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FOREIGN TRIP REPORT**

ORNL/FTR-3490

**Date:** December 4, 1989

**Subject:** Report of Foreign Travel of R. N. McGill, Development Staff Member, Engineering Technology Division

**To:** A. W. Trivelpiece

**Purpose:** To participate in a meeting in Rome, Italy, of the International Energy Agency Executive Committee on Alcohols and Alcohol Blends as Motor Fuels and to represent the position of the U.S. on the issues of the committee.

**SITES VISITED:**

11/13-17/89	IEA Committee and other dis- cussions	Rome, Italy
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**ABSTRACT:** The traveler participated in the 11th meeting of the Executive Committee on Alcohols and Alcohol Blends as Motor Fuels (International Energy Agency). Participating countries in addition to the U.S. are Canada, Italy, Finland, Japan, Sweden, New Zealand (absent). A representative of West Germany was in attendance as an observer and also to make a technical presentation. The status of three existing annexes was reviewed and two new annexes were approved in principle with details to be discussed in the next meeting. The traveler extended an invitation for the committee to hold its next meeting in June 1990 in Los Angeles, California. In other informal discussions during the travel period, the traveler learned that the organizing committee of the International Symposium on Alcohol Fuels wishes for the U.S. to host the symposium in 1993 and is enlisting the aid of the traveler in seeking support in the U.S. for this proposition.

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## INTERNATIONAL ENERGY AGENCY COMMITTEE MEETING

This was the 11th meeting of the Executive Committee on Alcohols and Alcohol Blends as Motor Fuels and the third meeting that the traveler has attended at the request of the Office of Transportation Systems. Participating countries in the committee and their delegates to this meeting are listed in the Appendix; Finland was new to the committee. Vice Chairman Pier Paolo Garibaldi of Italy presided over the meeting because the chairman, Mr. Nakayama of Japan, will no longer be with the committee since taking a new job in the Japanese government. The first meeting day was devoted to presentations of status of three annexes (studies) sponsored by the committee as well as three additional technical presentations. The second day included an Executive Committee meeting in which, among other things, two new annexes were approved in principle for the committee to sponsor.

Discussions began with members of each delegation briefly summarizing the status of developments in their countries regarding alcohol fuels. Most agreed that developments in the U.S. are driving the activities in the rest of the world and that environmental concerns are the primary driving forces for the serious consideration of alcohols. It appears that methanol is being taken seriously and that clarifications of its environmental benefits are needed before markets will be developed for its use. These findings are consistent with a written position outlining the situation in the U.S. that the traveler had submitted to the committee about one month before this meeting.

**Technical Presentations - Annexes**Annex 2 - Claes Pilo, Swedish Motor Fuel Consultants, Inc.

Claes Pilo reported on the past half-year's activities on Annex 2, "Technology Information Exchange," which is a long-term, general information exchange project. It deals with a variety of alcohol-related topics of interest to the participating countries (Canada, Italy, Japan, Sweden, USA). The information developed as a result of this annex centers on analyses and state-of-the-art reports. Publications called "Trends" are issued periodically, and the latest one near publication deals with the latest developments in the U.S. with regard to methanol. Mr. Pilo reported that he is not happy with the report in its present state because of the lack of published literature to support the conclusions and projections that are being promulgated about methanol today. He asked for help from the other delegates in identifying pertinent reports and papers for this purpose and also identifying persons who can be sources of the latest reports and materials.

Under the general auspices of Annex 2, Mr. Nils-Olaf Nylund offered a proposal for additional work that involved the testing and evaluation of emissions from methanol engines at low, ambient temperatures, down to minus 20°C. The bulk of the financing for this project would come from the Finnish government with the remainder being financed by this committee,

with results to be reported in the spring of 1991. Later, they may wish to pursue vehicle tests at low ambient temperatures after a new facility is completed. Chairman Garibaldi suggested that this proposal should be considered as a new annex and not part of Annex 2 and, therefore, should be considered further in the Executive Committee session.

Annex 3 - Gordon Hamilton, Sypher:Mueller, International

The progress report on Annex 3, "Diesel Field Trials and Analyses," was presented by Gordon Hamilton of Sypher:Mueller, International in Canada. This annex deals with establishing a database and methanol reference library for heavy-duty methanol-fueled diesel engines. Mr. Hamilton had distributed copies of two reports by mail shortly before the meeting; they were:

"Diesel Exhaust Emissions Legislation and Alcohol-Fuelled Engines"  
and  
"Alcohol Fuels for Heavy Duty Engines"

The first report above was to be the final report of this portion of the annex. It is to be reviewed by delegates with comments to Mr. Hamilton within a month so that it can be printed in final form and distributed. The second report is a survey of current state of international development of heavy duty vehicle engines operating on alcohol fuels.

Annex 4 - Liviu Vancea, Energy, Mines and Resources Canada

Progress on Annex 4, "Alcohol Production," was reported by Dr. Liviu Vancea of Canada's Ministry of Energy, Mines and Resources. It is primarily a study of the costs of producing alcohols and other oxygenates from fossil fuels, and this represented the final report for the authorized period of performance. The question of continuing the annex was to be discussed in the Executive Committee later. Dr. Vancea distributed a draft final report for review by delegates prior to its publication. Selected noteworthy conclusions from the report are as follows:

- \* Natural gas will remain the feedstock of choice for the production of methanol.
- \* Emerging technologies for production of methanol from natural gas can improve economics by 10-30%.
- \* Carbon dioxide and cost continue to appear to make production of methanol from coal unattractive.
- \* Biomass as a feedstock for methanol has problems in collection of the resource as well as processing.
- \* Methanol ignition promoters from biomass appear to be no longer an opportunity.
- \* CNG and LNG represent competition for methanol.
- \* Ethanol from grain continues to need subsidies.

- \* Ethanol from cellulose has long-term promise with continuing price and collection problems.
- \* Ethanol from synthesis gas represents an opportunity.

#### Technical Presentations

##### "A New Type of Fuel Injector Suitable for Methanol Utilization in Existing Diesel Engines," Alberto Cassiani - Euron, Italy

Mr. Cassiani described a fuel injector capable of injecting both diesel fuel and methanol from the same injector. The diesel fuel would serve as pilot ignition for the methanol that would follow in the injection cycle. This would represent a low-cost option for retrofitting a diesel engine to run on methanol. On the negative side, though, two fuel tanks would be required, and this is a factor known to be objectionable to truck drivers.

##### "Canadian Technical Results on Safety of Methanol Vehicles," Vittoria Battista, Transport Canada

Ms. Battista showed the results of a variety of tests comparing the relative safety aspects of gasoline and methanol (in 85% and 100% blends). These included flame luminosity tests, ignition from a hot surface, and explosivity in tanks. A number of the films of these tests had been used in previous presentations at which the traveler had been present, but the films were new to a number of the European delegates.

##### "FFV or Methanol Only? Emissions or Energy Efficiency," Hansgert Quadflieg, TUEV Rheinland, W. Germany

Mr. Quadflieg talked about the various comparisons between flexible fuel vehicles and dedicated methanol vehicles. Optimized use of methanol will be more likely achieved in dedicated methanol vehicles, but flexible fuel vehicles are the choice of governments and industry for the introduction of methanol into the transportation fuels market. Mr. Quadflieg identified the following as being the biggest issues remaining for methanol vehicles:

- \* Development of flexible fuel vehicles "as good as current production vehicles" (possessing the same reliability and durability)
- \* Lubrication
- \* Cold start performance

#### Executive Committee Meeting

The Executive Committee convened following all of the technical presentations and status reports of annexes. First order of business was to welcome Finland as a full member of the Executive Committee. The acting chairman reported that he had attended the latest End Use Working Party Meeting in Paris where he presented a summary of this committee's activities.

There has been a need in this committee to include consideration of other fuels for comparison to alcohols. Sometimes, this can involve considerable assessment of the other fuels, and the question has arisen whether the committee's scope should be expanded in general to include other fuels. This question was addressed by the acting chairman during his visit to IEA headquarters in Paris, and the result was that there exists enough license in the implementing agreement so that the committee can expand its mandate if it so wishes. Therefore, the committee voted to expand its activities to include other alternative fuels, principally natural gas, and the new name for the committee will be, "Executive Committee on Alternative Motor Fuels."

#### Action on Existing Annexes

In action on existing annexes, the committee agreed to extend Annex 3 at no additional cost to allow more time for collecting data from fleets. This activity had fallen behind because of delays in starting some of the fleets that were to be monitored, and the Canadian operating agents requested the extension.

Canada proposed an extension of Annex 4 to be considered at the next Executive Committee meeting. This would include a study of natural gas supply economics, a study of economics of methanol and ethanol from biomass, and a study of greenhouse gas emissions from methanol/ethanol processes. The delegates are to assess their country's support for such a continuation of this annex and come to the next meeting prepared to act on the proposal.

#### Action on New Annexes

The suggestion at the last meeting by the Italians for Annex 5 which would identify ways in which alcohol fuels could be introduced into the marketplace was withdrawn in light of the explanation of the situation in the U.S. as written by the traveler. The Finnish proposal for emissions at cold ambient conditions from methanol engines was then put forth as Annex 5. The committee gave preliminary approval for this annex, and the Finns will come to the next meeting with a detailed proposal.

Canada proposed Annex 6 which would be a state-of-the-art assessment of technology for natural gas as a transportation fuel. This would be much the same as was done for alcohol fuels in Annex 1. Operating agents (for the present) are Canada and Sweden, jointly. They also will come to the next meeting with a detailed proposal for this annex, and delegates should assess their country's interest in participating.

In other business, the name, "Executive Committee on Alternative Motor Fuels," was officially adopted for this committee. Mr. Garibaldi was elected chairman, and Mr. Kunisuke Konno of Japan was elected vice-chairman.

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The traveler extended an invitation for the committee to hold its next meeting in Los Angeles, California, in June 1990. The invitation was accepted by the committee. Meeting dates will be either June 8-9 or June 18-19. The traveler will be making arrangements for hosting the Los Angeles meeting in the interim.

#### Other Discussions

In informal discussions with committee delegates during the travel period the following were noteworthy:

Professor Kenichi Ito, of Hokkaido University, is serving as chairman of the 9th International Symposium on Alcohol Fuels to be held in Florence, Italy, in 1991. (This symposium is held approximately every two years and hosted on a revolving basis among several countries. The last symposium in Tokyo in 1988 attracted 550 attendees.) Professor Ito informed the traveler that the hosting responsibility for the 10th Symposium in 1993 should belong with the U.S., and he asked if we could agree to do this. The traveler discussed this with Jerry Allsup of DOE, and we agreed that we would begin to determine what is necessary for the U.S. to host the symposium in 1993.

Mr. Tadashi Ayusawa, of the Japan Automobile Research Institute, asked the traveler to help him find any material on measuring techniques for aldehyde emissions from engines and also research and development associated with measurement techniques. He is interested in measuring aldehyde emissions in an "on-line" fashion as can be done now for hydrocarbons, carbon monoxide, and nitric oxides. Up to now aldehyde emissions are measured in a batch fashion with an exhaust sample being analyzed in a process that takes considerable time. A continuous sampling system with near immediate analyses would greatly enhance our ability to understand and control aldehyde emissions.



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APPENDIX

A. ITINERARY

11/11-12/89	Travel en route, Knoxville to Rome, Italy
11/13-15/89	Informal discussions with other IEA committee members, Rome, Italy
11/16-18/89	IEA Committee meeting, Rome, Italy
11/18/89	Travel en route, Rome to Knoxville



## B. LIST OF PARTICIPANTS

IEA Committee Meeting  
November 16-18, 1989

U.S.A.

Jerry Allsup	DOE
Ralph McGill	ORNL

CANADA

Liviu Vancea	Energy, Mines and Resources
Gordon Hamilton	Sypher:Mueller, International
Bernie James	Energy, Mines and Resources
Vittoria Battista	Transport Canada

ITALY

Pier Paolo Garibaldi	Ecofuel
Alberto Cassiani	Euron, Italy
Mario Sposini	Ecofuel

NEW ZEALAND

Absent member

SWEDEN

Gunner Kimbom	Swedish Board for Technical Development
Claes Pilo	Swedish Motor Fuel Consultants
Folke Schippel	Swedish Board for Technical Development (Secretary of IEA Committee)

F. R. GERMANY (Observer)

Hansgert Quadflieg	TUV Rheinland
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FINLAND

Nils-Olof Nylund	Technical Research Center
Kai Sipila	Technical Research Center

## B. LIST OF PARTICIPANTS - IEA MEETING (CONTINUED)

JAPAN

Yoshihisa Kozawa  
Takashi Nakano

Kunisuke Konno  
Kanzo Sugimoto  
Tadashi Ayusawa  
Kenichi Ito

Yoshihiro Wahira

New Energy Development Org.  
Ministry of International Trade  
and Industry

New Energy Development Org.  
Showa Shell Sekiyu

Japan Automobile Res. Inst.  
Consultant - Japan Automobile  
Trans. Assoc.

Japan Transport Economics  
Research Center

## C. LITERATURE ACQUIRED

"Alcohol Fuels for Heavy Duty Engines - A Survey of Current Status, November 1989," Sypher:Mueller International, Ottawa, Canada, November 1989.

"Diesel Exhaust Emissions Legislation and Alcohol Fuelled Engines," Sypher:Mueller International, Ottawa, Canada, November 1989.

"Study of Safety Aspects of the Use of Alcohol Fuels in Road Vehicles - Phase II," H. J. Campbell, et al, Ortech International, Mississauga, Canada, March 31, 1989.

"Safety of Conventional Fuel Pumps and Fuel Level Indicators in Fuel Tanks of Road Vehicles Using Alcohol Fuels," J. A. Bossert and E. Dainty, Canada Centre for Mineral and Energy Technology, Energy, Mines and Resources Canada, April 1988.

"Safety of Reduced Liquid Volumes in Fuel Tanks of Road Vehicles Using Alcohol Fuels," E. E. Dainty and G. Lobay, Canadian Explosive Atmospheres Laboratory, Energy, Mines and Resources Canada, June 1989.

"Data Collection and Surveys on Diesel-Substitute Methanol Vehicle through Prototype Vehicle Driving Test and Other Studies - Interim Report," Japan Automobile Research Institute, November 1989.

"Ethanol from Biomass - The Factors Affecting its Commercial Feasibility," B. Foody, Iogen Corporation, Ottawa, Canada.

"Production of Alcohols and Other Oxygenates from Fossil Fuels - Final Report," Energy, Mines and Resources Canada, Ottawa, Canada, November 1989.

"Natural Gas Supply, Demand and Price," J. T. Jensen, Jensen Associates, February 1989.



## DISTRIBUTION

- 1-2. D. B. Waller, Assistant Secretary for International Affairs, DOE, Washington.
3. Melvin Chiogioji, Director, Office of Transportation Systems, Washington.
4. J. Michael Davis, Assistant Secretary, Conservation and Renewable Energy, DOE, Washington.
5. R. L. Egli, Assistant Manager, Energy Research and Development, DOE/ORO
6. D. J. Cook, Director, Safeguards and Security Division, DOE/ORO
- 7-8. Office of Scientific and Technical Information, P.O. Box 62, Oak Ridge, TN 37831
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