

BY THE U.S. GENERAL ACCOUNTING OFFICE

**Report To The Chairman, Subcommittee On
Fossil And Synthetic Fuels,
Committee On Energy And Commerce
House Of Representatives**

**Federal And State Methanol Fuel Projects,
Coordination, And State Tax Incentives**

This report summarizes federal and state research, development, and regulatory initiatives examining the use of methanol as an alternative fuel for motor vehicles. It also describes state tax incentives that are available to encourage methanol fuel use and some of the methods being used to coordinate methanol fuel activities. GAO identified 79 federal and state projects, as well as four states offering tax incentives for methanol fuel.



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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

RESOURCES, COMMUNITY,
AND ECONOMIC DEVELOPMENT
DIVISION

B-217943

The Honorable Philip R. Sharp
Chairman, Subcommittee on Fossil
and Synthetic Fuels
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

In your letter of May 7, 1984, you requested that we examine the potential use of methanol¹ as an alternative fuel for motor vehicles. More specifically, as agreed with your office, we

--identified and summarized all federal and state-funded methanol fuel research, development, and regulatory projects;

--identified and summarized state tax incentives for promoting the use of methanol as a fuel; and

--described some of the methods used by federal agencies and states to coordinate methanol fuel projects.

You also requested that we examine the vehicle and fuel supply issues associated with introducing methanol fuel and study methanol's potential as a boiler fuel.² As agreed with your office, we will issue separate reports on these two issues.

Methanol has attracted interest as an alternative vehicle fuel because it is a relatively clean-burning, high octane fuel that can be derived from varied sources. Despite these potential

¹Methanol (methyl alcohol) is a clear, odorless, flammable liquid that can be made from natural gas, coal, or biomass. Biomass in this context refers primarily to plant residues and other biologically produced materials.

²Boiler fuel is a combustible substance used to provide heat energy for heating systems or electricity generation.

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advantages, the economics of its production and use remain uncertain, and its chemical properties require specially adapted vehicles. Methanol fuel research is now underway in several areas including how to produce methanol more efficiently from new and existing sources, and what vehicle modifications are necessary to produce acceptable and economic performance.

To respond to your request, we contacted numerous offices of federal agencies and all 50 states. Through these contacts we identified 10 federal agencies and 7 states having projects for methanol research, development, and/or regulation. We identified a total of 65 federal projects and 14 state projects. The Department of Energy is involved with the most federally sponsored projects (30), followed by the Environmental Protection Agency (18), and the Department of Transportation (7). California has the largest number of state-sponsored methanol fuel projects (7). The types of projects and number of each are shown in the following table.

<u>Project type</u>	<u>Number</u>
Automobile or light duty vehicle testing	21
Fuel and emissions testing	19
Fuel production	18
Heavy duty vehicle and bus testing	7
Regulatory	6
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Miscellaneous	<u>5</u>
Total	<u>79</u>

Appendix I is an index of projects by type to enable those interested in a specific area to quickly locate projects of that variety. The information that we obtained on federal projects is summarized in appendix II, while appendix III summarizes state projects.

Four states--California, Kentucky, Ohio, and Utah--offer incentives to encourage the use of methanol fuel. Most of these tax incentives provide some relief from the state's fuel excise tax. California also offers a tax credit for converting vehicles to run on methanol. The state legislatures in Ohio and Utah are reportedly considering eliminating their state's methanol fuel incentives during 1985. Appendix IV describes state tax incentives.

The coordination methods contained in appendix V provide examples of some of the means used to coordinate methanol fuel research activities. Among the federal agencies, states, and

government contractors involved in methanol fuel development, the type and extent of coordination varies. Both formal and informal means are used to facilitate communication. Among the methods used are meetings within and between agencies and other groups involved in the area; participation in conferences, symposia, and workshops; report publication; and informal contacts over the telephone.

OBJECTIVES, SCOPE, AND METHODOLOGY

The objectives of our review were to summarize federal and state methanol fuel research, development, and regulation projects; to identify state tax incentives intended to encourage the use of methanol fuels; and to describe some of the methods used to coordinate methanol projects.

To accomplish our objectives, we first attempted to locate a centralized source of information such as a national association, or an agency that compiles such information. However, we were unable to locate such a group. Therefore it was necessary for us to individually contact federal and state offices that might plausibly be involved in methanol fuel-related activities. We contacted 50 state energy offices, and over 80 officials in 15 federal agencies and departments (see app. VI). Contacts were asked if their offices were involved in any methanol fuel projects and if they could identify others involved in this area. In this way we utilized the existing informal network of people involved in methanol fuel development. We limited the scope of our review primarily to ongoing or planned projects; however, we did include some recently completed projects. We gathered information on state tax incentives and inter-project coordination concurrently with the information on individual projects by asking the contacts for information on these activities.

We subjected information that we identified on projects and tax incentives to a verification process. We conducted the initial survey of state and federal agencies by telephone. Federal agencies and states that did not identify any ongoing or planned projects or state tax incentives were formally requested to provide written verification. These agencies and states all provided the requested verification. When projects were identified the information gathered by telephone was used to prepare a draft fact sheet describing the project. This summary was first verified by comparison with written documentation of the project that we requested from those performing the work. Subsequently, officials supervising each project reviewed the fact sheet to ensure that it was up to date and that our summary correctly portrayed the project being described. State tax incentive summaries were similarly reviewed by a responsible official. All of these reviews, along with any comments, were returned to us, and their comments have been incorporated where appropriate. We did not,

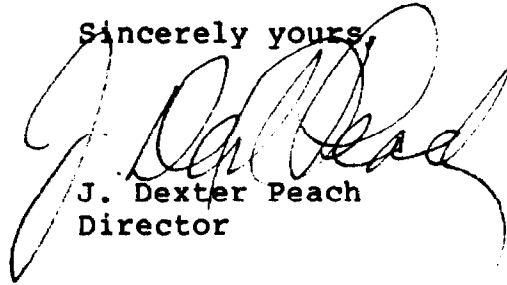
however, independently verify the project information supplied to us; rather, we relied on the accuracy of the verbal and written information provided. For example, we did not verify whether the projects were completed on the date provided by the contacts.

We conducted our review between August 1984 and February 1985. Our work was performed in accordance with generally accepted government auditing standards. As requested by your office, we did not obtain written comments on the draft report from the agencies involved. As previously discussed, however, we received written verification of the information provided from the federal agencies and states.

- - - -

As arranged with your office, unless you publically announce its contents earlier, we plan no further distribution of this report until 7 days after its issue date. At that time we will provide copies to other interested parties and make copies available to the public upon request.

Sincerely yours,

A large, stylized handwritten signature in black ink, appearing to read 'J. Dexter Peach', is written over the typed name and title.

J. Dexter Peach
Director

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GLOSSARY

Aldehydes	A group of chemical compounds that can result from the incomplete combustion of methanol fuel; many are noxious or toxic.
Anhydrous	Completely free of water.
Baseline gasoline	A gasoline of specific composition that is used as a basis for comparison of performance and emission characteristics with other fuels.
Batch process	A production operation in which discrete quantities of ingredients are processed and removed before more ingredients are added. This is the opposite of a continuous process in which ingredients and products are continuously moving through process reactors.
Bench scale	A small-scale experimental apparatus set up in a laboratory.
Biomass	A potential feedstock for methanol production made up of agricultural wastes, wood products, or other biologically produced materials.
Catalyst	A substance that helps initiate a chemical reaction and enables it to proceed under milder conditions (i.e., temperature and pressure) than otherwise possible.
Cetane rating	A measure of how easily a fuel will ignite under compression. The higher the cetane rating, the more easily a fuel will ignite. Current compression ignition diesel type engines require a cetane rating of at least 40, while methanol has a cetane rating of essentially zero.
Coal gasifiers	Industrial facilities used to convert coal into a gaseous state for further processing into methanol and other chemicals.
Co-solvents	A group of chemical compounds added to methanol/gasoline blends that prevent phase separation of the blend, reduce methanol's corrosive properties, and improve its lubricating properties.
Dissociated methanol	Methanol broken down by the use of heat and chemical catalysts to its basic constituents of carbon monoxide and hydrogen. This is now being tested as a fuel in experimental vehicles.

Energy content	A measure of the amount of energy released when a fuel is burned.
Evaporative emissions	Emissions caused by fuel evaporation.
Exhaust emissions	The products of combustion emitted by engines in operation.
Feedstock	The raw materials used to produce methanol. Natural gas is currently the most prevalent methanol feedstock; potential feedstocks include coal and biomass.
Fluidized bed	A new coal combustion process whereby pulverized coal, mixed with sulfur-absorbing substances (such as limestone), are suspended by a powerful stream of air during combustion or gasification.
Formaldehyde	The most common type of aldehyde that results from the incomplete combustion of methanol fuel.
Fuel cells	Devices that convert the energy of a fuel directly into electricity without an intermediate combustion cycle.
Fumigation	In reference to methanol fuels, an experimental technique of spraying methanol into the combustion air of a diesel engine. Methanol's low cetane rating precludes its use as a diesel replacement in conventional diesel engines. Fumigation is one process under investigation as a means of extending diesel supplies with methanol.
Gas turbine	A continuous-cycle internal-combustion engine driven by the expansion of hot combustion gases past the blades of a turbine.
Isobutanol	A type of four-carbon alcohol that is often used as a co-solvent in methanol gasoline blends to help prevent phase separation.
Liquid phase methanol synthesis	An experimental methanol production process that uses a catalyst suspended in a liquid, whereas conventional methanol production passes the synthesis gas through a bed of solid catalyst.
Luminosity	The brightness or visibility of a flame. Burning methanol produces a nearly invisible, low luminosity flame.

Methanol/gasoline blends	Blends of unleaded gasoline containing a specified percentage of methanol. At present up to 5 percent methanol (with proper co-solvents) can be blended into unleaded gasoline. "Splash" blends add methanol and cosolvents into conventional unleaded gasoline. However, under some circumstances this could produce overly volatile fuels. "Volatility-controlled" blends add the methanol and cosolvents into a gasoline specifically produced for blending, so that the volatility of the finished fuel is the same as that of conventional unleaded gasoline.
Neat methanol	The straight (undiluted) form of methanol fuel. Most neat methanol fuel in use today is actually a mixture of 85-90 percent methanol with the remainder made up of ingredients to improve cold starts, and reduce corrosiveness.
Octane rating	A measure of a fuel's resistance to premature detonation prior to spark initiation in a spark-ignition engine. The higher the octane rating, the greater its resistance. Premature detonation results in engine "knock" and power loss. Essentially the opposite of cetane rating.
Pack-bed reactor	A process reactor in which the catalyst remains stationary.
Phase separation	The separation of a gasoline/methanol blend into distinct layers usually caused by the presence of water. Cosolvents help prevent phase separation.
Photochemical reactivity	Chemical reaction caused by exposure to light. Many chemical compounds released into the atmosphere change after exposure to sunlight and other chemicals in the air. Scientists seek to estimate the rate, extent, and effects of these reactions to better understand smog.
Plant gate cost	The price paid for a commodity at the place of manufacture. It does not include shipping and associated distribution costs.
Pyrolysis	Chemical changes, usually the breakdown of complex molecules to simpler ones brought about by the action of heat without combustion or other oxidation.
Ruthenium homogenous catalyst	A type of catalyst being used experimentally to produce methanol fuels.

Smog chamber	A sealed chamber used to simulate specific atmospheric conditions in attempt to better understand air pollution and the effect of specific chemical compounds on overall air quality.
Spark ignition	The process in conventional and stratified-charge gasoline engines in which a cylinder's fuel charge is ignited by a spark.
Stirling engine	A prototype automotive engine that uses a continuous external combustion heat source with the ability to burn a variety of fuels.
Stoichiometry	A branch of science dealing with quantitative chemical proportions in a physical composition, especially as they affect chemical reactions. The proportions, or stoichiometry, of air and fuel burned in an engine play an important role in determining thermal efficiency and exhaust emissions. When the air/fuel mixture is such that the fuel is completely oxidized and there is no excess air, this is called the stoichiometric ratio. When excess fuel is present the mixture is "rich," while excess air produces a "lean" mixture.
Stratified-charge engine	Engines that use special techniques to burn a mixture of fuel and air that is fuel rich near the spark plug and much leaner farther away from the spark plug. Conventional, spark-ignited internal combustion engines burn a mixture of fuel and air that is nearly uniform in its proportions throughout the cylinder.
Synthesis gas	The mixture of carbon monoxide and hydrogen that can be used to produce methanol.
Thermochemistry	A branch of chemistry that deals with the reaction that follows the interaction of heat and a chemical.
Toxicology	A science dealing with the poisonous nature of substances and the related clinical, industrial, and legal implications.
Vapor pressure	The pressure exerted by the vapors of a fuel in a confined space. Vapor pressure is a significant characteristic of a fuel requiring careful, seasonal control. During cold weather a higher vapor pressure fuel is desirable to facilitate cold-engine starting. Hot weather calls for lower vapor pressure fuel to prevent a condition known as vapor lock, in which gas bubbles block the supply of fuel to the engine.

Volatility

A measure of the tendency of a fuel to change from a liquid to a vapor under a specific set of conditions.



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METHANOL PROJECT FACT SHEETS

Every fact sheet in this appendix and appendix III shows three major data categories. The first, project title, shows the official name of the project. Next, the locator describes the funding entity, the division supervising the effort, and a contact person to provide further details of the project, along with his/her telephone number and address. The third portion of the fact sheet is the project description, which includes the project's objectives and in some cases, information on how the objectives are to be accomplished. Some projects that are in advanced stages also include a summary of findings. The project description section also includes project initiation and estimated completion dates and a description of prospective follow-up work. In order to accurately and succinctly portray the nature of these projects, most of which are highly technical and specialized, it was necessary to use some technical terms. These terms are defined in the glossary.

Several other aspects regarding the fact sheets should also be noted. First, the project as presented reflects the description provided by the project supervisor. Second, the completion date provided in the fact sheet was provided by the project supervisor during the initial data gathering phase, and confirmed or updated during our data verification process. We did not further verify whether the projects were completed on schedule. Finally, in some cases we used "uncertain" or "none" to describe prospective follow-up work. Uncertain indicates that some follow-up may be done but nothing definitive has yet been proposed. None indicates that no follow-up work was planned.

PROJECT TITLE: CHEMICAL CONVERSION OF AGRICULTURAL PRODUCTS TO
ALCOHOLS AND OTHER ORGANIC MATERIALS

LOCATOR

Agency: Department of Agriculture

Group/Division: Agricultural Research Service
Western Regional Research Center

Contact Person: Dr. Attila Pavlath

Phone: 415 486-3251

Address: USDA Western Regional Research Center
800 Buchanan Street
Albany, California 94710

PROJECT DESCRIPTION: In the hope of finding new uses for agricultural products, this project is using pyrolytic techniques (i.e., the application of heat) to derive chemical compounds from agricultural products. Researchers are presently identifying the compounds that form as a result of this process. Methanol has already been identified as a product. Future research phases will seek to optimize production of a given set of products, which might include methanol, by varying process heating conditions and using catalysts.

Date Initiated: March 1982

Estimated Completion Date: Current funding expires in 1987. At that time project results will be reviewed for renewal, redirection, or termination.

Prospective Follow-up Work: It is too early in the project to predict specific follow-up work. The researchers anticipate applying the technology developed in this program to a variety of agricultural and forest products. The specifics depend on results achieved in the current early stages.

PROJECT TITLE: METHANOL PRODUCTION FROM FOOD AND AGRICULTURAL
WASTE

LOCATOR

Agency: Department of Agriculture

Group/Division: Office of Grants & Program Systems

Contact Person: Dr. Martin Okos

Phone: 317 494-1211

Address: AGEN
Purdue University
West Lafayette, Indiana 47907

PROJECT DESCRIPTION: This work, being conducted at Purdue University has a three-fold objective:

- 1) To determine the feasibility of producing methanol from citrus waste.
- 2) To examine the feasibility of converting methane to methanol using bacteriological methods.
- 3) To determine whether there are catalytic processes applicable to small-scale conversion of methane to methanol.

Findings indicate that the only one of these investigations that might result in a practical, economic undertaking is citrus waste conversion.

Date Initiated: October 1982

Estimated Completion Date: October 1984

Prospective Follow-up Work: None

PROJECT TITLE: COMPETITIVE ASSESSMENT STUDY OF THE METHANOL
INDUSTRY

LOCATOR

Agency: Department of Commerce

Group/Division: International Trade Administration/Office of
Basic Industries-Chemicals

Contact Person: Bill Lowrey

Phone: 202 377-0128

Address: Office of Chemicals-Room 4054
U.S. Department of Commerce
Washington, D.C. 20230

PROJECT DESCRIPTION: This project was initiated in order to

- evaluate the ability of the U.S. methanol industry to be internationally competitive,
- estimate what part of the U.S. methanol industry will survive international price competition, and
- examine the potential for lesser developed countries to use excess natural gas to produce methanol to earn hard currency.

Findings indicate that 50 percent of current U.S. methanol production capacity could survive increased foreign competition. The major problems for the U.S. industry involve the price of gas feedstock and competition with foreign national companies in debt-ridden lesser developed countries. While most U.S. plants have upgraded their methanol production technology in an attempt to stay competitive, the higher cost of natural gas feedstock in the United States compared with other methanol-producing countries could be a key competitive disadvantage. In addition, many of the new methanol production plants being built by foreign national companies are in countries suffering from serious debt and inflation problems. In these cases the methanol will be priced at whatever level is required to sell the product, with little regard for cost (especially capital) recovery.

Date Initiated: January 1984

Estimated Completion Date: December 1984

Prospective Follow-up Work: Uncertain

PROJECT TITLE: LESSONS FROM THE INTRODUCTION OF UNLEADED GASOLINE
THAT MIGHT BE PERTINENT TO METHANOL

LOCATOR

Agency: Congressional Research Service

Group/Division: Environmental Policy

Contact Person: Rob Bamberger

Phone: 202 287-7240

Address: CRS-ENR
Library of Congress
Washington, D.C 20540

PROJECT DESCRIPTION: This study, not yet begun, will have several objectives, including:

- providing a legislative history of unleaded gasoline legislation in the United States;
- explaining the federal government's role in promoting unleaded gasoline, since this could be useful for introducing methanol fuel;
- describing the history of the federal government's role in the introduction of unleaded gasoline; and
- providing a summary of legislation and decisions in the current lead phasedown effort.

Date Initiated: Uncertain

Estimated Completion Date: Uncertain

Prospective Follow-up Work: Uncertain

PROJECT TITLE: ALCOHOL FUEL RESEARCH AND DEVELOPMENT

LOCATOR

Agency: Department of Defense

Group/Division: U.S. Army - Belvoir Research and Development Center

Contact Person: Maurice Lepera

Phone: 703 664-3435

Address: U.S. Army Fort Belvoir Research and Development Center
STRBE - VF
Fort Belvoir, Virginia 22060

PROJECT DESCRIPTION: The Department of Defense has been conducting a number of methanol fuel related activities. Within the Department, the Army has been designated the lead military service for alcohol fuel research, testing, and evaluation. Its activities include:

--Testing of methanol/gasoline blends with materials common to automobile fuel systems.

--Developing methanol-powered fuel cells to be used as mobile power supply sources. The first generation, requiring both methanol and water, was developed but will not be used. A second generation, which runs on straight methanol, is also being developed. At this time it is unclear whether this project will continue into full-scale development, due to logistical concerns of supplying methanol to the field. This work is due to be reviewed by the Army in the near future to determine the course and extent of further development.

In addition the Army is preparing to participate in supporting the Department of Defense's methanol-compatible vehicle-demonstration program to develop an information resource base. At this time, the form and extent of this fleet demonstration program has not been defined. (For more information see p. 12.)

Date Initiated: January 1979

Estimated Completion Date: Uncertain

Prospective Follow-up Work: Uncertain

PROJECT TITLE: MECHANISMS OF WEAR WITH ALCOHOL FUELS

LOCATOR

Agency: Department of Defense

Group/Division: Army Fuels and Lubricants Research Lab

Contact Person: Ed Owens

Phone: 512 684-5111

Address: Southwest Research Institute
P.O. Drawer 28510, Div. 02
San Antonio, Texas 78284

PROJECT DESCRIPTION: Methanol and other alcohol fuels can cause lubrication and engine-wear problems in internal combustion engines. This research intended to identify exactly what causes these engine-wear problems. Researchers believe that they have identified the mechanisms that account for the lubrication and engine-wear problems.

Date Initiated: October 1976

Estimated Completion Date: October 1984

Prospective Follow-up Work: Researchers anticipate being involved in wear monitoring of DOD methanol demonstration fleets.

PROJECT TITLE: EVALUATION OF METHANOL-FUELED VEHICLE PERFORMANCE

LOCATOR

Agency: Department of Defense

Group/Division: U.S. Army Program Office/Jet Propulsion
Laboratory

Contact Person: John Brattenburg

Phone: 818 354-6852

Address: Jet Propulsion Laboratory
4800 Oak Grove Drive, MS 79/6
Pasadena, California 91109

PROJECT DESCRIPTION: (Preliminary, plans have not yet been made final.) The Army hopes to begin operation of a fleet of five methanol vehicles during 1985. Eventually, up to 1,000 vehicles may be converted to methanol for Army use. The Jet Propulsion Laboratory has been requested by the Army to assist in vehicle conversions by evaluating the Bank of America's reportedly successful methanol-conversion techniques.

The Jet Propulsion Laboratory has been requested to manage the conversion and limited evaluation of up to 30 vehicles using Bank of America techniques. Additionally, as presently planned the Jet Propulsion Laboratory will perform engineering tests to compare performance parameters with those reported by Bank of America, develop an understanding of the technology, and determine the specifications to be used in subsequent Army utility vehicle conversions.

This work is planned to be accomplished in three phases. Phase I is expected to test five vehicles. If successful, phase II is expected to test an additional 25 vehicles. The Jet Propulsion Laboratory will conduct an engineering evaluation of these vehicles. If the laboratory concludes that the vehicles successfully operated on methanol, a recommendation could be provided to the Army to proceed with phase III, in which up to 1,000 vehicles could be converted to run on methanol fuel. The Jet Propulsion Laboratory is not expecting to participate in phase III.

Date Initiated: March 1985

Estimated Completion Date: March 1986

Prospective Follow-up Work: Uncertain

PROJECT TITLE: ENVIRONMENTAL AND SAFETY REGULATIONS AND STANDARDS
APPLICABLE TO THE DISPENSING OF ALTERNATIVE
FUELS FOR VEHICLES

LOCATOR

Agency: Department of Energy

Group/Division: Argonne National Laboratory
Center for Transportation Research
Energy & Environmental Systems Division

Contact Person: Bob Larsen

Phone: 312 972-3735

Address: Argonne National Laboratories
Center for Transportation Research
Building 362
Mail Stop 2B
Argonne, Illinois 60439

PROJECT DESCRIPTION: This study examines the service station regulations that would affect the dispensing of alternative fuels such as methanol, propane, and compressed natural gas. Since these regulations vary by state, case studies of New York, Illinois, and California are being conducted. This study intends to identify safety and environmental regulations that would affect these fuels and draw conclusions about the effectiveness of the regulations.

Date Initiated: July 1984

Estimated Completion Date: January 1985

Prospective Follow-up Work: None

PROJECT TITLE: LOW-TEMPERATURE METHANOL CATALYSTS

LOCATOR

Agency: Department of Energy

Group/Division: Brookhaven National Laboratories
Fuels Catalysis and Energy Utilization Division
Department of Applied Science

Contact Person: Richard Sapienza

Phone: 516 282-2965

Address: Brookhaven National Laboratories
Building 120
Upton, New York 11973

PROJECT DESCRIPTION: A novel catalyst for methanol production has been developed at Brookhaven National Laboratories in a proprietary research program funded primarily by the Electric Power Research Institute. This new catalyst appears capable of more rapid and complete conversion of synthesis gas to methanol at a lower temperature and pressure than conventional catalysts. The combined effects of the new catalyst hold the potential for a very large decrease in investment costs for a methanol synthesis unit.

Findings to date using the Brookhaven catalyst in batch laboratory scale reactors indicate a number of novel features, including (1) liquid-phase performance, (2) low-temperature and pressure performance, (3) high activity and selectivity, (4) methanol yields near the maximum theoretically attainable, (5) catalyst activity 20 times greater than conventional catalysts. Together, these features indicate the potential for a radically new, technologically superior system for methanol synthesis.

Further development will include adapting the test unit to operate with continuous synthesis feed and methanol product removal. Such operation will permit better definition and understanding of the primary variables that affect the process so that improvements may be recognized and developed.

Date Initiated: July 1983Estimated Completion Date: Uncertain

Prospective Follow-up Work: Brookhaven is actively soliciting industrial partners for this program. Support is required for long-term continuous testing to develop sufficient process data for an engineering design and/or pilot plant.

PROJECT TITLE: METHANOL FROM BIOMASS

LOCATOR

Agency: Department of Energy

Group/Division: Solar Energy Research Institute for DOE
Biomass Energy Office - Thermochemical Program

Contact Person: Tom Reed

Phone: 303 231-1437

Address: Solar Energy Research Institute
1617 Cole Boulevard
Golden, Colorado 80401

PROJECT DESCRIPTION: This project is investigating potential means of deriving methanol from biomass primarily through oxygen gasification of wood to produce synthesis gas. The synthesis gas is passed over a catalyst to make methanol. This project has resulted in a new biomass gasifier called the stratified downdraft oxygen gasifier. It was chosen by Industrial Research magazine as one of the best inventions of 1982. DOE now considers the technology ready for commercialization.

Date Initiated: January 1, 1980

Estimated Completion Date: Uncertain

Prospective Follow-up Work: During 1985 the methods used in the original one-ton-per-day gasifier will be scaled up to about 20 tons per day. The work will be performed by Syn-Gas Systems and coinventor, Professor M. Graboski, under contract with the Department of Energy. They hope to collect sufficient data from this to design a full-scale unit of 100-200 tons per day.

PROJECT TITLE: DEVELOPMENT OF BIOMASS GASIFICATION TO PRODUCE
SUBSTITUTE FUELS

LOCATOR:

Agency: Department of Energy

Group/Division: Biomass Energy Office/Conservation and Renewable
Energy at Institute of Gas Technology

Contact Person: 1) Simon Friedrich at DOE
2) S.P. Babu at Institute of Gas Technology

Phone: 1) 202 252-6734
2) 312 567-5758

Address: U.S. Department of Energy
Biomass Energy Technology Division
Conservation and Renewable Energy
Washington, D.C. 20585

PROJECT DESCRIPTION: IGT is developing, with DOE support, a
pressurized steam-oxygen-blown fluidized-bed biomass gasifier.
This type of system is thought to offer both economic and
technical advantages over fixed-bed systems. At this point a
process development unit has been constructed and run through
system proving tests.

Date Initiated: July 1, 1981

Estimated Completion Date: Uncertain

Prospective Follow-up Work: Further experimental runs of the
process development unit are planned to examine the effects of
varying process conditions.

PROJECT TITLE: A TECHNICAL AND ECONOMIC ASSESSMENT OF EMERGING
BIOMASS THERMOCHEMICAL CONVERSION TECHNOLOGIES

LOCATOR

Agency: Department of Energy

Group/Division: Pacific Northwest Laboratories/Science
Applications Inc., for DOE's Biomass
Energy Office

Contact Person: Simon Friedrich

Phone: 202 252-6734

Address: U.S. Department of Energy
Biomass Energy Technology Division
Conservation and Renewable Energy
Washington, D.C. 20585

PROJECT DESCRIPTION: Science Applications Inc., in conjunction with Pacific Northwest Laboratories, is conducting an assessment of several biomass conversion processes, including the production of methanol synthesis gas. In the course of this work they will be:

- 1) analyzing the performance of new and advanced biomass thermochemical conversion processes,
- 2) developing conceptual designs for biomass-to-fuel processes using process models,
- 3) performing process condition and economic sensitivity analyses, and
- 4) identifying further research needs for biomass-to-fuel conversion technology.

Date Initiated: April 1, 1982

Estimated Completion Date: Uncertain

Prospective Follow-up Work: Efforts in fiscal year 1985 will be directed toward technical and economic assessment of several promising biomass gasification and pyrolysis processes.

PROJECT TITLE: INVESTIGATION OF BIOMASS GASIFICATION IN THE
PRESENCE OF CATALYSTS

LOCATOR:

Agency: Department of Energy

Group/Division: Biomass Energy Office/Conservation and Renewable
Energy at Battelle Pacific Northwest Laboratory

Contact Person: 1) Simon Friedrich at Department of Energy
2) L.K. Mudge at Pacific Northwest Laboratory

Phone: 1) 202 252-6734
2) 509 375-2268

Address: U.S. Department of Energy
Biomass Energy Technology Division
Conservation and Renewable Energy
Washington, D.C. 20585

PROJECT DESCRIPTION: This research seeks to take advantage of the favorable properties of biomass (low ash content and high volatiles fraction) to develop catalytic processes for its efficient conversion to synthesis gas. Specifically, this project will:

- 1) identify catalysts suitable for converting biomass into a clean synthesis gas for the subsequent production of high value liquid and gaseous fuels,
- 2) identify a process for gasifying biomass in the presence of the catalysts, and
- 3) determine the technical and economic feasibility of producing synthesis gas via catalytic gasification under the most favorable process conditions identified.

Several possible catalysts for converting biomass to methanol have been identified and tested. A preliminary economic evaluation showed that methanol from wood via catalytic gasification could be economically competitive with methanol from natural gas.

Date Initiated: December 1, 1977

Estimated Completion Date: Uncertain

Prospective Follow-up Work: Different catalysts and process conditions will be evaluated in an effort to improve yield and catalyst life. Bench-scale studies will examine catalyst activity and durability. Promising catalysts will be further investigated in a larger scale process development unit. The effects of catalyst lifetime and yield changes on process economics will be evaluated.

PROJECT TITLE: STEAM-GASIFICATION OF WOOD IN A FLUIDIZED BED
USING FIRE TUBES TO PROVIDE REACTOR HEATING

LOCATOR:

Agency: Department of Energy

Group/Division: Biomass Energy Office/Conservation and Renewable
Energy at University of Missouri

Contact Person: 1) Simon Friedrich at DOE
2) V.J. Flanigan at University of Missouri

Phone: 1) 202 252-6734
2) 314 341-4612

Address: U.S. Department of Energy
Biomass Energy Technology Division
Conservation and Renewable Energy
Washington, D.C. 20585

PROJECT DESCRIPTION: Research to date has indicated that synthesis gas might be economically produced in a fluidized-bed reactor heated indirectly with fire tubes. The objective of this project is to design and build a system to test the technical feasibility of this approach. This facility has been constructed at the University of Missouri and a limited number of experiments have been conducted.

Date Initiated: June 20, 1982

Estimated Completion Date: Uncertain

Prospective Follow-up Work: The gasifier will be dismantled and then inspected for mechanical integrity and wear. Any noted deficiencies will be corrected. Further experiments will assess the impact of changes in process variables (i.e., feed rate and temperature.)

PROJECT TITLE: INTEGRATED-PROCESS RESEARCH TECHNICAL SUPPORTLOCATOR:

Agency: Department of Energy

Group/Division: Biomass Energy Office/Conservation and Renewable Energy at Stone and Webster Engineering Corp.

Contact Person: 1) Simon Friedrich at Department of Energy
2) Dr. Herb Kasstrin at Stone and Webster
3) Dr. Thomas B. Reed at Solar Energy Research Institute

Phone: 1) 202 252-6734
2) 617 589-1309
3) 303 231-1437

Address: U.S. Department of Energy
Biomass Energy Technology Division
Conservation and Renewable Energy
Washington, D.C. 20585

PROJECT DESCRIPTION: This project will perform an engineering-economic study of a 100-200-ton-per-day wood-to-methanol plant using the downdraft, high pressure oxygen gasifier technology developed at the Solar Energy Research Institute. A draft report is being reviewed.

Date Initiated: October 1, 1983

Estimated Completion Date: Uncertain

Prospective Follow-up Work: A final report will be issued.

PROJECT TITLE: COMBUSTION OF COAL/WATER/METHANOL MIXTURES

LOCATOR

Agency: Department of Energy

Group/Division: Office of Coal Utilization, Advanced Conversion
and Gasification

Contact Person: Jack Siegel

Phone: 301 353-3965

Address: U.S. Department of Energy
Advanced Conversion and Gasification
FE-20, GTN
Washington, D.C. 20545

PROJECT DESCRIPTION: As part of the Department of Energy's alternative fuels program a data base is being developed to assist the private sector in determining whether to use a coal/water/methanol mixture (CMWM) in place of oil. The primary objective is to determine the maximum amount of water that can be tolerated in CMWM while still maintaining a stable flame, using ambient-temperature or minimally preheated combustion air. A variety of eastern and western coal will be tested. Other objectives include:

- developing retrofit technology to use in boilers designed to burn oil, and
- determining CMWM combustion characteristics, boiler efficiency, pollutant emissions, and ash deposition.

Date Initiated: June 1981

Estimated Completion Date: September 1984

Prospective Follow-up Work: None

PROJECT TITLE: DEVELOPMENT OF THE SELOX PROCESS (Selective Oxidation/Packed-Bed Methanol Synthesis Process) FOR METHANOL PRODUCTION

LOCATOR

Agency: Department of Energy

Group/Division: Office of Fossil Energy/Office of Coal Utilization, Advanced Conversion and Gasification

Contact Person: Lowell Miller

Phone: 301 353-3498

Address: U.S. Department of Energy
Office of Fossil Energy
FE-20
Washington, D.C. 20545

PROJECT DESCRIPTION: The objective of this work is to explore the potential of utilizing carbon-tolerant Beacon (a process for converting low-Btu gases into a high-Btu gas) type catalysts for selectively oxidizing methane to a mixture of predominantly carbon monoxide and hydrogen at ratios optimum for subsequent conversion into methanol. The current work employs the use of a packed-bed methanol synthesis reactor. Concurrent with the testing of the most promising catalysts at bench scale using commercial plant operating conditions, an economic assessment of the process will be performed. The best catalyst will be subjected to long-term testing with a goal of 1,000 hours of steady performance.

Date Initiated: September 1980

Estimated Completion Date: September 1984

Prospective Follow-up Work: None

PROJECT TITLE: LIQUID-PHASE METHANOL PROJECT

LOCATOR

Agency: Department of Energy

Group/Division: Office of Coal Liquefaction Technology/
Fossil Energy

Contact Person: 1) Tom Torkos, Project Management
Pittsburgh Energy Technology Center
2) Edward Schmetz, Headquarters Program Office

Phone: 1) 412 675-6145
2) 301 353-3931

Address: 1) U.S. Department of Energy
Pittsburgh Energy Technology Center
Liquefaction Project Management Branch
P.O. Box 10940
Pittsburgh, Pennsylvania 15236

2) U.S. Department of Energy
Fossil Energy Division
Office of Coal Liquefaction Technology
FE-34-GTN
Washington, D.C. 20545

PROJECT DESCRIPTION: The Department of Energy in cooperation with Air Products, Chem Systems Inc., the Electric Power Research Institute and Fluor Engineers is working to develop a liquid-phase methanol process with the potential for more efficient conversion of low hydrogen content, coal-derived synthesis gas to methanol. This process is thought to be especially useful with the emerging new generation of coal gasifiers.

Date Initiated: September 1981

Estimated Completion Date: September 1985

Prospective Follow-up Work: None

PROJECT TITLE: METHANOL-TO-GASOLINE PILOT PLANT PROJECT

LOCATOR

Agency: Department of Energy

Group/Division: Office of Coal Liquefaction Technology/
Fossil Energy Division

Contact Person: Dr. James Batchelor

Phone: 301 353-3482

Address: U.S. Department of Energy
Fossil Energy Division
Office of Coal Liquefaction Technology
FE-34-GTN
Washington, D.C. 20545

PROJECT DESCRIPTION: This joint effort by the U.S. Department of Energy, the West German government, Mobil Research and Development, and the West German firms URBK and UHDE, seeks to develop a fluidized bed catalytic process to convert methanol into high-octane gasoline. Recent developments also point to the potential of producing a slightly lower octane gasoline along with high-cetane diesel fuel.

Date Initiated: March 20, 1980

Estimated Completion Date: March 30, 1986

Prospective Follow-up Work: At the completion of the current pilot plant effort in 1986, the process will have been demonstrated in the methanol-to-gasoline and methanol-to-diesel fuel modes of operation. Significant process and design information is being obtained that will allow commercial design and cost estimation. The process will be available for commercialization by the private sector. No further U.S. government support is envisioned.

PROJECT TITLE: DIRECT SYNTHESIS OF ISOBUTANOL/METHANOL FUELS

LOCATOR

Agency: Department of Energy

Group/Division: Office of Coal Liquefaction Technology/Fossil Energy

Contact Person: 1) Tom Torkos, Project Management
Pittsburgh Energy Technology Center
2) Edward Schmetz, Headquarters Program Office

Phone: 1) 412 675-6145
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Address: 1) U.S. Department of Energy
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P.O. Box 10940
Pittsburgh, Pennsylvania 15236

2) U.S. Department of Energy
Fossil Energy Division
Office of Coal Liquefaction Technology
FE-34-GTN
Washington, D.C. 20545

PROJECT DESCRIPTION: The primary objective of this project is to derive better ways to produce octane enhancers such as methanol and higher alcohols as co-solvents from coal derived synthesis gas. This laboratory research will further investigate the performance of a cesium/copper/zinc oxide catalyst earlier identified as active in producing isobutanol and methanol from coal derived synthesis gas. This product could readily be converted to the methanol based octane enhancer MTBE (methyl tertiary butyl ether) for use as a gasoline blending agent.

Date Initiated: September 1984

Estimated Completion Date: September 1987

Prospective Follow-up Work: Uncertain

PROJECT TITLE: OPTIMUM FUEL ALCOHOL MIXTURES FOR FUELS FROM
SYNTHESIS GAS

LOCATOR

Agency: Department of Energy

Group/Division: Office of Coal Liquefaction Technology/Fossil
Energy

Contact Person: 1) Tom Torkos-Project Manager at PETC
2) Edward Schmetz-at DOE Headquarters

Phone: 1) 412 675-6145
2) 301 353-3931

1) U.S. Department of Energy
Pittsburgh Energy Technology Center
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Pittsburgh, Pennsylvania 15236

2) U.S. Department of Energy
Fossil Energy Division
Office of Coal Liquefaction Technology
FE-34-GTN
Washington, D.C. 20545

PROJECT DESCRIPTION: Union Carbide Corporation, based on experience with ruthenium homogeneous catalysts, proposed this exploratory research project to examine the practicality of selected homogeneous catalysts for producing higher alcohols from coal-derived synthesis gas. Higher alcohols are used with methanol in gasoline blends to overcome phase separation, and fuel volatility problems encountered when methanol is blended into gasoline. Such alcohols are available in limited quantities at present and are derived from petroleum.

The experimental work will be conducted by Union Carbide in its laboratories at Charleston, West Virginia.

Date Initiated: September 1984

Estimated Completion Date: September 1986

Prospective Follow-up Work: Uncertain

PROJECT TITLE: PANAMANIAN COAL-TO-METHANOL PROJECT

LOCATOR

Agency: Department of Energy

Group/Division: Fossil Energy/Office of Special Projects

Contact Person: Charles Olentine

Phone: 301 353-3138

Address: U.S. Department of Energy
Fossil Energy Division
Office of Special Projects
Washington, D.C. 20545

PROJECT DESCRIPTION: This project is a feasibility study for the construction of a facility in Panama that would produce fuel-grade methanol using U.S. midwestern coal as the feedstock and known technology for coal gasification and methanol synthesis. The methanol would be transported by pipeline across Panama for terminal storage and subsequent tanker shipping to Japan and other industrialized sectors in the Far East. The project concept envisions the construction of a \$4.5-billion (1982 dollars) complex in the Chiriqui Grande area of Panama. The feasibility study was to be jointly sponsored by the U.S. government, U.S. industry, and a consortium of Japanese companies. Only the U.S. government, however, has committed funding to date.

While initial efforts have been completed, the project has been on hold for some time pending evidence of a commitment to proceed further on the part of U.S. industry and the Japanese consortium.

Date Initiated: December 1982

Estimated Completion Date: 18 months after reinitiation

Prospective Follow-up Work: Ebasco, the project originator, continues to seek U.S. industry and foreign sponsors. Having received no indication that such sponsorship will be forthcoming, the Assistant Secretary for Fossil Energy is initiating action to de-obligate its remaining funds.

PROJECT TITLE: ECONOMICS OF METHANOL PRODUCTION FROM COAL

LOCATOR

Agency: Department of Energy

Group/Division: Fossil Energy/Oak Ridge National Laboratory-
Engineering Coordination & Analysis Section,
Chemical Technology Division

Contact Person: 1) Royes Salmon, Project Manager at Oak Ridge
2) L.E. McNeese, Director, Fossil Energy Program

Phone: 1) 615 574-6607
2) 615 574-7456

Address: Oak Ridge National Laboratory
Oak Ridge, Tennessee 37830

PROJECT DESCRIPTION: This group is performing computerized economic studies with a discounted cashflow program in order to estimate

--the costs of methanol production from coal and natural gas,
and

--the capital and operating costs of alternative technologies
for methanol production.

No new plant design work is being done for this study. It is using published design studies and capital cost estimates only, in an attempt to establish realistic estimates of the cost of producing methanol from coal.

Date Initiated: February 1984

Estimated Completion Date: December 31, 1984

Prospective Follow-up Work: Uncertain

PROJECT TITLE: ALTERNATIVE FUELS UTILIZATION PROGRAM

LOCATOR**Agency:** Department of Energy**Group/Division:** Office of Transportation Systems**Contact Person:** E. Eugene Eckland**Phone:** 202 252-8055**Address:** U.S. Department of Energy
Office of Transportation Systems, CE-131
Washington, D.C. 20585

PROJECT DESCRIPTION: This office of DOE now considers itself in the late stages of methanol vehicle research and development. During its work, it has established a comprehensive data base on alcohol fuel use, both neat and blends. This effort has resulted in 46 published reports, several conferences and workshops, and about 40 technical papers. The majority of its work has been on spark ignition engines, although it has assisted in work on methanol use in diesel-type engines. It has also sponsored research into methanol use by rail diesels through the American Association of Railroads. It coordinates research-contractor meetings every 6 months to discuss progress and direction.

Date Initiated: January 1974**Estimated Completion Date:** Uncertain**Prospective Follow-up Work:** Continued participation with government, industry, and international groups working in the area.

PROJECT TITLE: TRANSPORTATION UTILIZATION TECHNOLOGY TRANSFER

LOCATOR

Agency: Department of Energy

Group/Division: Office of Transportation Systems

Contact Person: E. Eugene Ecklund

Phone: 202 252-8055

Address: U.S. Department of Energy
Office of Transportation Systems, CE-131
Washington, D.C. 20585

PROJECT DESCRIPTION: This program produces reports and organizes symposia, meetings, and workshops to provide dissemination and exchange of information with the fuels and vehicle equipment industries. Present activities are concentrated on semiannual roundtables for informal information exchange. It also assembles International Energy Agency technical material on the state of the art and possible future research efforts for presentation at professional and industrial conferences.

Date Initiated: January 1984

Estimated Completion Date: None

Prospective Follow-up Work: Continued interaction with industry and the public as circumstances and interest require. Possible extension of International Energy Agency results to disseminate information to less-developed countries.

PROJECT TITLE: INTRODUCTION OF METHANOL-FUELED VEHICLES INTO THE
FEDERAL FLEET

LOCATOR

Agency: Department of Energy

Group/Division: Office of Transportation Systems

Contact Person: E. Eugene Ecklund

Phone: 202 252-8055

Address: U.S. Department of Energy
Office of Transportation Systems, CE-131
Washington, D.C. 20585

PROJECT DESCRIPTION: The Department of Energy is introducing methanol-fueled vehicles into the federal fleet. Energy is working in cooperation with the Departments of the Army and Transportation as well as the General Services Administration and the Environmental Protection Agency to expedite introduction of modified 1984 and 1985 model vehicles into agency fleets and to provide for fuel testing and data collection for reporting to the Congress. The precise structure of this program is under development.

Date Initiated: August 1984

Estimated Completion Date: 1986-1990

Prospective Follow-up Work: GSA will handle the target percentage of the methanol-fueled federal fleet as part of regular annual acquisitions.

PROJECT TITLE: FLEET TESTS OF GASOLINE/ALCOHOL BLENDS

LOCATOR

Agency: Department of Energy

Group/Division: Southwest Research Institute

Contact Person: John Tosh

Phone: 512 684-5111

Address: Southwest Research Institute
P.O. Drawer 28510 Div. 02
San Antonio, Texas 78284

PROJECT DESCRIPTION: This project supplied 12 vehicle fleets in different parts of the country with various gasoline/alcohol blends in order to determine if there might be problems with these blends that had not been uncovered in the lab. Working with blends of up to 10 percent total alcohol, including methanol and ethanol, the project worked with over 200 vehicles, including both test and control vehicles. Tentative findings indicate that:

- No discernible change in mileage was directly attributable to alcohol/gasoline blends. Effects on mileage were more related to driver variability than fuel type,
- There were no materials-compatibility problems,
- There were no problems encountered due to climatic variation of fleets around the country.
- Low-level methanol and ethanol blends are ready for commercialization.

Date Initiated: October 1980

Estimated Completion Date: December 1984

Prospective Follow-up Work: None

PROJECT TITLE: STUDY OF INTERMEDIATE METHANOL/GASOLINE BLENDS

LOCATOR

Agency: Department of Energy

Group/Division: Office of Transportation Systems/ Southwest
Research Institute

Contact Person: Norman Sefer

Phone: 512 684-5111

Address: Southwest Research Institute
P.O. Drawer 28510
San Antonio, Texas 78284

PROJECT DESCRIPTION: This is a two phase study investigating a wide range of gasoline/methanol blending proportions and techniques. The blends investigated will range from baseline gasoline with no methanol to 100 percent methanol.

Phase I will blend baseline gasoline with 15, 30, 50, and 90 percent methanol. Straight baseline gasoline and neat methanol will also be tested. Laboratory tests will determine the properties of the fuels, including octane rating, volatility, and energy content, etc. No actual vehicle testing is involved in this study. The effect of changes in octane and energy content of the fuels on fuel economy will be predicted on the basis of laboratory tests.

Phase II will blend 15, 30, and 50 percent methanol with a variable baseline gasoline that adjusts for the effects of methanol on octane and vapor pressure. Efforts will be made to maintain octane and vapor pressure within specified limits across blend levels. Vehicle performance using these fuels will also be projected on the basis of laboratory tests.

Date Initiated: April 23, 1984

Estimated Completion Date: November 23, 1984

Prospective Follow-up Work: Recommendations will be made in the final report and may include potential application in aircraft piston engines.

PROJECT TITLE: SYNTHETIC FUEL CENTER

LOCATOR

Agency: Department of Energy

Group/Division: Southwest Research Institute

Contact Person: John Russell

Phone: 512 684-5111

Address: Southwest Research Institute
P.O. Drawer 28510, Div. 02
San Antonio, Texas 78284

PROJECT DESCRIPTION: One function of the synthetic fuel center at the Southwest Research Institute is to mix alcohol blend fuels. These fuels are used by DOE and to a limited extent by commercial sponsors for testing the characteristics of alcohol blends.

Date Initiated: October 1982Estimated Completion Date: September 1987Prospective Follow-up Work: Uncertain

PROJECT TITLE: ENDURANCE TESTING OF THREE DIESEL ENGINES
OPERATING ON FUMIGATED METHANOL

LOCATOR

Agency: Department of Energy

Group/Division: Combustion and Fuels Technology/Southwest
Research Institute

Contact Person: Tom Ryan/Bill Likos

Phone: 512 684-5111

Address: Southwest Research Institute
P.O. Drawer 28510
San Antonio, Texas 78284

PROJECT DESCRIPTION: Fumigation is a technique of spraying methanol into a diesel engine's combustion air to reduce diesel fuel use. Heavy-duty, diesel truck engines are undergoing the 500-hour test cycle recommended by the Engine Manufacturers Association in order to determine if methanol fumigation will affect engine life expectancy. The engines are started and warmed up using pure diesel fuel. After the engine has warmed up, the fumigation system sprays methanol into the intake manifold. Tests to date under these conditions indicate no unusual wear or durability problems using methanol fumigation.

Date Initiated: January 1983

Estimated Completion Date: December 1984

Prospective Follow-up Work: No further fumigation studies are being conducted. Current alcohol fuel studies are addressing the excessive wear problems in methanol-fueled, spark-ignition engines, and the use of engine exhaust heat to chemically dissociate methanol fuel and improve the thermal efficiency of the engine.

PROJECT TITLE: ALTERNATIVE FUELS PERFORMANCE EVALUATION PROGRAM

LOCATOR

Agency: Department of Energy

Group/Division: Office of Transportation Systems

Contact Person: 1) Dr. Daniel Maxfield, DOE
2) David Najewicz, Principal Investigator

Phone: 1) 202 252-8055
2) 518 785-2284

Address: 1) U.S Department of Energy
Office of Vehicle and Engine R&D
Washington, D.C. 20585

2) Mechanical Technology Inc.
968 Albany-Shaker Road
Lathany, New York 12110

PROJECT DESCRIPTION: Mechanical Technology Inc., one of the U.S. developers of Stirling engines is currently testing a variety of alternative fuels (including methanol) in a Stirling engine combustion system to determine the effect of these fuels on combustion system performance. The evaluation will include investigation of the effect of stoichiometry on emissions, metal temperature, and projected engine performance.

Date Initiated: May 1984

Estimated Completion Date: February 1985

Prospective Follow-up Work: None

PROJECT TITLE: INVESTIGATION OF THE EFFECTS OF ALTERNATIVE FUEL
PROPERTIES ON COMBUSTION AND EMISSION MECHANISMS
IN DIRECT-INJECTION ENGINES

LOCATOR

Agency: Department of Energy

Group/Division: Office of Transportation Systems/Department of
Mechanical Engineering, University of Wisconsin

Contact Person: David Foster

Phone: 608 263-1617

Address: University of Wisconsin
Department of Mechanical Engineering
1513 University Avenue
Madison, Wisconsin 53706

PROJECT DESCRIPTION: This research is partially directed at gaining an understanding of aldehyde formation when using methanol fuel. Researchers are bench-testing a Texaco stratified charge engine, set up to run on methanol to make various measurements of aldehyde concentration. These measurements at various points along the exhaust system are being used to help understand aldehyde emissions.

Date Initiated: July 1, 1982

Estimated Completion Date: December 1984

Prospective Follow-up Work: A proposal is pending to run the same engine in a homogeneous charge, spark-ignited mode. In this work, comparisons will be made between the two modes of combustion (i.e., stratified vs. homogeneous) for aldehyde and unburned fuel emissions.

PROJECT TITLE: PROOF OF CONCEPT, DISSOCIATED METHANOL VEHICLES

LOCATOR

Agency: Department of Energy

Group/Division: Solar Energy Research Center/Office of
Transportation Systems

Contact Person: Mike Karpuk

Phone: 303 231-7000

Address: Solar Energy Research Institute
1617 Cole Boulevard
Golden, Colorado 80401

PROJECT DESCRIPTION: The Solar Energy Research Institute is currently in the process of converting a 1982 Ford Escort to be able to use either liquid or dissociated methanol. Dissociated methanol is a result of the catalytic breakdown of methanol into carbon monoxide and hydrogen. Dissociated methanol has the potential to be a more efficient fuel than liquid methanol because:

- Some waste heat from the exhaust is used to dissociate the methanol.
- Hydrogen is very flammable and can burn in a very lean mixture causing less pollution and increasing efficiency 5-20 percent.
- The heating value of the dissociated fuel is approximately 14 percent greater than liquid methanol.
- Overall, dissociated methanol vehicles offer the potential for lower exhaust emissions and higher energy efficiency. SERI has performed baseline emissions and efficiency testing on liquid methanol. It plans to begin testing dissociated methanol in the spring of 1985.

Date Initiated: October 1, 1983

Estimated Completion Date: August 1, 1985

Prospective Follow-up Work: None

PROJECT TITLE: DEPARTMENT OF ENERGY-FUNDED STUDIES AT THE
UNIVERSITY OF SANTA CLARA

LOCATOR

Agency: Department of Energy

Group/Division: Office of Vehicle and Engine Research and
Development

Contact Person: Professor Richard Pefley

Phone: 408 554-4325

Address: University of Santa Clara
Mechanical Engineering Department
Santa Clara, California 95053

PROJECT DESCRIPTIONS: The University of Santa Clara performed
four distinct studies for the Energy Department.

- Cold Start & Warmup Driveability: An investigation into the extent of cold start driveability problems with methanol fuel and possible means of dealing with the problem. This work involves computer modeling and cold chamber experiments.
- Materials Corrosion and Wear: The study investigated the differences in engine-wear characteristics between methanol and gasoline engines. Researchers believe they understand the mechanisms causing the wear, and possible means of control.
- Photochemical Reactivity: This project was jointly funded by ARCO, Dupont/Conoco, Sohio, and DOE, and looked at the comparative photochemical reactivity of methanol combustion hydrocarbon effluents versus those of gasoline.
- Research and Development of Neat Alcohol Fuel Usage in Automobiles: A final report dated June 1984 has just been released by the Department of Energy. It covers a project dating from 1981-84.

This group is also involved in testing fuel economy and emissions in California Energy Commission vehicles operating on neat methanol.

Date Initiated: January 1984

Estimated Completion Date: March 1984

Prospective Follow-up Work: Uncertain

PROJECT TITLE: LOW-COST EMISSIONS CATALYST FOR METHANOL VEHICLES

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Emission Control Technology Division

Contact Person: Bob Wagner

Phone: 313 668-4279

Address: Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, Michigan 48105

PROJECT DESCRIPTION: In a joint project between the Environmental Protection Agency, Ford Motor Company, catalyst suppliers, and the California Air Resources Board, alternative exhaust catalyst formulations that would be effective with methanol emissions are being tested in an effort to find a lower cost formulation than existing gasoline catalysts. Vehicles from the California Energy Commission methanol fleet are being used for catalyst durability testing and the Environmental Protection Agency is doing the analytical work.

Date Initiated: June 1982

Estimated Completion Date: June 1986

Prospective Follow-up Work: More comprehensive durability testing of the most promising exhaust catalyst formulations.

PROJECT TITLE: STATUS OF METHANOL TOXICOLOGY RESEARCH

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Emissions Control Technology Division/Health
Effects Institute

Contact Person: Tom Grumbly

Phone: 617 491-2926

Address: Health Effects Institute
215 First Street
Cambridge, Massachusetts 02142

PROJECT DESCRIPTIONS: The Health Effects Institute is an independent group funded jointly by the Environmental Protection Agency and industry. Under this project, the Health Effects Institute is evaluating the current status of toxicological knowledge on methanol in order to determine if more health effects research needs to be performed. If it is found that more needs to be done, a research plan will be assembled, and the Health Effects Institute is likely to be the group to implement such a plan.

Date Initiated: August 1984Estimated Completion Date: January 1985Prospective Follow-up Work: Specific projects will be targeted to provide additional information if the study identifies research "gaps."

PROJECT TITLE: SEQUENTIAL FUEL INJECTION FOR METHANOL VEHICLES

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Emission Control Technology Division/Ricardo
Consulting Engineers

Contact Person: Bob Wagner

Phone: 313 668-4279

Address: Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, Michigan 48105

PROJECT DESCRIPTION: The Environmental Protection Agency is planning to conduct tests using a sequential fuel injection system for methanol fuel. This type of fuel injection delivers fuel more precisely than existing fuel systems, allowing for better control of the air/fuel ratio. This system is believed to hold a potential for leaner burn, providing greater fuel efficiency and cleaner emissions.

Date Initiated: September 1984

Estimated Completion Date: January 1986

Prospective Follow-up Work: Evaluation of a modified engine at the Environmental Protection Agency's Ann Arbor laboratory and further emissions/emission control system optimization.

PROJECT TITLE: IN-CYLINDER DISSOCIATION OF METHANOL

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Emission Control Technology Division/Southwest
Research Institute

Contact Person: Bob Wagner

Phone: 313 668-4279

Address: Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, Michigan 48105

PROJECT DESCRIPTION: This project will investigate dissociating methanol into carbon monoxide and hydrogen within the cylinder prior to combustion. It is theoretically possible to dissociate methanol in the automobile cylinder prior to combustion to provide extra chemical energy, leaner burn, and cleaner emissions. SERI, Nissan, and others are now experimenting with dissociation reactors external to the engine. These systems, however, exhibit several problems with both transient and operational response rate. Performing the dissociation within the cylinder could provide emissions and energy advantages, without the operational problems encountered thus far with external systems.

Date Initiated: September 1984Estimated Completion Date: April 1986Prospective Follow-up Work: Additional concepts for in-cylinder dissociation have been proposed and could be explored pending the outcome of this project.

PROJECT TITLE: CHARACTERIZATION OF EMISSIONS FROM VARIOUS
METHANOL ENGINE TYPES

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Emission Control Technology Division/Southwest
Research Institute

Contact Person: Jeff Alson

Phone: 313 668-4296

Address: Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, Michigan 48105

PROJECT DESCRIPTION: This project is evaluating emissions from different types of potential methanol engines. To date, testing has focused on prototype Otto-cycle (i.e., 4 stroke, spark ignition) passenger car engines and diesel bus and truck engines. Limited testing has also been performed on engines utilizing more innovative concepts such as lean burn, supercharging, and stratified charge. Based on this testing, the Environmental Protection Agency has developed a broad data base of methanol vehicle and engine emissions.

Date Initiated: November 1981

Estimated Completion Date: None

Prospective Follow-up Work: Uncertain

PROJECT TITLE: EXHAUST AND EVAPORATIVE EMISSIONS TESTING OF
VEHICLES USING METHANOL/GASOLINE BLENDS

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Emission Control Technology Division/Southwest
Research Institute

Contact Person: Craig Harvey

Phone: 313 668-4237

Address: Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, Michigan 48105

PROJECT DESCRIPTION: This study seeks to compare straight gasoline and gasoline/methanol blends in terms of emissions, and their effect on the charcoal canisters used to control evaporative emissions. Some tests will also be conducted to evaluate the impact of controlled volatility methanol blends on evaporative emissions. Fourteen vehicles, 7 using straight gasoline, 7 using methanol/gasoline blends started out by accumulating about 10,000 miles on their respective fuel. Afterwards, exhaust and evaporative emissions were tested. Following these tests, the cars will accumulate another 4,000 miles on the road. After the second mileage accumulation, evaporative emissions tests will be performed with all vehicles to determine if the methanol/gasoline blend had any detrimental effect on the charcoal canisters. As part of this testing, some of the canisters will be switched between groups to make sure that any differences are due to the fuel, rather than the vehicle.

Date Initiated: June 1984

Estimated Completion Date: November 1984--First round of testing

Prospective Follow-up Work: The final evaporative emissions tests are scheduled to be completed in February 1985.

PROJECT TITLE: GASOLINE VOLATILITY ANALYSIS

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Emissions Control Technology Division/Southwest
Research Institute

Contact Person: Cooper Smith

Phone: 313 668-4270

Address: Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, Michigan 48105

PROJECT DESCRIPTION: Refinery modeling studies will be performed to evaluate the cost and feasibility of volatility control.

Volatility is a measure of how readily a fuel will vaporize. Seasonal volatility control is now commonplace. Overly volatile fuels can cause driveability problems in hot weather, while a fuel with low volatility can cause starting problems in cold weather.

Volatility control is a potentially important issue for methanol/gasoline blends because the addition of methanol to gasoline increases the overall volatility of the fuel. The volatility increase is disproportionately large for small amounts of methanol added to gasoline, although the effect levels off as increasing amounts of methanol are added.

Date Initiated: June 1984

Estimated Completion Date: January 1985

Prospective Follow-up Work: Follow-up work may be directed more specifically at volatility control of methanol/gasoline blends.

PROJECT TITLE: VOLATILITY OF GASOLINE/METHANOL BLENDS

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Emission Control Technology Division/Southwest
Research Institute

Contact Person: Craig Harvey

Phone: 313 668-4237

Address: Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, Michigan 48105

PROJECT DESCRIPTION: This study will investigate the volatility effects of mixing two or more brands of gasoline in an automotive fuel tank when one of those fuels contains methanol.

Date Initiated: October 1984

Estimated Completion Date: September 1985

Prospective Follow-up Work: None

PROJECT TITLE: COSTS TO CONVERT COAL TO METHANOL

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Emission Control Technology Division/Southwest
Research Institute

Contact Person: Tom Baines

Phone: 313 668-4366

Address: Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, Michigan 48105

PROJECT DESCRIPTION: This study will examine the total cost (i.e., capital, operating, and marketing) of converting coal to methanol and bringing it to market. The focus of the study is to use a common method for estimating plant gate cost for methanol derived from several types of coal (eastern high sulfur, mid-western high sulfur, western low sulfur, and lignite). Various plant-siting issues, such as western water availability, are being explored, as well as various transportation cost options (new versus existing pipelines).

Date Initiated: April 1984

Estimated Completion Date: February 1985

Prospective Follow-up Work: None

PROJECT TITLE: IN-USE CHARCOAL CANISTER EVALUATION

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Emission Control Technology Division/Southwest
Research Institute

Contact Person: Craig Harvey

Phone: 313 668-4237

Address: Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, Michigan 48105

PROJECT DESCRIPTION: Automobiles can pollute the air even when they are not running, due to fuel evaporation. To control these emissions, automobiles use a canister containing activated charcoal to trap the vapors from the fuel tank when the car is not running. When the car is running, air passes through the canister, removing the captured fuel vapors for combustion in the cylinders. During this investigation, the charcoal canisters from a small fleet of vehicles will be removed for detailed analysis to determine the effects of gasoline blended with methanol on the viability of the device. These cars, divided into two groups--one using gasoline with no methanol, the other group using a gasoline/methanol blend--are currently accumulating mileage.

Date Initiated: October 1984

Estimated Completion Date: September 1985

Prospective Follow-up Work: Several options are being considered to follow this project. After evaluation, the canisters might be reinstalled in vehicles and undergo evaporative emissions testing to determine any difference between the gasoline and the methanol blend canisters after being heated and purged. Alternatively, the charcoal from these canisters could be examined to determine any differences due to their exposure to different fuels.

PROJECT TITLE: METHANOL ADDITIVE CHARACTERIZATION

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Emissions Control Technology Division/Southwest
Research Institute

Contact Person: Tom Baines

Phone: 313 668-4366

Address: Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, Michigan 48105

PROJECT DESCRIPTION: In an effort to assess additives that could improve the safety of methanol fuel, the Environmental Protection Agency is conducting a survey of possible methanol additives that would improve flame luminosity, discourage human consumption or contact, result in regurgitation in the event of consumption, or impart color and odor to the methanol fuel.

Date Initiated: June 1983Estimated Completion Date: December 1984Prospective Follow-up Work: None

PROJECT TITLE: BENCH-SCALE EVAPORATIVE EMISSION EVALUATION OF
METHANOL/GASOLINE BLENDS

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Emissions Control Technology Division/Southwest
Research Institute

Contact Person: Craig Harvey

Phone: 313 668-4237

Address: Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, Michigan 48105

PROJECT DESCRIPTION: This study is a laboratory analysis to determine the effects of methanol/gasoline blends on the charcoal canisters used to control evaporative fuel emissions. Simulated charcoal canisters will be used to evaluate the effect of methanol/gasoline blends on the canisters compared to the effect of conventional gasoline. Researchers are attempting to determine whether methanol/gasoline blends cause faster deterioration of the charcoal canister than would be expected using conventional gasoline.

Date Initiated: January 1984

Estimated Completion Date: January 1985

Prospective Follow-up Work: The simulated charcoal canisters from this project will be used in a similar study that will evaluate the effect of switching the vapors each canister is exposed to. Each canister will be exposed to straight gasoline vapor for a time, then it will be exposed to methanol/gasoline-blend vapors, etc. The objective will be to determine the reversibility of any effects caused by the methanol blend exposure. In addition, a detailed analysis will be done on the vapors that were absorbed by the charcoal.

PROJECT TITLE: IN-USE GASOLINE VOLATILITY STUDY

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Emission Control Technology Division/Southwest
Research Institute

Contact Person: Craig Harvey

Phone: 313 668-4327

Address: Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, Michigan 48105

PROJECT DESCRIPTION: The purpose of this effort will be to investigate the volatility of in-use gasolines and methanol/gasoline blends. The work will stress two specific questions: 1) what changes in gasoline volatility occur in typical vehicle operation from when the gas tank is filled at the service station until it is empty, and 2) what are the volatility characteristics of methanol/gasoline blends and corresponding conventional gasolines collected from commercial retailers.

Date Initiated: January 1984

Estimated Completion Date(s): Question 1--October 1984
Question 2--February 1985

Prospective Follow-up Work: A more detailed analysis of all the volatility-related data from available fuel surveys may be conducted.

PROJECT TITLE: SMOG CHAMBER EXPERIMENTS WITH METHANOL EXHAUST

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Emission Control Technology Division/University
of North Carolina

Contact Person: Joe Somers

Phone: 313 668-4321

Address: Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, Michigan 48105

PROJECT DESCRIPTION: This project will run smog chamber tests using an outdoor chamber to provide natural conditions of sunlight, temperature, and adjusted humidity to: 1) determine whether the chemical mechanisms used in photochemical models accurately predict the likely effects of methanol substitutions, 2) confirm, under outdoor conditions, the general trends of the University of Santa Clara study, which showed significant smog reduction resulting from substantial methanol substitution, and 3) investigate the reactivity effects of changing the formaldehyde fraction in methanol exhaust.

Date Initiated: May 1984

Estimated Completion Date: June 1985

Prospective Follow-up Work: Results from these smog chamber experiments will be modeled.

PROJECT TITLE: MODELING OF OXIDANT LEVELS IN PHILADELPHIA FOR
METHANOL-FUELED VEHICLES IN YEAR 2000

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Emission Control Technology Division/Systems
Applications, Inc.

Contact Person: Joe Somers

Phone: 313 668-4321

Address: Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, Michigan 48105

PROJECT DESCRIPTION: The overall objective of this work is to determine the extent to which methanol fuel emissions are worse or better than gasoline fuel emissions from a photochemical oxidant standpoint, under various assumptions regarding the levels of methanol and formaldehyde emissions from methanol-fueled vehicles. Previous modeling work done in this area at the University of Santa Clara using Los Angeles as the subject city indicated that the use of methanol as a motor vehicle fuel may result in significant smog reduction. However, because of the unique nature of Los Angeles with respect to motor vehicles, it is desirable to have a similar assessment in another, more typical city, such as Philadelphia.

Date Initiated: July 1984

Estimated Completion Date: February 1985

Prospective Follow-up Work: Dependent on results of the modeling study.

PROJECT TITLE: EMISSIONS STANDARDS DEVELOPMENT FOR METHANOL
VEHICLES

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Standards Development and Support

Contact Person: Rick Rykowski

Phone: 313 668-4339

Address: Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, Michigan 48105

PROJECT DESCRIPTIONS: This group within the Environmental Protection Agency has the responsibility to

--develop emissions standards and standardized testing procedures for methanol-fueled vehicles, and

--develop a fuel equivalency factor to equate methanol with gasoline for corporate average fuel economy purposes. This is necessary due to the differing volumetric energy content of the two fuels.

In addition, this group has also been involved in the Environmental Protection Agency's overall assessment of methanol as a fuel.

Date Initiated: October 1983

Estimated Completion Date: May/June 1986

Prospective Follow-up Work: Uncertain

PROJECT TITLE: CHARACTERIZATION OF EMISSIONS FROM METHANOL-
FUELED VEHICLES

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Office of Research and Development

Contact Person: Frank Black

Phone: 919 541-3037

Address: Environmental Protection Agency
Research Triangle Park, North Carolina 27711

PROJECT DESCRIPTION: Emissions will be characterized and measured for methanol and methanol/gasoline blend-fueled vehicles. Particular attention will be focused on the emission of chemicals that contribute to smog formation and their impact upon air quality. Other unregulated pollutants will be measured as part of a routine screening process designed to isolate potentially hazardous compounds as well as to acquire useful emission-rate information.

Date Initiated: October 1983

Estimated Completion Date: October 1986

Prospective Follow-up Work: Uncertain

PROJECT TITLE: DEVELOPMENT OF INSTRUMENTATION AND MEASURING
PROCEDURES FOR METHANOL AND FORMALDEHYDE
EMISSIONS

LOCATOR

Agency: Environmental Protection Agency

Group/Division: Office of Research and Development

Contact Person: Frank Black

Phone: 919 629-3037

Address: Mobile Source Emissions Research Branch
Research Triangle Park, North Carolina 27711

PROJECT DESCRIPTION: As part of the effort to develop emissions standards for methanol vehicles, the Environmental Protection Agency is trying to come up with lower cost, more routine testing procedures to measure methanol and formaldehyde levels in vehicle exhaust. Current methods are complex and costly. The new methods, once finalized, will be specified as the standard testing procedures.

Date Initiated: June 1983

Estimated Completion Date: December 1984

Prospective Follow-up Work: Continued method evaluation

PROJECT TITLE: TESTING OF POSTAL SERVICE PINTO DELIVERY
VEHICLES ON ETHANOL AND METHANOL FUELS IN
SPRINGFIELD, ILLINOIS, AND DENVER, COLORADO

LOCATOR

Agency: U.S. Postal Service

Group/Division: Engineering Support Center

Contact Person: Ray Divacky

Phone: 301 443-3747

Address: U.S. Postal Service
Engineering Support Center
11711 Parklawn Drive
Rockville, Maryland 20852-8101

PROJECT DESCRIPTION: The U.S. Postal Service tested both methanol and ethanol fueled vehicles. The tests included 10 methanol and 10 ethanol vehicles at each of two test sites, for a total of 40 vehicles. These vehicles served in routine postal service. Unlike similar test programs, the Postal Service used pure anhydrous alcohol as a fuel, without any additives for cold start. In a recently issued final report, the Postal Service concluded that on the basis of their experience, "the conversion of engines to operate on neat alcohol fuels is not practical from the standpoint of operating costs and the high rate of engine wear. The potential benefits, if any, will lie with the use of vehicles which have been designed and manufactured from a metallurgical viewpoint in concert with lubrication technology to inhibit and withstand the corrosive potential associated with alcohol fuels and their combustion products."

Date Initiated: October 1981

Estimated Completion Date: Completed

Prospective Follow-up Work: In its report, the U.S. Postal Service recommended that since considerable funds were spent to build two methanol fueling facilities, consideration should be given to procuring and testing commercially manufactured vehicles specifically designed for operation on neat methanol.

PROJECT TITLE: FACILITATING INTERNATIONAL COOPERATION IN METHANOL
RESEARCH AND DEVELOPMENT

LOCATOR

Agency: State Department

Group/Division: Office of Energy Technology Cooperation

Contact Person: Martin Prochnik

Phone: 202 632-4413

Address: Department of State
OES/NTC
Room 7820
Washington, D.C. 20520

PROJECT DESCRIPTION: This group is periodically active in the area of alcohol fuels. It has the ongoing responsibility to facilitate multilateral projects in energy research and development, including methanol research. This group played a role in the U.S./German joint study of the fluidized-bed, methanol-to-gasoline process experiments now underway in Germany. This project is scheduled to terminate in March 1986.

They are also facilitating an informal information exchange between the United States and Brazil on alcohol fuels.

Date Initiated: March 1980

Estimated Completion Date: March 1985

Prospective Follow-up Work: Uncertain

PROJECT TITLE: METHANE CONVERSION FOR HIGHWAY FUEL USE

LOCATOR

Agency: Department of Transportation

Group/Division: Federal Highway Administration; Office of
Engineering and Highway Operations, Research and
Development

Contact Person: Clayton Ormsby

Phone: 202 285-2004

Address: Office of Engineering and Highway Operations, Research
and Development
Routing HNR-40
Turner Fairbank Highway Research Center
6300 Georgetown Pike
McLean, Virginia 22101

PROJECT DESCRIPTION: Pursuant to the requirements of Section 152 of the Surface Transportation Assistance Act of 1982, the Department of Transportation is conducting a technical and economic feasibility study of the barge-mounted natural gas-to-methanol concept. This study, performed by Vulcan Cincinnati under contract with Transportation, will be conducted as a two-phase project, with a go/no go option at the end of phase one.

Phase 1 will be a resource assessment to determine whether there is enough methane properly located and of sufficient quality to economically use barge-mounted facilities to convert methane to methanol.

Phase 2 will examine how such a project might be carried out, including necessary permitting procedures and possible regulatory problems.

Date Initiated: July 1984

Estimated Completion Date(s): Phase 1) July 1985
Phase 2) July 1986

Prospective Follow-up Work: Uncertain

PROJECT TITLE: THE TRANSPORTATION OF METHANOL BY PIPELINE

LOCATOR

Agency: Department of Transportation

Group/Division: Research and Special Programs Administration,
Materials Transportation BureauContact Person: Dr. Sherwood C. Chu, Office of Regulatory
Planning and Analysis

Phone: 202 472-2698

Address: U.S. Department of Transportation
Research and Special Programs Administration
Materials Transportation Bureau, DMT-60
400 Seventh Street, S.W., Room 8434
Washington, D.C. 20590

PROJECT DESCRIPTION: This study is mandated by section 4 of Public Law 98-464, which authorized appropriations for FY 85 to carry out the Natural Gas Pipeline Safety Act of 1968, and the Hazardous Liquid Pipeline Safety Act of 1979. It will examine the economic and engineering feasibility of transporting methanol through the existing interstate liquid pipeline system in the United States. The study will also evaluate any associated environmental, health, and safety problems.

On or before April 7, 1985, the Secretary of Transportation will submit a report to the Congress dealing with the results of this study, including appropriate recommendations. The study is being conducted for the Materials Transportation Bureau by the Transportation Systems Center, Department of Transportation.

Date Initiated: October 1984Estimated Completion Date: April 1985Prospective Follow-up Work: Uncertain

PROJECT TITLE: ALTERNATIVE TRANSIT FUELS

LOCATOR

Agency: Department of Transportation

Group/Division: Urban Mass Transportation Administration/Office
of Bus and Paratransit

Contact Person: Pat Sullivan

Phone: 202 426-4035

Address: U.S. Department of Transportation
400 7th Street
Room 6432
Washington, D.C. 20590

PROJECT DESCRIPTION: This project examined alternatives to petroleum-based fuels to determine which ones could be best adapted for transit use. Fuels were evaluated on the basis of safety, cost, and ability to implement. Methanol was selected as the best intermediate-term transit fuel. This report entitled, Evaluation of Alternative Fuels for Urban Mass Transit Buses provided Urban Mass Transportation Administration's framework for further examining methanol fuel.

Date Initiated: October 1981Estimated Completion Date: CompletedProspective Follow-up Work: None

PROJECT TITLE: DEVELOPMENT OF HARDWARE AND SPECIFICATIONS FOR
CONVERTING BUS ENGINES FROM DIESEL TO METHANOL
FUEL (See Florida fact sheet, App. III)

LOCATOR

Agency: Department of Transportation

Group/Division: Urban Mass Transportation Administration/Office
of Bus and Paratransit

Contact Person: Pat Sullivan

Phone: 202 426-4035

Address: U.S. Department of Transportation
400 7th Street, S.W.
Room 6432
Washington, D.C. 20590

PROJECT DESCRIPTION: This is a five-phase effort to develop hardware and documentation for converting the most common diesel bus engine now in use to methanol fuel. The program is roughly half completed, with funding approved to convert three buses for testing. Track testing of the buses is planned for December 1984 through June 1985. Revenue service trials are planned for July through December 1985. After testing, it is planned that documentation will be assembled, and any necessary design changes will be made to reflect operating experience. The final effort, if all other phases prove successful, will be a fleetwide planning document to explain what needs to be done to convert a bus fleet to methanol.

Date Initiated: October 1981

Estimated Completion Date: August 1986

Prospective Follow-up Work: Potential demonstration of a larger number of buses through the Technology Introduction Program. (See p. 67.)

PROJECT TITLE: METHANOL FUEL CELLS FOR TRANSPORTATION

LOCATOR

Agency: Department of Transportation

Group/Division: Urban Mass Transportation Administration/Office
of Bus and Paratransit

Contact Person: Pat Sullivan

Phone: 202 426-4035

Address: U.S. Department of Transportation
400 7th Street, S.W.
Room 6432
Washington, D.C. 20590

PROJECT DESCRIPTION: The primary objective of this project is to evaluate the potential of methanol-powered fuel cells for vehicular propulsion. The Urban Mass Transportation Administration will be working with Los Alamos National Laboratory under an interagency agreement.

Date Initiated: December 1984

Estimated Completion Date: December 1985

Prospective Follow-up Work: Uncertain

PROJECT TITLE: TECHNOLOGY INTRODUCTION PROGRAM

LOCATOR

Agency: Department of Transportation

Group/Division: Urban Mass Transportation Administration/Office
of Bus and Paratransit

Contact Person: Ramon Lopez

Phone: 202 426-8483

Address: U.S. Department of Transportation
400 7th Street, S.W.
Room 6432
Washington, D.C. 20590

PROJECT DESCRIPTION: Requests were solicited in May 1984 for transit authorities interested in receiving funds to help test new technology buses. Methanol-powered buses would be applicable. In order to qualify, the technology must be available or already identified. Five letters of interest were received by the June 1984 deadline. Technical analysis of the applications is complete, and the proposals are now under review for selection. Other requests for proposals are possible in the future.

Date Initiated: May 1984

Estimated Completion Date: Uncertain

Prospective Follow-up Work: Uncertain

PROJECT TITLE: RESEARCH AND DEVELOPMENT PROGRAM

LOCATOR

Agency: Department of Transportation

Group/Division: Urban Mass Transportation Administration

Contact Person: 1) Al Steiner-Region IX
2) Rick Ramon-Region X

Phone: 1) 415 454-7317
2) 206 399-4210

Address: 1) Urban Mass Transportation Administration
211 Main Street, Suite 1160
San Francisco, California 94105

2) Urban Mass Transportation Administration
3142 Federal Building
915 Second Avenue
Seattle, Washington 98174

PROJECT DESCRIPTION: Two cities have applied for funding under Section 9 of the Urban Mass Transportation Administration Act to develop methanol-powered buses.

--Region IX: The Southern California Rapid Transit District (SCRTD) has applied for funding under the Urban Mass Transit Administration Section 9 capital program to assist in the acquisition of 30 methanol-powered buses. The Urban Mass Transit Administration is currently considering the application.

--Region X: In a recent invitation for bids for 157 standard-size buses, the municipality of metropolitan Seattle specified as an option the delivery of 10 methanol-powered buses and 147 diesel-powered buses. Bids were due on November 29, 1984.

Date Initiated: Unknown

Estimated Completion Date: Uncertain

Prospective Follow-up Work: Uncertain

PROJECT TITLE: ALCOHOL FLEET TEST PROGRAM--FLEET THREE FORD ESCORTS

LOCATOR

State: California

Agency/Division: California Energy Commission/Synthetic Fuels Office

Contact Person: Mike McCormack

Phone: 916 324-3546

Address: 1516 9th Street
Mail Stop 41
Sacramento, California 95814

PROJECT DESCRIPTION: The California Energy Commission, in cooperation with the County of Los Angeles and Ford Motor Company, converted 40 Ford Escorts to run on methanol fuel. The program objective is to demonstrate methanol vehicle conversion technology, assess engine-fuel system durability, and resolve technical problems that arise. The vehicles are being run by the County of Los Angeles. The Energy Commission subsidized the cost difference between running the methanol vehicles and what it would have cost to run equivalent gasoline vehicles.

Date Initiated: May 1981

Estimated Completion Date: May 1983: the fleet is, however, continuing to accumulate mileage with support from Ford Motor Company.

Prospective Follow-up Work: Success with the 1981 Ford Escorts led to a larger purchase of 75 1983 methanol Escorts by Los Angeles in 1983 as part of the Energy Commission-sponsored California State Methanol Program.

PROJECT TITLE: CALIFORNIA METHANOL FLEET

LOCATOR

State: California

Agency/Division: California Energy Commission/Synthetic Fuels
Office

Contact Person: Ken Koyama

Phone: 916 324-3544

Address: 1516 9th Street
Mail Stop 41
Sacramento, California 95814

PROJECT DESCRIPTION: California purchased 506 factory-built, methanol-powered Ford Escorts for this program. These vehicles are now being tested in regular service in 22 California state and local fleets. Program objectives include: demonstrating the commercial feasibility of methanol vehicle production and increasing public awareness of methanol vehicle viability. California officials hope that this program might lead to an expanded market for methanol vehicles and fuel.

Date Initiated: June 1983Estimated Completion Date: June 1988Prospective Follow-up Work: Annual status report

PROJECT TITLE: METHANOL FUELING NETWORK

LOCATOR

State: California

Agency/Division: California Energy Commission/Synthetic Fuels
Office

Contact Person: Peter Ward

Phone: 916 324-3432

Address: 1516 9th Street
Mail Stop 41
Sacramento, California 95814

PROJECT DESCRIPTION: California currently operates a network of 18 commercial methanol fuel stations in the state that were installed at existing gasoline stations to support the state and local government fleets of methanol vehicles and for use by the general public.

Date Initiated: February 1983Estimated Completion Date: May 1988Prospective Follow-up Work: Fueling network will be expanded to approximately 32 stations.

PROJECT TITLE: HEAVY-DUTY METHANOL ENGINE DEMONSTRATION

LOCATOR

State: California

Agency/Division: California Energy Commission/Synthetic Fuels
Office

Contact Person: Cindy Sullivan

Phone: 916 324-3548

Address: 1516 9th Street
Mail Station 41
Sacramento, California 95814

PROJECT DESCRIPTION: The California Energy Commission, in cooperation with the Golden Gate Transit District, is demonstrating two buses (a German made MAN bus and a General Motors/Detroit Diesel Allison prototype) that were factory built to run on methanol fuel. The demonstration intends to show that methanol can displace diesel fuel as well as gasoline. Additionally, they hope to identify the environmental benefits that result from reduced emissions of regulated pollutants from methanol as compared with diesel-powered buses in urban applications.

Date Initiated: August 1982

Estimated Completion Date: April 15, 1985

Prospective Follow-up Work: The California Energy Commission is seeking funding support to extend the demonstration to 1988.

PROJECT TITLE: INVESTIGATION OF METHANOL/GASOLINE BLENDS FOR CALIFORNIA

LOCATOR

State: California

Agency/Division: California Energy Commission/Synthetic Fuels Office

Contact Person: Mike McCormack

Phone: 916 324-3546

Address: 1516 9th Street
Mail Stop 41
Sacramento, California 95814

PROJECT DESCRIPTION: The use of methanol/gasoline blends in California is currently limited by regulations limiting fuel volatility. Effective January 1, 1985, the state of California will permit limited use of methanol/gasoline blends in fleet vehicles if the vehicle's emissions are shown to be no higher than the vehicle's emissions using gasoline that complies with California volatility standards. This program will be administered by the Air Resources Board in consultation with the California Energy Commission. The Commission will also be looking into the implications of mid-level methanol/gasoline blend formulations, and the extent to which they can contribute to the Energy Commission's methanol implementation goals. The 1985-1986 budget item will evaluate the feasibility of methanol blend use in California in terms of its technical, economic, and air quality implications.

Date Initiated: January 1, 1985

Estimated Completion Date: January 1, 1988

Prospective Follow-up Work: Methanol fuel implementation activities.

PROJECT TITLE: METHANOL TEST FIRING OF A COGENERATION FACILITY

LOCATOR

State: California

Agency/Division: California Energy Commission/Biomass-
Cogeneration Office

Contact Person: Gerry Bemis

Phone: 916 324-3433

Address: 1516 9th Street
Mail Stop 42
Sacramento, California 95814

PROJECT DESCRIPTION: Using a cogeneration facility at the University of California at Davis, the California Energy Commission has recently tested the use of a methanol/water fuel mixture. It seeks to prove the feasibility of this fuel for this type of application and to determine exhaust emission and combustion efficiency characteristics. The combustion/turbine being used to test the fuel will run 24 hours a day for 1000 hours on the fuel. The methanol/water ratio will be varied in order to maximize emissions reduction.

Date Initiated: January 1983

Estimated Completion Date: January 1985

Prospective Follow-up Work: Uncertain

PROJECT TITLE: METHANOL OVERFIRING FOR INDUSTRIAL/UTILITY BOILERS
(tentative project, currently unbudgeted)

LOCATOR

State: California

Agency/Division: California Energy Commission/Biomass-
Cogeneration Office

Contact Person: Gerry Bemis

Phone: 916 324-3433

Address: 1516 9th Street
Mail Stop 42
Sacramento, California 95814

PROJECT DESCRIPTION: This program would be used to test the concept of burning methanol over a less clean burning fuel such as oil in a boiler. This technique is expected to reduce Nitrogen oxide emissions.

Date Initiated: Uncertain

Estimated Completion Date: Uncertain

Prospective Follow-up Work: Further testing at larger scale, unless a large utility boiler (with four burner elevations) is used in this test.

PROJECT TITLE: CONVERTING EXISTING DIESEL BUSES TO METHANOL FUEL

LOCATOR

State: Florida

Agency/Division: Department of Transportation/Public Transit
Operations

Contact Person: Stan Simmons

Phone: 904 488-1587

Address: 605 Suwannee St.
Tallahassee, Florida 32301

PROJECT DESCRIPTION: After 10-12 years of service, many buses are rehabilitated or remanufactured, resulting in a bus nearly equivalent to a new one at about half the cost. Since the engines are rebuilt and fuel systems replaced at that time, the state transportation agency believes rehabilitation provides an opportune time for conversion to methanol fuel. The Florida Department of Transportation believes that the most common bus engine in use today can be converted to run on methanol during rehabilitation for an additional cost of about \$10,000. In July 1984 the Florida Transportation Department received Urban Mass Transportation Administration grants to convert three buses during rehabilitation to run on methanol fuel, operate them at a test track, and place them in service in Jacksonville.

Date Initiated: Florida Action Plan, May 1979. Implementation began in June 1982.

Estimated Completion Date: State funding will last at least through late 1986. However, the buses are intended to remain in service after the demonstration is completed.

Prospective Follow-up Work: If the testing program proves successful, the Florida Department of Transportation would like to implement a larger, voluntary program to convert diesel buses to methanol fuel throughout the state.

PROJECT TITLE: METHANOL FUEL ACTIVITIES IN THE KENTUCKY ENERGY
OFFICE

LOCATOR

State: Kentucky

Agency/Division: Kentucky Energy Cabinet/Department of Energy
Production and Utilization

Contact Person: Bruce Sauer

Phone: 606 252-5535

Address: Kentucky Energy Cabinet
Department of Energy Production and Utilization
Box 11888
Lexington, Kentucky 40578

PROJECT DESCRIPTION: Kentucky purchased one of the factory-built methanol powered Ford Escorts produced in 1983. The state is interested in examining the viability of methanol fuel, since Kentucky's vast coal resources could potentially be used to produce methanol. The methanol-powered vehicle is currently being tested in the state fleet in order to get firsthand experience with the fuel. This work is being done in cooperation with Ashland Oil, which also has a methanol-powered Ford Escort. A comparative analysis of lubricant effectiveness is one of the primary features of the test from the state's perspective. Kentucky's Escort will be analyzed every 10,000 miles by Ashland Oil, examining several performance variables.

Date Initiated: June 1983

Estimated Completion Date: Uncertain

Prospective Follow-up Work: The project with Ashland Oil should continue for at least 2 more years.

PROJECT TITLE: METHANOL VEHICLE FLEET

LOCATOR

State: Maryland

Group/Division: City of Baltimore/Department of Public Works

Contact Person: Bruno Rudaitis

Phone: 301 396-4848

Address: Mayor's Energy Office
250 City Hall
Baltimore, Maryland 21202

PROJECT DESCRIPTION: The city of Baltimore operates a small fleet of methanol-powered vehicles funded by a grant from the Department of Energy via the Energy Task Force of the Urban Consortium. The methanol fleet includes seven vehicles--one retrofit American Motors Concord and six factory-built Ford Escorts. These vehicles run on 85 percent methanol blended with 15 percent unleaded gasoline. The primary goal of the program is to develop a technique for operating a methanol-powered fleet in the mid-Atlantic states' type of climate. The City of Baltimore is using this program to help train people, develop equipment, and solve any problems associated with methanol fuel use should the decision be made to convert the city fleet to methanol. Fleetwide conversion is a possibility only if methanol offers a distinct cost advantage in fleet operations or if oil products are not readily available.

Date Initiated: June 1981Estimated Completion Date: The methanol fleet may be terminated July 1, 1985; the final decision, however, has not yet been made.Prospective Follow-up Work: Uncertain

PROJECT TITLE: METHANOL PARATRANSIT DEMONSTRATION PROGRAM
(tentative project)

LOCATOR

State: Maryland

Agency/Division: Regional Planning Council of Baltimore/
Transportation Division

Contact Person: Paul Pezzotta

Phone: 301 383-5822

Address: Regional Planning Council of Baltimore
2225 N. Charles St
Baltimore, Maryland 21218

PROJECT DESCRIPTION: The Baltimore Regional Planning Council applied to Urban Mass Transportation Administration for a grant to demonstrate the use of methanol fuel for taxis, vanpools, and delivery operations. Several vehicles would be converted to demonstrate the feasibility of methanol fuel. Afterwards, the council hopes to convince individual taxi, vanpool, and delivery van owners to convert to methanol. They also plan to work with fuel suppliers to ensure adequate fuel supply in the area. The group is awaiting Urban Mass Transportation Administration notification.

Date Initiated: Uncertain

Estimated Completion Date: Uncertain

Prospective Follow-up Work: If the project is funded and proves successful, the Council envisions initiating a broad effort at expanded methanol fuel use. This could include a fuel-buying cooperative with public and private users to obtain economies of scale.

PROJECT TITLE: METHANOL FLEET TEST AND ASSESSMENT

LOCATOR

State: New York

Agency/Division: New York State Energy Research and Development
Authority/Biomass Energy Program

Contact Person: Dr. Lawrence Hudson

Phone: 518 465-6251

Address: NYSERDA
2 Empire State Plaza
Albany, New York 12223

PROJECT DESCRIPTION: New York State Energy Research and Development Authority, in cooperation with Brooklyn Union Gas Company and Mueller Associates, is currently testing two methanol-powered vehicles, one retrofit, and one Ford Escort manufactured to run on methanol. The purpose of this test is to assess the current state of the art for using methanol in spark-ignition engines. In addition, they will be using this opportunity to

- formulate specifications for vehicle conversion and fuel handling and storage, and test these specifications through methanol vehicle fleet operation;
- prepare a manual for use by state and local government fleet operators explaining how to convert vehicles to methanol operation as an option to deal with fuel supply interruption; and
- evaluate the potential market for methanol fuel in the Northeast.

Date Initiated: July 1984Estimated Completion Date: September 1985Prospective Follow-up Work: Will depend on project results, availability of funds, and interest on the part of potential cosponsors.

PROJECT TITLE: METHANOL VEHICLE TEST FLEET

LOCATOR

State: Pennsylvania

Agency/Division: 1) Bureau of Vehicle Management
2) Bureau of Telecommunications and StandardsContact Person: 1) Richard Addison - Bureau Director
2) Wilber Swade - Bureau DirectorPhone: 1) 717 787-3162
2) 717 787-8172Address: 1) Bureau of Vehicle Management
2221 Forster Street
Harrisburg, Pennsylvania 17125
2) Bureau of Telecommunications and Standards
2221 Forster Street
Harrisburg, Pennsylvania 17125

PROJECT DESCRIPTION: In order to accommodate a mandate of the state legislature, ten factory-built, methanol-powered Ford Escorts were purchased for testing. The state is interested in determining the feasibility of using methanol-powered vehicles in the state fleet. Particular issues under investigation include cold start capability, vehicle range, and economics.

Date Initiated: May 1984Estimated Completion Date: May 1985Prospective Follow-up Work: None

PROJECT TITLE: PRELIMINARY DEFINITION AND CONCEPTUAL DESIGN OF A
PEAT-TO-METHANOL FACILITY (tentative project)

LOCATOR

State: South Carolina

Agency/Division: South Carolina Energy Research and Development
Center/Energy Conservation Programs

Contact Person: Dr. Charles Hester

Phone: 803 656-2267

Address: South Carolina Energy Research and Development Center
302 Seneca Road
Clemson, South Carolina 29631

PROJECT DESCRIPTION: Anticipating the development of peat-to-methanol facilities utilizing some of the state's peat resources, researchers are preparing to estimate the implications and requirements of such development. In this study they plan to define the state's peat resources and site-specific technical and economic parameters associated with the peat-to-methanol process.

Date Initiated: January 1985

Estimated Completion Date: December 1985

Prospective Follow-up Work: None

STATES WITH TAX INCENTIVES TO
ENCOURAGE THE USE OR PRODUCTION
OF METHANOL FUEL

<u>State</u>	<u>Terms</u>
California	<p>1) The state excise tax on methanol fuel with no more than 15 percent gasoline added is half the tax on gasoline. This provision expires January 1, 1989.</p> <p>2) State income tax credit allows for the recovery of 55 percent of the cost, up to \$1000, for the conversion of gasoline-powered vehicles to run on methanol.</p>
Kentucky	<p>Provides an excise tax exemption of 35 cents per gallon of methanol blended with gasoline. The maximum concentration of methanol in gasoline permitted to claim this credit is 10 percent by volume. (This would provide a maximum credit of 3.5 cents per gallon of blend.) The methanol must be derived from coal or biomass. This credit expires June 30, 1986.</p>
Ohio	<p>Provides an excise tax exemption of 35 cents per gallon of methanol blended with gasoline. The maximum concentration of methanol in gasoline permitted to claim this credit is 10 percent by volume. (This would provide a maximum credit of 3.5 cents per gallon of blend.) The methanol must be derived from coal or biomass. According to state energy office officials, legislation is under consideration that would terminate this incentive in 1985.</p>
Utah	<p>Offers a 5-cent-per-gallon reduction in the state motor fuel excise tax for all motor fuel blended with at least 10 percent methanol. The methanol must be derived from solid hydrocarbons. This provision expires in 1992. According to state energy office officials, the state legislature is considering legislation to terminate this incentive during 1985.</p>

METHANOL PROJECT COORDINATION

Among the federal agencies, states, and government contractors involved in methanol fuel development, the type and extent of coordination and communication varies. Communicating the intent of ongoing research or publishing the results of work completed is a prominent means of coordinating methanol fuel research. Both formal and informal means are used to facilitate communication. These include regular formal meetings within and between agencies and other groups involved in the area; participation in conferences, symposia, and workshops; report publication; and informal contacts by telephone. The following sections show some examples of the types of communication and coordination of methanol fuel activities.

CABINET-LEVEL COORDINATION

At the highest levels of government, policy-oriented issues are coordinated through the cabinet-level working group on methanol fuels. This group was established early in 1984 to provide leadership and coordination in eliminating the barriers to methanol fuel use and for expanding the research and development base. The group includes representatives from the Departments of Agriculture, Commerce, Defense, Energy, Interior, Transportation, Treasury, and the Environmental Protection Agency, in addition to representatives from the Vice President's Office, Council of Economic Advisers, Office of Management and Budget, Office of Science and Technology Policy, Office of Policy Development, and the National Security Council. They meet monthly to discuss policy-oriented issues as well as specific projects and initiatives underway throughout the government.

DEPARTMENT OF DEFENSE

Within the Department of Defense, the Army has been designated the lead military service for alcohol fuel research, testing, and evaluation. Along with the other military services, the Army participates in a number of quarterly, semiannual, and annual meetings to coordinate its research and development activities. The Army also coordinates through formal and informal contacts with other government agencies involved in methanol development, such as the Department of Energy, the Department of Transportation, and the Environmental Protection Agency. In some cases, where common interests exist, interagency agreements have been developed for joint cooperative programs. Army representatives also participate in key industrial groups such as the Coordinating Research Council, the American Society for Testing and Materials, and the Society of Automotive Engineers. These groups are involved in the process of examining methanol fuel use and evaluating its impact on accepted standards and practices of the vehicle and fuel industries.

DEPARTMENT OF ENERGY

The Department of Energy's methanol activities focus on both the production and use of methanol fuels. The Office of Fossil Energy and the Office of Renewable Technology are responsible for methanol fuel production research. The Office of Transportation Programs is responsible for projects involving methanol fuel use in vehicles.

Within Fossil Energy, research responsibilities are divided between two program offices. The Office of Coal Utilization, Advanced Conversion and Gasification is responsible for research into improved techniques of gasifying coal and otherwise preparing it for conversion into methanol and other fuels. The Office of Oil, Gas, Shale, and Coal Liquids is responsible for research into improved catalysts and techniques for converting the gasified coal into methanol and other fuels. The objectives of both offices are coordinated through a dialogue on program plans and budget formulation. The success of this coordination is evaluated by the Fossil Energy Office during periodic reviews of program plans and their associated budgets.

The Office of Renewable Technology carries out its methanol fuel-related work under the Biomass Energy Technology Division. It sponsors research with the potential to increase biomass energy resources and reduce the cost of fuels (including methanol) derived from biomass. Within the Department of Energy, the Biomass Energy Technology Division coordinates its activities through the biomass energy coordinating committee. Participating groups within Energy use this forum to exchange information on current and planned research and development in the biomass area. In order to coordinate its activities with outside groups, the Office of Renewable Technology participates in the Council of Biomass Energy Technology. This is an independent association of government and industry groups that funds biomass research and development activities. The council is used to coordinate the actions of its members and to disseminate information on related activities. Representatives from the Biomass Energy Technology Division also participate in regional biomass energy programs around the country. These regional programs are also used to help disseminate information and coordinate member activities. In addition, they assist with new technology transfer and regional biomass resource assessments.

The Office of Transportation Programs, which is responsible for research and development into methanol fuel use by vehicles, coordinates with government and industry groups involved in methanol research. This office conducts a semiannual automotive technology development contractors coordination meeting. This meeting brings together representatives from the energy and automotive industries, research organizations, and government for

formal papers and informal roundtable discussions of ongoing efforts, including those regarding methanol fuel. The office has been holding monthly meetings with General Services Administration staff to discuss preparations for upcoming federal procurement of a limited number of methanol vehicles for the federal fleet.

ENVIRONMENTAL PROTECTION AGENCY

Most of the methanol fuel work at the Environmental Protection Agency is directed by the Office of Air and Radiation. A few projects, however, are under the direction of the Office of Research and Development. Those involved with methanol activities at the agency reportedly maintain communication with a diverse group through meetings, workshops, conferences, and telephone conversations. The Emissions Control Technology Division has been working with the Department of Transportation's Urban Mass Transportation Administration to coordinate federal activity on methanol-fueled urban bus programs.

The Environmental Protection Agency also communicates through the formal rulemaking process. Following publication in April 1984 of an "Advance Notice of Proposed Rulemaking" for methanol vehicle emissions standards, the agency held a workshop and received formal written comments from about 20 organizations. These comments will be considered in preparing the proposed rules, which are expected to be published in June 1985.

DEPARTMENT OF TRANSPORTATION

Within Transportation, the Urban Mass Transportation Administration has coordinated some of its methanol fuel-related activities with the Department of Energy, the Environmental Protection Agency, and the states of California and Florida. The Urban Mass Transportation Administration has executed bilateral funding agreements with the Department of Energy for methanol fuel activities. In addition, Energy has provided engineering support on fuel and engine matters. The Urban Mass Transportation Administration and the Environmental Protection Agency have cooperated in regard to methanol-fueled bus efforts. The Environmental Protection Agency has reviewed bus-related environmental documents and provided test information on methanol combustion emissions and their public health effects. In addition, the Urban Mass Transportation Administration has worked with California and Florida in their respective methanol fuel bus projects (see app. III).

GOVERNMENT CONTRACTORS AND STATES

The Southwest Research Institute, a private organization that does methanol fuel research for the Department of Energy and the Environmental Protection Agency, has monthly interdepartmental

committee meetings to exchange information among groups working independently on emissions, engine performance, corrosion, materials compatibility, economics, and forecasting. In its work for Energy, contractual requirements obligate the institute to produce monthly progress reports that are distributed among government agencies, universities involved in methanol fuel research, and industrial research and development organizations.

The states involved in methanol fuel development coordinate with other interested parties primarily through informal contacts, publication of project results, and participation in regional groups that help disseminate information on biomass programs on a regional basis. In California most methanol fuel-related activity has been coordinated through the California Energy Commission. Recently, an interagency methanol task force, comprised of the California Energy Commission, the California Air Resources Board, and the South Coast Air Quality Management District, was formed to establish a more focused state effort to address issues related to methanol fuel. The goal of the task force is to identify barriers to methanol fuel development in California and to recommend specific methanol projects in target areas to overcome these barriers. Interaction between California and federal agencies has been informal. There is occasional contact between the California Energy Commission and the Departments of Energy and Transportation; there are, however, no regularly scheduled events where information about program activities is exchanged.

LIST OF STATE AND FEDERAL CONTACTSSTATE CONTACTS

<u>States</u>	<u>Agencies/Departments</u>
Alabama	Department of Economic and Community Affairs/Energy Division
Alaska	Department of Commerce and Economic Development
Arizona	Office of Economic Planning and Development/Energy Office
Arkansas	Arkansas Energy Office
California	California Energy Commission
Colorado	Office of Energy Conservation
Connecticut	Office of Policy and Management/Energy Division
Delaware	Department of Administrative Services/Division of Facilities Management
Florida	Governor's Energy Office Florida Department of Transportation/Bureau of Transit
Georgia	Office of Energy Resources
Hawaii	Department of Planning and Economic Development/Energy Program
Idaho	Department of Water Resources
Illinois	Department of Energy and Natural Resources
Indiana	Department of Commerce
Iowa	Energy Policy Council
Kansas	State Corporation Commission
Kentucky	Department of Energy Production and Utilization/Kentucky Energy Cabinet
Louisiana	Department of Natural Resources
Maine	Office of Energy Resources

Massachusetts	Executive Office of Energy Resources
Maryland	Department of Natural Resources Baltimore Regional Planning Council Mayors Energy Office/City of Baltimore
Michigan	Department of Commerce Energy Administration
Minnesota	Department of Energy and Economic Development
Mississippi	Department of Energy and Transportation
Missouri	Department of Natural Resources
Montana	Department of Natural Resources and Conservation
Nebraska	Nebraska Gasohol Committee
New Hampshire	Governor's Energy Office
New Jersey	Office of Energy Policy and Planning
New Mexico	Energy and Minerals Department
New York	New York Energy Research and Development Authority
Nevada	State Office of Community Services
North Carolina	Department of Commerce/Energy Division
North Dakota	Office of Management and Budget
Ohio	Department of Development/Division of Energy
Oklahoma	Oklahoma Civil Defense
Oregon	Oregon Department of Energy
Pennsylvania	Office of Energy and Minerals Bureau of Vehicle Management Bureau of Telecommunications and Standards
Rhode Island	Governor's Energy Office
South Carolina	Energy Research and Development Center
South Dakota	Department of Commerce and Regulation/Energy Office

Tennessee	Department of Economic and Community Development Energy Division
Texas	Public Utility Commission of Texas
Utah	Utah Energy Office
Vermont	Department of Public Service
Virginia	Department of Emergency Services
Washington	Washington State Energy Office
West Virginia	Governor's Office of Economic and Community Development
Wisconsin	Department of Administration/Division of State Energy
Wyoming	Office of the Governor

FEDERAL CONTACTS

Department of Agriculture

Agricultural Marketing Service
 Agricultural Research Service
 Energy Office
 Forest Products Laboratory
 Forest Service
 Office of the Assistant Secretary for Economics
 Office of Grants and Program Systems
 Western Regional Research Center

Department of Commerce

International Trade Administration/Office of Basic
 Industries-Chemicals
 National Bureau of Standards/Office of Energy-Related
 Inventions
 Office of Major Projects/Chemicals and Petroleum
 Office of Major Projects/Fuels Division
 Office of Major Projects/Transportation and Power

Department of Defense

Army Corps of Engineers
 U.S. Army Ft. Belvoir Research and Development Center
 Army Energy Office
 Air Force Energy Office
 Assistant Secretary of Army for Research and Development

DOD Deputy Assistant Secretary of Defense
Office of the Secretary of Defense
Navy Energy Office

Department of Education

Office of the Secretary

Department of Energy

Biomass Energy Office
Fossil, Geothermal, Solar Division
Office of Coal Conversion
Office of Coal Liquefaction
Office of Conservation
Office of International Affairs
Office of Oil, Gas, Shale, and Coal Liquids
Office of Special Studies Projects
Office of Transportation Systems
Office of Small Scale Technology
Pittsburgh Energy Technology Center

Department of Health and Human Services

Office of the Secretary

Department of Housing and Urban Development

Office of the Secretary
Energy Office

Department of Interior

Office of the Secretary
Bureau of Mines
Fish and Wildlife Service
U.S. Geological Survey
National Park Service
Office of the Assistant Secretary for Land and Minerals
Management

Department of Justice

Office of the Attorney General

Department of Labor

Office of the Secretary
Occupational Safety and Health Administration

Department of State

Energy Consumer Country Affairs
Office of Economic and Business Affairs
Energy Producer Country Affairs
Office of Energy Technology Cooperation

Department of Transportation

Federal Aviation Administration
Federal Highway Administration
Federal Railroad Administration
Office of Industrial Policy
Office of Materials Transport
National Highway Traffic Safety Administration
Transportation Systems Center
Urban Mass Transportation Administration

Department of the Treasury

Office of the Assistant Secretary for Tax Policy
Office of the Secretary

Environmental Protection Agency

Office of Air and Radiation
Office of Mobile Sources
Emission Control Technology Division

General Services Administration

Office of Federal Fleet Management

National Aeronautics and Space Administration

Aimes Research Center
White Sands, N.M., Test Facility
Office of the Administrator

National Laboratories

Argonne National Laboratory
Brookhaven National Laboratory
Jet Propulsion Laboratory
Lawrence Berkeley Laboratory
Los Alamos National Laboratory
Oak Ridge National Laboratory
Solar Energy Research Institute

Other

Agency for International Development
Congressional Research Service
National Science Foundation
Office of the Vice President
Tennessee Valley Authority
U.S. Postal Service

Independent Groups, Contractors,
and Universities

Mechanical Technology Inc.
National Governors Association
Purdue University
Science Applications Inc.
Southwest Research Institute
Western Interstate Energy Board
University of Wisconsin

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