THE ENVIRONMENTAL ASSESSMENT OF SYNFUELS PROJECTS*

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ABSTRACT

The Oak Ridge National Laboratory is assisting the Department of Energy (DOE) in environmental assessments of synfuels demonstration projects. This activity includes the preparation of environmental impact statements for all six of DOE's demonstration plants. The synfuels technologies include high-BTU gasification, medium-BTU gasification and liquefaction.

Mr. Chairman and Members of the Committee:

I appreciate the opportunity to meet with you today to discuss the environmental impacts of synthetic fuel plants. I hope that my remarks will be of some use to you in your study of the feasibility of promoting the construction of a synthetic fuels plant in Tennessee.

I should begin by pointing out that the comments and opinions given here today are my own and are not necessarily those of the Department of Energy (DOE) or the Oak Ridge National Laboratory (ORNL).

NEPA Activities at ORNL

For almost a decade, since the passage of the National Environmental Policy Act (NEPA) in 1969, ORNL has been involved in assessing the environmental effects of energy technology development. Traditionally, much of the environmental work of the Laboratory has been the preparation of NEPA-required environmental impact statements (EISs) for specific energy facilities, particularly nuclear power plants. Beginning in about 1975, with increasing national emphasis on alternative energy supply technologies our assessment activities have gradually broadened until they now include geothermal, fossil, solar and biomass.

For the past four years I have managed the Fossil Energy Environmental Project at ORNL. This project is in the Environmental Impacts Section of the Energy Division and has a lead role in assisting DOE in all environmental matters related to its synthetic fuels demonstration program. For the past year and a half we have been heavily engaged in the preparation of environmental impact statements (EISs) for all six of DOE's synfuels demonstration projects. These involve the construction and short-term operation, on a cost-shared basis with private industry, of advanced coal gasification and liquefaction plants to establish the technical and

economic feasibility and the environmental acceptability of these technologies.

Approaches to Coal Conversion

The first viewgraph shows the various approaches to coal conversion. The oldest and, in many ways the simplest approach is to gasify coal to produce "synthesis gas" - a mixture containing largely carbon monoxide and hydrogen. This versatile product can then be converted to a high-BTU substitute natural gas (SNG), used directly as a medium-BTU industrial fuel gas, or converted by indirect liquefaction techniques to transportation fuels, chemical feedstocks or other products. The other approach is to convert coal by direct liquefaction techniques to distillates, heavy liquids, or even solid fuels, all of which can be upgraded to transportation fuels or other hydrocarbon products. DOE's demonstration projects include both gasification and direct liquefaction. Two projects are currently competing with each other in the high-BTU category. These are the Illinois Coal Gasification Group (ICGG) project in southern Illinois and the CONOCO project in eastern Ohio. Until April of this year, two projects were competing in the medium-BTU, industrial fuel gas category. These were the Grace project in western Kentucky and the Memphis Light, Gas and Water (MLGW) project near Memphis, Tennessee. The Memphis project won the competition and was chosen by DOE to go forward. The direct liquefaction demonstration projects sponsored by DOE are the Solvent Refined Coal-I (SRCI) project producing a solid fuel and the Solvent Refined Coal-II (SRC-II) project producing a liquid fuel.

Demonstration Plants

The second viewgraph shows the location and conversion type for each of DOE's synfuels demonstration projects. The geographic distribution of these projects is of interest. You will note that none of these projects

is located in the west even though large reserves of coal occur there. The reason is simple. DOE is attempting to demonstrate second generation coal conversion processes which can handle the more difficult, caking coals found in the east and midwest as opposed to first generation (e.g. Lurgi) processes which work well only with western coals. It is also interesting to note that all six projects are located close to the Ohio and Mississippi Rivers.

All of these projects are in the design stage with site preparation/construction to begin in late winter-spring of 1981, operation as demos to begin in the mid 1980s and as commercial ventures in the late 1980s.

Synfuels - An Alternative Conversion Step

To help our perspective we should bear in mind that synfuels plants are not end-users but more akin to oil refineries which convert crude oil to other, higher grade fuels. In the case of synfuel plants, the "refinery" converts coal to more transportable, cleaner burning gaseous or liquid fuels. In looking at the traditional coal fuel cycle (i.e. mining, cleaning/preparation, transportation, conversion usually via combustion to heat/electricity) a synfuels plant may be thought of as an alternative conversion step. The environmental impacts that occur in other parts of the fuel cycle (e.g. mining) will still be there with or without synfuels conversion. However, depending on end use and other factors, synfuels conversion, because of higher thermal efficiencies (60-70%), can substantially reduce overall environmental impacts when compared to conventional coal-electric conversion (33-36%). Not only is the waste heat problem greatly reduced at the conversion facility but less coal is required. For example, some proponents of high-BTU gasification claim that nearly 30% less coal is required for a gasification facility supplying similar quantities of useful end-use residential energy than that required for a coal-electric facility.

Environmental Assessments

The next viewgraph shows the range of disciplines covered in performing environmental assessments. These include water and air quality, geology, surface and groundwater hydrology, aquatic and terrestrial ecology, noise, and socioeconomics. All coal conversion and utilization technologies produce environmental impacts. At least part of the motivation for developing advanced conversion technologies has been to reduce those impacts. Actual impacts of large-scale coal conversion plants may not be known accurately until demonstration plants have operated for several years. However, it appears from pilot plant experience, large-scale overseas projects, and our own studies that in most cases these technologies will be relatively environmentally benign. This is especially true for gasification and indirect liquefaction.

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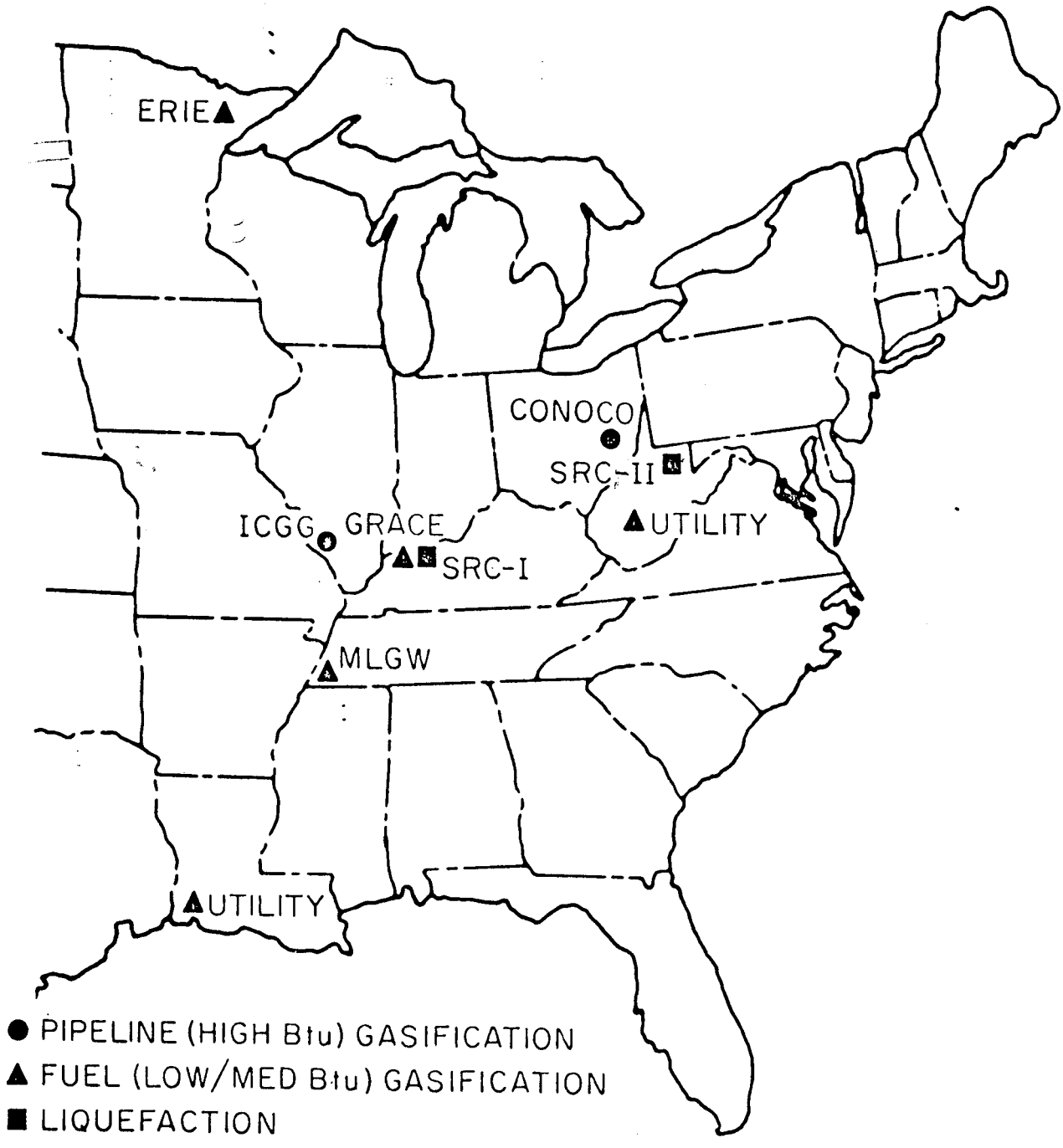

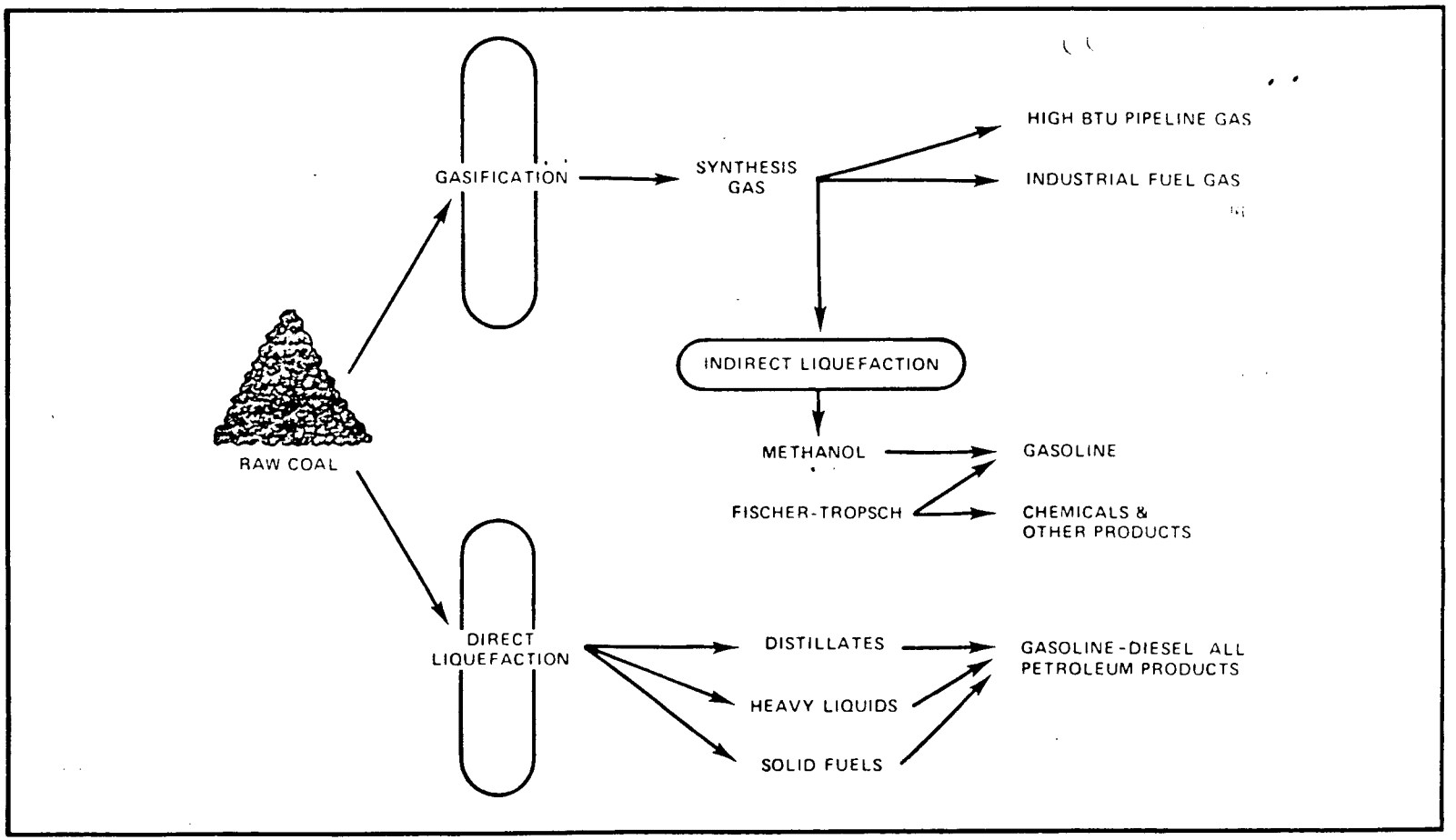
GASIFICATION
SYNTHESIS GAS
HIGH BTU PIPELINE GAS
INDUSTRIAL FUEL GAS
INDIRECT LIQUEFACTION
METHANOL
GASOLINE
FISCHER-TROPSCH
CHEMICALS & OTHER PRODUCTS
RAW COAL
DIRECT LIQUEFACTION
DISTILLATES
HEAVY LIQUIDS
SOLID FUELS
GASOLINE-DIESEL ALL PETROLEUM PRODUCTS

MULTIDISCIPLINARY APPROACH

- AIR QUALITY, METEOROLOGY, NOISE
- SURFACE WATER QUALITY AND HYDROLOGY
- GROUNDWATER QUALITY AND GEOHYDROLOGY
- GEOLOGY AND SOILS
- AQUATIC ECOLOGY
- TERRESTRIAL ECOLOGY
- SOCIOECONOMICS
- CHEMICAL ENGINEERING