in the context of a comprehensive plan for the management of radioactive wastes at ORNL. Three areas were determined to warrant more detailed, consolidated studies: waste management program planning, development of a centralized computer based data acquisition system, and a review for maintaining exposures to on-site personnel as low as reasonably achievable (ALARA).

ORIGIN: Government

KEYWORDS: DATA ACQUISITION; DATA COMPILATION; DIAGRAMS; EVALUATION; GASEOUS WASTES; LIQUID WASTES; OPTIMIZATION; ORNL; PERSONNEL; RADIATION DOSES; RADIATION MONITORING; RADIOACTIVE WASTE FACILITIES; RADIOACTIVE WASTE MANAGEMENT; REGULATIONS; SOLID WASTES; TABLES; TRITIUM; VOLUME; NUCLEAR FACILITIES

104
Gilbert/Commonwealth, Reading, PA; Gilbert/Commonwealth, Jackson, MI

STATE OF THE ART REVIEW OF RADIOACTIVE WASTE VOLUME REDUCTION TECHNIQUES FOR COMMERCIAL NUCLEAR POWER PLANTS. ORNL/SUB-79/13837/2 (1980)

Available from NTIS, PC A12/MF A01

A review is made of the state of

the art of volume reduction techniques for low-level liquid and solid radioactive wastes produced as a result of: (1) operation of commercial nuclear power plants, (2) storage of spent fuel in away-from-reactor facilities, and (3) decontamination/ decommissioning of commercial nuclear power plants. The types of wastes and their chemical, physical, and radiological characteristics are identified. Methods used by industry for processing radioactive wastes are reviewed and compared to the new techniques for processing and reducing the volume of radioactive wastes. A detailed system description and report on operating experiences follow for each of the new volume reduction techniques. In addition, descriptions of volume reduction methods presently under development are provided. The appendix records data collected during site surveys of vendor facilities and operating power plants. A bibliography is provided for each of the variuos volume reduction techniques discussed in the report.

ORIGIN: Commercial

KEYWORDS: INTERMEDIATE-LEVEL RADIOACTIVE WASTES; LIQUID WASTES; LOW-LEVEL RADIOACTIVE WASTES; RADIOACTIVE WASTE PROCESSING; REVIEWS; SOLID WASTES; VOLUME; NUCLEAR POWER PLANTS

105
Holcomb, W.F.

INVENTORY (1962-1978) AND PROJECTIONS (TO 2000) OF SHALLOW LAND BURIAL OF RADIOACTIVE WASTE AT COMMERCIAL SITES: AN UPDATE. Nuclear Safety 21(3):380-388 (1980)

The US Environmental Protectional Agency (EPA) has worked with the six states having commercial shallow land burial facilities for other-than-high-level radioactive wastes to provide inventories of the types and quantities of wastes buried at these sites. Compilations and interpretations of the inventories are presented in tables and figures. The EPA has proposed an equation to estimate the volume of waste generated from the total fuel cycle as a function of installed generating capacity. Non-fuel-cycle wastes are also estimated. Three of the six commercial burial sites have closed. Because of the recent projections of power-generating capacity and waste-generation rate and the proposed burial limitations, the projected cumulative volume of waste generated indicated that the burial capacity may be inadequate by the mid-1980's.

ORIGIN: Commercial

KEYWORDS: DATA COMPILATION; FORECASTING; INVENTORIES; LOW-LEVEL RADIOACTIVE WASTES; WASTE DISPOSAL; WASTE FACILITIES; UNDERGROUND DISPOSAL; PROJECTIONS; INTERMEDIATE-LEVEL RADIOACTIVE WASTES

106
Gustafson, P.F.; Illinois Commission on Atomic Energy, Springfield, IL

MANAGEMENT OF LOW-LEVEL RADIOACTIVE WASTES IN ILLINOIS. Transactions of the American Nuclear Society 34:362-363; CONF-800607; American Nuclear Society Annual Meetings, Las Vegas, NV, June 7-8, 1980, (5 pp.) (1980)

No abstract.

ORIGIN: Commercial

KEYWORDS: COST; ILLINOIS; INCINERATORS; LOW-LEVEL RADIOACTIVE WASTES; WASTE DISPOSAL; WASTE STORAGE; SOLIDIFICATION; UNDERGROUND DISPOSAL

107
Blackburn, J.A., and D.D. Ed; Illinois Department of Public Health, Division of Nuclear Safety, Springfield, IL

ILLINOIS EXPERIENCE WITH LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT. CONF-770512; Management of Low-Level Radioactive Waste, M.W. Carter, A.A. Maghissi, and B. Kahn (Eds.), Proceedings of a symposium, Atlanta, GA, May 23-27, 1977. Pergamon Press, New Yok, NY, Ch. 8, (pp. 837-841), 1214 pp. (1979)

The operating experience of the Sheffield Nuclear Waste Disposal Site in Illinois is discussed and recommendations made concerning the perceived major problems with site operations. Among the things learned from this experience have been the importance of adequate site criteria, the interactions between the State as the owner and the Federal Government as the licensing agency, the need for extensive environmental surveillance data, and the necessity for maintaining an impartial and unbiased relationship between the contractor and the general public. The criteria for the site, which were established in 1965, require that only solid waste be buried at the site. Although liquid may be received, it must be solidified prior to burial. Further, excluded from burial are all wastes containing more than 1 Ci/cu. ft. In a few instances, shipments exceeding this limit have been accepted by the State Department of Health for burial, where the shipments contained relatively short-lived radionuclides. Several requests for exemption to the limitation have been denied. Environmental surveillance by the State originally consisted of several wells around the site boundary, monitoring water for migrating radionuclides. In the past year, several wells have been drilled with the assistance of the U.S. Geological Survey to expand this effort. Several recommendations are made to improve the effectiveness of this and future waste management operations. State ownership of the buffer zone around the site as well as the site itself is felt to be necessary in order to avoid the

awkward situation of having radwaste buried next to private land, should the present buffer zone be sold. A more orderly approach to site monitoring is suggested, with a predetermined monitoring well plan based on the site criteria. At present, users of the site do not totally pay for all services connected with its operation; in fact, spending on monitoring alone almost equals this funding. It is recommended that site operations be funded entirely from charges on the waste buried. Possible solutions are discussed for the problems of misclassification, improper packaging, and incomplete documentation of radwastes being transported from nuclear facilities to Sheffield for disposal. Since federal regulations in these areas are not being adequately enforced, the State of Illinois is preparing to do so. Increased charges for disposal, fines, and formal citations are among the options under consideration to deal with violators.

ORIGIN: Commercial

KEYWORDS: SITE SURVEILLANCE; MONITORING; GROUND DISPOSAL; REGULATIONS; LOW-LEVEL RADIOACTIVE WASTES; SOLID WASTES; RADIOACTIVE WASTE MANAGEMENT; COST; ECONOMICS; PACKAGING; WASTE TRANSPORTATION; RECOMMENDATIONS; RADIOACTIVE WASTE DISPOSAL; REVIEWS; WELLS; ILLINOIS

108
NUS Corporation, Rockville, MD

PRELIMINARY STATE-BY-STATE ASSESSMENT OF LOW-LEVEL RADIOACTIVE WASTES SHIPPED TO COMMERCIAL BURIAL GROUNDS. NUS-3440: 109 pp. (1979)

Study was sponsored by EG&G, Idaho.

On a state-by-state basis, this report provides estimates of the quantities and characteristics of low-level radioactive wastes other than those originating in nuclear power plants and fuel-fabrication facilities. Estimates are given of the following sectors: commercial nuclear power plants, medical and educational institutions, industry (other than commercial nuclear power plants), and government and military. An estimated 83,800 cubic meters of radioactive waste, containing 886,000 curies of radioactivity were buried in the four U.S. commercial burial grounds in 1978. Tables show the volumes by source of these wastes and their distribution by burial ground. Data have been reported on wastes generated from reactor, institutional, and government/military sectors but not from industrial users of radioactive materials. The nonindustrial sources account for approximately 75% of all wastes by volume, and 54% of the recorded activity of the wastes buried. A final state by state assessment will be available in late 1980.

ORIGIN: Commercial

KEYWORDS: LOW-LEVEL RADIOACTIVE

WASTES; NUCLEAR POWER PLANTS; COMMERCIAL WASTES; DEFENSE WASTES; INSTITUTIONAL WASTES; VOLUME; WASTE MANAGEMENT; UNDERGROUND DISPOSAL; DISPOSAL SITE; RADIONUCLIDES; STATES

109
Hensley, L.C., V.L. Turner, and A.S. Pruitt; Oak Ridge National Laboratory, Oak Ridge, TN

PROGRESS REPORT ON THE DESIGN OF A LOW-LEVEL WASTE PILOT FACILITY AT ORNL. CONF-800416-3; UCC ND and GAT Waste Management Seminar Program, Portsmouth, OH, April 22, 1980 (1980)

Available from NTIS, PC A02/MF A01

All low-level radioactive solid wastes, excluding TRU wastes, are disposed of by shallow land burial at the Oak Ridge National Laboratory (ORNL); contaminated liquids and sludges by hydrofracture; and TRU wastes by storage in a retrievable fashion in concrete storage facilities. Currently, the capacity for low-level radioactive waste burial at ORNL is adequate for another six years at the current solids disposal rate which ranges between 80,000 and 100,000 cu ft per year. Decontamination and decommissioning of a number of ORNL facilities will be a significant activity in the next few years. Since quantities of LLW to be stored or disposed of will be large, the technology to handle large quantities must be demonstrated. The UCC-ND Engineering Division, in concert with other divisions of ORNL, has been requested to prepare a conceptual design for a facility to both dispose of the currently produced LLW and also to provide a test bed for demonstration of other processes which may be used in future LLW disposal facilities. This facility is designated as the Low-Level Waste Pilot Facility (LLWPF). This paper describes the status of the conceptual design of a facility for disposal of the subject radioactive waste.

ORIGIN: Government

KEYWORDS: DESIGN; FEASIBILITY STUDIES; LOW-LEVEL RADIOACTIVE WASTES; ORNL; PILOT PLANTS; PLANNING; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE FACILITIES; RADIOACTIVE WASTE MANAGEMENT; SOLID WASTES; TENNESSEE; VOLUME

110
Pacific Northwest Laboratory, Richland, WA

SUMMARY OF TECHNOLOGY, SAFETY AND COSTS OF DECOMMISSIONING A REFERENCE LOW-LEVEL WASTE BURIAL GROUND. NUREG/CR-0570 (Draft): 38 pp. (1979)

The results of a study to conceptually decommission commercial low-level waste (LLW) burial grounds is described. The purpose of the study is to provide information on the available

technology, safety considerations, and probable costs of decommissioning the burial grounds after termination of waste emplacement operations. This information is intended for use as background data in the development of regulations pertaining to decommissioning activities. It is also intended for reuse by regulatory agencies and site operators in developing improved waste burial and site maintenance procedures at operating burial ground. Generic LLW burial facilities based on real characteristics of the 6 commercial burial grounds that have operated in the U.S. are used as the reference facilities for the study. These generic burial grounds are assumed to be located on two reference sites, an arid western site and a humid eastern site, for which representative parameters are chosen. Decommissioning options and estimated costs (in millions of 1978 dollars) are as follows: Minimal Stabilization Plus Long-Term Care is 17.7 (stabilization 0.4, long-term care 17.3) for the arid site, 25.0 (stabilization 0.5, long-term care 24.5) for the humid site; Modest Stabilization Plus Long-Term Care - 19.8 (stabilization 2.5, long-term care 17.3) arid site, 28.3 (stabilization 3.8, long-term care 24.5) humid site; Complex Stabilization Plus Long-Term Care-24.0 (stabilization 7.7, long-term care 16.3) arid site, 31.3 (stabilization 5.3, long-term care 26.0) humid site; and Waste Relocation - 1402 arid site, 1418 humid site. The results of safety analysis for decommissioning the reference burial grounds are divided into public safety concerns (radiation exposure) and occupational safety concerns (radiation exposure, serious lost-time injuries, and fatalities). Public radiation exposures from decommissioning the arid site can be summarized as 0-100 man-rem for decommissioning operations and 0-3 man-rem for transporation (removal option only), depending on the decommissioning option. For the humid site, values are: decommissioning operations - 0-100 man-rem, transportation - 0-10 man-rem. Occupational exposures at both sites are estimated as 2.0-240 man-rem for decommissioning operations, 0-99 man-rem for transportation, and 0-0.21 man-rem for long-term care. Total lost-time injuries are estimated at 1.58 X 10(E-2) to 2.76/yr, and fatalities at 2.27 X 10(E-4) to 0.15/yr, depending on the option.

ORIGIN: Commercial

KEYWORDS: DECOMMISSIONING; DECONTAMINATION; RADIOACTIVE WASTE FACILITIES; GROUND DISPOSAL; RADIOACTIVE WASTE DISPOSAL; RECOMMENDATIONS; DOSE COMMITMENTS; COST; REGULATIONS; LOW-LEVEL RADIOACTIVE WASTES; OCCUPATIONAL SAFETY; POPULATIONS; RADIATION ACCIDENTS; WASTE TRANSPORTATION; RADIOACTIVE WASTE MANAGEMENT; THEORETICAL STUDIES

111
Murphy, E.S., and G.M. Holter; Pacific Northwest Laboratory, Richland, WA

TECHNOLOGY, SAFETY AND COSTS OF DECOMMISSIONING A REFERENCE, LOW-LEVEL WASTE BURIAL GROUND, VOLUME 2. NUREG/CR-0570/V2: 267 pp. (1980)

No abstract.

ORIGIN: Commercial

KEYWORDS: COST; DECOMMISSIONING; LOW-LEVEL RADIOACTIVE WASTES; RADIATION PROTECTION; WASTE DISPOSAL; WASTE FACILITIES; WASTE PROCESSING; TECHNOLOGY ASSESSMENT; UNDERGROUND STORAGE

112
Anderson, J.D., and B.E. Poremba; Rockwell International, Rockwell Hanford Operations, Research and Engineering Division, Richland, WA

SUMMARY OF RADIOACTIVE SOLID WASTE BURIALS IN THE 200 AREAS DURING 1978. RHO-LD-78-24-4Q: 40 pp. (1979)

This report lists radioactive solid wastes buried on the 200 areas burial ground at Hanford during 1978. Cumulative data from start-up to present is summarized.

ORIGIN: Government

KEYWORDS: SOLID WASTES; UNDERGROUND DISPOSAL; HANFORD RESERVATION; INVENTORIES; REVIEWS

113
Oyen, L.C., and R.F. Tucker; Sargent and Lundy

UPDATING RADWASTE PROCESSING, STORAGE. Power (N.Y.) 123(10): 81-87 (1979)

A brief survey of past and present systems for radioactive waste treatment and storage is presented. Today's systems have improved capability for handling the low-level wastes generated at nuclear stations. Stressing reliability and safety, they feature volume reduction to minimize overall disposal cost for liquid and solid waste. It is concluded that because of the high cost of radwaste processing and disposal, maximum effort must be made to reduce the waste volumes generated. This will probably require installation of some type of volume reduction equipment at most nuclear stations. If the trend toward eliminating shallow land burial of waste continues, the possibility of long-term on-site storage must be taken into account.

ORIGIN: Commercial

KEYWORDS: COST; LOW-LEVEL RADIOACTIVE WASTES; RADIOACTIVE WASTE PROCESSING; RADIOACTIVE WASTE STORAGE; VOLUME

114
Wiley, J.R.; Savannah River Laboratory, Aiken, SC

DECONTAMINATION OF SAVANNAH RIVER PLANT WASTE SUPERNATE. DP-1436: 19 pp. (1976)

Cesium-137, strontium-90, and plutonium were removed from 100-liter quantities of actual waste supernate by ion exchange in tests of the conceptual process for solidification of Savannah River Plant (SRP) radioactive waste. The supernate had been slurried with actual SRP sludges, and these sludges were separated from supernate by centrifugation and sand filtration. These steps simulated tank cleaning and isolating the insoluble waste sludge. Ion exchange reduced radioactivity in the supernate by a factor of 4 x 10(E+5) for Cs-137, 5 x 10(E+3) for Sr-90, and 300 for plutonium. These results were insensitive to flow rate over the range of rates studied. The process was monitored with an in-line gamma detector. Salt cake made from the decontaminated supernate would contain about 6 nCi/g from the combined activities of Cs-137, Sr-90, and plutonium. Ru-106 was not removed; it will decay to a level below that of other nuclides in decontaminated salt stored for 12 years. Cs-137, Sr-90, and plutonium were eluted from the ion exchange columns, concentrated by evaporation of the eluate, and sorbed onto zeolite. This concentrated the radioactivity removed from supernate by a factor of 1500. Carrier precipitation was tested for removing Sr-90 from supernate, but was not effective.

ORIGIN: Government

KEYWORDS: DECONTAMINATION; CESIUM-137; STRONTIUM-90; PLUTONIUM; ION EXCHANGE; SLUDGES; RADIATION MONITORING; EFFICIENCY; ACTIVITY LEVELS; ZEOLITES; RUTHENIUM-106; CLEANING; TANKS; SOLIDIFICATION

115
Garrett, P.M.; Technology for Energy Corporation, Knoxville, TN

AN EVALUATION OF LOW-LEVEL RADIOACTIVE WASTE BURIAL GROUND CAPACITIES AT THE MAJOR DEPARTMENT OF ENERGY RESERVATIONS. ORNL/NFW-79/17: 49 pp. (1979)

Sites investigated in this report are: Idaho National Engineering Laboratory; Hanford Reservation, Nevada Test Site, Los Alamos Scientific Laboratory, Savannah River Plant, and Oak Ridge National Laboratory

This investigation was conducted for the National Low-Level Radioactive Waste Program, Oak Ridge National Laboratory (ORNL), to provide information for a contingency plan on commercial radwaste management being prepared by EG and G Idaho, Inc. at the Idaho National Engineering Laboratory (INEL). The contingency plan will evaluate the options that may be available to DOE should the Federal government be required to assume an active

management role in the disposition of commercial low-level radwastes. The primary objectives of this work were to determine the remaining acreages and capacities of the low-level radwaste shallow-land burial grounds at various major DOE reservations and to forecast DOE's research and defense program needs for these unused portions of existing burial grounds. The possibility of expanding existing capacities as well as establishing new burial ground utilization factors at each of the reservations was considered. The six sites investigated were INEL, Hanford, Nevada Test Site (NTS), Los Alamos Scientific Laboratory (LASL), Savannah River Plant (SRP), and ORNL. The major findings of the study are summarized as follows: (a) remaining usable authorized burial space (in acres), INEL - 10, Hanford - over 1000, NTS - 0, LASL - 25, SRP - 81, ORNL - 8; (b) estimated years until authorized acreage is filled to capacity based on forecasted volumes of on-site radwaste generation from DOE activities, INEL - 12 + or - 6, Hanford - over 100, NTS - 0, LASL - 40, SRP - 30, ORNL - less than 10; (c) potential for expansion of existing or establishment of new burial capacity, INEL - possibly extensive, Hanford - extensive, NTS - extensive, LASL - virtually nil, SRP - possibly extensive, ORNL - virtually nil; (d) possible availability for disposal of commercial radwaste, by 1980: Hanford and SRP; by 1985: INEL, Hanford, NTS, and SRP.

ORIGIN: Commercial

KEYWORDS: SITE EVALUATION; FORECASTING; LOW-LEVEL RADIOACTIVE WASTES; INDUSTRIAL WASTES; RADIOACTIVE WASTE MANAGEMENT; RADIOACTIVE WASTE DISPOSAL; FIELD STUDIES; REVIEWS; ORNL; US DOE; RADIOACTIVE WASTE FACILITIES; GROUND DISPOSAL

116

Steger, J.G.; U.S. Energy Research and Development Administration, Division of Waste Management, Production and Processing, ERDA Waste Management Branch, Washington, DC

BURIAL TECHNOLOGY. CONF-770512; Management of Low-Level Radioactive Waste, M.W. Carter, A.A. Moghissi, and B. Kahn (Eds.), Proceedings of a Symposium, Atlanta, GA, May 23-27, 1977. Pergamon Press, New York, NY, Ch. 5, (pp. 665-677), 1214 pp. (1979)

The current ERDA program is described in order to develop a technology for shallow burial of solid low-level radwaste. In late 1975, ERDA formed a Steering Committee on Land Burial composed of ERDA experts to review the situation and make recommendations. By mid 1976, the Steering Committee issued the ERDA Plan to Develop a Technology for the Shallow Land Burial of Solid Low-Level Radioactive Waste. The Plan contains an evaluation of the present state of knowledge and recommends a program to be followed which will lead to site

selection criteria, proper burial practices, waste preparation requirements, and a systems analysis method to determine the least cost way of achieving a predetermined level of performance. This program will be reviewed and the Plan updated annually until the desired results are achieved. ERDA approved this plan and the recommended programs were implemented starting in October, 1976. This multi-laboratory, multi-disciplinary program is expected, in about 5 to 6 years, to produce a land burial technology, a systems analysis technique to optimize procedures, and a data file to keep investigators informed.

ORIGIN: Commercial

KEYWORDS: RADIOACTIVE WASTE MANAGEMENT; RADIOACTIVE WASTE DISPOSAL; LOW-LEVEL RADIOACTIVE WASTES; SOLID WASTES; COST ESTIMATES; METHODS; FORECASTING; THEORETICAL STUDIES; REVIEWS; GROUND DISPOSAL

117
Thompson, W.T., and L.H. Stinton; Union Carbide Corporation, Oak Ridge, TN

MANAGEMENT OF SOLID WASTE.
ORNL/ENG/IFN-80/1; CONF-800416-2; UCC-ND and Gat Waste Management Seminar Program, Portsmouth, OH, April 22, 1980 (1980)

Available from NTIS, PC A02/MF A01

Compliance with the latest regulatory requirements addressing disposal of radioactive, hazardous, and sanitary solid waste requires the application of numerous qualitative and quantitative criteria in the selection, design, and operation of solid waste management facilities. Due to the state of flux of these regulatory requirements from EPA and NRC, several waste management options were identified as being applicable to the management of the various types of solid waste. This paper highlights the current regulatory constraints and the design and operational requirements for construction of both storage and disposal facilities for use in management of DOE-ORO solid waste. Capital and operational costs are included for both disposal and storage options.

ORIGIN: Government

KEYWORDS: CAPITAL; COMPARATIVE EVALUATIONS; COMPLIANCE; DESIGN; DIAGRAMS; FINANCIAL DATA; LOW-LEVEL RADIOACTIVE WASTES; OPERATING COST; OPERATION; ORNL; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE FACILITIES; RADIOACTIVE WASTE MANAGEMENT; RADIOACTIVE WASTE STORAGE; REGULATIONS; SOLID WASTES; TABLES; US DOE; US EPA; US NRC; NUCLEAR FACILITIES; COST; RADIOACTIVE MATERIALS

118
Beck, T.J., M.R. McCampbell, and L.R. Cooley; University of Maryland, Baltimore, MD

PROFILE OF INSTITUTIONAL RADIOACTIVE WASTES GENERATED IN 1977. PB-296947; Low-Level Radioactive Waste Management, J.E. Watson (Ed.), (pp. 27-37); EPA-520/3-79-002; CONF-790209; Twelfth Health Physics Society Midyear Topical Symposium, Williamsburg, VA, February 12, 1979 (1979)

Available from NTIS, PC A99/MF A01

A national survey of radwaste volumes and characteristics generated by large medical and academic institutions in 1977 was performed. This is a followup to a survey which obtained 1975 data. The estimated total waste volume generated by the survey population in 1977 was 7771 cu m (274,400 cu ft). These data and those from the previous survey show that the volume is increasing linearly and consistently accounts for approximately 11% of the total volume of low level radwaste buried commercially. Most of the waste shipped by respondents (78%) was shipped to the shallow land burial site at Barnwell, SC. Included in this profile of institutional radwastes are: a report of the principal radionuclides present as waste contaminants, and a breakdown of waste by form; an estimate of the effects of mechanical compaction of dry waste; and a review of the extent to which alternative disposal methods are used by the study population for the various waste forms.

ORIGIN: Institutional

KEYWORDS: DATA COMPILATION; EDUCATIONAL FACILITIES; HOSPITALS; LOW-LEVEL RADIOACTIVE WASTES; NUCLEAR MEDICINE; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE FACILITIES; SOUTH CAROLINA; TABLES; VOLUME

119
Andersen, R.; University of Maryland, Baltimore, MD

PRELIMINARY IMPACT ASSESSMENT OF INSTITUTIONAL RADIOACTIVE WASTE DISPOSAL. PB-296947; Low-Level Radioactive Waste Management, J.E. Watson (Ed.), (pp. 151-158); EPA-520/3-79-002; CONF-790209; Twelfth Health Physics Society Midyear Topical Symposium, Williamsburg, VA, February 12, 1979 (1979)

Available from NTIS, PC A99/MF A01

This paper considers, in a preliminary manner, some of the impacts of disposing of institutional radwastes via the same methods and systems as are used to dispose of fuel cycle radwastes. Nuclide content and activity concentrations of institutional and reactor radwastes differ greatly. The varied physical and chemical forms of institutional radwastes may not be compatible for burial with reactor radwastes. Animal carcasses and other biological

materials may adversely affect containment and transport parameters in the burial trenches. The time and expense involved in the commercial burial of institutional radwastes may not be commensurate with the actual radiological content of the materials. Finally, this method of disposal may not present an optimum use of limited burial space.

ORIGIN: Institutional

KEYWORDS: COST; EDUCATIONAL FACILITIES; EVALUATION; GROUND DISPOSAL; HOSPITALS; LOW-LEVEL RADIOACTIVE WASTES; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE MANAGEMENT

120
Lee, P.K., J.G. Shotts, and D.L. Spate; University of Missouri, Columbia, MO

MANAGEMENT AND SURVEILLANCE OF A UNIVERSITY RADIOACTIVE WASTE BURIAL SITE. PB-296947; Low-Level Radioactive Waste Management, J.E. Watson (Ed.). (pp. 141-150); EPA-520/3-70-002; CONF-790209; Twelfth Health Physics Society Midyear Topical Symposium, Williamsburg, VA, February 12, 1979 (1979)

Available from NTIS, PC A99/MF A01

A radioactive waste burial site is operated at the University of Missouri under the conditions of 10 CFR 20.304. Over 90% of the radioactive wastes generated by the laboratories and clinics, exclusive of the research reactor facility, are economically disposed at this site. During the seven year operation about 200 cubic meters of low-level wastes containing about 1.5 x 10(E&11) becquerels have been buried in 3.6 meter deep and 0.6 meter wide trenches. A radiation surveillance program confirms that radiation levels in the vicinity of the burial site are well within acceptable limits.

ORIGIN: Institutional

KEYWORDS: DATA COMPILATION; EDUCATIONAL FACILITIES; GRAPHS; GROUND DISPOSAL; LOW-LEVEL RADIOACTIVE WASTES; MISSOURI; MONITORING; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE FACILITIES; RADIOACTIVE WASTE MANAGEMENT; RADIOACTIVITY; SOILS; VOLUME; WATER

121
Shotts, J.G., D.L. Spate, and P.K. Lee; University of Missouri, Columbia, MO

COLLECTION AND HANDLING OF RADIOACTIVE WASTES FROM A LARGE UNIVERSITY. PB-296947; Low-Level Radioactive Waste Management, J.E. Watson (Ed.). (pp. 107-115); EPA-520/3-70-002; CONF-790209; Twelfth Health Physics Society Midyear Topical Symposium, Williamsburg, VA, February 12, 1979 (1979)

Available from NTIS, PC A99/MF A01

Various types, levels, and amounts of radioactive wastes are generated by the University of Missouri research, teaching, and clinical programs. Health Physics Services is responsible for collecting these wastes from the more than 200 laboratories spread over the Columbia campus and disposing of the wastes in an economical and safe manner. Most of the radioactive waste are labortory paper trash and liquids containing low levels of activity but some high level wastes and contaminated large animal carcasses also require disposal. The wastes are stored at one of four interim storage locations until ultimately disposed of by incineration, sewer release, local burial, shipment for commercial waste disposal or decay. The economics, safety, and handling aspects of the various disposal methods must be considered.

ORIGIN: Institutional

KEYWORDS: COST; EDUCATIONAL FACILITIES; GROUND DISPOSAL; INCINERATORS; LOW-LEVEL RADIOACTIVE WASTES; MISSOURI; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE FACILITIES; RADIOACTIVE WASTE MANAGEMENT; RADIOACTIVE WASTE STORAGE; TRANSPORT

122
Andrews, D.L., J.R. Gilchrist, and H.W. Berk; University of Virginia, Charlottesville, VA

COLLECTION AND DISPOSAL OF LOW LEVEL WASTE AT AN EDUCATIONAL INSTITUTION. PB-296947; Low-Level Radioactive Waste Management, J.E. Watson (Ed.), (pp. 101-106); EPA-520/3-79-002; CONF-790209; Twelfth Health Physics Society Midyear Topical Symposium, Williamsburg, VA, February 12, 1979 (1979)

Available from NTIS, PC A99/MF A01

Low Level radioactive wastes are generated by a number of different laboratories and departments at the University of Virginia. Radioactive materials are utilized in a variety of research applications including medical and basic sciences, as well as for diagnostic and therapeutic uses at the University hospital. Radioisotopes are purchased from commercial sources and are produced locally for use in research and medical diagnosis and treatment by the University reactor. In 1974, the University Radiation Safety Committee adopted rules for discharging radioisotopes to the environment which are more restrictive than the NRC regulations. The committee's philosophy is that no radioactive substances should be discharged to the environment which can be reasonably avoided, including those used in medical diagnosis and therapy. This policy has caused a significant increase in the accumulation of low-level radioactive wastes, at the university they have increased from about 1.5 cu m in 1969 to over 68 cu m in 1977. Disposal

costs have increased proportionately. Currently the University employs a full-time technician to collect and package radioactive wastes under the supervision of the health physics staff of the Radiation Safety Office. In 1976, the Radioactive Waste Management Facility (RWMF) was completed. This facility houses the Radiation Safety Office staff and has modern facilities for collecting and packaging all types of radioactive wastes. The facility is being used to limit the total cost of radioactive waste disposal, while fulfilling the objectives of the radiation safety committee. Methods used to limit waste disposal volumes and costs are compaction, storage and decay of short half-life isotopes, solidification of liquid wastes, and education and training of radioactive materials users throughout the University in reducing waste volume.

ORIGIN: Institutional

KEYWORDS: COST; EDUCATIONAL FACILITIES; HALF-LIFE; LOW-LEVEL RADIOACTIVE WASTES; RADIATION PROTECTION; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE FACILITIES; RADIOACTIVE WASTE MANAGEMENT; VIRGINIA; VOLUME; NUCLEAR MEDICINE; RADIOISOTOPES

123
Subramanian, R.V., and R. Mahalingam; Washington State University, Pullman, WA

IMMOBILIZATION OF HAZARDOUS RESIDUALS BY ENCAPSULATION. FINAL TECHNICAL REPORT. PB-296642: 212 pp. (1979)

Available from NTIS, PC A10/MF A01

Laboratory and pilot plant studies are reported which demonstrate the feasibility of encapsulating hazardous aqueous wastes in a water-extensible polyester matrix for land burial. Laboratory experiments showed that a polyester matrix is much more efficient than cement or urea-formaldehyde polymers in containing wastes. A pilot plant was conducted to handle 15 gal/hr liquid waste. Polymerization was readily controllable, and process upsets were easily handled. An economic evaluation of the polyester process shows it to be 2 1/2 times more expensive than its nearest competitor, the cement silicate process, the major cost item being the polyester resin. It is anticipated that the polyester process will become a viable, if not the sole, process for immobilizing dangerous wastes for underground disposal.

ORIGIN: Commercial

KEYWORDS: COST; CURING; DESIGN; EMULSIONS; ENCAPSULATION; FEASIBILITY STUDIES; HAZARDOUS MATERIALS; INDUSTRIAL WASTES; LEACHING; LIQUID WASTES; LOW-LEVEL RADIOACTIVE WASTES; PARTICLE SIZE; PERFORMANCE; PILOT PLANTS; POLYESTERS; RADIOACTIVE WASTE PROCESSING; RESIDUES; RESINS; SOLID WASTES; SOLIDIFICATION; SURFACES; UNDERGROUND DISPOSAL

124
Ericson, R., and R. Keenan; Werner an Pfleiderer Corporation, Waldwick, NJ

RADWASTE VOLUME REDUCTION OPTIONS: TOTAL COST SENSITIVITY TO FIXED CHARGE RATE AND INFLATION. Transactions of the American Nuclear Society 34:370-372; CONF-800607; American Nuclear Society Annual Meeting, Las Vegas, NV, June 7-8, 1980, (3 pp.) (1980)

No abstract.

ORIGIN: Commercial

KEYWORDS: BITUMENS; CAPITAL; CEMENTS; COST BENEFIT ANALYSIS; CRYSTALLIZATION; EVAPORATION; LOW-LEVEL RADIOACTIVE WASTES; OPERATING COST; POLYESTERS; PWR TYPE REACTORS; WASTE PROCESSING; SOLIDIFICATION; CHARGES

125
Brooksbank, R.E., and W.J. Armento; Oak Ridge National Laboratory, Oak Ridge, TN

POST-ACCIDENT CLEANUP OF RADIOACTIVITY AT THE THREE MILE ISLAND NUCLEAR POWER STATION. ORNL/TM-7081: 61 pp. (1980)

Graphs, flowsheets, and tables are included.

A summary of on-site assistance and accomplishments following the accident on the Three Mile Island site, flowsheet development for the TMI recovery team, and the numerous reports generated on the TMI cleanup and recovery is provided. Three major concerns are: radioactive distribution in air and water (primarily iodine and xenon), their decontamination and immobilization, and the treatment of gaseous, liquid, and solid wastes. It was concluded that release of radioactivity was limited to the atmosphere, primarily with xenon isotopes. Iodine was successfully contained by the continual replacement of the charcoal filter traps, supplemented by an off-gas filtration system, and capping of the exhaust stack. Low-activity-level water (LALW) was treated and subsequently released to the Susquehanna River, while 279,000 gal of IALW is in storage and should e processed using the Epicor-II process. Process tests were conducted in an ORNL hot cell for HALW. Approximately 60-70,000 cu ft of solid waste will be generated over the next 24 mo from waste treatment and building decontamination, primarily from sorbents. A temporary interim storage facility is under construction and a more permanent one is being designed. Remote decontamination is needed before hands-on decontamination. Tritium and Kr 85 can be removed by filtration and controlled release to the atmosphere over about a 2-month period. Equipment and systems should be protected by proper use of chemicals, administrative control, physical coverings, and long-term wet-layup for major components. It is assumed that recommissioning will procede without legal problems.

Nine million gal of liquid waste may have to be processed into solids and 400,000 cu ft of dry, compacted waste may be generated by decontamination and discards. Operation of TMI-2 could resume 42 mo after reentry with costs of $250-300 million.

ORIGIN: Commercial

KEYWORDS: DECONTAMINATION; DECOMMISSIONING; COST; INVENTORIES; REACTORS; THREE-MILE ISLAND-2 REACTOR; PWR TYPE REACTORS; ENRICHED URANIUM REACTORS; FLOWSHEETS; GASEOUS WASTES; LIQUID WASTES; SOLID WASTES; IODINE; KRYPTON-85; XENON; LOW-LEVEL RADIOACTIVE WASTES; HIGH-LEVEL RADIOACTIVE WASTES; INTERMEDIATE-LEVEL RADIOACTIVE WASTES; WASTE WATER; WASTE MANAGEMENT

126
Platt, A.M., and J.V. Robinson; Pacific Northwest Laboratory, Richland, WA

COMMERCIAL NUCLEAR REACTORS AND WASTE: THE CURRENT STATUS. PNL-3317-1 (1980)

Available from NTIS, PC A04/MF A01

During the last five years, the declared size of the commercial light water reactor (LWR) nuclear power industry in the US has steadily decreased. As of January 1980, the total number of power plants had dropped to 191 from the 226 in December 31, 1974. At least another nine were cancelled in the last few months. This report was developed as the first of a series of track implications to waste management due to changes in the declared size of the industry. For the presently declared size, key conclusions are: the declared reactors will peak at a capacity of 162 GWE and consume about 10(E+6) MTU as enrichment feed. As few as two repositories of about 100,000 MTHM capacity each would hold the waste. Predisposal storage (reactor basins and AFRS) would peak at less than 100,000 MTHM (in the year 2020) with one repository opening in the year 1997 and the other in the year 2020. Most of the 100,000 MTHM would have to be in AFR storage unless current practice regarding reactor basin size was radically changed.

ORIGIN: Commercial

KEYWORDS: BWR TYPE REACTORS; FORECASTING; LOW-LEVEL RADIOACTIVE WASTES; NUCLEAR POWER PLANTS; PWR TYPE REACTORS; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE MANAGEMENT; SPENT FUEL STORAGE; TRANSURANIUM ELEMENTS; NUCLEAR FACILITIES

127
Cohen, B.L.

THE SITUATION AT WEST VALLEY.
Public Utilities Fortnightly:
26-32 (1979)

The West Valley plant is the only privately owned nuclear fuel reprocessing plant in the United States. The plant began operations in 1966 and continued through 1972 at which time it was shut down for modifications and enlargement to increase its capacity. During the following years government regulations and safety requirements were substantially tightened, resulting in rapidly escalating costs. Thus, the project became uneconomical and it was decided to abandon it. The primary blame for the collapse of the project lies then in our political system which tightened environmental and safety requirements in response to a shift in the public's perception of nuclear energy. In going out of business, Nuclear Fuel Service (which operated the plant) relinquished future responsibility to the disposition of the facilities. Therefore, the legal responsibility belongs to New York State, which owns the plant, and morally, the Federal Government also bears a considerable portion of the responsibility. There has been tremendous controversy and concern over what should be done with the high-level radioactive waste in the underground storage tanks, the burial grounds for low-level and other radioactive waste, and the plant itself which is heavily contaminated with radioactivity; simple abandonment is not a viable option. As long as minimum surveillance is maintained, it is difficult to develop a scenario in which the high-level liquid wastes could leak out. However, the hazards may be further reduced through several options. For approximately $25 million the liquid waste could be converted into cement and stored in the original tanks; an intermediate solution totaling $42 million would involve removal of the wastes from the tanks, mixing it with cement, and injecting it in rock deep underground; the most complex procedure would be to remove the waste from the tanks, convert it to glass, and ship it for deep burial in a federal waste repository at a cost of $123 million. The low-level burial grounds may be improved by upgrading present trench covers and developing better control of water drainage and erosion for a cost of $1.5 million. On the other hand exhuming this low-level waste for burial elsewhere would cost at least $100 million. Exhumation of highly radioactive items associated with the plant operations would cost an additional $370 million. Protective storage is a simple remedial measure for the reprocessing plant, which involves removing as much contamination as possible and sealing the remainder in the chemical process cells. This operation would cost $17 million plus $500,000 per year for maintenance. The area affected by all the above operations encompasses about 200 acres of the total site area of 3,300 acres. The remainder could be released

for use in farming, forestry, recreation, industry, or research.

ORIGIN: Commercial

KEYWORDS: DECOMMISSIONING; DECONTAMINATION; NUCLEAR FACILITIES; FUEL REPROCESSING PLANTS; LIQUID WASTES; UNDERGROUND DISPOSAL; COST; WEST VALLEY PROCESSING PLANT; STORAGE FACILITIES; WASTE PROCESSING; LOW-LEVEL RADIOACTIVE WASTES; HIGH-LEVEL RADIOACTIVE WASTES; INTERIM STORAGE

128
Russell, J.L., and W.N. Crofford; Environmental Protection Agency, Office of Radiation Programs, Washington, DC

DECOMMISSIONING STANDARDS: THE RADIOACTIVE WASTE IMPACT.
PB-296947; Low-Level Radioactive Waste Management, Watson, J.E. (Ed.); EPA-520/3-79-002; CONF-790209; Twelfth Health Physics Society Midyear Topical Symposium, Williamsburg, VA, February 12, 1979 (1979)

Available from NTIS, PC A99/MF A01

Several considerations are important in establishing standards for decommissioning nuclear facilities, sites and materials. The review includes discussions of some of these considerations and attempts to evaluate their relative importance. Items covered include the form of the standards, timing for decommissioning, occupational radiation protection, costs and financial provisions, and low-level radioactive waste. Decommissioning appears more closely related to radiation protection than to waste management, although it is often carried under waste management programs or activities. Basically, decommissioning is the removal of radioactive contamination from facilities, sites and materials so that they can be returned to unrestricted use, or other actions designed to minimize radiation exposure of the public. It is the removed material that is the waste and, as such, it must be managed and disposed of in an environmentally safe manner. It is important to make this distinction even though, for programmatic purposes, decommissioning may be carried under waste management activities. It was concluded that the waste disposal problem from decommissioning activities is significant in that it may produce volumes comparable to volumes produced during the total operating life of a reactor. However, this volume does not appear to place an inordinate demand on shallow land burial capacity. It appears that the greater problems will be associated with occupational exposures and costs, both of which are sensitive to the timing of decommissioning actions.

ORIGIN: Commercial

KEYWORDS: COST; DECOMMISSIONING; LOW-LEVEL RADIOACTIVE WASTES; NUCLEAR FACILITIES; PERSONNEL;

RADIATION DOSES; RADIATION PROTECTION; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE MANAGEMENT; STANDARDS

129
La Guardia, T.S., and W.J. Manion; Nuclear Energy Services, Incorporated, Danbury, CT

REACTOR DECOMMISSIONING INFORMATION PERTINENT TO PLANNING. Trans. Am. Nucl. Soc. 30:551; Proceedings of a symposium, ANS Winter Meeting, Washington, DC, November 12-16, 1978. 31 pp. (1978)

The planning of a decommissioning program must address the selection of a decommissioning alternative, the technical feasibility, financial considerations and environmental impacts. In turn, the decommissioning alternatives must consider the intended post-decommissioning use of the site: re-use of the site for a replacement reactor or other facility, return of site to its original state, abandonment with the reactor mothballed or entombed, or re-commissioning of the facility with a new reactor vessel. Whatever the decommissioning alternative, the financial plan must be based on the major, site-specific cost contributors. Local labor rates can have a tremendous effect on the overall cost due to the labor intensive nature of decommissioning activities. The radioactive inventory of contaminated materials, the structural, NSSS design, and land features of a particular site, the distance to burial grounds, and the regional cost of materials must all be accounted for to assure the accuracy of the site specific cost estimate. The recommended method for preparing cost estimates for a selected alternative requires development of a detailed work activity sequence in which the resources can be expressed in terms of cost factors. Activity dependent cost factors are subdivided into unit factors and fixed factors (nonconsumable materials and equipment) while period dependent factors are cost parameters based on the term of the program or the duration of phases of the program. To complete the financial planning it is prudent to add a contingency factor to the cost estimate; the Atomic Industrial Forum cost sensitivity analysis found a contingency factor of 25% appropriate. In terms of technical feasibility, the techniques to accomplish activities such as vessel and internals removal, concrete demolition and decontamination are available and have been demonstrated; there is no new technology required to completely dismantle a nuclear power plant. In general, most of the environmental impacts are readily addressed and can be shown to be of small consequence; however, the ultimate waste disposal issue is of great concern due to the exhausting of available shallow burial low level waste sites. A volume reduction program has been initiated to more efficiently

utilize the limited licensed burial space. A thorough decommissioning plan must include provision of sufficient environmental impact information to permit the NRC to perform their environmental assessment to issue either an environmental impact statement or a negative declaration.

ORIGIN: Commercial

KEYWORDS: DECONTAMINATION; DECOMMISSIONING; COST; ENVIRONMENTAL IMPACTS; PLANNING; FEASIBILITY STUDIES; REACTORS; NUCLEAR POWER PLANTS; WASTE DISPOSAL; SITE CAPACITY; DISPOSAL SITE; LAND USE; VOLUME REDUCTION

130
Murphy, E.S.; Pacific Northwest Laboratory, Richland, WA

TECHNOLOGY, SAFETY AND COSTS OF DECOMMISSIONING REFERENCE NON-FUEL-CYCLE NUCLEAR FACILITIES. NUREG/CR-1754 (1981)

Technology, safety, and cost information was developed for the conceptual decommissioning of some example radioactive material handling facilities which are not part of the reactor fuel cycle. Examples were chosen which require fairly large decommissioning efforts and include: radiopharmaceutical and sealed-source manufacturers, rare metal refiners, and broad research and development licenses. The costs of decommissioning facility components are generally estimated to be in the range of $1,000 to $10,000, depending on the type of component, the type and amount of radioactive contamination, and the DECON options chosen. Estimated costs for decommissioning the example laboratories range from $50,000 to $75,000. On the basis of estimated decommissioning costs for facility components, the costs of decommissioning typical non-fuel-cycle laboratory facilities are estimated to range from about $10,000 for the decommissioning of a small room containing one or two moderately contaminated fume hoods to more than $1 million for the decommissioning of an industrial plant containing several laboratories in which radiochemicals and sealed radioactive sources are prepared. For the reference sites of this study, the basic decommissioning alternatives are: 1) site stabilization followed by long-term care (similar to SAFSTOR) and 2) removal of the waste or contaminated soil to an authorized disposal site (DECON of the site). Cost estimates made for decommissioning three reference sites range from about $37,000 for the removal of a contaminated drain line and hold-up tank to more than $8 million for the removal of a tailings pile that contains radioactive residue from ore-processing operations in which tin slag is processed for the recovery of rare metals. Radioactive inventories for typical non-fuel-cycle facilities are usually several orders of magnitude smaller than inventories

associated with typical fuel cycle facilities. For the reference laboratories of this study, radionuclide inventories range from 0.002 curies to 800 curies.

ORIGIN: Commercial

KEYWORDS: NUCLEAR FACILITIES; DECOMMISSIONING; RADIATION DOSES; DOSE RATES; SAFETY; COST; INVENTORIES

131
Murphy, E.S., and G.M. Holter; Pacific Northwest Laboratory, Richland, WA

TECHNOLOGY, SAFETY AND COSTS OF DECOMMISSION A REFERENCE, LOW-LEVEL WASTE BURIAL GROUND, VOLUME 1. NUREG/CR-0570/VI: 445 pp. (1980)

Technology, safety and cost information is presented for the conceptual decommissioning of a reference low-level waste burial grounds, both on a dry and wet site. Two basic approaches to decommissioning, stabilization followed by at least 200 years of surveillance and disinterment, were studies to obtain comparisons between costs and occupational radiation doses, potential dose to the public and other safety impacts.

ORIGIN: Commercial

KEYWORDS: COST; DECOMMISSIONING; ENVIRONMENTAL IMPACTS; LOW-LEVEL RADIOACTIVE WASTES; RADIATION DOSES; RADIATION PROTECTION; WASTE DISPOSAL; WASTE FACILITIES; SAFETY ENGINEERING; STABILIZATION; TECHNOLOGY ASSESSMENT; COST BENEFIT ANALYSIS

132
Bermanis, H.; United Engineers and Constructors, Inc., Philadelphia, PA

HOW WILL THE COST OF DECOMMISSIONING BE FUNDED. Nucl. Eng. Int. 24(292):21-23 (1979)

The US NRC favours the complete dismantling of nuclear power plants at the end of their lives and is concerned to assure the public that adequate funding will be available to cover the costs when the time comes. The advantages and disadvantages of different methods of funding are discussed.

ORIGIN: Commercial

KEYWORDS: COST; DECOMMISSIONING; FINANCING; NUCLEAR POWER PLANTS; US NRC; REACTOR DISMANTLING; COMPARATIVE EVALUATIONS

133
Raicevic, D.; CANMET, Energy, Mines and Resources Canada, Mineral Sciences Laboratories, Ottawa, Canada

DECONTAMINATION OF ELLIOT LAKE URANIUM TAILINGS. The Canadian Mining and Metallurgical Bulletin, August 1979:1-7 (1979)

A flotation approach is described which uses unsaturated fatty acids to suspend the slag for treatment of the Elliot Lake uranium tailings to produce new, decontaminated tailings reduced in pyrite, radium, thorium and uranium contents. These decontaminated tailings which comprise about 75% by weight of the current uranium tailings, appear to be suitable for mine backfill. Because mine backfilling normally uses about 50% of the plant tailings, the surface storage of about half of the uranium tailings would be eliminated by this process. Mine backfilling would also increase mine production and thus enlarge over-all uranium resources due to recovery of the ore from pillars. The pyrite concentrate produced from the current uranium tailings would be suitable for sulphuric acid production.

ORIGIN: Commercial

KEYWORDS: TAILINGS; MILL TAILINGS; URANIUM MINES; ELLIOT LAKE; RADIUM-226; PYRITE; GANGUE; RESIDUES; SLAGS; THIOBACILLUS OXIDANS; BACTERIA; LEACHING; MICROORGANISMS; BACILLUS; RADIOISOTOPES; RADIONUCLIDE MIGRATION; LAKE HURON; LAKES; FLOTATION; SEPARATION PROCESSES; RADIUM; THORIUM; URANIUM; BACKFILLING; RECOVERY

134
Ford, Bacon and Davis Utah Inc., Salt Lake City, UT

ENGINEERING ASSESSMENT OF INACTIVE URANIUM MILL TAILINGS: VITRO SITE, SALT LAKE CITY, UTAH. PHASE 2 - TITLE 1. FB&DU 130-00; Phase 2-Title 1: 22 pp. (1976)

Results of a quantitative analysis of existing conditions at the Vitro Chemical Company mill site led to the detailed evaluation and cost-benefit analysis of ten viable remedial action alternatives. Reported field measurements of direct gamma radiation levels above the surface of the exposed tailings pile ranged from 100 to 1,500 uR/hr, well above the average background values of 12 uR/hr in the Salt Lake Valley, and far in excess of recommended levels for continuous public exposure. However, extensive core sampling of the site shows very limited movement of radium-226 beneath the tailings with only negligible penetration as shallow as two feet below the pile. In addition, the extent of soil contamination determined to date from windblown tailings is limited to the immediate vicinity of the site and airborne dust particles from the tailings site are considered only a very minor direct contributor to the exposure of man. Measurements of

atmospheric levels of radon-222 found background radon concentrations to be quite significant, increasing from an offsite background value of 0.38 pCi/L (measured in 1967-1968) to a present concentration of 0.69 pCi/L. However, due to the variability of background radon levels, the contribution of radon emanating from the site to the observed total becomes indistinguishable at points beyond 0.5 mile from the site, thus making correlation only fair. On the basis of radon concentrations in excess of background values, the calculated radon-induced lung cancer risk within a 0.5 mile radius of the site is .0001/person/year, slightly less than the Salt Lake Valley average risk due to all causes. The engineering assessment of existing conditions also included assays of tailings samples to determine the extraction potential of additional residual metals. Only uranium was found to be present in potentially economically recoverable concentrations, showing an average content of 0.018% uranium by weight. This concentration however, is not sufficient to support reprocessing costs using present technology and current market prices. An impact assessment of the Vitro site on the land values and use revealed strongly depressed market values for land in the immediate vicinity, resulting from a further-construction ban within 0.5 mile of the site. Intensive investigation of the above conditions resulted in the evaluation of the following remedial action alternatives: 1) a minimum action consisting of returning tailings from existing off-site structures and improvement of site security, 2) stabilization of tailings at the present site, 3-9) removal of tailings to seven possible repositories, suitable for long-term stabilizaton, and 10) removal of tailings to an operating mill in Moab, Utah.

ORIGIN: Commercial

KEYWORDS: MILL TAILINGS; GAMMA RADIATION; RADON-222; ACTIVITY LEVELS; PUBLIC HEALTH; URANIUM; BACKGROUND RADIATION; STABILIZATION; HEALTH HAZARDS; COST BENEFIT ANALYSIS; MILLING; RISK ASSESSMENT; ECONOMICS; REPROCESSING; LAND USE; UTAH

135
Martin, A.; Associated Nuclear Services, Epsom, England, United Kingdom

DECOMMISSIONING NUCLEAR POWER PLANTS: WHAT ARE THE PROBLEMS THAT NEED TO BE OVERCOME?. Nuclear Engineering International 24(286):37-42 (1979)

A broad overview of the main issues involved in the treatment of redundant nuclear power stations, both for existing and future plant designs, recommends the use of standard terminology to describe three alternative approaches to decommissioning of a nuclear power plant: the stage 1 alternative being a minimum decommissioning operation involving complete defueling, removal of fuel and radioactive wastes, and a general cleanup; stage 2 is a maximum decommissioning, short of complete dismantling, involving the removal of all equipment and structures which can easily be dismantled; and stage 3 decommissioning requiring the complete dismantling of a plant and clearance of the site for unrestricted use. (Stages 1, 2, and 3 correspond respectively to the descriptive terms mothballing, entombment, and dismantling.) Evidence from the decommissioning of prototype and research reactors, combined with studies undertaken at commercial facilities, proves decommissioning and complete dismantling of nuclear plants to be technically feasible. The primary issue that remains to be resolved is the time-scale on which complete dismantling is to be undertaken. Another major uncertainty is the cost of decommissioning commercial reactors. The approach adopted will inevitably be a compromise between the cost and the radiological and environmental impacts; for example occupational as opposed to population radiation exposure, or the costs of long-term surveillance and delayed dismantling as against the high initial cost of early dismantling. However, it appears that delayed final dismantling is the preferred choice and the general consensus is that the estimated cost of dismantling a large nuclear power station is 10 to 15 percent of the original capital cost of construction, escalated to the time of dismantling.

ORIGIN: Foreign

KEYWORDS: REACTOR DECOMMISSIONING; REACTOR DISMANTLING; NUCLEAR POWER PLANTS; NUCLEAR FACILITIES; COST; DECOMMISSIONING; UNITED KINGDOM

136
DECOMMISSIONING OF NUCLEAR POWER PLANTS. Ingenioer-Nytt 16(24):18-19,27 (1980)

The general aspects of the decommissioning of power reactors are discussed. The three stages of decommissioning, stage 1 (protective storage, or mothballing), stage 2 (entombment) and stage 3 (complete dismantling, or green-field) are each briefly discussed, and practical experience referred to. The

amounts and types of waste and their disposal is also touched upon. It is estimated that decommissioning costs will be about 10 percent of the original construction costs.

ORIGIN: Foreign

KEYWORDS: COST; NUCLEAR POWER PLANTS; WASTE DISPOSAL; RADIOACTIVE WASTES; RADIOACTIVITY; REACTOR DECOMMISSIONING; REACTOR DISMANTLING; COST ESTIMATES

137
Chapin, J.A.; EG&G Idaho, Inc., Idaho Falls, ID

PATHWAYS AND COST-RISK-BENEFIT ANALYSES FOR INEL RADIOACTIVELY CONTAMINATED SOIL AREAS BEING EVALUATED FOR DECONTAMINATIN AND DECOMMISSIONING. EGG-2041: 108 pp. (1980)

Figures, tables, and a glossary are included. Appendices summarize dose calculations, nuclide metabolic data, pathways analysis, contaminated soil areas, and graphs of natural decay curves.

Several radioactively contaminated soil areas exist at the Idaho National Engineering Laboratory; virtually all are contaminated with nuclides of cesium, strontium, and cobalt at low levels of activity. This study develops a method of analysis to determine cost effective alternatives for decommissioning these areas, considering risk to the workers and general public, as well as the benefits to be gained. Because much of the input data to the analysis is highly subjective and detailed radiological characterization of the soil areas is minimal, it was decided that an analysis based on a relative weighting method be employed. The results of this analysis constitute a relative prioritization list of the soil areas being considered for decommissioning as well as the recommended decommissioning alternatives. The results of this analysis indicate that, of the 46 areas considered, 11 should be left in place under protective storage and 16 should be left as is. Nineteen ares were not analyzed because they were either operational or characterization data was not available. These results are based on a maximum exposure to a member of the general population, through realistic exposure pathways, of 5 mrem/yr. (Auth)

ORIGIN: Government

KEYWORDS: CESIUM; STRONTIUM; COBALT; IDAHO NATIONAL ENGINEERING LABORATORY; SOILS; DECONTAMINATION; DECOMMISSIONING; LOW-LEVEL RADIOACTIVE WASTES; COST; COMPARATIVE EVALUATIONS; RISK ASSESSMENT; COST BENEFIT ANALYSIS; PUBLIC HEALTH; DOSE RATES

138
Hine, R.E.; EG&G Idaho, Inc., Idaho Falls, ID

DECONTAMINATION AND DECOMMISSIONING OF THE SPERT-II AND SPERT-III REACTORS AT THE IDAHO NATIONAL ENGINEERING LABORATORY. EGG-2074: 28 pp. (1981)

This report describes the decontamination and decommissioning (D and D) of the Spert-II and Spert-III reactor facilities performed during the period June through September 1980 at the Idaho National Engineering Laboratory. It includes a detailed description of the D and D accomplished and the Post-D and D condition of the reactor facilities. The report also serves to document the radiological condition of the facilities after the D and D, the waste volume generated and its disposition, and the project cost and schedule.

ORIGIN: Government

KEYWORDS: COST; DECONTAMINATION; RADIOACTIVE WASTES; REACTORS; DECOMMISSIONING; SPERT-2 REACTOR; SPERT-3 REACTOR; IDAHO NATIONAL ENGINEERING LABORATORY

139
Chapin, J.A., R.E. Hine, and C.R. (Ed.) Tolman; EG&G Idaho, Inc., Idaho Falls, ID

DECONTAMINATION AND DECOMMISSIONING, LONG RANGE PLAN, IDAHO NATIONAL ENGINEERING LABORATORY. TREE-1250 (Volume 2): 319 pp. (1978)

Several diagrams are given in the appendices.

A detailed description of the various facilities for decontamination and burial is provided. Included in the discussion, which is divided into appendices, are: contaminated reactor facilities, reprocessing facilities, Idaho Chemical Processing Plant, description of laboratory facilities, burial grounds, description of contaminated miscellaneous equipment and areas, and contaminated inventory at the Idaho National Engineering Laboratory. All appendices are abstracted separately.

ORIGIN: Commercial; Government

KEYWORDS: IDAHO NATIONAL ENGINEERING LABORATORY; FUEL REPROCESSING PLANTS; RADIOACTIVE WASTE MANAGEMENT; CALCINATION; CONTAMINATION; DECONTAMINATION; EVAPORATION; ION EXCHANGE; MONITORING; RADIOACTIVE WASTE FACILITIES; REPROCESSING; SOLIDIFICATION; TANKS; URANIUM; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE STORAGE; VOLUME; SOLID WASTES; TRANSURANIUM ELEMENTS; INVENTORIES; GROUND DISPOSAL

140
Hine, R.E.; Idaho National Engineering Laboratory, Idaho Falls, ID

REMEDIAL ACTION, SURPLUS FACILITIES

DECONTAMINATION AND DECOMMISSIONING OF THE ORGANIC MODERATED REACTOR EXPERIMENT FACILITY (OMRE). EGG-2059: 98 pp. (1980)

This report describes the decontamination and decommissioning (D and D) of the Organic Moderated Reactor Experiment (OMRE) facility performed from October 1977 through September 1979. This D and D project included removal of all the facilities and as much contaminated soil and rock as practical. Removal of the reactor pressure vessel was an unusually difficult problem, and an extraordinary, unexpected amount of activated rock and soil was removed. After removal of all significantly contaminated material, the site consisted of a 20-ft deep excavation surrounded by backfill material. Before this excavation was backfilled, it and the backfill material were radiologically surveyed and detailed records made of these surveys. After the excavation was backfilled and graded, the site surface was surveyed again and found to be essentially uncontaminated.

ORIGIN: Government

KEYWORDS: COST; ENVIRONMENTAL IMPACTS; OMRE REACTOR; RADIATION HAZARDS; RADIATION MONITORING; WASTE DISPOSAL; RADIOACTIVE WASTES; REACTOR DECOMMISSIONING; REACTOR DISMANTLING

141
Hoech, G.W., and D.W. Rhodes; Idaho National Engineering Laboratory, Idaho Falls, ID

REMOVAL AND DISPOSAL OF RADIOACTIVE SLUDGE FROM THE FUEL STORAGE BASIN AT THE IDAHO CHEMICAL PROCESSING PLANT. ICP-1195: 19 pp. (1979)

The fuel storage basin at the Idaho Chemical Processing Plant recently underwent an intensive cleanup program, which included a major project to remove a five-to-ten cm layer of sludge from the basin floor and a lesser amount from the walls. This was done by a sub-contractor, Chem Nuclear, using an underwater vacuum system to pick-up the sludge. The sludge was then transported through a flexible line to a hydroclone, where it was separated into, (1) a concentrated sludge, which was placed in temporary storage in a stainless steel tank; and (2) water containing finely divided solids, which was returned to the inlet of the multimedia filters. Later the sludge was pumped from the sludge storage tank into concrete steel-lined vaults, where it was dewatered and solidified, then placed in storage at the Radioactive Waste Management Complex. When the project was completed, 43 vaults, containing approximately 48,150 liters of sludge weighing approximately 195,000 kg, had been filled and solidified. Based on the analytical results from several sludge samples, this sludge was calculated to contain 6.1 kg of

uranium, 2.9 kg of uranium-235, and 6.7 g of plutonium. A thin coat of sediment remains on the basin floor from the sludge removal project; this will be removed by a new vacuum system, currently in the design stage, which will be incorporated into the present water cleanup system. The experience gained from the sludge removal project is being used in designing the new system. (Auth)

ORIGIN: Government

KEYWORDS: US DOE; RESEARCH PROGRAMS; SLUDGES; RADIOACTIVE WASTES; WASTE MANAGEMENT; TANKS; WASTE TRANSPORTATION; VOLUME; URANIUM-235; PLUTONIUM; CLEANING; DECONTAMINATION; FUEL POOLS; IDAHO CHEMICAL PROCESSING PLANT; BASINS; SPENT FUEL STORAGE

142
Lawrence Berkeley Laboratory, Berkeley, CA

PRELIMINARY DRAFT: RADIOLOGICAL, HYDROGEOLOGICAL, GEOCHEMICAL AND GEOPHYSICAL ASSESSMENT OF THE WELDON SPRING QUARRY, MISSOURI DISPOSAL SITE. LBID-152: 144 pp. (1980)

The Weldon Spring Quarry was a USAEC disposal site for low level radioactive wastes between 1960 and 1969. The quarry is located in limestone bedrock, and only 200 feet of rock separate the wastes from the Missiouri River alluvial deposits in which are located wells that supply municipal water systems. This report contains results of the first phase of a program to assess the extent of containment migration via surface and ground water, to inventory the wastes present at the site, and to predict the impact of remedial action options. The most immediate radiation hazard found was a group of processed uranium waste piles at the east end of the quarry. Except for the waste piles, surface radiation in the quarry is low (less than 0.5 mRem/hr beta and gamma). Split spoon samples from auger holes and gamma-spectrometric measurements in these holes, showed the wastes on the main floor of the quarry to be dominated by Ra-226 and daughters, and chemically separated uranium. It was estimated that the main floor deposits contain 10-20 Curies of Ra-226, accompanied by a larger quantity of uranium. Geochemical samples of surface waters showed elevated uranium contents in the quarry sump and in the Femme Osage Slough system, but not in Little Femme Osage Creek, Femme Osage Creek, or the Missiouri River. Major recommendations for work to complete the study are given.

ORIGIN: Government

KEYWORDS: FIELD STUDIES; RESEARCH PROGRAMS; US DOE; MISSOURI; RADIONUCLIDE MIGRATION; URANIUM; RADIOACTIVE WASTES; LOW-LEVEL RADIOACTIVE WASTES; SEDIMENTARY ROCKS; LIMESTONES; GEOLOGY; GROUND WATER; SURFACE WATERS; CONTAMINATION; RADIUM-226; RADIATION HAZARDS; SAMPLING; GEOCHEMISTRY; INVENTORIES; WASTE

REMEDIAL ACTION, SURPLUS FACILITIES

DISPOSAL; DISPOSAL SITE

143
Cox, E.J., and R. Garde; Los Alamos Scientific Laboratory, Los Alamos, NM

DECONTAMINATION OF CONCRETE SURFACES AT THE LOS ALAMOS SCIENTIFIC LABORATORY.
LA-UR-80-1460; CONF-800542-3; Concrete Decontamination Workshop, Seattle, WA, May 28, 1980 (1980)

Available from NTIS, PC A02/MF A01.

For the past two years the Los Alamos Scientific Laboratory has been engaged in decontaminating its former plutonium facility. The facility was in use for over 30 years for plutonium operations varying from dry metallurgical processes to wet (solution) recovery processes. To date approximately 3400 square meters of floor surface have been decontaminated to permit re-use for nonplutonium work. Approximately 330 square meters of concrete surfaces required scarifying the contamination after all other attempts such as detergents and acid solutions had proven ineffective. The uses of hand-held and floor type pneumatic scarifiers are described as well as an inexpensive but effective contamination containment chamber built at Los Alamos for use with the hand-held model. Contamination control, waste handling, manpower requirements, and cost are documented for the techniques used at LASL.

ORIGIN: Commercial

KEYWORDS: CONCRETES; COST; DECONTAMINATION; FLOORS; LASL; NUCLEAR FACILITIES; RADIOACTIVE WASTE DISPOSAL; SURFACES; PLUTONIUM

144
Bell, J.P.; Oak Ridge National Laboratory, Oak Ridge, TN

ORNL DECONTAMINATION AND DECOMMISSIONING PROGRAM.
CONF-800416-4; UCC ND and GAT Waste Management Seminar Program, Portsmouth, OH, April 22, 1980 (1980)

Available from NTIS, PC A03/MF A01

A program has been initiated at ORNL to decontaminate and decommission surplus or abandoned nuclear facilites. Program planning and technical studies have been performed by UCC ND Engineering. A feasibility study for decommissioning the metal recovery facility, a fuel reprocessing pilot plant, has been completed.

ORIGIN: Government

KEYWORDS: ABANDONED SITES; COST; DATA; DECOMMISSIONING; DECONTAMINATION; DIAGRAMS; FEASIBILITY STUDIES; FLOWSHEETS; FUEL REPROCESSING PLANTS; RADIOACTIVE WASTE STORAGE; TABLES

145
Arrowsmith, H.W.; Pacific Northwest Laboratory, Richland, WA

DECONTAMINATION AND DECOMMISSIONING OF HANFORD FACILITIES - TECHNOLOGIES. PNL-3000-3; Nuclear Waste Management Quarterly Progress Report July Through September 1979, (pp. 13.1-13.11) 71 pp. (1979)

The intrinsic germanium x-ray spectrometer has been found to be an efficient and sensitive system for surveying large areas of transuranic contaminated surfaces. Efforts are in progress to assemble and calibrate a completely portable field survey instrument utilizing germanium diode spectroscopy. The differences observed among the concrete specimens of Hanford types studied are small, and none can be attributed specifically to the history of the specimen. To improve the concrete spaller system operation and the surface removal rate, a longer track was added and motors with control circuitry were incorporated to automatically position the drill. The improved equipment was tested at 100-F Area. The ability of the arc saw to split pipe was demonstrated, and enough cuts made to demonstrate a low blade-wear trend. A new cost/benefit task was established to develop and analyze unit cost data for the various D&D technologies. Processing of material removed from the reference alpha facility was begun. The material was decontaminated to less than 10 nCi/g TRU using vibratory finishing techniques. A 5000-gal liquid radioactive waste tank was successfully decontaminated using in-situ electropolishing techniques. The tank decontamination was accomplished using only 50 gal of electrolyte, with 85% of the interior surfaces decontaminated from outside the tank. Two fixatives were selected for field testing: a polyvinyl alcohol which forms a clear, tough film easily removed by vibratory finishing and a polybutyl dispersion which forms a durable, strippable film.

ORIGIN: Government

KEYWORDS: US DOE; RESEARCH PROGRAMS; DECONTAMINATION; DECOMMISSIONING; PROGRESS REPORTS; LABORATORY STUDIES; SPECTROMETRY; INSTRUMENTS; TRANSURANIUM ELEMENTS; MEASURING INSTRUMENTS; RADIOACTIVE WASTES; LIQUID WASTES; TANKS; ELECTROPOLISHING; COST BENEFIT ANALYSIS

146
Sexton, R.A., and J.P. Melvin; Rockwell Hanford Operations, Research and Engineering Division, Richland, WA

SUMMARY OF THE DEVELOPMENT OF A COST/RISK/BENEFIT ANALYSIS FOR THE DECONTAMINATION AND DECOMMISSIONING OF THE HANFORD Z-PLANT. RHO-SA-103; CONF-790923: 14 pp. (1979)

The Hanford Z-Plant complex is a large plutonium facility located

on the Hanford Site in Eastern Washington. This study includes eight buildings totaling about 240,000 sq ft of floor space. They contain processing facilities, laboratories, offices, storage space, ventilation equipment, and a 200 foot stack. The facilities contain contaminated equipment and contaminated structural surfaces. Most of the contamination in Z-Plant is plutonium with some americium. Z-Plant was designed to convert plutonium nitrate product solutions from the spent fuel reprocessing facilities into plutonium metal for fabrication of weapons parts. The Plutonium Reclamation Facility, 236-Z, was constructed to recover and recycle plutonium from scrap and solutions generated during reduction to metal. The processing facilities in Z-Plant are currently scheduled for deactivation by 1983, with the laboratory facilities expected to remain operative beyond that. The objective of this study is to quantify costs/risks/and benefits associated with various approaches to the D&D of Z-Plant. It should be understood that subjectivity is involved in comparing radiological hazards to dollars, but this study attempts to provide objective input into the subjective analysis. There are a number of alternatives to be considered in the planning of any D&D project. The major questions addressed in this Cost/Risk/Benefit Analysis are, to what level of residual contamination should the project be carried, and what combination of D&D methods should be used. The study includes consideration of the alternative of maintaining an inactive facility without undertaking D&D. It also includes analysis of various endpoints, and the impact of using new and developing D&D technology. In order to maintain flexibility to perform a variety of calculations, and respond to changes in input data or endpoint criteria, a computer program was written to perform the calculations required by this report.

ORIGIN: Government

KEYWORDS: DECOMMISSIONING; DECONTAMINATION; HANFORD RESERVATION; BUILDINGS; PLUTONIUM NITRATES; FUEL REPROCESSING PLANTS; PLUTONIUM; NUCLEAR WEAPONS; COST ESTIMATES; COST BENEFIT ANALYSIS

147
U.S. Department of Energy, Assistant Secretary for Nuclear Energy, Office of Nuclear Waste Management, Washington, DC

NUCLEAR WASTE MANAGEMENT PROGRAM SUMMARY DOCUMENT. DOE/NE-0008: 273 pp. (1980)

Included is a table of presently planned defense D & D projects.

The D & D of surplus defense-related DOE facilities is a separately funded sub-activity accomplished as part of the Surplus Facilities Management Program (SFMP) described in the section of Remedial Actions. The objective of Defense D & D is to

reach a point where no further maintenance and surveillance of the surplus facility are required because of the radiological safety considerations. In some cases, decontamination may be adequate and in others, the facility or a portion of it will have to be removed for disposal. Transportation requirements will be identified and schedules established. The Defence D & D projects fall into many categories. The projects presently planned to begin through FY 1982 are as follows: FY 1980 Start--ORNL Curium Facility, INEL Hot Waste Tank, INEL Fuel Element Cutting Facility; FY 1981 Start--Mound Facility Buildings (PP, R), ORNL Waste Holding Basin, INEL Reprocessing Cells, INEL Liquid Metal Furance, INEL Original Waste Calciner; and FY 1982 Starts--ORNL Gunite Storage Tanks, INEL CPP Heating/Ventilating System, INEL CPP Carbon Beds and Filter, INEL Hot Waste Tanks. The appropriated budget for FY 1980 is $2000K and for FY 1981, $6070K.

ORIGIN: Government

KEYWORDS: DECONTAMINATION; DECOMMISSIONING; MILITARY FACILITIES; COST; DEFENSE WASTES; NUCLEAR FACILITIES; ORNL; INEL; STORAGE FACILITIES; BUDGETS; MOUND LABORATORY

148
Townes, G.A., M.L. Rogell, and R.T. Anderson; Allied-General Nuclear Services, Barnwell, SC

STUDIES AND RESEARCH CONCERNING BNFP SPENT FUEL DISASSEMBLY AND CANNING PROGRAMS AT THE BARNWELL NUCLEAR FUEL PLANT (BNFP). AGNS-35900-1.2-45: 64 pp. (1979)

Methods of disassembling and canning spent fuel to allow more efficient storage are being investigated at the BNFP. Studies and development programs are aimed at dry disassembly of fuel to allow storage and shipment of fuel pins rather than complete fuel assemblies. Results indicate that doubling existing storage capacity or tripling the carrying capacity of existing transportation equipment is achievable. Disassembly could be performed in the BNFP hot cells at rates of about 12 to 15 assemblies per day. (Auth)

ORIGIN: Commercial

KEYWORDS: LABORATORY STUDIES; RESEARCH PROGRAMS; US DOE; SPENT FUELS; PACKAGING; WASTE TRANSPORTATION; BARNWELL FUEL REPROCESSING PLANT; INTERIM STORAGE; SPENT FUEL ELEMENTS; BARNWELL FUEL REPROCESSING PLANT

149
Bechtel National, Inc., Nuclear Fuel Operations, San Francisco, CA

AN ASSESSMENT OF LWR SPENT FUEL DISPOSAL OPTIONS. VOLUME 2. SYSTEM DEFINITION AND ASSESSMENTS. ONWI-39, Vol. 2: 188 pp. (1979)

A study designed to provide the U.S. Department of Energy with an evaluation of ultimate disposition methods for spent nuclear fuel assemblies is presented. Various alternatives for the treatment of spent fuel elements for the purpose of geologic isolation were analyzed, and contrasted to the geologic isolation of high-level waste from fuel reprocessing. Alternative forms of spent fuel were identified and the physical system and facilities necessary to process, handle, and transport each of them were defined. A methodology was developed for comparing various disposal alternatives for spent fuel, and these alternatives were analyzed and rated in terms of six assessment criteria: technical feasibility, safeguards, criticality, radiological impact, retrievability, and economics. Gaps were identified where additional research and development are required to develop and demonstrate technologies.

ORIGIN: Commercial

KEYWORDS: RESEARCH PROGRAMS; US DOE; SPENT FUELS; REVIEWS; WASTE PROCESSING; WASTE DISPOSAL; WASTE STORAGE; HIGH-LEVEL RADIOACTIVE WASTES; REPROCESSING; COMPARATIVE EVALUATIONS; WASTE TRANSPORTATION; ECONOMICS; FEASIBILITY STUDIES; RETRIEVAL; LWR TYPE REACTORS; SPENT FUEL ELEMENTS; ECONOMICS

150
Bechtel National, Inc., San Francisco, CA

ASSESSMENT OF LWR SPENT FUEL DISPOSAL OPTIONS, VOLUME 1, SUMMARY AND CONCLUSIONS. ONWI-39, Vol. 1 (1979)

Available from NTIS PC A03/MF A01.

A general overview of a study is presented, which 1) identifies several spent fuel waste forms as well as the high level waste and other waste forms from fuel reprocessing, 2) defines facility and system design features to handle, transport, process, encapsulate, and dispose of these spent fuel and waste forms, and 3) provides a comparative assessment of each of the spent fuel/waste alternatives with respect to technical feasibility, safeguards, criticality, radiological impact, retrievability, and economics. Specific conclusions developed from the comparative assessments of the study cases and study variations are detailed. Three study cases involving the entire back end of the spent fuel disposal system were investigated and contrasted to a Reference Case. Several study variations were also reviewed and analyzed to a lesser degree. It was concluded that 1) all of the cases studied were technically feasible, 2) case 1 was the simplest case, scoring well in almost all the assessments, 3) transportation of all nuclear materials studied is feasible, and by the private sector, given suitable financial guarantees, 4) the most urgent need is to define the specific technical bases and design criteria for facility development, 5) there are no radiological hazards for the cases studied nor risks to arouse public concern even approaching those which it routinely accepts, 6) long-term criticality is neither a significant hazard nor would it prove an impediment to implementation, 7) the spent fuel disposal cycle would not attract a terrorist since additional processing would be required to make it of value, 8) since the Reference Case involves separated Pu, methods are available for reduction of theft risks, 9) it is feasible to design a repository with retrieval capabilities, and 10) the Reference Case is much more economical than the spent fuel cases but all are feasible at reasonable cost.

ORIGIN: Commercial

KEYWORDS: SPENT FUELS; HIGH-LEVEL RADIOACTIVE WASTES; WASTE MANAGEMENT; PLUTONIUM; WASTE DISPOSAL; FUEL CYCLE; COST; WASTE TRANSPORTATION; ACCIDENTS; REPROCESSING; RADIOACTIVE WASTE FACILITIES; DESIGN

151
Piatier, H.; Compagnie Generale Des Matieres Nucleaires (COGEMA), La Boursidiere, 92-Le Plessis-Robinson

REPROCESSING OF IRRADIATED FUELS. Rev. Gen. Nucl. 2:159-167 (1979)

In French

Having first introduced the dry and wet (Purex) reprocessing procedures, the reprocessing situation in France and the coordination and cooperation policies applied in this at the European level are described. The problem of wastes issued from the reprocessing operations, both as concerns reliability and the economics of the fuel cycle is considered.

ORIGIN: Foreign

KEYWORDS: CEA LA HAGUE; CEA MARCOULE; DATA; FORECASTING; FRANCE; GRAPHS; ISOLATED VALUES; PLANNING; REPROCESSING; SPENT FUELS; ECONOMICS

152
Greene, E.M.; Hanford Engineering Development Laboratory, Richland, WA

SPENT FUEL DATA FOR WASTE STORAGE PROGRAMS. HEDL-TME 79-20: 100 pp. (1980)

Schematics, fuel design data, drawings, maps, graphs and tables are included.

Data on LWR spent fuel were compiled for dissemination to participants in DOE-sponsored waste storage programs. A Centralized Fuel Data base is maintained as a common reference for spent fuel characteristics and conditions. Included are mechanical descriptions of the existing major types of LWR fuel assemblies, spent LWR fuel fission product inventories and decay heat data, and inventories of LWR spent fuel currently in storage, with projections of future quantities. Based on an 200-GWe installed nuclear capacity in the year 2000, HEDL projects approximately 276,000 discharged fuel assemblies, excluding discharged assemblies reprocessed before 1972. Specific information is provided about Turkey Point spent fuel used in the dry surface storage demonstration, including fuel assembly physical, mechanical, material and dimensional characteristics, and operating history. The decay heat of a reference PWR spent fuel assembly irradiated to a 33,000-MWd/MT level was calculated to be approximately 1.1 kW per assembly after a 5 yr cooling period, and for a reference BWR fuel assemble irradiated to a 28,000-MWd/MT level, about 0.32 kW per assembly.

ORIGIN: Commercial

KEYWORDS: INVENTORIES; SPENT FUELS; SPENT FUEL STORAGE; WASTE STORAGE; SPENT FUEL ELEMENTS; LWR TYPE REACTORS; US DOE; PROGRAMS; FISSION PRODUCTS; FORECASTING; AFTER HEAT; TURKEY-POINT REACTOR; REVIEWS; PWR TYPE REACTORS

153
Lawrence, M.J.

SPENT FUEL

AWAY-FROM-REACTOR FUEL ELEMENT STORAGE & TRANSPORTATION OF NUCLEAR WASTE. Transactions of American Nuclear Society 32:100-101; CONF-790602; ANS Annual Meeting, Atlanta, GA, June 3, 1979, 5 pp. (1979)

A brief overview is given for U.S. DOE's program to store U.S. commercial and foreign spent fuels. In response to a growing scarcity of spent fuel storage capacity which could cause shutdown of U.S. commercial reactors and which could lead to the need for reprocessing in foreign countries and thereby the possibility of weapons proliferation, the U.S. DOE has submitted legislation to congress to provide automation to begin an interim storage program for U.S. commercial and limited amounts of foreign spent fuels.

ORIGIN: Commercial; Foreign

KEYWORDS: REVIEWS; SPENT FUELS; AWAY-FROM-REACTOR STORAGE; SPENT FUEL STORAGE; COMMERCIAL WASTES; NUCLEAR POWER PLANTS; GOVERNMENT POLICIES; PROLIFERATION; WASTE TRANSPORTATION; REPROCESSING; US DOE; INTERNATIONAL COOPERATION; PROGRAMS

154
Lawrence, M.J.

STATUS OF DOE AFR STUDIES. American Nuclear Society, 25th Annual Meeting, Atlanta, GA, June 3-8, 1979, 5 pp. (1979)

A brief overview is given for the U.S. DOE program for Away-From-Reactor (AFR) interim storage of spent fuels. This program was developed to prevent reactor shutdowns due to inadequate spent fuels storage capacities. Commercial storage capacities have been reviewed, a conceptual design has been completed for an AFR interim storage facility, and storage charges have been assessed.

ORIGIN: Commercial

KEYWORDS: REVIEWS; AWAY-FROM-REACTOR STORAGE; SPENT FUELS; SPENT FUEL STORAGE; COMMERCIAL WASTES; NUCLEAR POWER PLANTS; GOVERNMENT POLICIES; US DOE; INTERIM STORAGE; COST

155
Cobb, D.D.; Los Alamos Scientific Laboratory, Los Alamos, NM

SPENT-FUEL STORAGE FACILITY PROJECT. PROGRESS REPORT, JUNE 1-SEPTEMBER 30, 1979. LA-8237-PR (1980)

Available from NTIS, PC A03/MF A01.

The Los Alamos Scientific Laboratory (LASL) Safeguards Groups (Q-1, Q-2, Q-3, Q-4, Q-5) and the Nuclear Data Group (T-2) are participating in the U.S. Department of Energy Away-From-Reactor Spent-Fuel Storage Program. This report presents the status of the LASL

Spent Fuel Storage Facility Project being performed under the direction of Savannah River Laboratory. Four task areas are: concept development, spent-fuel assay, spent-fuel verification, and automated data-base management.

ORIGIN: Commercial

KEYWORDS: ACCOUNTING; AWAY-FROM-REACTOR STORAGE; DATA BASE MANAGEMENT; INVENTORIES; NONDESTRUCTIVE ANALYSIS; NUCLEAR MATERIALS MANAGEMENT; RESEARCH PROGRAMS; SAFEGUARDS; SPENT FUEL STORAGE; SPENT FUELS; LASL

156
Los Alamos Scientific Laboratory, Los Alamos, NM

MATERIALS MANAGEMENT IN AN INTERNATIONALLY SAFEGUARDED FUELS REPROCESSING PLANT: VOLUME 2. LA-8042, Vol. 2: 141 pp. (1980)

The first volume of this report summarizes the results and conclusions for this study of conventional and advanced nuclear materials accounting systems applicable for both large (1500 MTHM/yr) and small (210 MTHM/yr) spent-fuel reprocessing facilities subject to international verification. The second volume describes the requirements and functions of materials measurement and accounting systems (MMAS) and conceptual designs for an MMAS incorporating both conventional and near-real-time (dynamic) measurement and accounting techniques. Effectiveness evaluations, based on recently developed modeling, simulation, and analysis procedures, show that conventional accountability can meet IAEA goal quantities and detection times in these reference facilities only for low-enriched uranium. Dynamic materials accounting may meet IAEA goals for detecting the abrupt (1-3 wk) diversion of 8 kg of plutonium. Current materials accounting techniques probably cannot meet the 1-yr protracted-diversion goal of 8 kg for plutonium. Supporting information, including detailed facility and process descriptions, and details of the design and analysis procedure are given in a third volume (Appendices). (Auth)

ORIGIN: Government

KEYWORDS: NUCLEAR MATERIALS; SPENT FUELS; REPROCESSING; DESIGN; WASTE MANAGEMENT; MATHEMATICAL MODELS; REVIEWS; PLUTONIUM; DIVERSION; URANIUM; METHODS; THEORETICAL STUDIES; SITE SELECTION; FUEL REPROCESSING PLANTS

157
Los Alamos Scientific Laboratory, Los Alamos, NM

MATERIALS MANAGEMENT IN AN INTERNATIONALLY SAFEGUARDED FUELS REPROCESSING PLANT: VOLUME 3. LA-8042, Vol. 3: 265 pp. (1980)

Supporting information required for the design, evaluation, and implementation of an improved

materials accounting system for reprocessing-conversion facilities is included in the third volume (the Appendices) of this report. Appendices A, B, and C include the basic process chemistry, descriptions of the reference facilities, and recommendations for possible process and facility modifications for improved materials accounting. The operator's safeguards system structure is reviewed in Appendix D. Appendices E-1 review the tools used in the design and effectiveness evaluation studies, including the mathematical basis for international verification of the system. Measurement methodologies are reviewed in Appendices J-N. Appendix O considers the problem of integrating materials accounting and containment and surveillance measures. (Auth)

ORIGIN: Government

KEYWORDS: SPENT FUELS; REPROCESSING; NUCLEAR MATERIALS; DIVERSION; PLUTONIUM; CHEMISTRY; RADIOCHEMISTRY; RECOMMENDATIONS; DESIGN; EVALUATION; METHODS; CONTAINMENT; THEORETICAL STUDIES; REVIEWS; WASTE MANAGEMENT; FUEL REPROCESSING PLANTS

158
Lin, K.H.; Oak Ridge National Laboratory, Oak Ridge, TN

PROCESS ALTERNATIVES FOR HTGR FUEL REPROCESSING WASTES: AN ENGINEERING EVALUATION. ORNL/TM-5823: 92 pp. (1977)

Numerous process alternatives for different types of radioactive wastes from reprocessing of HTGR fuels were evaluated. Pertinent waste characteristics are discussed and a description and assessment of selected process alternatives are given. Finally, research and development needs for specific alternatives are identified. High-level wastes from the head-end system, unique to HTGR fuel reprocessing, require major process development efforts. Most other types of wastes can reasonably be expected to make use of technologies being developed for LWR wastes, and will require minor to moderate modifications.

ORIGIN: Commercial

KEYWORDS: CALCINATION; CLASSIFICATION; EVALUATION; FUEL REPROCESSING PLANTS; HTGR TYPE REACTORS; LEACHING; RADIOACTIVE WASTE PROCESSING; SOLIDIFICATION; VITRIFICATION; REPROCESSING

159
Lin, K.H.; Oak Ridge National Laboratory, Oak Ridge, TN

CHARACTERISTICS OF RADIOACTIVE WASTE STREAMS GENERATED IN HTGR FUEL REPROCESSING. ORNL/TM-5096: 38 pp. (1976)

This report presents the results of a study concerned with identification and characterization of radioactive

waste streams from an HTGR fuel reprocessing plant. Approximate quantities of individual waste streams as well as pertinent characteristics of selected streams have been estimated. Most of the waste streams are unique to HTGR fuel reprocessing; however, waste streams from the solvent extraction system and from the plant facilities do not differ greatly from the corresponding LWR fuel reprocessing wastes.

ORIGIN: Commercial

KEYWORDS: REPROCESSING; SPENT FUELS; HTGR TYPE REACTORS; WASTE STREAMS; FISSION PRODUCTS; SOLVENT EXTRACTION; OFF-GAS SYSTEMS; FUEL CYCLE; THORIUM

160
Judd, M.S., R.A. Bradley, and A.R. Olsen; Oak Ridge National Laboratory, Oak Ridge, TN

CHARACTERIZATION OF EFFLUENTS FROM A HIGH-TEMPERATURE GAS-COOLED REACTOR FUEL REFABRICATION PLANT. ORNL/TM-5059: 50 pp. (1975)

The types and quantities of chemical and radioactive effluents that would be released from a reference fuel refabrication facility for the high-temperature gas-cooled reactor (HTGR) have been determined. This information will be used to predict the impact of such a facility on the environment, to identify areas where additional development work needs to be done to further identify and quantify effluent streams, and to limit effluent release to the environment. (Auth)

ORIGIN: Commercial

KEYWORDS: FUEL REPROCESSING PLANTS; GASEOUS WASTES; HTGR TYPE REACTORS; MATERIALS RECOVERY; NONRADIOACTIVE WASTES; RESEARCH PROGRAMS; SOLID WASTES; THERMAL EFFLUENTS; FUEL REFABRICATION

161
Office of Nuclear Waste Isolation, Columbus, OH

PROJECTED COSTS FOR DEEP GEOLOGIC REPOSITORIES FOR SPENT FUEL DISPOSAL. ONWI-191: 20 pp. (1980)

Repository characteristics and costs are given in tables.

Cost estimates are given for the research, development, engineering, licensing, and management of design and construction required to develop commercial spent fuel isolation facilities. Design, construction and decommissioning costs for such facilities are also included.

ORIGIN: Commercial

KEYWORDS: THEORETICAL STUDIES; COST; SPENT FUELS; STORAGE FACILITIES; RADIOACTIVE WASTE FACILITIES; DESIGN; CONSTRUCTION; DECOMMISSIONING; WASTE MANAGEMENT; LICENSING; SPENT FUEL STORAGE; COST ESTIMATES

162
Zima, G.E.; Pacific Northwest Laboratory, Richland, WA

INDEPENDENT SPENT FUEL STORAGE INSTALLATIONS (ISFSI) ANNUAL REPORT FOR FY 1978. PNL-2880: 12 pp. (1979)

The prime objective of the subject program is the identification of technical aspects of the design, operation and maintenance of independent spent fuel storage installations which would contribute to technical bases for Regulations and Regulatory Guides issued by NRC for these facilities. Activities on the various tasks of the program for the FY 1978 period are discussed in this report. (Auth)

ORIGIN: Commercial

KEYWORDS: REVIEWS; US NRC; US DOE; RESEARCH PROGRAMS; SPENT FUELS; SPENT FUEL STORAGE; REGULATIONS; STORAGE FACILITIES; EVALUATION

163
White, M.K.; Pacific Northwest Laboratory, Richland, WA

ANALYSIS OF SPENT FUEL POLICY IMPLEMENTATION. PNL-3000-7; Nuclear Waste Management Quarterly Progress Report July Through September 1980, (p. 20.1), 120 pp. (1980)

Project activities have consisted of updating the spent fuel storage and disposal fee calculations and modifying the computer models used to reflect changes in the reference methodology. The storage and disposal fees have been updated because of changes in the program assumptions for facility startup for the management of spent fuel and because of changes in estimated program costs. The calculational methodology has been modified to incorporate recent changes in the fee prepayment assumptions. (Auth)

ORIGIN: Government

KEYWORDS: US DOE; RESEARCH PROGRAMS; THEORETICAL STUDIES; SPENT FUELS; WASTE DISPOSAL; COST; MATHEMATICAL MODELS; COMPUTER CODES; SPENT FUEL STORAGE

164
Johnson, A.B., Jr.; Pacific Northwest Laboratory, Richland, WA

BEHAVIOR OF SPENT NUCLEAR FUEL IN WATER POOL STORAGE. BNWL-2256: 95 pp. (1977)

The state-of-the-art of spent nuclear fuel storage in water pools is assessed. Five U.S. and Canadian sites, representing nine storage pools, were visited and information was gathered on Canadian, British and German experience. With storage times of up to 18 years, no evidence has been found indicating singificant deterioration. Low temperatures and favorable water chemistries are not likely to cause cladding deterioration. There is sufficient

evidence to warrant expectations that spent fuels with adequate surveillance can be stored for between 20 and 100 years without serious hazards.

ORIGIN: Commercial; Foreign

KEYWORDS: REVIEWS; FUEL POOLS; SPENT FUELS; SPENT FUEL STORAGE; CONTAINER INTEGRITY; CONTAINMENT; CONTAINERS; CLADDING; CANADA; USA; ZIRCALOYS; STAINLESS STEELS

165
Rockwell Hanford Operations and Kaiser Engineers

DRY WELLS STORAGE FACILITY CONCEPTUAL DESIGN STUDY. RHO-C-25, Vol. 1: 135 pp. (1979)

To implement the U.S. government decision to indefinitely defer chemical reprocessing of spent fuel from the nuclear power industry, the Department of Energy (DOE) has established the Spent Fuel Handling and Packaging Program to provide a means of encapsulating light-water reactor spent fuel in a package that will be compatible with the selected surface storage mode (dry well) or with one or more of the geologic repository concepts presently under consideration. Rockwell Hanford Operations is responsible for overall program management, which includes the conceptual design of the Dry Well Storage Facility described in this report. The facility, sited adjacent to the 200-West Area of the Hanford Reservation as the design reference, provides for 50 years of interim surface storage of all LWR spent fuel assemblies that will have accumulated as a result of commercial nuclear power plant operation through the year 1990. The facility described in this report is assumed to be located adjacent to or near a spent fuel receiving and packaging facility and/or a packaged fuel transfer facility. The estimated cost of the project, performance requirements, quality levels and codes and standards, and the schedule and methods of performance are discussed.

ORIGIN: Commercial

KEYWORDS: SPENT FUELS; RESEARCH PROGRAMS; REVIEWS; US DOE; LWR TYPE REACTORS; RADIOACTIVE WASTES; SPENT FUEL STORAGE; WASTE MANAGEMENT; WELLS; PACKAGING; ENCAPSULATION; STORAGE FACILITIES; INTERIM STORAGE

166
Black, J.E., and F.D. King; Savannah River Laboratory, Aiken, SC

DESIGN COMPARISONS FOR AWAY-FROM-REACTOR SPENT FUEL STORAGE BASINS. DP-MS-78-4: 19 pp. (1978)

This report describes work by DuPont for the Department of Energy to design a facility for receipt and storage of spent fuel as part of the International Spent

Fuel Storage Program at the Savannah River Plant. The facility will be able to receive and store 5,000 metric tons of domestic and foreign light water reactor spent fuel elements. Conceptual design and cost estimates are discussed.

ORIGIN: Commercial; Foreign

KEYWORDS: AWAY-FROM-REACTOR STORAGE; THEORETICAL STUDIES; INTERIM STORAGE; STORAGE FACILITIES; SPENT FUELS; DESIGN; COST; LWR TYPE REACTORS; SPENT FUEL STORAGE; PROGRAMS; FUEL POOLS

167
Clark, H.J.; Savannah River Laboratory, Aiken, SC

FEDERAL FEES AND CONTRACTS FOR STORAGE AND DISPOSAL OF SPENT LWR FUEL. DP-MS-79-71: 17 pp. (1979)

The methodology for establishing a fee for federal spent fuel storage and disposal services is explained along with a presentation of the cost centers and cost data used to calculate the fee. Results of the initial fee calculation and the attendant sensitivity studies are also reviewed. The current status of the fee update is presented. The content of the proposed contract for federal services is briefly reviewed. (Auth)

ORIGIN: Government

KEYWORDS: THEORETICAL STUDIES; SPENT FUELS; ECONOMICS; FEDERAL REGULATIONS; GOVERNMENT POLICIES; LWR TYPE REACTORS; COST; SPENT FUEL STORAGE; FORECASTING; WASTE DISPOSAL; CHARGES

168
Lehtinen, R., P. Silvennoinen, and J. Vira; Technical Research Centre of Finland, Helsinki, Finland

ALLOWING FOR UNCERTAINTIES IN THE EXPECTED WASTE MANAGEMENT COSTS. Radioactive Waste Management 1(1):43-55 (1980)

Graphs and tables are included which show information on cost data.

Evaluating the estimates available, the uncertainties embedded in waste management and disposal costs are expressed by means of subjective probability distributions. Cost data for each separate operational step are convoluted into a probabililty estimate of the total cost. As a case study, LWR spent fuel management is examined for both once-through and recycle alternatives. While the recycle cases entail lower expected costs, the associated uncertainty variance is an order of magnitude larger than that for the once-through options. (Auth)

ORIGIN: Foreign

KEYWORDS: URANIUM; PLUTONIUM; SPENT FUELS; WASTE MANAGEMENT; COST; LWR TYPE REACTORS; NUMERICAL ANALYSIS; FUEL CYCLE; EVALUATION;

ECONOMICS; WASTE DISPOSAL; REPROCESSING; COMPARATIVE EVALUATIONS; REVIEWS; RESEARCH PROGRAMS; FINLAND

169
Forster, J.D., and S. Cohen; TRW Energy Systems Planning Division, McLean, VA

THE DISCOUNT RATE IN THE SPENT FUEL STORAGE AND DISPOSAL FEE. ONWI-189 (1980)

This study evaluates the suitability of alternative discount rates for use in calculating the fee the Government will charge utilities for acceptance and disposition of commercial spent nuclear fuel. The use of a discount rate assures recovery of the Government's capital costs, i.e. interest, for the spent fuel program. The choice of this rate will affect both the level of the fee and the rate of change of the fee in future revisions. An introduction of the financial analyses, discount rates, and interest rates involved, is followed by a discussion of existing Government guidelines for establishing charges for any service provided by the Government to be paid by users of those services. Guidelines identified include the requirement of full cost recovery, the allowance of appropriate research expenses, the annual updating of user charges, and precedent for use of Government borrowing rates to calculate interest. Three current Government user charges analyzed including interest rate policies and how these charges provide precedent for the spent fuel acceptance and disposal fee are: uranium enrichment services, the sale of electric power, and the delivery of experiments to orbit by the NASA Space Shuttle. The current DOE policy regarding this storage and disposal fee states that: the full Government cost is borne by users; the fee is set and due at the time of spent fuel delivery; and the fee is adjusted when spent fuel is transferred from the AFR to the repository. Four evaluation criteria in analyzing the applications of discount rates are: recovery in full of Government interest costs; availability of a proxy for numerical estimation of the rate; suitability of the proxy; and the adaptability of the discount rate to the future. Discount rates based on seven different financial assumptions were evaluated. A discussion of three questions conclude the study: should DOE implement a pricing method which directly displays interest expense on undepreciated investment, will numerical calculations of fee time histories under a number of assumptions demonstrate stability and full cost recovery, and which costs and to what extent are these costs included in current government user charges.

ORIGIN: Commercial

KEYWORDS: COST; COST ESTIMATES; WASTE STORAGE; CHARGES

170
U.S. Department of Energy, Washington, DC

FINAL ENVIRONMENTAL IMPACT STATEMENT: US SPENT FUEL POLICY. CHARGE FOR SPENT FUEL STORAGE - VOLUME 4. DOE/EIS-0015, Vol. 4: 75 pp. (1980)

Available from NTIS, PC E03/MF E03

The United States Government policy relating to nuclear fuel reprocessing, which was announed by President Carter on April 7, 1977, provides for an indefinite deferral of reprocessing, and thus commits light water reactor (LWR) plants to a once-through fuel cycle during that indefinite period. In a subsequent action implementing that policy, the Department of Energy (DOE) on October 18, 1977 announced a spent fuel policy which would enable domestic, and on a selective basis, foreign utilities to deliver spent fuel to the US Government for interim storage and final geologic disposal, and to pay the government a fee for such services. This volume addresses itself to whether the fee charged for these services, by its level or its structure, would have any effect on the environmental impacts of implementing the spent fuel policy itself. Thus it analyzes the fee and various alternatives to determine the interaction between the fee and the degree of participation by domestic utilities and foreign countries in the proposed spent fuel program for implementing the spent fuel policy. It also analyzes the effect, if any, of the fee on the growth of nuclear power.

ORIGIN: Commercial; Foreign

KEYWORDS: CHARGES; COST; DATA; ECONOMIC IMPACT; ENERGY CONSUMPTION; ENVIRONMENTAL IMPACT STATEMENTS; ENVIRONMENTAL IMPACTS; GOVERNMENT POLICIES; GRAPHS; IMPLEMENTATION; INVENTORIES; LAND USE; NUCLEAR INDUSTRY; SPENT FUEL STORAGE; SPENT FUELS; TABLES; VOLUME; RADIOACTIVE WASTE STORAGE

171
U.S. Department of Energy, Washington, DC

FINAL ENVIRONMENTAL STATEMENT: US SPENT FUEL POLICY. STORAGE OF FOREIGN SPENT POWER REACTOR FUEL. DOE/EIS-0015, Vol. 3 (1980)

Available from NTIS, PC E03/MF E03

In October, 1977, the Department of Energy (DOE) announced a spent fuel storage policy for nuclear power reactors in which U.S. utilities will be given the opportunity to deliver spent fuel to US Government custody for a fee. The US Government will also be prepared to accept a limited amount of spent fuel from foreign sources when such action would contribute to meeting nonproliferation goals. Under the new policy, spent fuel transferred to the US Government will be delivered, at user expense, to a US Government-apporoved site. Foreign spent fuel would be stored

in interim spent fuel storage (ISFS) facilities with domestic fuel. This volume of the environmental impact statement includes effects associated with implementing or not implementing the spent fuel storage policy for the foreign fuels. The analyses show that there are no substantial radiological health impacts either way. In no case considered does the population dose commitment exceed 0.000006% of the world population dose commitment from natural radiation sources over the period analyzed. Full implementation of the US offer to accept a limited amount of foreign spent fuel for storage provides the greatest benefits for US nonproliferation policy. Acceptance of lesser quantities of foreign spent fuel in the US or less US support of foreign spent fuel storage abroad provides some nonproliferation benefits, but at a significantly lower level than full implementation of the offer. Not implementing the policy in regard to foreign spent fuel will be least productive in the context of US nonproliferation objectives. The remainder of the summary provides a brief description of the options that are evaluated, the facilities involved in these options, and the environmental impacts, including nonproliferation considerations, associated with each option.

ORIGIN: Commercial; Foreign

KEYWORDS: DATA; DIAGRAMS; DOSE COMMITMENTS; ENVIRONMENTAL IMPACT STATEMENTS; ENVIRONMENTAL IMPACTS; GLOBAL ASPECTS; GOVERNMENT POLICIES; GRAPHS; HEALTH HAZARDS; IMPLEMENTATION; IMPORTS; LAND USE; MAN; PROLIFERATION; RADIOACTIVITY; SAFEGUARDS; SPENT FUEL STORAGE; SPENT FUELS; TABLES; TRANSPORT; VOLUME

172
U.S. Department of Energy, Washington, DC

FINAL ENVIRONMENTAL IMPACT STATEMENT: US SPENT FUEL POLICY. EXECUTIVE SUMMARY. DOE/EIS-0015, Vol. 1 (1980)

Available from NTIS, PC E03/MF E03

The analysis of the environmental impacts for storage of domestic fuel shows that the impacts for the full range of alternatives considered are relatively small compared with available resources or background exposure of the population from natural radiation sources. The differences in impacts of storage of domestic fuel are attributed to the amount of fuel stored in independent spent fuel storage (ISFS) facilities, the storage time, and, to a lesser degree, the difference in spent fuel transportation.. The differences between comparable alternatives of implementing the policy or not are small. The differences in impacts of storage of foreign fuel are attributed to the amount of fuel received under the policy and to the disposition mode analyzed. The impact of storage of foreign fuel (a small fraction of the amount of domestic fuel considered) is also small.

SPENT FUEL

As a result of the small differences in environmental impacts of all cases considered for foreign fuel, environmental impacts probably will not strongly influence the selection of the case that best meets US nonproliferation goals. Proliferation benefits of the various cases analyzed vary significantly. The structure and level of fee charged for storage of spent fuel will affect the degree of participation in the spent fuel storage program by utilities. However, the range of participation is within the range of alternatives analyzed in the draft EISS on storage of US and foreign fuels, for which the environmental effects were found to be relatively small. The fee computed on the basis of full recovery of government costs should not significantly affect the cost of generating nuclear power.

ORIGIN: Commercial; Foreign

KEYWORDS: CHARGES; DATA COMPILATION; DOSE COMMITMENTS; ENVIRONMENTAL IMPACT STATEMENTS; ENVIRONMENTAL IMPACTS; GLOBAL ASPECTS; GOVERNMENT POLICIES; IMPLEMENTATION; IMPORTS; MAN; RADIATION DOSES; RADIOACTIVE WASTE STORAGE; SPENT FUEL STORAGE; SPENT FUELS; TABLES; USA; VOLUME; PROLIFERATION

173
U.S. Department of Energy, Washington, DC

SPENT FUEL STORAGE. FACTS BOOKLET. DOE/NE-0005 (1980)

Available from NTIS, PC A04/MF A01

In October 1977, the Department of Energy (DOE) announced a spent nuclear fuel policy where the government would, under certain conditions, take title to and store spent nuclear fuel from commercial power reactors. The policy is intended to provide spent fuel storage until final disposition is available. DOE has programs for providing safe, long-term disposal of nuclear waste. The spent fuel storage program is one element of waste management and compliments the disposal program. The costs for spent fuel services are to be fully recovered by the government from the utilities. This will allow the utilities to confidently consider the costs for disposition of spent fuel in their rate structure. The United States would also store limited amounts of foreign spent fuel to meet nonproliferation objectives. This booklet summarizes information on many aspects of spent fuel storage.

ORIGIN: Commercial

KEYWORDS: AWAY-FROM-REACTOR STORAGE; BWR TYPE REACTORS; CHARGES; COST; DATA; DIAGRAMS; FISSION PRODUCTS; FUEL POOLS; GOVERNMENT POLICIES; GRAPHS; PWR TYPE REACTORS; RADIOACTIVE WASTE FACILITIES; RADIOACTIVE WASTE MANAGEMENT; RADIOACTIVITY; SPENT FUEL CASKS; SPENT FUEL STORAGE; SPENT FUELS; TABLES; TRANSPORT; UNDERWATER

174
Cunningham, G.W.; U.S. Department of Energy, Washington, DC

IMPACT OF ADMINISTRATION ENERGY POLICY ON NUCLEAR WASTE MANAGEMENT. Nuclear Engineering Questions: Power, Reprocessing, Waste, Decontamination, Fusion, R.D. Walton, Jr. (Ed.), AIChE Symposium Series 191, Vol. 75 (pp. 11-13) (1979)

The impact of the Administration's energy policy on federal programs directed to the management of radioactive wastes generated by commercial nuclear power reactors is discussed. It is asserted that the principal problem facing the nuclear industry is the need to remedy the growing spent fuel management problem and the need to establish an operational final disposal capability. These two issues constitute the Department of Energy's highest priority nuclear programs. The National Waste Terminal Storage (NWTS program) provides for studies in various geologic formations and multiple geographic locations prior to selection of a specific site for geologic commercial waste repositories. Repository design and related safety studies, including studies on the final form of waste or wastes to be delivered to the repositories, are also being addressed. The waste processing portion of the civilian radioactive waste management program has been modified to reflect new policy regarding spent fuels. Spent fuel reprocessing is now indefinitely deferred, with a resulting emphasis on development of interim and permanent spent fuel storage capabilities. Total storage and dipsosal cost estimates indicate the addition of less than 1 mill/kwh to nuclear power electricity costs which are now about 40 mills/kwh to the consumer. In support of U.S. nonproliferation goals, limited spent fuel storage will be offered to foreign users. The U.S's ability to negotiate more effective nonproliferation measures with foreign countries and to prevent premature entry into the plutonium economy will be enhanced by this policy. It is expected that foreign spent fuel will be a small part of the total stored in the U.S.

ORIGIN: Commercial; Foreign

KEYWORDS: WASTE MANAGEMENT; SPENT FUELS; PROLIFERATION; COST; WASTE STORAGE; WASTE PROCESSING; REVIEWS; UNDERGROUND STORAGE; GEOLOGIC FORMATIONS; SITE SELECTION; DESIGN; SAFETY; REPROCESSING; NUCLEAR FUELS; WASTE DISPOSAL; INTERIM STORAGE; NUCLEAR POWER; GOVERNMENT POLICIES

175
U.S. Department of Energy, Washington, DC

FINAL ENVIRONMENTAL IMPACT STATEMENT U.S. SPENT FUEL POLICY - STORAGE OF U.S. SPENT POWER REACTOR FUEL - VOLUME 2. DOE/EIS-0015, Vol. 2: 217 pp. (1980)

This report is the second volume

of a five volume environmental impact statement assessing the effects from either implementing or not implementing a U.S. spent fuel storage policy. It is concluded that risks associated with constructing new holding facilities at reactors would be slightly greater than those associated with constructing independent spent fuel storage (ISFS) facilities; however, the risks of either are small compared to other existing radiation risks. The U.S. government should provide sufficient storage capacity at ISFS facilities to allow U.S. reactors to maintain full-core reserve storage capacity.

ORIGIN: Commercial

KEYWORDS: REVIEWS; ENVIRONMENTAL IMPACT STATEMENTS; ENVIRONMENTAL IMPACTS; AWAY-FROM-REACTOR STORAGE; SPENT FUELS; FUEL POOLS; SPENT FUEL STORAGE; POLITICAL ASPECTS; GOVERNMENT POLICIES; STORAGE FACILITIES

176
Battelle Memorial Institute, Office of Nuclear Waste Isolation, Columbus, OH

DISPOSAL OF SPENT NUCLEAR FUEL. ONWI-59 (1979)

Available from NTIS, PC A04/MF A01

This report addresses the topic of the mined geologic disposal of spent nuclear fuel from pressurized water reactors (PWR) and boiling water reactors (BWR). Although some fuel processing options are identifed, most of the information in this report relates to the isolation of spent fuel in the form it is removed from the reactor. The characteristics of the waste management system and research which relate to spent fuel isolation are discussed. The differences between spent fuel and processed HLW which impact the waste isolation system are defined and evaluated for the nature and extent of that impact. What is known and what needs to be determined about spent fuel as a waste form to design a viable waste isolation system is presented. Other waste forms and programs such as geologic exploration, site characterization and licensing which are generic to all waste forms are also discussed. R&D is being carried out to establish the technical information to develop the methods used for disposal of spent fuel. All evidence to date indicates that there is no reason, based on safety considerations, that spent fuel should not be disposed of as a waste.

ORIGIN: Government; Commercial

KEYWORDS: ACTINIDES; BWR TYPE REACTORS; CHEMICAL PROPERTIES; COST; DATA; DECAY; DIAGRAMS; GRAPHS; HIGH-LEVEL RADIOACTIVE WASTES; PHYSICAL PROPERTIES; PWR TYPE REACTORS; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE MANAGEMENT; RADIOACTIVITY; SALT DEPOSITS; SPENT FUELS; UNDERGROUND DISPOSAL

177
Croff, A.G., and C.W. Alexander; Oak Ridge National Laboratory, Oak Ridge, TN

DECAY CHARACTERISTICS OF ONCE-THROUGH LWR AND LMFBR SPENT FUELS, HIGH-LEVEL WASTES AND FUEL-ASSEMBLY STRUCTURAL MATERIAL WASTES. ORNL/TM-7431: 215 pp. (1980)

The decay characteristics of spent fuel, high-level waste, and fuel-assembly structural material (cladding) waste are presented in the form of ORIGEN2 output tables for (1) a pressurized water reactor operating on a once-through cycle with low-enrichment uranium feed, (2) a boiling-water reactor operating on a once-through cycle with low-enrichment uranium feed, and (3) a liquid-metal fast breeder reactor being fueled with depleted uranium enriched with discharged light water reactor plutonium on a once-through basis. The decay characteristics given include the mass (g), radioactivity (Ci), thermal power (W), photon activity (photons/s and MeV/W-s in 18 energy groups), and neutron activity (neturons/s) from (a,n) and spontaneous fission events. The first three characteristics are given for each element and for the principal nuclide contributors to the activation products, actinides, and fission products. Also included are a summary description of the ORIGEN2 reactor models that form the basis for the calculated results and a physical description of the fuel assemblies for the three reactors. (Auth)

ORIGIN: Government

KEYWORDS: THEORETICAL STUDIES; MATHEMATICAL MODELS; RADIOLOGICAL HALF-LIFE; HIGH-LEVEL RADIOACTIVE WASTES; CLADDING; PWR TYPE REACTORS; BWR TYPE REACTORS; LMFBR TYPE REACTORS; URANIUM; PLUTONIUM; FUEL ASSEMBLIES; PARTICLE DECAY; FISSION PRODUCTS; ACTINIDES; SPENT FUELS; RADIOACTIVITY; NUCLEAR REACTORS

178
Bechtel National, Inc., Nuclear Fuel Operations, San Francisco, CA

AN ASSESSMENT OF LWR SPENT FUEL DISPOSAL OPTIONS, VOL. 3 - STUDY BASES AND SYSTEM DESIGN CONSIDERATIONS. ONWI-39, Vol. 3: 422 pp. (1979)

The third volume of a report of a Spent Fuel Disposal Study (SFDS) is presented. The SFDS is part of the DOE's National Waste Terminal Storage (NWTS) program. The study identifies several spent fuel waste forms as well as the high-level waste and other waste forms from fuel reprocessing, defines facility and system design features to handle, transport, process, encapsulate, and dispose of these spent fuel and waste forms, and provides a comparative assessment of each of the spent fuel/waste alternatives with respect to technical feasibility, safeguards, criticality, radiological impact, retrievability, and economics. The first volume of the report

contains the summary and conclusions of the study. Volume 2 introduces and defines the requirements for the study. It contains the detailed evaluation of the study cases in each of six assessment areas, and describes and evaluates a number of study variations. The third volume, presented here, provides a tabulation of the bases and assumptions used in the study as well as preconceptual design descriptions and cost estimates of the facilities and transportation systems necessary to implement the various study cases.

ORIGIN: Government

KEYWORDS: RESEARCH PROGRAMS; US DOE; SPENT FUELS; RADIOACTIVE WASTES; HIGH-LEVEL RADIOACTIVE WASTES; NWTS; REPROCESSING; RISK ASSESSMENT; WASTE TRANSPORTATION; ENCAPSULATION; WASTE DISPOSAL; REVIEWS

179
Watson, C.D., B.J. Hudson, D.A. Keith, M.K. Jr. Preston, P.N. McCreery, W. Knox, E.M. Easterling, A.S. Lamprey, and G. Wiedemann; Allied-General Nuclear Services, Barnwell, SC

FLEET SERVICING FACILITIES FOR SERVICING, MAINTAINING, AND TESTING RAIL AND TRUCK RADIOACTIVE WASTE TRANSPORT SYSTEMS: FUNCTIONAL REQUIREMENTS, TECHNICAL DESIGN CONCEPTS AND OPTIONS COST ESTIMATES AND COMPARISONS. ORNL/SUB-79/13866/1 (1980)

Available from NTIS, PC A07/MF A01

Feasibility design concepts and feasibility studies of a Fleet Servicing FAcility (FSF) are examined. Such a facility is intended to be used for routine servicing, preventive maintenance, and for performing requalification license compliance tests and inspections, minor repairs, and decontamination of both the transportation casks and their associated rail cars or tractor-trailers. None of the United States' waste handling plants presently receiving radioactive wastes have an on-site FSF, nor is there an existing third party facility providing these services. This situation has caused the general accounting office to express concern regarding the quality of waste transport system maintenance once the system is placed into service. Thus, a need is indicated for FSF's, or their equivalent, at various radioactive materials receiving sites. In this report, three forms of FSF's solely for spent fuel transport systems were examined: independent, integrated, and colocated. The independent concept was already the subject of a detailed report and is extensively referenced in this document so that capital cost comparisons of the three concepts could be made. These facilities probably could service high-level, intermediate-level, low-level, or other waste transportation systems with minor modification, but this study did not include any system other than spent fuel. Both the integeated and colocated concepts were assumed to be associated with some radioactive materials handling facility such as an AFR repository.

ORIGIN: Commercial

KEYWORDS: CASKS; COST; DECONTAMINATION; DIAGRAMS; ECONOMIC ANALYSIS; FEASIBILITY STUDIES; INSPECTION; MAINTENANCE; WASTE TRANSPORTATION; SPENT FUELS; TRANSPORT; TRUCKS; NUCLEAR FACILITIES

180
Wallis, M.G., D.J. Giroux, D.E. Calhoun, and J.R. Mantel; FMC Corporation, Engineered Systems Division, Santa Clara, CA

CONCEPTUAL DESIGNS OF RADIOACTIVE WASTE CANISTER TRANSPORTER. Y/OWI/SUB-78/16538: 216 pp. (1978)

Conceptual designs of transporters for the vertical, horizontal, and inclined installation of canisters

containing spent fuel elements, high-level waste, cladding waste, and intermediate-level waste are presented. The discussion includes: cask concepts; transporter vehicle designs; concepts for mechanisms for handling and manipulating casks, canisters, and concrete plugs; transporter and repository operating cycles; shielding calculations, operator radiation dosages; radiation-resistant materials; and criteria for future design efforts. The three basic concepts are a tractor-trailer unit for the vertical installation and transporting of spent fuel, a modified forklift for the vertical install tion of high-level wastes, cladding wastes, and intermediate-level wastes, and a tractor-trailer unit for horizontal and inclined emplacement. Design of the cask concepts limits cask surface contact dosage rate to 25 millirems/hr. Total annual radiation dosages for the transporter operators were calculated to be less than 5 rems for all the transporter concepts. Because of the lower sheidling requirements for cladding wastes as compared to high-level wastes, a single transporter designed for the high-level wastes can also transport all of the cladding wastes.

ORIGIN: Commercial

KEYWORDS: CANISTERS; WASTE TRANSPORTATION; HIGH-LEVEL RADIOACTIVE WASTES; INTERMEDIATE-LEVEL RADIOACTIVE WASTES; CLADDING; SPENT FUEL ELEMENTS; THEORETICAL STUDIES; DOSE RATES; DESIGN; REPOSITORY; EQUIPMENT; COST; RECOMMENDATIONS; CASKS; RADIATION DOSES; CONTAINERS; SHIELDING; OCCUPATIONAL SAFETY

181
Dupree, S.A., R.B. Pope, L.C. O'Malley, and D.A. Hankins; Los Alamos Technical Associates, Inc., Los Alamos, NM; Sandia Laboratories, Albuquerque, NM; Exxon Nuclear Company, Inc., Bellevue, WA; General Electric Company, San Jose, CA

ECONOMIC ANALYSIS OF THE TRANSPORT OF RADIOACTIVE MATERIALS IN LWR AND LMFBR FUEL CYCLES IN THE UNITED STATES. SAND80-0297C; CONF-801115; Packaging and Transporting Radioactive Material, Proceedings of an International Symposium, Berlin, German Federal Republic, November 10, 1980. International Atomic Energy Agency, Vienna, (7 pp.) (1980)

The costs associated with the transportation of heavy-metals in two LWR fuel cycles and one LMFBR fuel cycle have been estimated, both for existing levels of technology and for advanced shipping technology. The costs of transporting low-level wastes in the two LWR fuel cycles have also been estimated. The cost assessment included not only the package capital costs and the operating transportation costs (tariffs), but also included such items as technology development, fleet costs. Areas in which

transportation costs can be reduced through the use of advanced packaging designs have been identified, and the amount of such cost reduction has been estimated. Savings in transportation costs of 20 percent for the LWR once-through fuel cycle, 13 percent for the LWR recycle fuel cycle, and 29 percent for the LMFBR recycle fuel cycle can result from the use of advanced shipping systems instead of the use of current package designs or current technology. Identification of those transportation segments in a given nuclear fuel cycle which offer the possibility of significant cost reduction should permit orderly progress toward a more efficient nuclear transportation industry.

ORIGIN: Commercial

KEYWORDS: CAPITAL; COST; ECONOMIC ANALYSIS; FUEL CYCLE; LMFBR TYPE REACTORS; LOW-LEVEL RADIOACTIVE WASTES; OPERATION; PLUTONIUM RECYCLE; RADIOACTIVE MATERIALS; TRANSPORTATION SYSTEMS; URANIUM DIOXIDE; URANIUM HEXAFLUORIDE; WATER COOLED REACTORS; WASTE TRANSPORTATION; TRANSPORT; SPENT FUELS

182
Marshall, J.R., D.S. Joy, and B.J. Hudson; Oak Ridge National Laboratory, Oak Ridge, TN

ORNL INTERFACE AND LOGISTICS STUDIES. Trans. Am. Nucl. Soc. 33:452-453; CONF-791103; American Nuclear Society Meeting, San Francisco, CA, November 12, 1979 (1979)

A figure shows a typical interaction pattern for the computer code network.

Computer developmental work being performed at ORNL in support of the TTC program at Sandia is discussed. Topics are concerned principally with current computer program development, their interactions and application to ORNL Transportation/Logistics studies. Each program is categorized into 4 program areas: package assessment, logistics, routing, and system simulation. The package assessment program area is comprised of the PACRAT code (designs for heavily shielded casks), and those codes utilized by NRC in licensing evaluations of shipping packages. The codes consist of criticality, shielding, and thermal computer program modules--specifically NITAWL, XSDRN, DENO, ORIGEN, MORSE, and HEATING5. One logistics program deals with transportation of spent fuel and is designed to evaluate optimal transportation sequences for a wide range of shipping scenarios. It can predict spent fuel movements, cask buildup requirements, overall costs, and public radiation exposure. Constraints are incorporated in the model to reflect operational limits of the receiving facilities and transportation systems, such as fuel handling rates, storage capacities, and number of truck and rail casks built per year. The rail/truck routing programs determine optimum transportation

routes, given the shipping and receiving points and any regulatory constraints. The system simulation program evaluates design and operation of a spent-fuel receiving facility. These codes assist in several major study areas related to waste transportation. Each of the programs can be used separately or in varying combinations to study a wide range of problems.

ORIGIN: Government

KEYWORDS: A CODES; COMPUTER CODES; COMPUTERIZED SIMULATION; COST; D CODES; H CODES; M CODES; N CODES; O CODES; P CODES; PACKAGING; RADIOACTIVE MATERIALS; S CODES; TRANSPORT; X CODES; WASTE TRANSPORTATION; CASKS; SPENT FUELS

183
Andrews, W.B., J.C. Bower, R.A. Burnett, R.L. Engel, and C.W. Rolland; Pacific Northwest Laboratory, Richland, WA

PACIFIC NORTHWEST LABORATORY (PNL) SPENT FUEL TRANSPORTATION AND HANDLING FACILITY MODELS. PNL-3105: 75 pp. (1979)

A logistics study has been conducted in support of the Department of Energy's program for geologic storage of unreprocessed commercial spent fuels. The objectives were to: 1) provide quantitative information as required and existing transportation systems, and 2) develop a method for evaluating alternative spent fuel storage and handling policies. Two computerized logistics models were used.

ORIGIN: Commercial

KEYWORDS: THEORETICAL STUDIES; TRANSPORT; MATHEMATICAL MODELS; COMPUTER PROGRAMS; SPENT FUELS; COMMERCIAL WASTES; WASTE TRANSPORTATION

184
Sucherland, S.H.; Sandia Laboratories, Albuquerque, NM

ALARA STUDIES ON SPENT FUEL AND WASTE CASKS. SAND79-1841 (1980)

Available from NTIS, PC A03/MF A01

Implications of applying the ALARA concept to cask designs for transporting spent fuel, high-levl commercial and defense waste, and remote-handled transuranic waste are investigated. The XSDRNPM, one-dimensional radiation transport code, was used to obtain potential shield designs that would yield total dose rates at 1.8 m from the cask surface of 10, 5, and 2 mrem/h. Gamma shields of depleted uranium, lead, and steel were studied. The capacity of the casks was assumed to be 1, 4, or 7 elements or canisters, and the wastes were 1, 3, 5, and 10 years old. Depending on the dose rate, the cask empty weights and lifetime transportation costs were estimated.

ORIGIN: Government; Commercial

KEYWORDS: CASKS; COST; DESIGN; DOSE RATES; HIGH-LEVEL RADIOACTIVE WASTES; RADIATION PROTECTION; SHIELDING; SPENT FUEL CASKS; WASTE TRANSPORTATION; CONTAINERS

185
Dupree, S.A., and L.C. O'Malley; Sandia Laboratories, Albuquerque, NM

ECONOMICS OF RADIOACTIVE MATERIAL TRANSPORTATION IN THE LIGHT-WATER REACTOR NUCLEAR FUEL CYCLE. SAND80-0035: 69 pp. (1980)

This report presents estimates of certain transportation costs, in 1979 dollars, associated with Light-Water Reactor (LWR) once-through and recycle fuel cycles. Shipment of fuel, high-level waste and low-level waste was considered. Costs were estimated for existing or planned transportation systems and for recommended alternate systems, based on the assumption of mature fuel cycles. The annual radioactive material transportation costs required to support a nominal 1000-MWe LWR in a once-through cycle in which spent fuel is shipped to terminal storage or disposal were found to be approximately $490,000. Analogous costs for an average reactor operating in a fuel cycle with uranium and plutonium recycle were determined to be approximately $770,000. These results assume that certain recommended design changes will occur in radioactive material shipping systems as a mature fuel cycle evolves.

ORIGIN: Commercial

KEYWORDS: US DOE; RESEARCH PROGRAMS; COST; HIGH-LEVEL RADIOACTIVE WASTES; LOW-LEVEL RADIOACTIVE WASTES; RECOMMENDATIONS; ECONOMICS; FUEL CYCLE; URANIUM; PLUTONIUM; EVALUATION; WASTE TRANSPORTATION; LWR TYPE REACTORS; REPROCESSING

186
Sutherland, S.H.; Sandia Laboratories, Albuquerque, NM

ALARA ASSESSMENT OF SPENT FUEL AND NUCLEAR WASTE TRANSPORTATION SYSTEMS. SAND80-0794C; CONF-801115; Packaging and Transporting Radioactive Material, Proceedings of an International Symposium, Berlin, German Federal Republic, November 10, 1980. International Atomic Energy Agency, Vienna, (21 pp.) (1980)

Six figures, 3 tables.

The effects of ALARA (As Low As Reasonably Achievable) on transportation system costs were evaluated for LWR spent fuel, high-level commercial and defense wastes, and remotely handled TRU waste. Three dose rate specifications were used: 10 mrem/h at 2 m, 5 mrem/h, and 2 mrem/h. The evaluation was done for wastes and LWR spent fuel 1,

3, 5, and 10 years old. Gamma shield materials were depleted uranium, lead, and steel; the neutron shield material was water. Results for a 7-element PWR cask show that uranium shielding is the lightest, and that the increased weight of the low dose rate casks results in 1 to 2 million dollars increase in lifetime transportation cost.

ORIGIN: Commercial; Government

KEYWORDS: COST; DEPLETED URANIUM; DOSE RATES; FUEL CYCLE; HIGH-LEVEL RADIOACTIVE WASTES; LEAD; PWR TYPE REACTORS; RADIATION PROTECTION; SHIELDING; SHIELDS; SPENT FUEL CASKS; STEELS; TRANSPORTATION SYSTEMS; WATER COOLED REACTORS

187
Unione, A.J., A.A. Garcia, and R. Stuart; Science Applications, Inc., Palo Alto, CA

A GENERIC ASSESSMENT OF BARGE TRANSPORTATION OF SPENT NUCLEAR FUEL. SAI-055-77-PA: 255 pp. (1978)

A risk assessment of the transportation of spent nuclear fuels on barges is presented. It was found that the equipment necessary to handle shipments of spent fuel is available today and the NRC and DOT regulations do not impose severe constraints on the equipment and procedures which can be used in intermodal transport. The maximum individual dose received by an individual member of the public from normal intermodal transport operations was calculated to be 1.9 x 10(E-3) mrem/R-yr, which is a factor of 4 x 10(E-6) smaller than allowable dose from nuclear activities cited in 10CFR20.105. Risks to the public from intermodal or rail transport of spent fuel are comparable and small. Intermodal transport of spent nuclear fuel is more costly than either rail or truck transport due to the relatively high costs of cask rental which accrue during long transit and transfer periods. These costs should become more attractive, however, as crews become increasingly familiar with the transfer operation and better transfer equipment designs come on line. It was concluded that intermodal transport represents a viable alternative to rail and truck transport, especially for sites near navigable waterways which do not have rail service.

ORIGIN: Commercial

KEYWORDS: RISK ASSESSMENT; SPENT FUELS; WASTE TRANSPORTATION; BARGES; COMPARATIVE EVALUATIONS; LAND TRANSPORT; COST; RAIL TRANSPORT; RADIATION DOSES; SPENT FUEL CASKS

188
Joy, D.S., and B.J. Hudson; Oak Ridge National Laboratory, Oak Ridge, TN

TRANSPORTATION ANALYSIS FOR THE CONCEPT OF REGIONAL REPOSITORIES. ORNL/TM-7170: 82 pp. (1980)

Available from NTIS, PC A05/MF A01.

Planning associated with the National Waste Terminal Storage (NWTS) Program has in the past assumed the use of one or two large, centrally located repository facilities. Recently, an alternative approach has been proposed which consists of the use of multiple, smaller regional repositories. In this report, several regional concepts were studied and the transportation requirements for the shipment of spent fuel to the regional repositories were estimated. In general, the transportation requirements decrease as the number of repositories increase. However, as far as transportation is concerned, the point of diminishing returns is reached at approximately one repository in each of three to four regions. Additional savings beyond this point are small. A series of sensitivity studies is also included to demonstrate the impact on the total transportation requirements of varying cask capacity, rail speed, or truck speed. Since most of the projected fuel shipments are to be made by rail, varying the capacity of the rail cask or varying average rail transport speed will have a major effect on overall transportation requirements.

ORIGIN: Commercial

KEYWORDS: AWAY-FROM-REACTOR STORAGE; CAPACITY; CASKS; COMPARATIVE EVALUATIONS; COST; LAND TRANSPORT; PLANNING; RADIOACTIVE WASTE FACILITIES; RAIL TRANSPORT; REGIONAL ANALYSIS; SPENT FUEL STORAGE; SPENT FUELS; TRANSPORT; TRUCKS; WASTE TRANSPORTATION; CONTAINERS

189
McKinley, Kirk B., Joel W. Cannon, F.J. Wheeler, and H.A. Worle; EG&G Idaho, Inc., Idaho Falls, ID

TWTF PROJECT CRITICALITY TASK FORCE FINAL REVIEW AND ASSESSMENT. EGG-2055: 39 pp. (1980)

The potential for criticality problems at the Transuranic Waste Treatment Facility (TWTF) is reviewed and assessed. Techniques for assaying monitoring and controling criticality are discussed. Additional criticality studies and validation experiments are needed.

ORIGIN: Government

KEYWORDS: THEORETICAL STUDIES; CRITICALITY; TRANSURANIUM ELEMENTS; WASTE PROCESSING; RISK ASSESSMENT; REVIEWS; IDAHO NATIONAL ENGINEERING LABORATORY; STORAGE FACILITIES

190
Smith, T.H.; EG&G Idaho, Inc., Idaho Falls, ID

EVALUATIONS OF ALTERNATIVES FOR MANAGEMENT OF INEL TRANSURANIC WASTE. CONF-79060230; American Nuclear Society Annual Meeting, Atlanta, GA, June 3, 1979, (5 pp.) (1979)

Alternatives for the long-term management of transuranic (TRU)-contaminated waste at the INEL are summarized and evaluated. Although environmental monitoring has failed to identify any near-term hazards from the defense-produced wastes, buried waste containers have deteriorated badly. From 1954 through 1970, about 14,000 cu m of beta/gamma-emitting, non-TRU waste was intermixed with the total 62,000 cu m of buried TRU waste. Since 1970, 31,000 cu m of TRU waste has been stored retrievably above ground on asphalt pads. Studies have begun on methods to implement the most attractive of the alternatives studied. In no particular order they are: 1) leave the waste as is; 2) improve in-place confinement; 3) retrieve, process, then ship to a federal repository; 4) as in (3) but delay shipment; 5) retrieve, process, then dispose onsite; and 6) as in (3), but delay retrieval. Estimated costs of implementing the alternatives are tabulated. None of the methods would cause significant nonradiological environmental effects and the radiological dose commitment to the public from normal operational releases would be a minute fraction of background. The dominant natural release scenario was disruption of the waste by volcanic action while that for operational release included an explosion in the incineration facility and a fire in the retrieval facility. For wastes remaining onsite, the radiological consequences of uncontrolled releases occurring more than 100 yr into the future again would involve volcanic action with a maximum individual dose commitment to the lung of up to 90 rem.

ORIGIN: Government

KEYWORDS: WASTE MANAGEMENT; TRANSURANIUM ELEMENTS; WASTE DISPOSAL; DISPOSAL SITE; WASTE STORAGE; RETRIEVAL; DOSE COMMITMENTS; CONTAINMENT; COST; RADIATION DOSES; ENVIRONMENTAL IMPACTS; REPOSITORY; INCINERATION; GAMMA RAYS; BETA PARTICLES; REVIEWS; VOLUME; INVENTORIES

191
Brown, C.M.; Energy Systems Group, Rocky Flats Plant, Golden, Colorado

ECONOMIC COMPARISON OF CENTRALIZING OR DECENTRALIZING PROCESSING FACILITIES FOR DEFENSE TRANSURANIC WASTE.
DOE/AL/TRU-8003: 66 pp. (1980)

This study is part of a set of analyses under direction of the Transuranic Waste Management Program designed to provide comprehensive, systematic methodology and support necessary to better understand options for national long-term management of transuranic (TRU) waste. The report summarizes activities to evaluate the economics of possible alternatives in locating facilities to process DOE-managed transuranic waste. The options considered are: 1) facilities located at all major DOE TRU waste generating sites; 2) two or three regional facilities; 3) central processing facility at only one DOE site. The study concludes that processing at only one facility is the lowest cost option, followed, in order of cost, by regional then individual site processing.

ORIGIN: Government

KEYWORDS: REVIEWS; TRANSURANIUM ELEMENTS; US DOE; WASTE PROCESSING PLANTS; ECONOMICS; COST BENEFIT ANALYSIS; WASTE PROCESSING; TECHNOLOGY ASSESSMENT; WASTE MANAGEMENT

192
Tedder, D.W., B.C. Finney, and J.O. Blomeke; Georgia Institute of Technology, Atlanta, GA

ACTINIDE PARTITIONING-TRANSMUTATION PROGRAM FINAL REPORT. II. PARTITIONING PROCESS FOR LWR FUEL REPROCESSING AND REFABRICATION PLANT WASTES.
ORNL/TM-6982: 167 pp. (1980)

Chemical processing flowsheets that were developed for use in conceptual waste treatment facilities for partitioning actinides from commercial light water reactor reprocessing and refabrication wastes are presented. The flowsheets may be used in conjunction with actinide transmutation, space disposal of the separated transuranics, or alternative management with specially designed actinide waste forms. Several advanced waste management concepts that might reduce the long-term (more than 1000 years) risk associated with the geologic isolation of wastes contaminated with actinides and fission products are permitted by

the successful operation of such waste treatment facilities.

ORIGIN: Commercial

KEYWORDS: US DOE; RESEARCH PROGRAMS; WASTE PROCESSING; REVIEWS; WASTE PROCESSING PLANTS; FLOWSHEETS; ACTINIDES; PARTITION; SEPARATION PROCESSES; CHEMISTRY; LWR TYPE REACTORS; REPROCESSING; TRANSMUTATION; WASTE DISPOSAL; WASTE MANAGEMENT; EXTRATERRESTRIAL DISPOSAL; FISSION PRODUCTS; HIGH-LEVEL RADIOACTIVE WASTES; FLOWSHEETS

193
Gilbert/Commonwealth, Reading, PA

ASSESSMENT OF ALTERNATIVES FOR MANAGEMENT OF ORNL RETRIEVABLE TRANSURANIC WASTE - NUCLEAR WASTE PROGRAM: TRANSURANIC WASTE (ACTIVITY NO. AR 05 15 15 0: ONL-WT04). ORNL/SUB-79/13837/5: 267 pp. (1980)

Since 1970, solid waste with TRU or U-233 contamination in excess of 10 mu ci per kilogram of waste has been stored in a retrievable fashion at ORNL, such as in SS drums, concrete casks, and SS-lined wells. This report describes the results of a study performed to identify and evaluate alternatives for management of this waste and of the additional waste projected to be stored through 1995. The study was limited to consideration of the following basic strategies: Strategy 1: Leave waste in place as is; Strategy 2: Improve waste confinement; and Strategy 3: Retrieve waste and process for shipment to a federal repository. Seven alternatives were identified and evaluated, one each for strategies 1 and 2 and five for strategy 3. Each alternative was evaluated from the standpoint of technical feasibility, cost, radiological risk and impact, regulatory factors and nonradiological environmental impact.

ORIGIN: Government

KEYWORDS: ALPHA-BEARING WASTES; COMPARATIVE EVALUATIONS; COST; ENVIRONMENTAL IMPACTS; FEASIBILITY STUDIES; ORNL; RADIATION HAZARDS; WASTE MANAGEMENT; WASTE STORAGE; TECHNOLOGY ASSESSMENT; TRANSURANIUM ELEMENTS; URANIUM-233

194
Bishoff, J.R., and R.J. Hudson; Idaho National Engineering Laboratory, Idaho Falls, ID

EARLY WASTE RETRIEVAL FINAL REPORT. TREE-1321: 24 pp. (1979)

The Early Waste Retrieval Project began operations in FY 1976 to investigate methods, risks, and hazards associated with the retrieval of 65,000 cubic meters of transuranic contaminated waste in below grade storage. The retrieval facilities consisted of an Air Support Weather Shield and a movable Operating Area Confinement. Retrieval operations

were conducted in the Operating Area Confinement to prevent contamination spread to the environment. The Air Support Weather Shield provided weather protection for the Operating Area Confinement and all associated retrieval equipment. Retrieval personnel wore full anticontamination clothing and a totally enclosed bubble suit that incorporated a fresh air supply. Waste retrieved included drums, loose waste, and contaminated soil. Approximately 67% of the drums retrieved were severely breached. Free liquid leaked from about 6% of the drums, and 5% were externally alpha-contaminated. Although alpha-contamination levels often exceeded 2 x 10(E&6) cpm, available equipment and established operating and safety procedures protected personnel and prevented any release of contamination into the environment. Under the Early Waste Retrieval project, the following studies and tests relating to buried waste retrieval were conducted: a transuranic isotope migration study was performed in support of the Programmatic Environmental Impact Statement for the Long-Term Management of the Defense Transuranic Waste at the Idaho National Engineering Laboratory; strip curtains were tested and used successfully for contamination control; a waste compactor was purchased and used to compact loose and self-generated waste into 208-l drums; and dust and airborne contamination control tests were performed using soil binders and fabric material. The total cost of the Early Waste Retrieval Project was $1,202,705. (Auth)

ORIGIN: Government

KEYWORDS: US DOE; RETRIEVAL; RESEARCH PROGRAMS; RISK ASSESSMENT; RADIOACTIVE WASTES; CONTAINMENT; CONTAINERS; TESTING; COST; TRANSURANIUM ELEMENTS; IDAHO NATIONAL ENGINEERING LABORATORY; DEFENSE WASTES

195
Girardi, F.; Joint Research Center, Ispra, Italy

OVERVIEW OF PARTITIONING AND TRANSMUTATION STUDIES IN THE EUROPEAN COMMUNITY. Transactions of the American Nuclear Society 34(411); CONF-800607; American Nuclear Society Annual Meeting, Las Vegas, NV, June 7-8, 1980, (5 pp.) (1980)

No abstract.

ORIGIN: Foreign

KEYWORDS: ACTINIDE BURNER REACTORS; ACTINIDES; COST; DENITRATION; SPENT FUEL ELEMENTS; HDEHP; HIGH-LEVEL RADIOACTIVE WASTES; WASTE PROCESSING; RISK ASSESSMENT; SEPARATION PROCESSES; SOLVENT EXTRACTION; TRANSMUTATION

196
Mulkin, R.; Los Alamos Scientific

Laboratory, Los Alamos, NM

CHARACTERIZATION OF TRANSURANIC SOLID WASTES FROM A PLUTONIUM PROCESSING FACILITY. LA-5993-MS: 24 pp. (1975)

Transuranic-contaminated wastes generated in the processing areas of the Plutonium Chemistry and Metallurgy Group at the Los Alamos Scientific Laboratory (LASL) were studied in detail to identify their chemical and physical composition. Nondestructive Assay (NDA) equipment was developed to measure transuranic activity at the 10-nCi/g level in low-density residues typically found in room-generated waste. This information will supply the Waste Management Program with a more positive means of identifying concerns in waste storage and the challenge of optimizing the system of waste form, packaging, and environment of the storage area for 20-year retrievable waste. A positive method of measuring transuranic activity in waste at the 10-nCi/g level will eliminate the need for administrative control in a sensitive area, and will provide the economic advantage of minimizing the volume of waste stored as retrievable waste. (Auth)

ORIGIN: Government

KEYWORDS: TRANSURANIUM ELEMENTS; LABORATORY STUDIES; CHEMICAL COMPOSITION; PHYSICAL PROPERTIES; WASTE MANAGEMENT; ECONOMICS; VOLUME; LASL; PLUTONIUM; RESEARCH PROGRAMS; RETRIEVAL; WASTE PROCESSING; FUEL FABRICATION PLANTS; RECOMMENDATIONS; FLOWSHEETS

197
Kosiewicz, S.T., B.L. Barraclough, and A. Zerwekh; Los Alamos Scientific Laboratory, Los Alamos, NM

STUDIES OF TRANSURANIC WASTE STORAGE UNDER CONDITIONS EXPECTED IN THE WASTE ISOLATION PILOT PLANT (WIPP). INTERIM SUMMARY REPORT, OCTOBER 1, 1977-JUNE 15, 1979. LA-7931-PR (1980)

The major focus of the program has been on the gas generation potential of organic wastes produced by radiolytic and thermal degradation under simulated WIPP storage conditions. The effects of TRU contamination level, temperature, waste type, pressure, and exposure time on radiolysis are presented. In addition, results from preliminary experiments on processed sludge dewatering are discussed. A summary is presented here of the results of a detailed study of all retrievably stored TRU wastes present at LASL before January 1, 1978. The data indicate a gross volume for the LASL inventory of 1610 cu m with a total weight of nearly 1.24 x 10(E+6) kg (1240 metric tonnes). The dominant radionuclide contents of the waste are plutonium (primarily Pu 238) and americium.

ORIGIN: Government

KEYWORDS: ACTINIDES; AMERICIUM; BITUMENS; CELLULOSE;

DECOMPOSITION; DEGASSING; INVENTORIES; LASL; NEW MEXICO; PILOT PLANTS; PLUTONIUM; POLYETHYLENES; PYROLYSIS; RADIATION DOSES; RADIOACTIVE WASTE STORAGE; RADIOLYSIS; SLUDGES; TEMPERATURE DEPENDENCE; TRANSURANIUM ELEMENTS; WATER REMOVAL; WIPP; PLUTONIUM-238

198
Logan, S.E., R.L. Conarty, H.S. Ng, L.J. Rahal, and C.G. Shirley; Los Alamos Technical Associates, Inc., Los Alamos, NM

ACTINIDE PARTITIONING-TRANSMUTATION PROGRAM FINAL REPORT VII. LONG-TERM RISK ANALYSIS OF THE GEOLOGIC REPOSITORY. ORNL/TM-6987: 126 pp. (1980)

This report supports the overall assessment by Oak Ridge National Laboratory of actinide partitioning and transmutation by providing an analysis of the long-term risks associated with the terminal storage of wastes from a fuel cycle which incorporates partitioning and transmutation (P-T) and wastes from a cycle which does not. The system model and associated computer code, called AMRAW (Assessment Method for Radioactive Waste), are used for the analysis and are applied to the Los Medanos area in southeastern New Mexico. Because a conservative approach is used throughout, calculated results are believed to be consistently higher than reasonable expectations from actual disruptive incidents at the site and therefore are not directly suited for comparison with other analyses of the particular geological location. The assessment is made with (1) the probabilistic, or risk, mode that uses combinations of reasonably possible release incidents with their probability of occurrence distributed and applied throughout the assessment period, and (2) the consequence mode that forces discrete release events to occur at specific times. An assessment period of 1 million years is used. The principal results are summarized as follows: 1) In all but the expulsive modes, Tc-99 and I-129 completely dominate cumulative effects based on their transport to man through leaching and movement with groundwater, effecting about 33,000 health effects (deaths) over the 1 million years. 2) P-T has only limited effectiveness in reducing long-term risk from a radionuclide waste repository under the conditions studied, and such effectiveness is essentially confined to the extremely unlikely (probability of occurrence approximately 10(E-12)/year). 3) Removal or immobilization of Tc-99 and I-129 might provide benefits sufficiently tangible (cumulative reduction of about 33,000 deaths--98.8% decrease) to warrant special consideration. (Auth)

ORIGIN: Government

KEYWORDS: THEORETICAL STUDIES; RISK ASSESSMENT; RESEARCH PROGRAMS; WASTE PROCESSING; COMPUTER CODES; ACTINIDES; WASTE

STORAGE; STATISTICS; ACCIDENTS; TECHNETIUM-99; IODINE-129; GROUND WATER; PARTITION; TRANSMUTATION; RECOMMENDATIONS

199
Logan, S.E., R.L. Conarty, H.S. Ng, L.J. Rahal, and C.G. Shirley; Los Alamos Technical Associates, Inc., Los Alamos, NM

ACTINIDE PARTITIONING-TRANSMUTATION PROGRAM. FINAL REPORT. VII. LONG-TERM RISK ANALYSIS OF THE GEOLOGIC REPOSITORY (APPENDIX). ORNL/SUB-80/31038/1 (1980)

Available from NTIS, PC A99/MF A01.

The Chemical Technology Division of ORNL has prepared a set of documents that evaluate a partitioning-transmutation (PT) fuel cycle relative to a reference cycle employing conventional fuel-material recovery methods. The PT cycle uses enhanced recovery methods so that most of the long-lived actinides are recycled to nuclear power plants and transmuted to shorter-lived materials, thereby reducing waste toxicity. Data pertaining to the long-term risk analysis of waste generated from the PT fuel cycle are presented.

ORIGIN: Commercial

KEYWORDS: ACTINIDES; FUEL CYCLE; INVENTORIES; LEACHING; PARTITION; RADIATION DOSES; RADIOACTIVE WASTE DISPOSAL; RADIOACTIVE WASTE PROCESSING; RISK ASSESSMENT; THEORETICAL DATA; TRANSMUTATION

200
Croff, A.G., J.O. Blomeke, and B.C. Finney; Oak Ridge National Laboratory, Chemical Technology Division, Oak Ridge, TN

ACTINIDE PARTITIONING-TRANSMUTATION PROGRAM FINAL REPORT. 1. OVERALL ASSESSMENT. ORNL-5566: 135 pp. (1980)

This report is concerned with an overall assessment of the feasibility of and incentives for partitioning (recovering) long-lived nuclides from fuel reprocessing and fuel refabrication plant radioactive wastes and transmuting them to shorter-lived or stable nuclides by neutron irradiation. The principal class of nuclides considered is the actinides, although a brief analysis is given of the partitioning and transmutation (P-T) of Tc 99 and I 129. Three major conclusions concerning technical feasibility can be drawn from the assessment: (1) actinide P-T is feasible, subject to the acceptability of fuels containing recycle actinides; (2) technetium P-T is feasible if satisfactory partitioning processes can be developed and satisfactory fuels identified (no studies have been made in this area); and (3) iodine P-T is marginally feasible at best because of the low transmutation

rates, the high volatility, and the corrosiveness of iodine and iodine compounds. It was concluded on the basis of a very conservative repository risk analysis that there are no safety or cost incentives for actinide P-T. In fact, if nonradiological risks are included, the short-term risks of P-T exceed the long-term benefits integrated over a period of 1 million years. Incentives for technetium and iodine P-T exist only if extremely conservative long-term risk analyses are used. It is estimated that P-T would take 20 years to implement on a commercial scale, assuming a well-supported development program and no licensing delays. The development program would cost about $900 million (1979 dollars), with the largest fraction being required for a hot partitioning pilot plant. Further RD&D in support of P-T is not warranted. (Auth)

ORIGIN: Commercial

KEYWORDS: WASTE PROCESSING; ACTINIDES; THEORETICAL STUDIES; HIGH-LEVEL RADIOACTIVE WASTES; RECOMMENDATIONS; TRANSMUTATION; PARTITION; NEUTRON ACTIVATION; IODINE-129; TECHNETIUM-99; FUEL CYCLE; REPROCESSING; COST BENEFIT ANALYSIS; VOLATILITY; CORROSION; SAFETY; WASTE TRANSPORTATION; CLADDING; VOLUME; SPECIFIC ACTIVITY; RADIONUCLIDES; TIME DEPENDENCE; RISK ASSESSMENT

201
Smith, A.E., and D.F. Davis; Oak Ridge National Laboratory, Oak Ridge, TN

PRECONCEPTUAL DESIGNS AND COSTS OF PARTITIONING FACILITIES AND SHIPPING. ORNL/TM-6985: 91 pp. (1980)

Evaluation of the incentives for implementing Partitioning-Transmutation (P-T) requires that the differential capital and operating costs be estimated to provide a basis for comparison with an analogous generic reference fuel cycle. Preconceptual process facility designs based on P-T process flow sheets and a preconceptual shipping cask design provided the basis for the required cost estimates. Estimates of the fuel cycle shipping, reprocessing and recycle fuel fabrication cost impact were developed for use in the overall incentives evaluation. (Auth)

ORIGIN: Commercial

KEYWORDS: US DOE; RESEARCH PROGRAMS; TRANSMUTATION; PARTITION; WASTE PROCESSING; RADIOACTIVE WASTES; THEORETICAL STUDIES; COST; WASTE PROCESSING PLANTS; WASTE TRANSPORTATION; CAPITAL; DESIGN; SPENT FUEL CASKS; FABRICATION; COST ESTIMATES

202
Parsons, (Ralph M.) Co., Pasadena, CA

ACTINIDE PARTITIONING-TRANSMUTATION PROGRAM. V. PRECONCEPTUAL DESIGNS AND COSTS OF PARTITIONING FACILITIES AND SHIPPING CASKS, APPENDIX 4. FINAL REPORT. ORNL/SUB-79/31056/1/A4 (1980)

Available NTIS, PC A12/MF A01.

Cost estimate documents for the Fuels Fabrication Plant Waste Treatment Facility are contained in this appendix. Plant costs are summarized by code of accounts and by process function. Costs contributing to each account are detailed. Process equipment costs are detailed for each waste treatment process. Service utility costs are also summarized and detailed. Shipping cask costs are provided.

ORIGIN: Commercial

KEYWORDS: ACTINIDES; CASKS; COST; DESIGN; FUEL FABRICATION PLANTS; PARTITION; RADIOACTIVE WASTE PROCESSING; RECYCLING; REPROCESSING; TRANSMUTATION; NUCLEAR FACILITIES; CONTAINERS

203
Parsons, (Ralph M.) Co., Pasadena, CA

ACTINIDE PARTITIONING-TRANSMUTATION PROGRAM FINAL REPORT. V. PRECONCEPTUAL DESIGNS AND COSTS OF PARTITIONING FACILITIES AND SHIPPING CASKS (APPENDIX 3).

ORNL/SUB-79/31056/1/A3 (1980)

Available from NTIS, PC A18/MF A01.

This appendix contains cost estimate documents for the Fuels Reprocessing Plant Waste Treatment Facility. Plant costs are summarized by code of accounts and by process function. Costs contributing to each account are detailed. Process equipment costs are detailed for each waste treatment process. Service utility costs are also summarized and detailed.

ORIGIN: Commercial

KEYWORDS: ACTINIDES; BUILDINGS; CAPITAL; COST; EQUIPMENT; FUEL REPROCESSING PLANTS; PARTITION; RADIOACTIVE WASTE PROCESSING; RECYCLING; REPROCESSING; SPENT FUELS; TRANSMUTATION; NUCLEAR FACILITIES

204
Krugmann, H.H.L.; Princeton University, Princeton, NJ

RADIOACTIVE WASTE DISPOSAL- A COMPARISON OF ALTERNATIVE NUCLEAR FUEL CYCLES. Ph. D. Thesis (1979)

Available from University Microfilms: order no. 79-10,121

The influence of radioactive waste disposal issues on policy choices between alternative nuclear fuel cycle is examined. Two principal choices are discussed. One is between retaining the current

once-through fuel cycle and establishing a more uranium efficient fission economy involving the recycle of plutonium produced by neutron absorption in the nonchain-reacting uranium isotope U 238. The other is between introducing this plutonium economy and embarking on an alternative uranium efficient fission economy which would involve the recycle of the artificial isotope U 233 produced by neutron bombardment of thorium. Two major policy questions relevant to choices between fission economies are explored: what are the consequences for radioactive waste disposal of switching from one nuclear fuel cycle to another and how significiant are these consequences relative to other concerns. The effects of changing to another fuel cycle on the radioactive waste disposal problem are discussed in terms of waste properties: what is the influence of choice of fuel cycle on the amount and concentration of fissile plutonium in nuclear wastes and the possible diversion of this plutonium to weapons uses. Fissile plutonium inventories in wastes from alternative fuel cycles are compared and the nature and commercial attractiveness of spent fuel repositories as plutonium mines is discussed.

ORIGIN: Commercial

KEYWORDS: ECONOMICS; FISSION; FUEL CYCLE; INVENTORIES; NEUTRON ACTIVATION; NUCLEAR MATERIALS DIVERSION; PLUTONIUM; PLUTONIUM RECYCLE; RADIOACTIVE WASTE DISPOSAL; REPROCESSING; SPENT FUELS; THORIUM; URANIUM-233; URANIUM-238; ACTINIDE ISOTOPES; TRANSURANIUM ELEMENTS

205
Eakes, R.G., G.H. Lamoreaux, L.E. Romesberg, S.H. Sutherland, and T.A. Duffey; Sandia Laboratories, Albuquerque, NM

TRU WASTE TRANSPORTATION PACKAGE DEVELOPMENT. CONF-801115; Packaging and Transporting Radioactive Material, Proceedings of a International Symposium, Berlin, German Federal Republic, November 10, 1980. International Atomic Energy Agency, Vienna, (7 pp.); SAND80-0793C: 7 pp. (1980)

Inventories of the transuranic wastes buried or stored at various US DOE sites are tabulated. The leading conceptual design of type-B packaging for contact-handled transuranic waste is the Transuranic Package Transporter (TRUPACT), a large metal container comprising inner and outer tabular steel frameworks which are separated by rigid polyurethane foam and sheathed with steel plate. Testing of TRUPACT is reported. The schedule for its development is given.

ORIGIN: Government

KEYWORDS: CONTAINERS; IMPACT TESTS; INVENTORIES; PACKAGING; PLANNING; RADIOACTIVE WASTES; RESEARCH PROGRAMS; TRANSURANIUM ELEMENTS; WASTE TRANSPORTATION

206
Savannah River Laboratory, Aiken, SC

ALTERNATIVES FOR LONG-TERM MANAGEMENT OF DEFENSE TRANSURANIC WASTE AT THE SAVANNAH RIVER PLANT. DOE/SR-WM-79-1: 12 pp. (1979)

Risks and costs are summarized in a table.

Costs and risks are estimated for 12 alternatives for the long-term management of defense transuranic waste now stored in trenches and on pads at the Savannah River Plant. The alternatives range from the no-action alternative to the alternative where all waste is retrieved, fixed in concrete or glass, and disposed of in deep geologic facilities. For a 10-year processing and a 100-year surveillance period, estimated costs range from under 25 million (1979) dollars for the no-action alternative to over 500 million dollars for fixation of all transuranic waste and disposal in bedrock. Time-integrated risks range from 13,000 man-rem for the no-action alternative to 50 man-rem for alternatives in which all waste is placed either in onsite trenches or overpacked and placed in geologic disposal facilities. If institutional control of the onsite trench area ceases after 100 years, radiation doses to the public over the next 1000-year period would range from about 20,000 man-rem for the no-action alternatives down to 100-300 man-rem for the action alternatives.

ORIGIN: Government

KEYWORDS: COST; TRANSURANIUM ELEMENTS; RADIOACTIVE WASTE DISPOSAL; SOLID WASTES; DOSE RATES; RADIOACTIVE WASTE MANAGEMENT; RADIOACTIVE WASTE STORAGE; RISK ASSESSMENT; SAVANNAH RIVER PLANT; COST ESTIMATES; RADIOACTIVE WASTE PROCESSING

207
Hootman, H.E., D.J. Trapp, and Warren J.H.; Savannah River Laboratory, Aiken, SC

OPERATION OF A PILOT INCINERATOR FOR SOLID WASTES. DP-MS-78-97: 21 pp. (1979)

A laboratory-scale incinerator (0.5 kg waste/hr) was built and operated for more than 18 months as part of a program to adapt and confirm technology for incineration of Savannah River Plant solid wastes, which are contaminated with about 0.3 Ci/kg of alpha-emitting transuranium (TRU) nuclides. About 4000 packages of simulated nonradioactive wastes were burned, including HEPA (high-efficiency particulate air) filters, resins, and other types of solid combustible waste from plutonium finishing operations. Throughputs of more than 3 kg/hr for periods up to 4 hours were demonstrated. The incinerator was operated at temperatures above 750 degrees C for more than 7700 hours during a period of 12 months, for an overall availability of 88%. The incinerator was shut down three

times during the year: once to replace the primary combustion chamber electrical heater, and twice to replace oxidized electrical connectors to the secondary chamber heaters. Practical experience with this pilot facility provided the design basis for the full-size (5 kg waste/hr) nonradioactive test incinerator, which began operation in March 1979. (Auth)

ORIGIN: Government

KEYWORDS: RESEARCH PROGRAMS; LABORATORY STUDIES; US DOE; INCINERATION; SOLID WASTES; RADIOACTIVE WASTES; TRANSURANIUM ELEMENTS; EQUIPMENT; WASTE PROCESSING; SAVANNAH RIVER PLANT

208
Towler, O.A., Jr., and G.F. Molen; Savannah River Laboratory, Aiken, SC

ALTERNATIVES FOR LONG-TERM MANAGEMENT OF TRANSURANIC WASTE AT THE SAVANNAH RIVER PLANT. DP-MS-80-77; CONF-810217; Waste Management, Proceedings of a Conference, Tucson, AZ, February 23, 1981. American Nuclear Society, Tucson, AZ, (16 pp.) (1981)

The six alternatives proposed consider the effects of making no decision (alternative 1), delaying a decision for up to 100 years (alternatives 2 and 3), or taking significant action (alternatives 4, 5, or 6). Alternative 4 exhibits intermediate cost and risk values, and indicates good agreement with ideal disposal characteristics. Alternative 6, which is comparable to alternative 4 in risk and disposal characteristics, would require a large single outlay of capital funds, whereas funds for alternative 4 could be staged. The cases described, excluding the no-action case, represent the better alternatives of the 34 that have been studied. Their costs range from 80 to 270 million dollars, while the sum of the population risk and worker dose ranges from 95 to 13,800 man-rem. The naturally occurring dose from cosmic rays and terrestrial activity to the same population over the same period is many times larger.

ORIGIN: Government

KEYWORDS: ALPHA-BEARING WASTES; COMBUSTION; COST; DECISION MAKING; GEOLOGIC DEPOSITS; INCINERATORS; RADIATION DOSES; RADIATION MONITORING; WASTE DISPOSAL; WASTE FACILITIES; WASTE MANAGEMENT; WASTE PROCESSING; WASTE STORAGE; RISK ASSESSMENT; SAVANNAH RIVER PLANT; SOLIDIFICATION; TRANSURANIUM ELEMENTS

209
Savannah River Laboratory, Aiken, SC

DEFENSE TRANSURANIC WASTE AT THE SAVANNAH RIVER PLANT, AIKEN, SOUTH CAROLINA. SUPPLEMENTAL

ALTERNATIVES FOR LONG-TERM MANAGEMENT. DOE/SR-WM-70-1, Suppl.: 53 pp. (1980)

Costs and risks are estimated for four supplemental alternatives for the long-term management of retrievably stored defense transuranic solid waste now stored in trenches and on pads at the Savannah River Plant. These alternatives supplement the twelve alternatives described in reference 1, alternatives for long-term management of defense transuranic waste at the Savannah River Plant, Aiken, South Carolina, by adding the use of the planned alpha waste incinerator and alpha disassembly and decontamination facilities to process retrievable stored TRU solid waste. The four supplemental alternatives are compared with three of the twelve alternatives described in reference 1.

ORIGIN: Government

KEYWORDS: COMBUSTION; COST; DECONTAMINATION; INCINERATORS; PLANNING; WASTE FACILITIES; WASTE MANAGEMENT; WASTE PROCESSING; RETRIEVAL SYSTEMS; RISK ASSESSMENT; SAVANNAH RIVER PLANT; SOLID WASTES; TRANSURANIUM ELEMENTS

210
Kniazewycz, B.G.; TERA Advanced Services Corp., Berkeley, CA

TRANSURANIC CONTAMINATED WASTE CONTAINER CHARACTERIZATION AND DATA BASE. REVISION I. UCRL-15253 (1980)

Available from NTIS, PC A15/MF A01.

The Nuclear Regulatory Commission (NRC) is developing regulations governing the management, handling and disposal of transuranium (TRU) radioisotope contaminated wastes as part of the NRC's overall waste management program. In the development of such regulations, numerous subtasks have been identified which require completion before regulations can be proposed, their impact evaluated, and the regulations implemented. This report was prepared to assist in the development of the technical data base necessary to support rule-making actions dealing with TRU-contaminated wastes. An earlier report presented the waste sources, characteristics and inventory of both Department of Energy (DOE) generated and commercially generated TRU waste. A wide variety of waste sources as well as a large TRU inventory were identified. The purpose of this report is to identify the different packaging systems used and proposed for TRU waste and to document their characteristics. This document then serves as part of the data base necessary to complete preparation and initiate implementation of TRU waste container and packaging standards and criteria suitable for inclusion in the present TRU waste management program. It is the purpose of this report to serve as a working document which will be used as appropriate in the TRU waste management program. This

report, and those following, will be compatible not only in format, but also in reference material and direction.

ORIGIN: Commercial

KEYWORDS: CHEMICAL COMPOSITION; CONTAINERS; DATA BASE MANAGEMENT; DIAGRAMS; INVENTORIES; PACKAGING; PHYSICAL PROPERTIES; RADIOACTIVE WASTE MANAGEMENT; RADIOACTIVE WASTE PROCESSING; STANDARDS; TRANSURANIUM ELEMENTS

211
Kniazewycz, B.G.; TERA Corporation, Berkeley, CA

TRANSURANIC CONTAMINATED WASTE FUNCTIONAL DEFINITION AND IMPLEMENTATION. UCRL-15229 (1980)

Available from NTIS, PC/MF A01

Problems of TRU waste classification are examined and the development of easy-to-apply standards to determine whether or not this waste package should be emplaced in a geologic repository for final disposition is documented. TRU wastes are especially significant because they have long half-lives and some are rather radiotoxic. Transuranic radionuclides are primarily produced by single or multiple neutron capture by U-238 in fuel elements during the operation of a nuclear reactor. Reprocessing of spent fuel elements attempts to remove plutonium, but since the separation is not complete, the resulting high-activity liquids still contain some plutonium as well as other tansuranics. Likewise, TRU contamination of low-activity wastes also occurs when these materials are handled or processed, which is primarily at Federal facilities involved in R&D and nuclear weapons production. Transuranics are presistent in the environment and, as a general rule, are strongly retained by soils. They are not easily transported through most food chains, although some reconcentration does take place in the aquatic food chain. They pose no special biological hazard to humans upon ingestion because they are weakly absorbed from the gastrointestinal tract. A greater hazard results from inhalation since they behave like normal dust and fractionate accordingly.

ORIGIN: Commercial

KEYWORDS: ADSORPTION; AIR; BIOLOGICAL HALF-LIFE; CLASSIFICATION; DATA COMPILATION; FLOWSHEETS; FOOD CHAINS; GROUND WATER; HEALTH HAZARDS; HIGH-LEVEL RADIOACTIVE WASTES; INHALATION; INVENTORIES; PLUTONIUM; RADIOACTIVE WASTE MANAGEMENT; RADIOACTIVITY; SOILS; TABLES; TOXICITY; TRANSURANIUM ELEMENTS; URANIUM-238

212
TERA Corporation, Berkeley, CA

TRANSURANIC WASTE FORM

CHARACTERIZATION AND DATA BASE.
UCRL-15299: 15 pp. (1980)

The transuranic waste form characterization and data base (Volume 1) provides a wide range of information from which a comprehensive data base can be established and from which standards and criteria can be developed for the present NRC Waste Management Program. Supplementary information on each of the areas discussed in Volume 1 is presented in appendices A through K (Volumes 2 and 3). The structure of the study (Volume 1) is outlined and appendices of volumes 2 and 3 correlate with each main section of the report. The executive summary reviews the sources, quantities, characteristics and treatment of transuranic wastes in the United States. Due to the variety of potential treatment processes for transuranic wastes, the end products for long-term storage may have corresponding variations in quantities and characteristics.

ORIGIN: Commercial; Institutional; Government

KEYWORDS: ALPHA-BEARING WASTES; CHEMICAL PROPERTIES; PHYSICAL PROPERTIES; WASTE MANAGEMENT; WASTE PROCESSING; RADIOACTIVE WASTES; TRANSURANIUM ELEMENTS; VOLUME

213
U.S. Department of Energy, Albuquerque Opertions Office, Albuquerque, NM

TRANSURANIC (TRU) WASTE MANAGEMENT PROGRAM STATEGY DOCUMENT.
DOE/AL/TRU-8002: 33 pp. (1980)

DOE strategy for developing acceptable forms of transportation and final disposition of transuranic wastes (TRU) is described. An overview of TRU waste management, existing and projected inventories, and capabilities are discussed.

ORIGIN: Government

KEYWORDS: REVIEWS; WASTE MANAGEMENT; TRANSURANIUM ELEMENTS; INVENTORIES; RADIOACTIVE WASTE FACILITIES; WASTE TRANSPORTATION; STORAGE FACILITIES

214
U.S. Department of Energy

REPORT OF THE SUBGROUP ON DOE WASTE - SPECIAL ISSUES OF THE INTERAGENCY REVIEW GROUP ON NUCLEAR WASTE MANAGEMENT.
TID-28883: 61 pp. (Draft) (1979)

Information concerning commerical & DOE waste inventories and generation is shown in tables. Volumes, activity levels, and TRU content are shown graphically. Logistics and milestone charts are included.

A report compiled by the Subgroup No. 3 of the Interagency Review Group (IRG) for Nuclear Waste Management is presented. The

report addresses in a summary manner the decisions, actions, and issues for all kinds of U.S. Dept. of Energy radioactive wastes. Four issues discussed in the report are: 1) timing of waste processing; 2) maintaining waste in recoverable forms; 3) near term versus long term costs risks; and 4) strategy for reducing the number of nuclear sites in the U.S. A systems analysis of radioactive waste treatment methods is also presented, along with a work plan for the subgroup.

ORIGIN: Government

KEYWORDS: US DOE; REVIEWS; RESEARCH PROGRAMS; WASTE MANAGEMENT; RADIOACTIVE WASTES; RISK ASSESSMENT; WASTE PROCESSING; COST BENEFIT ANALYSIS; INVENTORIES; METHODS

215
Kreiter, M.R., R.M. Fleischman, and W.A. Muckerheide; Pacific Northwest Laboratory, Richland, WA

INFLUENCE OF PLUTONIUM RECYCLE ON THE RADIOACTIVE WASTE MANAGEMENT SYSTEM. BNWL-SA-6193; CONF-770554; Plutonium Fuel Recycle, Proceedings of a Symposium, Miami, May 2, 1977, (14 pp.) (1977)

The effect that variations in the back-end of the fuel cycle have upon radioactive waste characteristics is of increasing interest. An overview treatment of the characteristics for the once-through cycle, recycle of uranium only, and recycle of uranium and plutonium modes of operation is presented. Characteristics which are considered include waste volumes, heat generation, neutron source strength, specific activities, and radioactive airborne releases.

ORIGIN: Commercial

KEYWORDS: REVIEWS; PLUTONIUM; URANIUM; REPROCESSING; RISK ASSESSMENT; AIR POLLUTION; VOLUMETRIC ANALYSIS; NEUTRONS; FUEL CYCLE; VOLUME; GASEOUS WASTES; WASTE STREAMS

216
Taboas, A.L., W.S. Bennett, and C.M. Brown; Rockwell International, Rocky Flats Plant, Golden, CO; Rockwell Hanford Operations, Richland, WA

US DEPARTMENT OF ENERGY ACCEPTANCE OF COMMERCIAL TRANSURANIC WASTE. DOE/AL/TRU-8001; RFP-3110: 27 pp. (1980)

Charge schedules , TRU waste generations and projections, inventories, and cost data through the year 2003 are given in tables.

Contaminated transuranic wastes generated as a result of non-defense activities have been disposed of by shallow land burial at a commercially operated (NECO) facility located on the Hanford Federal Reservation, which is licensed by the state of Washington and by the NRC. About

15,000 cu ft of commercial TRU waste have been generated each year, but generation for the next three years could triple due to decontamination and decommissioning scheduled to start in 1980. Disposal at other commercial burial sites has been precluded due to site closing or prohibitions on acceptance of transuranic wastes. The state of Washington recently modified the NECO-Hanford operation license, effective February 29, 1980, to provide that radioactive wastes contaminated with transuranic in excess of 10 nci/g will not be accepted for disposal. Consistent with the state policy, that NRC amended the NECO special nuclear material license so that Pu in excess of 10 n ci/g cannot be accepted after February, 1980. As a result, NRC requested DOE to examine the feasibility of accepting these wastes at a DOE operated site. TRU wastes accepted by the DOE would be placed in retrievable storage in accordance with DOE policy which requires retrievable storage of transuranic wastes pending final disposition in a geologic repository. DOE transuranic wastes are stored at six major DOE sites: INEL, Hanford, LASL, NTS, ORNL, and SRP. A specific site for receiving commercial TRU waste has not yet been selected. Shipments to DOE-Hanford would cause the least disruption to past practices. CommerciaL TRU wastes would be subject to waste form and packaging criteria established by the DOE. The waste generators would be expected to incur all applicable costs for DOE to take ownership of the waste, and provide storage, processing, and repository disposal. The 1980 charge to generators for DOE acceptance of commercial TRU waste is $147 per cubic foot.

ORIGIN: Government; Commercial

KEYWORDS: COST; HANFORD RESERVATION; LICENSING; PLUTONIUM; WASTE MANAGEMENT; WASTE FACILITIES; WASTE DISPOSAL; WASTE STORAGE; RADIOACTIVE WASTES; TRANSURANIUM ELEMENTS; US DOE; WASHINGTON; COMMERCIAL WASTES; DECONTAMINATION; DECOMMISSIONING; NECO; UNDERGROUND DISPOSAL

217
Palmer, C.R., and O.F. Hill; Pacific Northwest Laboratory, Richland, WA

WASTES FROM SELECTED ACTIVITIES IN TWO LIGHT-WATER REACTOR FUEL CYCLES. PNL-3425: 45 pp. (1980)

This report presents projected volumes and radioactivities of wastes from the production of electrical energy using light-water reactors (LWR). The projections are based upon data developed for a recent environmental impact statement in which the transuranic wastes (i.e., those wastes containing certain long-lived alpha emitters at concentrations of at least 370 becquerels, or 10 nci, per gram of waste) from fuel cycle activities were characterized. In addition, since the WG.7 assumed that all fuel cycle wastes except mill

tailings are placed in a mined geologic repository, the nontransuranic wastes from several activities are included in the projections reported. The LWR fuel cycles considered are the LWR, once-through fuel cycle (strategy 1), in which spent fuel is packaged in metal canisters and then isolated in geologic formations; and the LWR U/Pu recycle fuel cycle (strategy 2), wherein spent fuel is reprocessed for recovery and recycle of uranium and plutonium in LWRs. The wastes projected for the two LWR fuels cycles are summarized. The reactor operations and decommissioning were found to dominate the rate of waste generation in each cycle. These activities account for at least 85 percent of the fuel cycle waste volume (not including head-end wastes) when normalized to per unit electrical energy generated. At 10 years out of reactor, however, spent fuel elements in strategy 1 represent 98 percent of the fuel cycle activity but only 4 percent of the volume. Similarly, the packaged high-level waste, fuel hulls and hardware in strategy 2 concentrate greater than 95 percent of the activity in 2 percent of the waste volume.

ORIGIN: Commercial

KEYWORDS: BWR TYPE REACTORS; COMPARATIVE EVALUATIONS; FORECASTING; FUEL CYCLE; WASTE MANAGEMENT; RADIOACTIVE WASTES; REPROCESSING; VOLUME; PROJECTIONS

218
U.S. Department of Energy, Office of Nuclear Waste Management, Washington, DC

ALTERNATIVES INVOLVING RETRIEVAL, PROCESSING, AND SHIPMENT TO THE FEDERAL REPOSITORY. DOE/ET-0081; Environmental and Other Evaluations of Alternatives for Long-Term Management of Stored INEL Transuranic Waste, Section 9, (pp. 9-1 - 9-28) (1979)

Site plans for facilities for retrieval, onsite processing, and shipping to a Federal Repository are illustrated. Block flow diagrams show retrieval and processing steps. Plans are given of slagging pyrolysis facilities. A table shows flow rates of over-all system.

This section discusses the methods studied for 1) retrieval of TRU waste storage at the Radioactive Waste Management Complex, 2) onsite processing, 3) packaging, and 4) shipment to the Federal Repository. Several options were considered for each of these operations, but only one option for each was evaluated further. The sequence of operations selected for study was retrieval with operator-controlled equipment inside a moveable, solid-frame structure at subatmospheric pressure; processing by slagging pyrolysis with slat packaged in 55-gal drums; and rail shipment to the Federal Repository. Alternatives 3, 4, and 6 are discussed in this section. In Alternative 3, the TRU waste would be retrieved as scheduled

(beginning in 1985 and requiring 10 yr), incinerated and immobilized by slagging pyrolysis, packaged, and shipped by rail to the Federal Repository. In Alternative 4, the TRU waste would be retrieved as scheduled (beginning in 1985 and requiring 10 yr), processed by slagging pyrolysis, packaged, stored in a precast concrete facility at the RWMC for 20 yr, and shipped to the (delayed) Federal Repository in 2005. In Alternative 6, retrieval would be delayed for 20 yr (to the year 2005). Processing would involve slagging pyrolysis and packaging. The TRU waste would then be shipped to the Federal Repository. There are significant uncertainties associated with planning for a 20 yr delay. If the ongoing monitoring and surveillance program for stored waste were to detect accelerated degradation of the waste containers, the delay of the retrieval for 20 yr would have to be reevaluated.

ORIGIN: Commercial

KEYWORDS: TRANSURANIUM ELEMENTS; RADIOACTIVE WASTE PROCESSING; PACKAGING; WASTE TRANSPORTATION; RADIOACTIVE WASTE STORAGE; RADIOACTIVE WASTE MANAGEMENT; EQUIPMENT; INCINERATION; CONTAINERS; VOLUME; GASES; DECONTAMINATION; DECOMMISSIONING; VENTILATION; THEORETICAL STUDIES; PYROLYSIS; DIAGRAMS

AUTHOR INDEX

AUTHOR INDEX

AUTHOR INDEX

AUTHOR INDEX

AUTHOR INDEX

AUTHOR INDEX

AUTHOR INDEX

AUTHOR AFFILIATION INDEX

AUTHOR AFFILIATION INDEX

AUTHOR AFFILIATION INDEX

AUTHOR AFFILIATION INDEX

SUBJECT CATEGORY INDEX

KEYWORD INDEX

KEYWORD INDEX

KEYWORD INDEX

KEYWORD INDEX

KEYWORD INDEX

KEYWORD INDEX

KEYWORD INDEX

KEYWORD INDEX

KEYWORD INDEX

KEYWORD INDEX

KEYWORD INDEX

KEYWORD INDEX

KEYWORD INDEX

KEYWORD INDEX

KEYWORD INDEX

PUBLICATION DESCRIPTION INDEX

PUBLICATION DESCRIPTION INDEX

PUBLICATION DESCRIPTION INDEX

PUBLICATION DESCRIPTION INDEX

PUBLICATION DESCRIPTION INDEX

PUBLICATION DESCRIPTION INDEX

PUBLICATION DESCRIPTION INDEX

PUBLICATION DESCRIPTION INDEX

PERMUTED TITLE INDEX

PERMUTED TITLE INDEX

PERMUTED TITLE INDEX

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PERMUTED TITLE INDEX

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PERMUTED TITLE INDEX

PERMUTED TITLE INDEX

PERMUTED TITLE INDEX

PERMUTED TITLE INDEX

PERMUTED TITLE INDEX

PERMUTED TITLE INDEX

PERMUTED TITLE INDEX

PERMUTED TITLE INDEX

PERMUTED TITLE INDEX

PERMUTED TITLE INDEX

PERMUTED TITLE INDEX

PERMUTED TITLE INDEX

PERMUTED TITLE INDEX

PERMUTED TITLE INDEX

PERMUTED TITLE INDEX