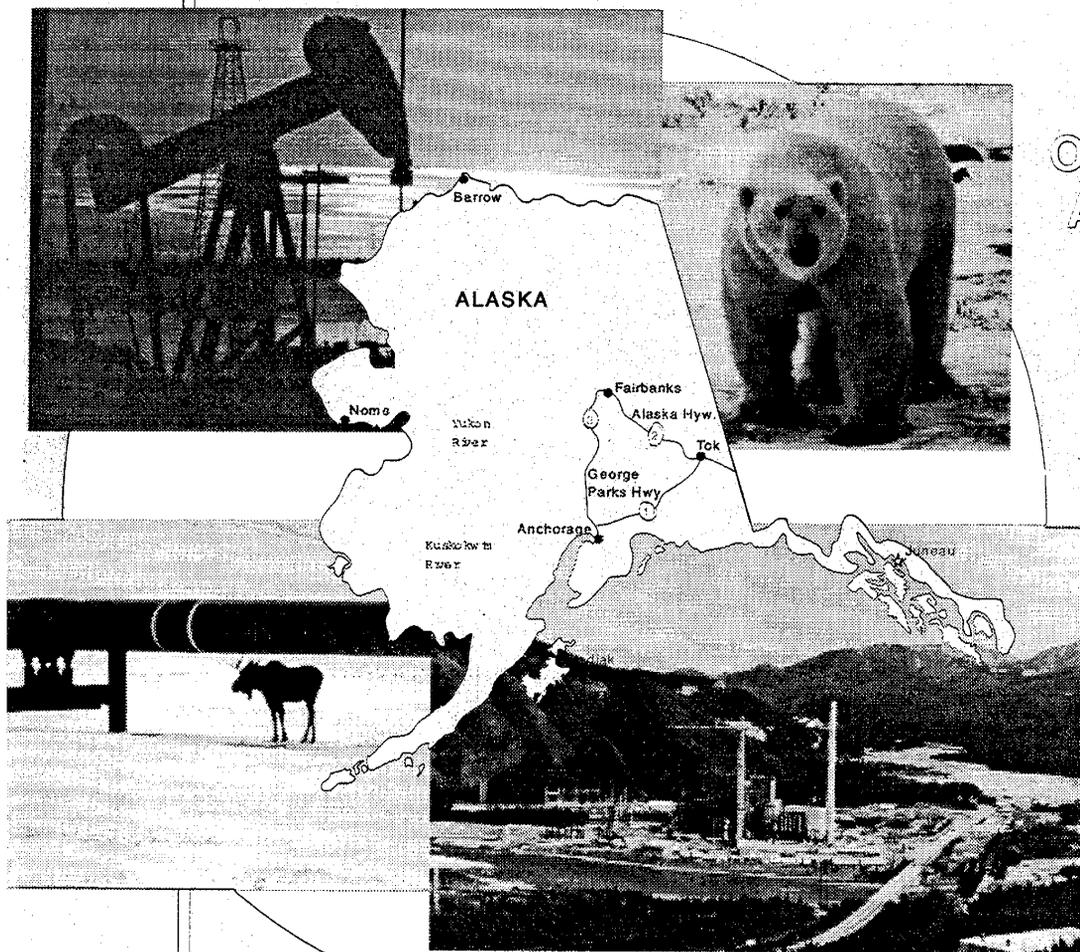


ALASKA FOSSIL ENERGY WORKSHOP

“One Decade Later — What’s Alaska’s Future?”

October 28-29, 1997
Anchorage, Alaska



U.S. Department of Energy
Office of Fossil Energy

February 1998

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ALASKA FOSSIL ENERGY WORKSHOP
ONE DECADE LATER — WHAT'S ALASKA'S FUTURE?

ANCHORAGE, ALASKA
October 28–29, 1997



OFFICE OF FOSSIL ENERGY
U.S. DEPARTMENT OF ENERGY
Washington, DC

February 1998

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ACRONYMS AND ABBREVIATIONS

Acronyms

AEI	:	Alaska Energy Infobank
ANWR	:	Arctic National Wildlife Refuge
AOGA	:	Alaska Oil and Gas Association
API	:	American Petroleum Institute
ARCO	:	Atlantic Richfield Company / ARCO Alaska, Inc.
BLM	:	Bureau of Land Management
BP	:	British Petroleum
CIS	:	Commonwealth of Independent States
CNG	:	Compressed Natural Gas
COST	:	California Oil Survival Team
CRADA	:	Cooperative Research and Development Agreement
DNR	:	Department of Natural Resources
DOE	:	Department of Energy
DOE/FE	:	Department of Energy/Office of Fossil Energy
EFPR	:	Electronic Filing, Permitting, and Reporting
EPA	:	U.S. Environmental Protection Agency
FETC	:	Federal Energy Technology Center
G&G	:	Geological and Geophysical
GIS	:	Geographic Information System
GRI	:	Gas Research Institute
GWPC	:	Ground Water Protection Council
IEEE	:	Institute of Electrical and Electronics Engineers
INEEL	:	Idaho National Engineering and Environmental Laboratory
IOGCC	:	Interstate Oil and Gas Compact Commission
LLNL	:	Lawrence Livermore National Laboratory
LNG	:	Liquefied Natural Gas

ACRONYMS AND ABBREVIATIONS (Continued)

MMS	:	Minerals Management Service
NPR-A	:	National Petroleum Reserve Alaska
NREL	:	National Renewable Energy Laboratory
OCS	:	Outer Continental Shelf
PCE	:	Power Cost Equalization
PTTC	:	Petroleum Technology Transfer Council
R&D	:	Research and Development
RBDMS	:	Risk-Based Data Management System
TAPS	:	Trans Alaska Pipeline System
USGS	:	United States Geological Survey

Scientific Abbreviations

Bcf	:	Billion Cubic Feet
Btu	:	British Thermal Unit
CO ₂	:	Carbon Dioxide
kW	:	Kilowatt
MMBtu	:	Million British Thermal Units
MW	:	Megawatt
SO ₂	:	Sulfur Dioxide
Tcf	:	Trillion Cubic Feet

ACKNOWLEDGMENTS

The authors wish to give special thanks to the following individuals: Marilyn Crockett [Alaska Oil and Gas Association, (AOGA)], who assisted with planning and obtaining speakers; Jim Collins (ARCO Alaska, Inc., retired), who aided with contacts and arrangements; Kevin Meyers (ARCO Alaska, Inc.), who supported the workshop and assisted with its implementation; Kenneth Boyd and Jim Clough (State of Alaska), who assisted in planning and working with the State of Alaska; Les Clark (Independent Oil Producers' Agency), who related California's experiences; Kathy Reheis (Western States Petroleum Association), who helped organize the workshop; and British Petroleum (BP) and ARCO Alaska, Inc., which offered support when needed.

Much of the workshop's success is due to the speakers who set the stage for the Breakout Sessions by presenting broad perspectives, and the facilitators and note-takers who were diligent in helping the breakout groups function and develop a final report. Finally, without the efforts by attendees in raising and discussing the issues, the workshop would not have been a success.

1.0 EXECUTIVE SUMMARY

In a successful cooperative effort involving the U.S. Department of Energy/Office of Fossil Energy (DOE/FE), Alaska Oil and Gas Association, the State of Alaska Department of Natural Resources, the Bureau of Land Management (BLM), and Alaskan oil, gas, and coal producers, DOE held a two-day workshop in Anchorage, Alaska. The purposes were to discuss how to maximize development of fossil energy resources in Alaska, and to determine how DOE could assist Alaska in ensuring future growth of its energy industry. About 100 attendees participated in the workshop, including representatives of the oil, gas, and coal industries, Federal and State organizations, environmental groups, academia, and other interested parties.

Robert Kripowicz, Principal Deputy Assistant Secretary, Fossil Energy, initiated the first day of the workshop with his *Perspectives on Alaska*. This was followed by presentations on oil, gas, and coal resources of Alaska, and the Alaska Energy Infobank. That afternoon and the second day sessions focused on identification of issues, strategies, DOE's role, and next steps.

Following the plenary presentations and immediately prior to the breakout sessions, all attendees participated in an exercise to identify the universe of issues facing fossil energy development in Alaska. During this session, the workshop attendees selected Access and Resource Development related to oil and gas; Power Generation; and the Alaska Energy Infobank (AEI or Infobank) as the topics of the breakout sessions. In addition to these three subjects, heavy oil received a considerable amount of attention by attendees. However, it was recognized that the magnitude of the issues relating to heavy oil production and refining warranted being the focus of a separate workshop. Although not the subject of a breakout session, the sense of the discussion pertaining to heavy oil issues and possible discussion areas of the proposed workshop is presented in Section 5.1.4 as background to the reader.

The results of the breakout sessions were summarized and presented by each group in the afternoon of the second day. Sandra Waisley, Deputy Assistant Secretary (Acting) for the Office of Natural Gas and Petroleum Technology, concluded the workshop with a summary of issues, DOE's role, and next steps. Ms. Waisley emphasized that Alaska's energy industry has been vital to the U.S. economy and National security and said Alaska will continue to be important in the next century.

1.1 BREAKOUT SESSION OUTCOMES

Session I — Access and Resource Development: Access session issues identified were: unreliable and unpredictable lease sales; regulations and stipulations that often lack a scientific basis (“*Stop Raising the Regulatory Bar*”); coalbed methane for rural areas; and heavy oil recovery. Strategies/next steps to address Access issues included: determining the basis for changes in lease sale times, areas, and stipulations; examining stipulations of regulations, and conducting a workshop to build a consensus among involved parties; performing coalbed methane demonstrations in permafrost areas to determine viability; and conducting technology research and development (R&D) on recovering heavy oil and pursuing heavy oil tax incentives. Suggested DOE roles included the following:

- Act as an independent developer and evaluator of state-of-the-art technology;
- Show examples of advanced technology and corresponding environmental benefits (potential showpieces for new approaches in Alaska North Slope and offshore);
- Assist in educating the Alaskans about the energy, environmental, and regulatory issues;
- Seek a broader coalition of stakeholders to carry the message (including DOE, independents, and Native corporations); and
- Work with stakeholders to develop a process for reaching solutions before regulations take effect, thereby avoiding unnecessary litigation.

Session II — Power Generation: Issues discussed were: limited infrastructure; cost of utilities; rural area needs; and environmental regulations. Strategies/next steps included: increasing access and grid system and seeking innovative power generation and storage; sustaining and/or upgrading existing power generation technology projects and addressing urban and rural area needs; and investigating options and implementing actions for regulatory streamlining. The group identified the following steps as important in addressing power generation issues effectively:

- Strengthen partnerships among stakeholders (i.e., DOE, State of Alaska, end-users, fuel suppliers);
- Form a structured advisory group;
- Involve utilities and regulators with initiatives;

- Educate stakeholders and public Statewide on the link between environmental issues and energy supplies;
- Promote energy issues and solutions (particularly in schools); and
- Maintain strong, sustained support of ongoing programs.

Session III — Alaska Energy Infobank: Session issues included: AEI use for electronic permitting and reporting to reduce operating costs; system security and confidentiality of data; and compatibility of data standards. Strategies/next steps included: conducting State/industry meetings to address issues and agree on measures; determine ways to share and transmit data to State regulators; and consolidating government experience on electronic permitting and database development. This group suggested the following as potential DOE roles:

- Undertake a study consolidating government experience in database development, electronic permitting, and environmental compliance;
- Participate in the AEI steering board meetings; and
- Assist in addressing technical challenges such as information security, electronic signatures, data standards, geographic information system (GIS) application, and database development and management.

1.2 IMPORTANT OUTCOMES FROM THE WORKSHOP

Future Growth: Workshop attendees agreed future growth in Alaska lies in heavy oil production, natural gas production (including gas hydrates and coalbed methane) and transportation to markets, continued oil resources development in both explored and unexplored basins, and development of coal resources for in-State use and the Pacific Rim markets.

DOE Role: Participants stated that this workshop was a successful first step in listening to stakeholders about Alaska's energy resources development. Attendees were interested in DOE participation in addressing access, regulatory, power generation, and Infobank issues. They also supported the role of DOE as mediator at consensus meetings between Federal and State regulatory agencies, industry, and the interested public to discuss and resolve potentially costly issues affecting fossil energy exploration and production in Alaska. DOE accepted the role of mediator and advocate for "sound science" and further agreed to attend, or even arrange meetings between interested parties to increase utilization of Alaska's energy resources.

Case Study: With reference to *access* issues, it was agreed that the Alaska Oil and Gas Association (AOGA), Minerals Management Service (MMS), the State of Alaska, and DOE would meet within two months in Alaska to plan a project that will result in case studies on lease sales and attached stipulations. AOGA would take the lead and develop an advisory board for the proposed project.

Next Workshop: DOE also agreed to plan a third workshop for next summer to address refining, natural gas use for heavy oil recovery, and regulatory issues. The intended participants would include the U.S. Geological Survey (USGS), U.S. Environmental Protection Agency (EPA), MMS, the State of Alaska, and industry.

Table 1, Matrix of Breakout Session Issues and Proposed Solutions, provides detailed information on the breakout session outcomes, including issues, strategies, next steps, and DOE's role.

TABLE 1. MATRIX OF BREAKOUT SESSION ISSUES AND PROPOSED SOLUTIONS
I. OIL AND GAS RESOURCES DEVELOPMENT: ACCESS

ISSUES	GOALS	STRATEGIES	NEXT STEPS	PARTICIPANTS
<ul style="list-style-type: none"> • Lease sales unreliable, unpredictable, and untimely. • Litigation by non-industry groups. • Scientifically unjustified stipulations and mitigation measures. • Decisionmaking without collection and consideration of scientific data. 	<ul style="list-style-type: none"> • Predictable, reliable, timely lease sales with appropriate stipulations based on sound science and risk-based data. 	<ul style="list-style-type: none"> • Determine basis for changes in lease sale times, areas, and stipulations. • Educate the public and engage in collaborative problem solving with State and Federal agencies. • Research other States' actions to improve the lease sale process. • Encourage Federal and State agencies to conduct public surveys as part of the leasing process. 	<ul style="list-style-type: none"> • DOE to perform post-mortem of selected prior lease sales to determine process improvements. • DOE to consider INEEL's environmental partnership proposal: <i>A Systems Approach to Address Environmental Issues with Development of Arctic Areas.</i> • DOE to complete "Environmental Benefits of Advanced Technologies" study. • DOE to provide a forum on regulatory decisionmaking based on sound science and appropriate risk management. 	<ul style="list-style-type: none"> • DOE, MMS, BLM, EPA, IOGCC, API, GRI, Industry, State, Stakeholders, Universities, and National Laboratories <p><i>(Note: See acronyms at end of table.)</i></p>

TABLE 1. MATRIX OF BREAKOUT SESSION ISSUES AND PROPOSED SOLUTIONS (Continued)

I. OIL AND GAS RESOURCES DEVELOPMENT: "STOP RAISING THE REGULATORY BAR"

ISSUES	GOALS	STRATEGIES	NEXT STEPS	PARTICIPANTS
<ul style="list-style-type: none"> • Regulations and stipulations often lack a scientific basis. • Stipulations on sale-prelease have transitional problems, i.e., stipulations are added throughout the lease sale process. • Once stipulations are in place, they are hard to remove -- seasonal stipulations become year-round. 	<ul style="list-style-type: none"> • Develop a mechanism for increasing emphasis on science when applying stipulations and regulations, in a time-certain, site-specific manner. • Stop changing the size of lease sale lands after the announcement. 	<ul style="list-style-type: none"> • Perform systematic examination of stipulations and regulations. • Analyze stipulations and ensure that science is considered. 	<ul style="list-style-type: none"> • DOE to perform a study of the basis of sale stipulations, timing, and tract deletions on past two sales (149 and 85A) and provide feedback to regulatory agencies -- show impact of stipulations on industry. • Conduct a DOE-mediated workshop to build consensus on how and when stipulations should be applied. • DOE to bring State and Federal agencies together to streamline the entire process. 	<ul style="list-style-type: none"> • DOE, Industry, State and other Federal Agencies, Native Groups, and Interested Parties/Stakeholders

TABLE 1. MATRIX OF BREAKOUT SESSION ISSUES AND PROPOSED SOLUTIONS (Continued)

I. OIL AND GAS RESOURCES DEVELOPMENT: LOCAL ENERGY DEVELOPMENT

ISSUES	GOALS	STRATEGIES	NEXT STEPS	PARTICIPANTS
<ul style="list-style-type: none"> Alternative energy sources are needed for rural Alaska, e.g., coalbed methane. 	<ul style="list-style-type: none"> Determine the viability of coalbed methane as a source of energy in parts of rural Alaska. 	<ul style="list-style-type: none"> Establish partnerships among Federal and State agencies, industry, Native corporations, and municipalities. Educate the public and provide information. 	<ul style="list-style-type: none"> Perform demonstrations in two areas: permanent permafrost and discontinuous permafrost. 	<ul style="list-style-type: none"> DOE, USGS, State, Universities, Industry, Municipalities, Native Corporations

TABLE 1. MATRIX OF BREAKOUT SESSION ISSUES AND PROPOSED SOLUTIONS (Continued)

I. OIL AND GAS RESOURCES DEVELOPMENT: HEAVY OIL PRODUCTION

ISSUES	GOALS	STRATEGIES	NEXT STEPS	PARTICIPANTS
<ul style="list-style-type: none"> Large resources, remote Arctic location, cool (low temperature) reservoirs. 	<ul style="list-style-type: none"> Produce and market heavy oil resources. 	<ul style="list-style-type: none"> Conduct research to provide scientific information. 	<ul style="list-style-type: none"> Generate fundamental scientific information for heavy oil production from cold reservoirs. 	<ul style="list-style-type: none"> DOE, North Slope Producers, Universities
<ul style="list-style-type: none"> Recovery technology uncertainties due to Arctic location and reservoir characteristics. 	<ul style="list-style-type: none"> Gain information on cold production, soft rock fracturing, and viscosity reduction. 	<ul style="list-style-type: none"> Conduct fundamental research in miscible flooding for cold reservoirs, soft rock fracturing, production methods for viscous oils under arctic conditions, and use of diluents for transportation. 	<ul style="list-style-type: none"> Conduct laboratory and pilot demonstration projects. 	<ul style="list-style-type: none"> DOE, Service Companies, North Slope Producers, Universities
<p><i>(Arctic conditions and reservoir geology present unique challenges to Alaskan heavy oil production.)</i></p>				
<ul style="list-style-type: none"> Economic incentives are necessary to promote heavy oil production. 	<ul style="list-style-type: none"> Modify Section 29 of Federal Tax Code to provide incentives. 	<ul style="list-style-type: none"> Convince taxing authority to grant a \$3/barrel credit on Alaska heavy oil. 	<ul style="list-style-type: none"> Generate data and material to convince taxing authority. 	<ul style="list-style-type: none"> DOE, State of Alaska, Production Companies, Treasury Department

TABLE 1. MATRIX OF BREAKOUT SESSION ISSUES AND PROPOSED SOLUTIONS (Continued)

II. POWER GENERATION

ISSUES	GOALS	STRATEGIES	NEXT STEPS	PARTICIPANTS
<ul style="list-style-type: none"> • Cost of utilities (urban vs. rural) • Limited infrastructure (grids, pipeline, roads, fuel, population density) 	<ul style="list-style-type: none"> • Decrease costs. • Develop/explore rural and urban systems to address different needs. 	<ul style="list-style-type: none"> • Investigate technologies to address urban and rural-specific needs. • Explore innovative generation and storage, and analyze options to increase the grid system. 	<ul style="list-style-type: none"> • Sustain support of ongoing programs and upgrade existing power generation technology projects. • Explore use of State power cost equalization funds to subsidize technology development. • DOE to provide information on oil, gas, and coal R&D programs and contacts. • Increase access (e.g., roads); promote energy issues. • Form a structured advisory group to study issues. 	<ul style="list-style-type: none"> • Users, Environmental Regulators, Federal and State Agencies, Industry, Utilities, Suppliers • DOE, State, Users, Utilities, Equipment Suppliers

TABLE 1. MATRIX OF BREAKOUT SESSION ISSUES AND PROPOSED SOLUTIONS (Continued)
II. POWER GENERATION (Continued)

ISSUES	GOALS	STRATEGIES	NEXT STEPS	PARTICIPANTS
<ul style="list-style-type: none"> Environmental regulations 	<ul style="list-style-type: none"> Reduce impact of regulations to improve power generation options. 	<ul style="list-style-type: none"> Investigate options for eliminating unnecessary regulations. 	<ul style="list-style-type: none"> Initiate cooperative actions between utilities and regulators. Strengthen partnership among stakeholders. Form a structured advisory group to study issues. 	<ul style="list-style-type: none"> DOE, Suppliers, Utilities, Regulators
<ul style="list-style-type: none"> Basic understanding of bush (rural) problems 	<ul style="list-style-type: none"> Develop methods for small-scale, localized generation. 	<ul style="list-style-type: none"> Study possible systems for economic generation in very small units. 	<ul style="list-style-type: none"> Educate stakeholders and public on links between environment and energy. Match needs and viable technologies. 	<ul style="list-style-type: none"> DOE, State, and Local Communities
<ul style="list-style-type: none"> Impact of deregulation (e.g., reduced R&D, competition between independent power producers and utilities) 	<ul style="list-style-type: none"> Minimize problems caused by unsynchronized needs of power generation and regulation. 	<ul style="list-style-type: none"> Educate the State and users of impact and alternatives. 	<ul style="list-style-type: none"> Promote energy issues and solutions. 	<ul style="list-style-type: none"> DOE, State, Utilities, and Local Communities

TABLE 1. MATRIX OF BREAKOUT SESSION ISSUES AND PROPOSED SOLUTIONS (Continued)

III. ALASKA ENERGY INFOBANK (AEI)

ISSUES	GOALS	STRATEGIES	NEXT STEPS	PARTICIPANTS
<ul style="list-style-type: none"> Technical: (1) system access security; (2) confidentiality of data; (3) compatibility of standards; (4) database development and management. 	<ul style="list-style-type: none"> Industry and government working together to reduce operating costs. 	<ul style="list-style-type: none"> Address technical issues through government/industry meetings. 	<ul style="list-style-type: none"> Determine ways to share data, maintain confidentiality, and provide regulators with needed material and information for permitting. 	<ul style="list-style-type: none"> DOE, State and Federal Regulators, Industry, GWPC, IOGCC, PTTC
<ul style="list-style-type: none"> Streamlining of permitting and reporting. 	<ul style="list-style-type: none"> Perform electronic permitting and reporting without duplication. 	<ul style="list-style-type: none"> Address and agree on measures through government/industry meetings. 	<ul style="list-style-type: none"> Conduct joint meetings to discuss ways of accomplishing goals. 	<ul style="list-style-type: none"> DOE, State and Federal Regulators, and Industry
<ul style="list-style-type: none"> Consolidation of government experience. 	<ul style="list-style-type: none"> Obtain government experience on electronic permitting. 	<ul style="list-style-type: none"> Consolidate government data on electronic permitting systems. 	<ul style="list-style-type: none"> DOE to participate in AEI steering board meetings. Perform study of current work and past experience. 	<ul style="list-style-type: none"> DOE, GWPC, IOGCC, PTTC

AEI: Alaska Energy Infobank
 API: American Petroleum Institute
 BLM: Bureau of Land Management
 DNR: Department of Natural Resources
 DOE: Department of Energy
 EPA: U.S. Environmental Protection Agency
 GRI: Gas Research Institute
 GWPC: Ground Water Protection Council
 INEEL: Idaho National Engineering and Environmental Laboratory
 IOGCC: Interstate Oil and Gas Compact Commission
 MMS: Minerals Management Service
 PTTC: Petroleum Technology Transfer Council
 R&D: Research and Development
 USGS: U.S. Geological Survey

2.0 INTRODUCTION AND BACKGROUND

In 1985, the Department of Energy's Office of Fossil Energy and the State of Alaska signed an agreement to conduct joint research on Alaska's oil and gas resources. To determine the scope and types of activities to be conducted under the agreement, DOE/FE, the State of Alaska, and the University of Alaska jointly conducted a workshop in June 1987. This workshop brought together a cross-section of public and private sector stakeholders concerned with the recovery and utilization of Alaskan oil and gas to discuss potential options, such as enhanced oil recovery, gas-to-liquids conversion, liquefied natural gas, compressed natural gas, bioconversion, and transportation of gas to the Lower-48 States.

Workshop results were instrumental in planning and implementing many successful and significant Alaskan oil and gas R&D projects during the past 10 years. Specific examples include: recovery techniques for heavy oil, natural gas-to-liquids technology, and risks associated with discharge of produced waters into open bays. In the coal R&D area, DOE also has been involved in several Cooperative Research and Development Agreements (CRADAs) with Alaska as well as the Clean Coal Technology Demonstration projects at Healy and the University of Alaska Fairbanks.

In light of renewed optimism about Alaska's resources and the lifting of the export ban on Alaskan North Slope oil, DOE's Office of Fossil Energy organized a second workshop for October 28-29, 1997, in Anchorage. This workshop, titled "*One Decade Later: What's Alaska's Future?*," was a cooperative effort with Alaska Oil and Gas Association, the State of Alaska Department of Natural Resources, the Bureau of Land Management, and Alaskan oil, gas, and coal producers.

A workshop format employing small groups in breakout sessions was adopted to encourage everyone to participate. First, a plenary session by industry, State, and Federal government representatives provided an overview of Alaska's resources and many of the issues involved. Following the plenary presentations and immediately prior to the breakout sessions, all attendees participated in an exercise to identify the universe of issues facing fossil energy development in Alaska. During this session, the workshop attendees selected Access and Resource Development related to oil and gas; Power Generation; and the Alaska Energy Infobank as the topics of the breakout sessions. In addition to these three subjects, heavy oil received a considerable amount of attention by attendees. However, it was recognized that the magnitude of the issues relating to heavy oil production and refining warranted being the focus of a separate workshop. Although not the subject of a breakout session, the sense of the discussion pertaining to heavy oil issues and possible discussion areas of the proposed workshop is presented in Section 5.1.4 as background to the reader.

Then, workshop attendees separated into breakout sessions to discuss specific areas. The charge to the breakout groups was to develop a sense of the issues, determine whether the solutions can be developed in the near-term (two years or less) or long-term (more than two years), prioritize the issues, determine the level of difficulty in solving them, and determine the next steps for resolution and the necessary participants in the resolution.

3.0 WORKSHOP AGENDA

ALASKA FOSSIL ENERGY WORKSHOP
"One Decade Later: What's Alaska's Future?"
Captain Cook Hotel, Anchorage, Alaska

Topical Agenda

"What does the future hold for these valuable domestic energy resources?"

Tuesday, October 28, 1997

- 7:00 - 8:00 a.m. **Registration**
- 8:00. - 8:10 a.m. **Introduction**
Sandra L. Waisley
Deputy Assistant Secretary (Acting), and Associate Deputy
Assistant Secretary, Office of Natural Gas and
Petroleum Technology
- 8:10 - 9:00 a.m. **Perspectives for Alaska**
R. S. (Bob) Kripowicz
Principal Deputy Assistant Secretary
Office of Fossil Energy
- Exploration Issues**
David T. Perkins, President, AOGA
Alaska Region Manager
Marathon Oil Company
- 9:00 - 9:30 a.m. **State of Alaska Efforts**
Kenneth A. Boyd
Director, Alaska Division of Oil and Gas
Peter Crimp
Development Specialist, Alaska Division of Energy
- 9:30 - 9:50 a.m. **Congressional Perspectives**
R. S. (Bob) Kripowicz
Principal Deputy Assistant Secretary
Office of Fossil Energy
- 9:50 - 10:10 a.m. **Break**

10:10 - Noon

Setting the Stage for Breakout Sessions

(All sessions will address R&D, regulatory, policy, and financial investment needs.)

Access and Exploration Issues

Marilyn Crockett

Alaska Oil and Gas Association

Resource Development (Coal)

John F. M. Sims

Vice President, Marketing

Usibelli Coal Mine, Inc.

Resource Development (Oil & Gas)

Kevin O. Meyers

President, ARCO Alaska, Inc.

Alaska Energy Infobank (AEI)

Erik Dahl

Supervisor, Technology Planning & Information Resources

ARCO Alaska, Inc.

Noon - 1:00 p.m.

Lunch

1:00 - 1:10 p.m.

Focus of Breakout Groups

Sandra L. Waisley

Deputy Assistant Secretary (Acting), and Associate Deputy Assistant Secretary, Office of Natural Gas and Petroleum Technology

- Goals
- Identification of barriers and issues (including environmental considerations)
- Prospective solution paths, strategies and activities
- Identification of who should be involved to work on the barriers
- Recommended Next Steps

1:10 - 5:00 p.m.

Breakout Sessions

5:00 - 7:00 p.m.

Reception

Wednesday, October 29, 1997

8:30 - 11:30 a.m. **Reconvene Breakout Sessions**

11:30 - 1:00 p.m. **Lunch**

1:00 - 2:30 p.m. **Group Reports - 20 minutes each**

2:30 - 4:00 p.m. **Discussion of Commonalties: Consolidation into
Broad Categories**

- Prioritization of Concerns
- Possible Solutions
- Actions to be Taken/Timeline
- Who has Responsibility for Action Items?
- Final Discussion (Next Steps)

4:00 - 4:30 p.m. **Summary**
Sandra L. Waisley
Deputy Assistant Secretary (Acting), and Associate Deputy
Assistant Secretary, Office of Natural Gas and
Petroleum Technology

4:30 p.m. **Adjourn**

4.0 WORKSHOP SESSIONS

4.1 Opening Remarks

Sandra L. Waisley
Deputy Assistant Secretary (Acting) and
Associate Deputy Assistant Secretary
Office of Natural Gas and Petroleum Technology
U.S. Department of Energy

I would like to thank everyone for taking time to be here today and tomorrow to work with us, your peers, and other Alaskan organizations and groups. We are pleased to have this opportunity for a frank, open discussion about the energy future of Alaska and the needs of its energy industry and the public.

I have been working for the U.S. Department of Energy since 1991. I currently manage the oil and gas R&D program, both upstream and downstream. Prior to that, I worked for 11 years with major oil companies, including BP and Exxon, in exploration and production. Some of my activities involved the North Slope, and it is great for me to be back in Alaska.

We have several representatives here from DOE's Office of Fossil Energy and you will meet them over the next two days. They represent the oil and gas, power generation, and coal R&D programs. There are also some representatives from the Interior Department. Overall, we have about 100 participants from all segments of the Alaskan community -- public and private sectors, including industry, State and Federal agencies, universities, and researchers.

The world, and with it, the oil and gas industry, has changed dramatically since I started with the industry in 1977, especially in the last decade. We all know about globalization of markets, restructuring of natural gas and electricity sectors, privatization efforts in many countries, and the changing role of independent producers. It is remarkable that independents are moving offshore, into the Gulf of Mexico, and to deeper waters. They are forming joint ventures with major companies and are working in international markets. The independent community now produces about 65 percent of natural gas and nearly 40 percent of oil in the United States. We also have experienced many changes in the environmental area, specifically more and more regulations at the Federal, State, and local levels. Recently, global warming and its effects have been a primary news topic.

In 1987, we conducted a workshop that focused on Alaska's R&D needs at that time. Now, 10 years later, we hope to address questions such as: What is the energy future of Alaska and what are your needs and concerns? We look forward to the next two days. The real work will be accomplished in the breakout sessions that will start this afternoon and continue tomorrow. We encourage you to participate, and to be open and frank. This is not our workshop. We are just hosting an event. We are here to listen and to respond to you.

DOE can be helpful in several ways, not only in terms of R&D -- development and improvement of advanced technologies and technology transfer -- but also in analyses and studies, and in the legislative and regulatory reform area. Our programs are driven by both the public and private sectors. We do not conduct our programs in isolation; rather, we listen to our stakeholders to develop our programs and determine what activities to focus on each year. We need to hear what your priorities are for ensuring the future of Alaska.

At the end of the workshop, the breakout sessions will be summarized and given back to you for your review and use. The workshop summary should represent a business plan for the State and all the participants.

Again, welcome, and let us start with our presentations this morning. Our first speaker is Bob Kripowicz, the Principal Deputy Assistant Secretary, Office of Fossil Energy. Bob spent 17 years on Capitol Hill working in Congress. He has a lot of experience in Washington, D.C., and now he is working with the Fossil Energy R&D programs at DOE.

4.2 Perspectives for Alaska

Bob Kripowicz
Principal Deputy Assistant Secretary
Office of Fossil Energy
U.S. Department of Energy

I am pleased to see you all here to discuss the future of Alaska's abundant fossil energy resources. I have been intimately involved in this and other energy issues for some time. The development and consumption of fossil resources are a "hot topic" because of the growing concern over global climate change. But, the fact is 85 percent of our energy needs are met by fossil fuels, and this reliance is not expected to change in the foreseeable future.

All is not doomed, contrary to some reports, because we are continuing to develop technologies that will help us extract and use these fossil fuel resources efficiently and cost-effectively. I happen to believe that "fossil fuels are future fuels," and that we can use them in a way that will protect the environment for future generations.

In 1995, Congress lifted the ban on oil exports from Alaska's North Slope, and there is renewed optimism in Alaska's energy resource potential. For these reasons, we thought the time was right to revisit energy issues of importance to the region, and to include coal so that we could consider the total Alaskan fossil energy picture.

Our main goal today is to discuss ways to maximize development of Alaskan fossil resources in an environmentally acceptable manner that benefits State residents and the American people.

Alaska is one of the most resource-rich States in the union. In 1997, oil production in Alaska was 1.3 million barrels per day (average to date), accounting for 20 percent of total U.S. production. Proven reserves in 1996 were 5.3 billion barrels, about 24 percent of the U.S. total of 22 billion barrels.

Alaska also contains 38 trillion cubic feet of discovered natural gas, and 64 trillion cubic feet (U.S. Geological Survey mean value) of undiscovered and technically recoverable natural gas, 20 and 6 percent of the U.S. resource, respectively. However, no significant commercial use has yet been made of this vast resource base because there are no facilities in place to transport the gas to current markets outside of the North Slope.

Alaska ranks twelfth out of 32 States with a demonstrated coal reserve base of approximately 6 billion short tons, about 1 percent of the U.S. demonstrated reserve of 476 billion short tons. However, the State ranks 22nd (out of 26) in coal production. Annual production is only about 1.5 million short tons. Although the sulfur content of the coal is very low, almost all is sub-bituminous (having a low energy, high moisture content) and located far from the markets.

As you can see from the numbers, Alaska's resources are very important to the Nation. We are here this week to continue our involvement in the State which began a decade ago.

In 1987, the State of Alaska and DOE conducted a workshop to identify joint research on Alaska's oil and gas resources. Like today's workshop, it brought together a cross-section of public and private sector stakeholders concerned with the recovery and utilization of Alaskan gas. The outcomes and actions identified during that workshop were instrumental in planning and implementing projects that addressed the recovery and utilization of Alaskan oil and gas.

As a result of that and other efforts, Fossil Energy R&D is sponsoring 11 oil and gas projects (totaling \$9.2 million), three coal R&D projects (totaling \$3.04 million), and two clean coal demonstration projects (totaling \$1.4 billion) here in Alaska.

One oil and gas project was a four-year, \$4.9 million effort to determine the true risks associated with discharge of produced water into open bays. The results were reviewed and cited by EPA in its 1996 decision to exempt the Gulf of Alaska from the zero discharge rules.

BP, DOE, and BDM-Oklahoma are participating in a Cooperative Research and Development Agreement (CRADA) to demonstrate advanced oil recovery technologies in the Schrader Bluff-Milne Point Field located north of the Prudhoe Bay Field, and the heavy oil recovery project in the Prudhoe Bay Field, with total funding of \$10.6 million over five years. (Between 1996 and 2001, it is expected that 250 million barrels of heavy oil will be made economical and \$40 million will be saved in brine disposal costs.)

A recent Fossil Energy study (August 1996) assessed whether gas-to-liquids (GTL) conversion technology would be an economic alternative for the development and sale of the large, remote, and currently unmarketable Alaska North Slope natural gas resource. The study also compared the long-term economic impact of a GTL conversion option to that of the more frequently discussed natural gas pipeline/liquefied natural gas (LNG) option. DOE funding for this project was \$300,000.

DOE has just awarded a contract to a team headed by Air Products and Chemicals (team participants include ARCO and Chevron, both with extensive Alaska North Slope gas interests) to study gas-to-liquids conversion with ceramic membranes to facilitate liquid production. This work will culminate in a proof-of-concept facility by 2006.

If successfully demonstrated, this advanced technology would provide a viable method to bring North Slope gas as high-purity oil to market at \$18-20 per barrel equivalent. Total DOE funding will be approximately \$30 million for this substantially cost-shared project over its projected life of eight years.

Coal will continue to supply a substantial portion of our Nation's energy needs, particularly for power generation. We have two advanced Clean Coal Technology Demonstration Projects located in Alaska, including a coal-fired diesel engine located at the University of Alaska Fairbanks, and an entrained slagging combustor located at Healy. The total estimated cost of both of these projects is approximately \$290 million, with government funding of \$141 million.

The Coal-Fired Diesel Project entered the detail design and construction phase in August of this year. This project will demonstrate coal as a clean, efficient energy source for remote locations.

Construction of the Healy slagging combustor was completed this month and it is currently undergoing startup and shakedown testing. This coal project will provide 50 MW of clean, highly efficient energy to Alaska customers.

Usibelli coal is being used to fuel both of the Department of Energy's Clean Coal Technology Demonstration Projects in Alaska. The Coal Diesel Project will process 100 tons per day of coal into slurry using a Low-Rank Coal Water Slurry process. The Healy Project will use approximately 300,000 tons per year of blended Alaskan sub-bituminous and waste coal.

Another program that DOE completed about five years ago, phosphoric acid fuel cells, has had a recent impact on the State of Alaska. A number of fuel cells using this technology were recently installed in Alaska in the form of 200-kilowatt power plants manufactured by ONSI Corporation, a subsidiary of International Fuel Cells Corporation. More fuel cell installations are being planned. These are environmentally clean, high-efficiency units that promise to provide reliable electric power and heat to Alaskans.

These units, 140 of which are operating throughout the world, are highly reliable, have demonstrated efficiencies of 40 percent, and produce extremely low levels of greenhouse gases and pollutant emissions.

A fuel cell workshop was held in Anchorage in August of this year. The meeting, sponsored by the local chapter of the Institute of Electrical and Electronics Engineers (IEEE) and DOE, served as a forum for dialogue between fuel cell developers and potential users from the State of Alaska. Fuel cells could tie in well with Alaska's low natural gas rates and relatively high electricity rates in a wide range of applications.

Like industry and other government agencies, we have become very customer-focused. We listen to our stakeholders -- whether they are State and local officials, industry or the public. We ask them to tell us what they need rather than the other way around. We also have realized the value of public-private sector partnerships. Most of our programs are cost-shared partnerships with industry, universities, State governments, and other organizations. We look forward to hearing all of your views and ideas about making the most of our domestic fossil resources here in Alaska.

I would like to highlight a few examples of what we have recently done with respect to this new approach. In California, the oil and gas industry asked us to conduct a workshop on their needs. The workshop, held in Bakersfield in November 1993, identified several high priority issues and solutions to encompass both policy (the cost of regulatory compliance in California, lifting the ban on exporting Alaskan oil) and research (air emissions from heavy oil storage tanks).

This workshop created a positive atmosphere that enabled the California oil and gas producers, State regulators, and researchers to collectively address important issues threatening the viability of the industry. At the 1993 Bakersfield workshop, a forum where the free flow and exchange of ideas could take place was created -- now known as the California Oil Survival Team (COST). It has been successful in identifying and leading parties to agree upon research necessary to develop risk-based environmental regulations. We at DOE continue to support COST in its efforts to make environmental regulations sensible, and not overly burdensome.

We believe this workshop could be the kickoff to another successful decade of partnership and cooperation. We are very fortunate to have several industry representatives who have worked with us in California -- among them is Les Clark, Vice President, Independent Oil Producers' Agency. Please talk to them and obtain their independent views. Please participate and offer your ideas.

4.3 Exploration Issues

David T. Perkins
President
Alaska Oil and Gas Association

On behalf of the Alaska Oil and Gas Association, I am pleased to welcome the Department of Energy and all the participants to this Alaska Fossil Energy Workshop. As has been pointed out, the purpose of this workshop is to address issues of how to maximize development of all Alaskan fossil resources and their benefit throughout the Nation. That is a big challenge for a two-day workshop, and the big questions are: Where will we be 10 years from now, in 2007? What is our vision of the future for fossil energy, both for Alaska and for the United States? What can we do to make a difference to that future?

People attending this same conference in 1987 asked these same questions: Where will we be 10 years from now? Where will we be in 1997? What is our vision? What can we do to make a difference? They predicted a future in which it might be economical to produce heavy oil, and they decided to help make it happen with research and development funds for heavy oil recovery techniques. They predicted a future where gas would take on new and diversified roles, and they decided to help make it happen with research and development funds for natural gas-to-liquids technology.

They predicted a future where the availability of baseline data on water quality would become an increasingly important factor in development decisions, and they decided to help make sure that data was available by funding studies on the risks associated with the discharge of produced waters into open bays. They predicted a future where "clean coal" technology would be a critical technological advance for that industry, and they decided to help make it happen by funding clean coal projects at Healy and the University of Alaska Fairbanks. You cannot get much better than that for "predicting" four major themes of the future. I hope we do as well today. Of course, the main menu of life and business serves up both the predictable and the unpredictable. No matter how well we plan and anticipate, events happen that change the course of our world and our business.

Let us look at some of the highlights of the past 10 years -- from the time the Department of Energy and the State of Alaska conducted that first workshop in June of 1987. Perhaps a reminder of the past will help us focus on the next 10 years. In June 1987, the oil and gas industry and the State of Alaska was still reeling from the collapse of oil prices. The U.S. average wellhead value of crude oil per barrel that year was \$15.40 -- \$10 per barrel below what it had been in 1984. The average wellhead value per barrel of crude oil in Alaska was \$10.83; it would drop to \$8.43 the next year, and continue at a level of around \$10 for the next several years. The Alaska Oil and Gas Association had 28 members. Five years before, we had 36. During this time, companies found it was more economical to buy reserves than to explore for them.

The theme for the industry was "do it better, more efficiently, and more cost effectively." Ronald Reagan was President of the United States. Steve Cowper was Governor of Alaska. The 15th

platform, "Steelhead," had just been installed in Cook Inlet the year before. On the North Slope, the world's largest miscible gas enhanced oil recovery project was installed. Endicott field began production. The State of Alaska held two oil and gas lease sales.

In 1988, production from North Slope oil fields peaked at 2 million barrels per day. The State of Alaska held three oil and gas lease sales. The U.S. Minerals Management Service held one. Point McIntyre oil field was discovered by ARCO, Exxon, and BP. In 1989, the seven billionth barrel of oil passed through the Trans Alaska Pipeline System, and the same year North Slope oil production started to decline. After an intensive five-year effort, it began to look like Congress might open the northern portion of the Arctic National Wildlife Refuge (ANWR) to oil and gas leasing. Then two unpredictable events changed the course of history. In March, the Exxon Valdez grounded in Prince William Sound and months later, in November, across the world, the Berlin Wall came down.

In 1990, George Bush was elected President and Walter J. Hickel was elected governor. The ten thousandth crude oil tanker was loaded at Valdez. Lisburne production peaked at 45,000 barrels a day. The GHX I facility at Prudhoe Bay increased production by 100,000 barrels per day. In August, Iraq invaded Kuwait and in early 1991, the Persian Gulf War was fought. There was hope again that the need for American-produced oil would convince Congress to open Alaska North Slope to oil and gas drilling. The State of Alaska held five oil and gas lease sales, while MMS held two. The sixth North Slope field, Sag Delta North, began production.

In a year of monumental events, in December 1991 the USSR formally ceased to exist, being replaced by the Commonwealth of Independent States (CIS). In the next two years, the State of Alaska held nine oil and gas lease sales. Production from two more North Slope fields peaked and two new fields began production. In 1993, U.S. production fell below 6.9 million barrels of oil per day, its lowest level since 1958. In 1994, Bill Clinton was elected president and Tony Knowles was elected governor. The State held one lease sale. With the Niakuk field beginning production, the North Slope had 10 separate producing fields.

In 1995, Congress ended the ban on export of Alaska North Slope crude oil. Interior Secretary Bruce Babbitt held out no hope that the Clinton administration would open ANWR, but suggested some interest in reopening the National Petroleum Reserve Alaska (NPR-A). While gas from Cook Inlet now provided heat and electricity for most of South-central Alaska, Cook Inlet oil production entered a twilight era with 90 percent of the region's recoverable reserves produced. Inlet oil production dropped to 35,000 barrels per day. The State held two oil and gas lease sales. The GHX II gas handling facility was installed at Prudhoe Bay, increasing ultimate recovery by 400 million barrels. Construction of the Kuparuk large-scale enhanced recovery project was approved with the goal of increasing oil recovery by 200 million barrels.

In 1996, the State held two oil and gas lease sales and MMS held one lease sale. The Department of the Interior began studies for reopening leasing in the National Petroleum Reserve Alaska. MMS released its 1997-2002 proposed, final, five-year outer continental shelf oil and gas leasing program -- with Alaska and the Gulf of Mexico having the only proposed sale locations in the United States. Five sales were proposed for Alaska. The State of Alaska passed legislation for areawide leasing. The State issued its own Five-Year Oil & Gas Leasing Program proposing four areawide lease sales.

That was a fast 10 years, with some amazing changes. Of course, these are just a few of the things that happened over the past 10 years, but they do suggest some trends. Before I mention those trends, I would make the following overall observations:

Throughout this past 10 years, oil from Alaska made up 25 percent of the oil produced in the United States. It now produces more than 20 percent. Half of the Nation's top 10 producing oil fields are located in Alaska. Today, in 1997, Alaska has 12 producing fields on the North Slope. Alaska has been, is, and will continue to remain critical to the Nation's ability to produce its own oil and gas.

The State of Alaska held 32 oil and gas lease sales. The Federal government held five. The only places in the Nation where MMS now holds oil and gas lease sales are Alaska and the Gulf of Mexico. This has some serious implications for U.S. energy policy.

The Alaska Oil and Gas Association now has 20 members. If you will recall, in 1987 we had 28 members. Each of the producing company members in AOGA have announced major oil and/or gas investments and discoveries outside the United States during the past 10 years. Directly as the result of massive investments in research and development, there have been critical improvements to North Slope estimated production figures. In published reports, Prudhoe Bay, originally estimated at 9.6 million barrels, will produce in excess of 13 billion barrels with today's technology. The Kuparuk River field, originally estimated to produce 1.5 billion barrels is now estimated at 2.7 billion barrels. Endicott reserves, initially estimated at 300 million barrels are now set at 600 million.

If the past is an indicator, there are three themes that will continue to dominate the next 10 years: the need for continued research and development; the need for continued access to land; and the need for continued pursuit of environmental excellence. First is the need for continued research and development. Technology has made it possible to increase production from known reserves, discover new reserves, and operate more effectively and more efficiently: 3-D seismic; coiled-tube drilling, multilateral well completions, horizontal drilling, new information management, process control and corrosion control are the technologies of the past 10 years. Our challenge is to focus on the technologies of the next 10 years.

Second is the continued need for access to land. Land access is the key concern for the members of our industry. It is the only thing we truly cannot do for ourselves. This industry has the internal capability to innovate, to explore, to discover, to produce, and to transport. But to do any or all of this we need access to the resources. In Alaska, the State government or the Federal government, or Native corporations need to make their land available for lease -- because they "own" the land.

Today, as we predict the future of energy in Alaska, we might want to spend some time discussing whether there will even be an Outer Continental Shelf (OCS) program or the MMS office in Alaska in the year 2002, and what we can do to make sure there is one. The answers include strong clear national energy policy, the re-leasing of NPR-A, and predictable Federal lease sales.

Third is the continued need for environmental excellence. We believe that the industry in Alaska represents the "best and the brightest" in environmental excellence. Continued monitoring of air, water, fish and wildlife is our assurance that we are moving forward in an environmentally safe manner. We continue to be committed to environmental excellence and I expect that recommendations from this group will reflect that commitment.

I will conclude by pointing out what other "predictors" are saying: that global population levels have increased more in the past 30 years than in any other 30-year period in history. These massive increases in population as well as the rapid industrialization of China and the Far East nations, along with access to the enormous Commonwealth of Independent States (CIS) resources will continue to have critical significance for Alaska, as a producer of energy and for United States energy policy.

Even as we look to other energy sources, oil, gas, and coal will continue to be the cornerstone of our energy future. I look forward to seeing you all here at this conference 10 years from now in 2007. By then, we will know if Alaska and the United States remain an important part of the world energy picture.

4.4 Alaska Oil and Gas Activities *

Kenneth A. Boyd
Director
Alaska Division of Oil and Gas

[Please see presentation viewgraphs in Section 7.1]

The State of Alaska efforts are partnerships between both the executive and legislative branches of State government and industry. There has been a significant progress during the past decade, especially in the last few years. For example, in 1995, the State initiated a program called "exploration licensing." It too was a partnership between government and industry -- similar to international organizations that avoid "sunk costs" and go directly to exploration.

In Alaska, most of the land is owned by the State and the Federal government, and most of the private land belongs to the Native corporations. About 25 percent of the Nation's oil comes from Alaska and virtually all of those locations are on State land. The majority of Alaska's income (80-85 percent) comes from oil.

In the south-central Alaska, Cook Inlet production has been on the decline, but in the last two years production has been increasing again. We also have two new companies in Alaska: Anadarko Petroleum and Forcenergy. Anadarko Petroleum will be working on the North Slope and Cook Inlet. Forcenergy is a very fast moving company that has formed partnerships with some of the majors. In Cook Inlet, Phillips Petroleum is trying to develop a discovery that ARCO traded away, called Sunfish, which has not proven to be as major a discovery as initially thought.

In the northeast, ANWR is a politically closed issue although USGS is conducting a reinterpretation of some data there, and results will be available next spring. BP has moved onto locations just west of ANWR and is ready to drill in various locations. Two offshore prospects, Kuvlum and Hammerhead, are economically challenged, and Point Thomson Units and Eiger Unit are now receiving a lot of attention. In Sourdough, BP has numerous 3-D seismic surveys and plans to drill new wells. Further west is the Badami project, a partnership with BP and PetroFina, with about 120 million barrels of oil. New advanced technology is being applied at this project. BP is ready to start its first development well and is developing a pipeline back to Prudhoe. Production is anticipated to start in the next year or so.

Niakuk field was first considered by CONOCO. It was supposed to be an offshore operation, but BP decided to move back onshore to Heald Point and started drilling directional wells, hoping to recover 90 percent of the 40 million barrels of oil. Currently, BP and its partners, ARCO and Exxon, are setting North American drilling records at Niakuk, at 18,000 feet, pushing 20,000 feet offset. They not only reached all the original oil, but doubled the size of the reserves and hope to recover about 100 million barrels of oil.

* Summary of remarks.

Northstar is another BP field, purchased from Amerada Hess several years ago, with 140-150 million barrels of oil. This operation will feature new advanced technology applications and the first Arctic offshore buried oil pipeline in the world, about 6 miles.

In addition, there are several small fields around Prudhoe Bay and Kuparuk, called satellites. Companies revisited these fields, applied 3-D seismic surveys, and were able to drill into substantial fields within these fields. Companies are now able to identify new reserves they could not even detect with seismic technology of five years ago.

About four years ago, ARCO and BP conducted a 3-D survey in the Tarn field, and then drilled several discovery wells. Now, Tarn is a 50-million-barrel field. Just recently, ARCO and BP announced a series of prospects along the western edge of the Kuparuk field, south of Tarn, and they will have 3-D surveys in the coming years. Another field where both ARCO and BP have conducted pilot programs is the West Sak (a heavy oil field), and production has recently started.

Alpine is ARCO's new 365-million-barrel field. This area had been drilled many years ago, but with new technology more oil was discovered. Drilling with its partners, ARCO discovered three new Jurassic sands that it is preparing to develop. The operations will have a very small footprint of about 100 acres of gravel in a 40,000-acre prospect. Alpine is the field of the future.

The Alaska production decline curve shows the dominance of the North Slope and the inevitable production decline. With these new projects, we are trying to reduce the decline. ARCO's slogan of "No Decline After '99" has been a popular rallying point, which I hope goes beyond 1999.

I think what has saved Alaska is the new technology. Without 3-D seismic surveys, prospects like Tarn would not likely be drilled today, since they were not visible on 2-D seismic data. Another new technology is directional drilling. With this technology, companies are drilling a lot more wells and at a lower cost than five or 10 years ago. Now, they are able to reach a greater part of the subsurface with a much smaller surface footprint.

As mentioned earlier, availability of land to lease is the most important issue -- if you cannot obtain land, you cannot explore, and if you cannot explore, you cannot find oil. The land issue has led to new legislation called "Areawide Leasing." This initiative is a result of cooperation between State (both executive and legislative branches) and industry. The Alaska leasing map of two years ago looks very different from that of today's. We are going to offer all the land every year. Before, leases were offered through a nomination process, resulting in a "shotgun" pattern of land. That process sometimes cut prospects in half. The prior leasing process raised fears among companies who never knew if the other half of the prospect was going to be offered for leasing.

The Alaska Oil and Gas Association, the legislature, and the Governor's office together tried to solve this problem and decided to try leasing all of the land every year, a process that is still in progress. The last sale under the old nomination process will be in November 1997, and then, starting next year, we will implement the Areawide Leasing Program.

About a year ago, Governor Knowles and Interior Secretary Babbitt worked together to develop a plan to establish a leasing program in NPR-A again, in light of the discovery of Alpine. As a result, the Department of the Interior selected 4.6 million acres of prospective land. Now, the Bureau of Land Management is looking at drafting the preliminary environmental impact statement that will be out in November 1997.

We believe the sands present in Alpine exist in the northern part of that sale area. We are trying to resolve the environmental concerns. ARCO, BP, and others operating on the North Slope can show they can do this exploration and do it right.

This is the kind of lease sale that brings new companies to Alaska. We are hoping that companies that have been here before, along with their old friends who are here now, will come back. We hope to bring back Chevron and Shell by offering more than four million acres of fairly prospective land. That sale is expected to take place about this time next year, at the earliest.

In terms of natural gas, there are 30 trillion cubic feet of proven gas reserves in Alaska, most of which is being reinjected. There are several different ways to utilize and bring this gas to market. One option, which is very expensive, is to build a conventional gas line with LNG terminals, perhaps in Valdez. Gas-to-liquids technology is another option, which allows use of the existing pipeline. There are also combinations of both options. The question is how to pay for bringing this gas to market -- a discussion that will take place in the State legislature next year.

Again, a lot has happened in Alaska, especially during the last half of this decade and, even after all these years, more activity is planned for the future in addition to those currently underway.

4.5 Central and Distributed Power in the State of Alaska

Peter Crimp
Development Specialist
Alaska Department of Community and Regional Affairs
Division of Energy

[Please see presentation viewgraphs in Section 7.2]

The State of Alaska Division of Energy assists communities in the rural portions of Alaska with fossil fuel alternatives. My presentation will describe energy issues facing these smaller communities and alternatives for pursuing the Division's mission, which is "to assist in the development of safe, reliable and efficient energy systems that are environmentally sound and are managed and maintained independently of State financial assistance."

Under the Power Cost Equalization (PCE) Program, the Division aims to roughly equalize electric power costs across the State. The program reduces rates for rural communities that rely largely on diesel-fired generators for electricity. There are 211 PCE communities in Alaska with stand-alone power systems. These communities receive a State subsidy for their higher energy costs. Subsidies averaged about \$17.9 million per year for the last two years.

The village of Chefornak, on the Bering Sea coast, is an example of a PCE community. Most villages are not connected to other communities by roads. The only access is by air or waterways. Average electric loads for such stand-alone communities range from less than 50 kW to 3,700 kW. Most have an average load below 100 kW. Therefore, the systems are generally very small in these rural communities. The average cost of power production is about 32 cents per kWh but can be as high as \$1/kWh. Currently, there are two more remaining years of funding for the PCE program. The Governor is conducting a planning effort to ensure the program continues at least until the year 2013.

Rural power generation is predominantly diesel-fueled. Ninety-five percent of the kilowatt hours have been generated using diesel with a small amount, 5 percent or so, from hydro. About 27.9 million gallons of oil were used for power production in 1995. Operating and maintaining energy systems in rural Alaska is tough and presents unique challenges. Fuel must be transported long distances within narrow windows of time and stored for a season's use. Some systems have fallen into disrepair. For example, a tank farm near Kaltag, about 350 miles down the Yukon from Fairbanks, had a number of questionable items on the premises. Much of the piping is in disrepair in these communities.

An important point in rural communities is that electrical generation represents only about 28 percent of the overall energy usage. Rural energy consumption consists of electrical generation (28 percent), space heating (oil, 28 percent; wood, 30 percent), and transportation (14 percent). The larger heating loads use oil as a heating fuel, whereas in areas containing wood much of the residential home heating is done with wood. Up to 2/3 of the overall energy usage in northern rural communities may be for space heating.

The Division of Energy conducts a number of programs aimed at fostering reliable and self-sustaining energy systems in rural areas. Current efforts include alternative energy projects, rural power system upgrades and bulk fuel upgrades (to help tank farmers meet environmental regulations and health and safety codes). Rural energy alternatives include village interties, small hydro, conservation, and energy supply based on wood, municipal solid waste, wind and coal.

Along with the Kotzebue Electric Association and the U.S. National Renewable Energy Laboratory (NREL), the Division of Energy sponsors the Kotzebue Wind Program. It is a demonstration project providing three 50-kW wind turbines to the community of Kotzebue. The program serves as a training laboratory to develop the technical know-how to implement similar projects throughout Alaska. Current energy output from these turbines is enough to meet the electrical needs of 20 homes in Kotzebue. The U.S. Department of Energy has already granted funding for more equipment to expand wind farm production to a capacity of 2 megawatts. [As Division Director Percy Frisby has noted, "At a time when all rural utilities in Alaska are concerned about the rising cost of diesel fuel and the possible loss of power cost assistance, electricity generated by wind power is seen as a welcome and environmentally acceptable option."]

The Division also conducted a small natural gas study. Results found natural gas to be competitive with diesel for communities near a high quality resource, with populations above 3,500, and when costs for successful exploration programs are below \$3 million.

In addition, the Division has agreements with DOE's Federal Energy Technology Center (FETC) and the University of North Dakota Energy and Environmental Research Center to investigate small coal systems. Recent research examined the feasibility of a 600 kW fluid bed combustor in McGrath as well as the feasibility and design of 500 to 5,000-kW systems.

4.6 Congressional Perspectives

Bob Kripowicz
Principal Deputy Assistant Secretary
Office of Fossil Energy
U.S. Department of Energy

Current congressional activity of great importance to Fossil Energy includes the Senate Interior Appropriations Bill, which provides all of our program funding. From our perspective in the Office of Fossil Energy, the Interior Appropriations have proceeded quite well for us. For the past couple of years, Congress authorized more funds than we requested, which is a highly unusual circumstance.

For example, additional funds were provided for our coal program to accelerate completion of low-emission boiler systems, which are innovative designs of pulverized coal power plants with integrated cleanup systems. We also were provided funds to accelerate our gas turbine program with General Electric and Westinghouse. Congress approved funding for the gas-to-liquids program above our original request, and Congress has finally, this year, begun to honor our request for oil and gas research in the resource area. Until this year, we had declining budgets in our oil and gas program.

Now, in fiscal year 1998, we will actually have more funds for oil and gas R&D than we had last year, which is the first increase in quite a while. The House Report specifically stated that one of the reasons was the industry's support of our programs.

Electric industry deregulation is another legislative, high-profile activity followed by many stakeholders. In the Senate, Senator Murkowski and, in the House, Chairman Schaefer of Colorado have been holding a series of hearings all year into the prospects of Federal legislation dealing with electric utility deregulation. Due to the infinite variety of issues involved, it is not clear that a Bill will emerge. Some people believe that the longer Congress debates the more the issues will be taken care of at the State level. In the end, what Congress may do is pass "mop-up" legislation to clarify residual issues not addressed at the State level. As you know, several States have aggressively pursued a competitive marketplace, such as California, Pennsylvania, and New York.

Nuclear waste is another activity under Congressional review that is of great interest to Fossil Energy. Committees in both the House and Senate passed legislation providing for interim storage of nuclear waste in Nevada. However, the Administration indicated a possible veto of such legislation, not wanting an interim storage site until a final storage site is selected. This continues to be a major issue for Congress.

We also have a balanced budget agreement that has an impact on all congressional activity. We heard in the news the other day that the 1997 deficit will be about \$22-23 billion, which is an unbelievably small number compared to what it was five years ago. There is actually talk on the Hill as to what to do with the budget surpluses once they are realized.

Also, there was a vote in the Senate, 95 to zero, on a resolution known as the Byrd (D-WV)-Hagel (R-NE) resolution, concerning the global climate change/global warming treaties. The resolution basically states that the Senate would not consider favorably any treaty that did not include the participation of developing nations. As you may be aware, the negotiations that are ongoing in Bonn, Germany (for completion hopefully in Kyoto, Japan in December), would be intended to bind the developing nations, the so-called Annex I nations of the world, to greenhouse gas reductions. But the negotiations would not, in most cases, directly involve developing nations that, in the next decade, will be producing approximately 60 percent of the greenhouse gas emissions in the world.

The treaty resolution began as the Byrd resolution and has been adopted by essentially the entire Senate. It was modified to state that, although we recognize the need for controlling greenhouse emissions, it is not possible for us to accept a treaty unless all nations are involved. Usually, there are congressional representatives in these negotiation sessions, and I am sure our negotiators are well aware of Congress' strong position.

4.7 Access and Exploration Issues

Marilyn Crockett
Assistant Executive Director
Alaska Oil and Gas Association

Alaska is unique by any standard. First, it is huge -- 378 million acres. Second, it is a public land State with less than 1 percent of its lands in conventional private ownership. The Federal government owns 60 percent, the State 28 percent and the Natives 12 percent. About half of Alaska is already protected from development as Federal and State parks, wildlife refuges and other conservation units. In fact, Alaska has contributed 62 percent of all Federally-designated Wilderness lands, 70 percent of all park land, and 90 percent of all wildlife refuge land in the national system. What this means is that despite its size, Alaska has fewer lands to develop, and we must concentrate our efforts on these areas.

There are several components to the "access" equation. The first is the basic premise that lands must be made available for lease if discoveries are to be made. The second is that lands must be offered on a reliable, predictable schedule in order for companies to seriously consider if Alaska is the best place for them to invest. This is particularly important in today's open global market where investment opportunities in foreign areas are becoming more attractive. Companies need to know with certainty that sales will be held on schedule so that budgetary and manpower commitments can be made. When lease sales are delayed, particularly if there is a pattern of delays, company resources are allocated elsewhere. First let's take a look at land availability.

Federal Offshore Lease Sales

In November of last year, MMS released its final five-year OCS Leasing Program for the period 1997-2002. The good news is that almost half, or five of the eleven sales nationwide, are scheduled for the Alaska OCS.

- 1998: Sale 170, a small sale in the Beaufort Sea, limited to the near shore area from east of the Colville River to west of Barter Island;
- 1999: Sale 173 in Cook Inlet, excluding areas near Kamishak and Kachemak Bays, the Barren Islands and Shelikof Strait;
- 2000: Sale 176, the full Beaufort Sea planning areas from Barrow to the Canadian border, excluding 416 blocks east of Barter Island that are farther offshore, but including blocks adjoining near shore State waters in this area;
- 2001: Sale 179 in the Gulf of Alaska; and
- 2003: Sale 183 in the Chukchi Sea/Hope Basin areas excluding the near shore Chukchi Polynya area and most of southern Hope Basin.

These Federal sales cover five of the 15 OCS planning areas offshore of Alaska.

State Sales

In January of this year, the State of Alaska released its Five-Year Oil and Gas Leasing Program for the period 1997-2001. The schedule includes two individual sales and four new areawide sales, authorized by a unanimous vote of the Alaska Legislature in 1996. These sales include:

- Sale 86 in the Central Beaufort Sea, originally scheduled for September of this year, but now delayed to November 18;
- Cook Inlet Reoffering Sale 85A-W, scheduled for February 1998. This sale will re-offer leases not receiving bids in Sale 85A, held in December of 1996;
- Sale 87, North Slope Areawide, scheduled for June 1998;
- Sale 85, Cook Inlet Areawide, scheduled for April 1999;
- Beaufort Sea Areawide, scheduled for October 1999; and
- North Slope Foothills Areawide, scheduled for April 2001.

Under the Areawide Lease Sale process, acreage within an areawide sale boundary is offered annually for a period of 10 years -- the duration of Best Interest Finding document prepared by the State for an areawide lease sale. This regular schedule of annual sales speaks to the second point I made earlier with regard to predictability in the lease sale process. If the State holds firm to this schedule, companies will be able to plan and budget investment decisions for exploration activities in Alaska.

Access/Land Availability

In February of last year, the Alaska Oil and Gas Association developed a strategic plan to guide its activity over the near term. The number one priority identified by AOGA Members was land availability. Access to lands for leasing has been and will continue to be the cornerstone of oil and gas development in the State of Alaska. It is what brought the oil industry to the State in the first place.

In the early 1950s, there was a "mini oil rush" in Alaska's south-central region. In 1954, the Secretary of the Interior opened the Kenai Moose Range (now the Kenai National Wildlife Refuge) to oil and gas leasing. This opportunity brought companies to Alaska and by the mid 1950s, even though no commercial wells had been drilled, individuals and companies had leased over five million acres of land for oil and gas. In 1957, the Swanson River field was discovered in Kenai Moose Range, paving the way for Statehood in 1959. The rest, as they say, is history, as exploration efforts continued in the Cook Inlet area and expanded north to the North Slope for the grandest discovery of all, the Prudhoe Bay.

The new discoveries and new investments over the years resulted from the same thing that made Alaska an oil State to begin with - land availability - and made available for lease. The long and short of it is that no new discoveries can be made, no new companies can enter Alaska unless land is made available for lease.

Predictability

Cancellation and delays can have a devastating effect on lease sales. A case in point is OCS Sale 149: MMS Sale 149 offered lands offshore in lower Cook Inlet. The sale was originally scheduled during the Bush Administration and included a total of 2.5 million acres. Two previous sales scheduled in the 149 planning area were either delayed or canceled. Extensive efforts were undertaken by MMS and industry to meet with public officials, fishing organizations and other user groups about the sale -- more than 50 meetings in 12 communities were held. MMS incorporated numerous requests for stipulations and conditions on the sale and deleted tracts in an effort to satisfy concerns raised by what some perceived to be a vocal minority. In the end, the sale area was a mere shadow of its former self -- 90 percent of the acreage had been deleted and the sale had been delayed. When the sale finally did take place in June of this year, only one company participated, leasing only four of the remaining 101 tracts.

How do we avoid this from happening again? The Federal and State governments must make a strong commitment to carry out a reliable leasing program. That is not to say that concerns cannot be addressed or considered. But it is also clear that we all must take a new approach to considering concerns when they are voiced. Agencies must be willing to take a tough position with regard to industry's ability to explore for and produce oil and gas in an environmentally responsible and safe manner. When statements are made which are inaccurate, they must be willing to base their decisions on the facts, not the emotion.

They also must be willing to take a step back and consider whether concerns and objections they may receive truly represent the opinions of the majority of the public. Chances are very good, they do not.

I consider myself to be a somewhat responsible citizen. I vote, I familiarize myself with the issues before I vote, I even attend community council meetings now and then. But, like everyone else in this room, I have a full plate. When I receive notices at my home of activities that are being proposed around me, I scan them and if I have no objections I will generally roundfile it and then run out the door ferrying kids to soccer or hockey. The entity looking for my support of his proposal probably does not appreciate it much, but that is simply the way it is. We all prioritize the little spare time we have and unless we have an objection, we generally do not speak up.

One of my favorite stories is about a family of five -- Mom, Dad, and three wonderful children. The youngest, the baby, is of course the center of everyone's attention and an extraordinarily happy child. But as young Johnny gets older, the family becomes concerned because he does not speak. Mom and Dad take him to specialist after specialist, only to be told there is no medical or psychological reason why Johnny is not talking. "Give it time," they say. One evening at dinner, when Johnny is about five, he suddenly speaks up. "What the heck is this?" he says.

"These mashed potatoes are cold, the gravy is lumpy, and this meatloaf tastes like rubber. I cannot eat this," he says, and he throws down his napkin. The family is stunned. They jump from their seats and surround Johnny, laughing and crying at the same time. Finally, Dad gains his composure and says, "Johnny, you talked! We are so thankful. But, tell me, why haven't you spoken before?" Johnny shrugs his shoulders and replies, "up until now everything has been OK"

Well, for most of us, everything is okay and until it is not, chances are no one is going to hear from us. We must find creative ways of encouraging public input and weighing the merits of that input. Some would suggest something as simple as a public opinion survey in nearby areas affected by a sale might be an effective way of determining support for or opposition to sales.

We also must become more creative in considering the validity of concerns. Often it is fear of the unknown. One approach might be to conduct case studies of actual experience. For example, if the concern is interference with commercial fishing activities, we might take a look first at operations currently underway in the areas to determine whether conflicts have occurred and if so, how they were resolved.

In addition to the State and Federal sales I mentioned earlier, we have other new opportunities on the horizon. Perhaps most notable is the re-leasing of NPR-A. There is no doubt that industry has demonstrated its ability to operate safely in the Arctic. Nevertheless, we can be sure that numerous obstacles will be raised during the upcoming debate. Agencies and industry alike must concentrate on the technological and operational advances made over the last several decades of North Slope development and be willing to dedicate the resources to addressing any new valid issues. On the State side, the Department of Natural Resources is moving forward with its Exploration Licensing Program. This program is intended to encourage oil and gas exploration in remote areas outside of known oil and gas provinces -- Cook Inlet, the North Slope, and the Beaufort Sea. The area currently under consideration borders the Cook Inlet Areawide sale boundary on the North.

Optimizing land availability should include a mix of successful policies, practices and programs aimed at ensuring lands are offered on a timely and reliable basis. The breakout sessions this afternoon and tomorrow provide us with a unique opportunity to improve those policies, practices and programs. We are happy for the opportunity to participate in them.

4.8 Coal Resources Development

John F. M. Sims
Vice President, Marketing
Usibelli Coal Mine, Inc.

[Please see presentation viewgraphs in Section 7.3]

The coal industry in Alaska is somewhat minuscule at this time. However, coal is abundant and very widely distributed in Alaska, with major concentrations in the Cook Inlet and Railbelt regions, and in Northern and Northwest Alaska.

I certainly can say that in the 10 years since a similar meeting like this was held, most of Alaska's coal resources and reserves still reside in the ground. In the interim, at Healy, where Usibelli mine (the only producing coal mine) is located, we extracted about 15 million tons in almost 10 years -- half of that going to South Korea and the other half for in-State use. Certainly Alaskan coal is underdeveloped, given that we only have one producing mine. There are vast tonnages of Alaskan coal that are remote and inaccessible. Nevertheless, there also are large proven reserves accessible within the Railbelt regions.

I will discuss several project sites, starting with that of the Beluga Coal Company. At this location, within four separate deposits, there is an aggregate of more than one billion tons of sub-bituminous coal in proven reserves, about 50 percent of which is surface minable at favorable ratios. Adjacent to the Beluga Coal Company project is the Chuitna project, which is owned by Texan principals Bass and Hunt. This property has over 1,000 million tons of coal in the proven and probable reserve categories.

The third property is the one at Healy, Usibelli coal mine, where we have actual proven reserves of about 150 million tons of sub-bituminous coal supporting a current production base of 1.5 million tons a year, which represents less than 0.2 percent of total U.S. coal production.

These properties -- Beluga, Chuitna, and Usibelli -- feature a remarkably uniform coal quality, designated as sub-bituminous, C-rank coal, with an ultra-low sulfur content of about 0.2 percent. The moving average of all coal produced at Usibelli over the 5-year period is 0.17 percent with respect to sulfur content. These coals also have low nitrogen (contributes to low fuel nitrogen oxides emissions) and a moderate ash content of around 8 percent. These coals possess excellent combustion characteristics and are readily ignitable and burn completely. On the other hand, they are difficult to grind for pulverized coal applications, and contain 26 percent moisture. Their heating value range is 7,600-8,200 Btu/lb.

Just to the north of Anchorage is another property called Wishbone Hill. In Alaska, we refer to the "Railbelt" as a corridor that extends from Fairbanks, in the North, down to Anchorage and the Kenai Peninsula, which is served by the Alaskan railroad. Wishbone Hill was recently acquired by Usibelli Coal Mine. In terms of coal quality, it is out of character with others since it is

essentially a bituminous coal. Saleable product from Wishbone Hill will be a washed coal with heating value of about 11,800 Btu/lb, ash content of approximately 15 percent, very low nitrogen, and extremely low sulfur of 0.4 percent. Development of Wishbone Hill is essentially market driven. There have been a number of inquiries about bringing this property into production. One option is to produce a blended product with some coal from the Usibelli property to produce a good utility blend that could be marketed and sold in the Pacific Rim to markets like Japan.

Although I primarily have focused on the Railbelt coals, any discussion of Alaskan coal would be incomplete without reference to the huge coal province in North and Northwest Alaska. There is a featured deposit known as Deadfall Syncline, which is owned by the Arctic Slope Region Corporation (ASRC). It has extrapolated reserves of about 750 million tons of hard bituminous coal with exceptional quality, all contained in a very gently dipping geological syncline structure. The coal quality is approaching 13,000 Btu/lb, with an extremely low sulfur content of less than 0.3 percent. If this coal were better positioned geographically, it would command strong market interest. However, it is very difficult to take advantage of this resource when there is no developed infrastructure available and little prospect of anything developing in the short term.

Alaska's coal prospects, therefore, essentially hinge on export opportunities from the accessible Railbelt region.

I would like to discuss recent marketplace developments to determine whether there is a glimmer emerging that could change that situation from essentially no development over the past 10 years to a more productive scenario. The first observation is that demand is growing and continues to develop dramatically for imported coals throughout the entire Pacific Rim, with very dramatic growth in Japan, Korea, Taiwan, and other Asian countries. There also is an emphasis in many of those countries, driven by regulations, to identify and source low-sulfur and ultra-low sulfur coals. A great strength of Alaskan coal is its low and ultra-low sulfur content.

The other development in places like Korea and Taiwan is that instruments of taxation (tariffs) are being placed upon sulfur content of imported thermal coals. Therefore, if you are competing with 1.0 percent sulfur coals, and you have 0.3 percent sulfur, you are not going to incur the same level of penalties as some other producers.

There also is a growing trend to expand the utilization of low-rank coals, and there is a greater appreciation of some of the properties of low-rank coals. Part of this is technology driven. Diversified sourcing of supply and reliability of supply within marketplaces are other important factors in the export market. We have demonstrated reliability in Alaska over the period of our contract to service the South Korean coal market, which is the trend you will see continued. There also has been deployment of new technologies, some of which compliment attribute properties of low-rank coals. For example, some Alaskan low-rank coals are suitable for gasification, and we are looking at products like low-rank coal slurries as fuel feedstocks.

For all of these reasons, Alaska is very well positioned to become a major force in the Pacific Rim coal trade. I have been saying this since I came to Alaska about 20 years ago. It is mainly a question of *when*, not *if*, this will occur. Maybe we can explore this with those of you who are interested in the ways in which we can help bring this about in the latter part of this meeting.

I would like to introduce several historical perspectives with similarities to what might happen with Alaskan coal, particularly the Alaskan Railbelt and Cook Inlet coals. In response to Pacific Rim demand, is it possible for Alaska to replicate the amazing growth that took place with coal production in some other major regions, like the Powder River Basin in Wyoming and Montana since the early 1970s and, more recently, the offshore revolution of the Indonesian coal?

Coal was being mined in modest quantities in Wyoming since the 1900s, but production tailed off when railroads phased out steam locomotives after World War II. The low point of Wyoming coal production was in 1958, at 1.8 million tons. After that, demand began to rebound in the 1960s and rose dramatically in the 1970s in response to successive oil price increases. Phenomenal growth occurred, with Wyoming tonnage exploding from 25 million tons/year production in 1975 to 270 million tons/year in 1995.

Montana, the adjoining State, did not participate quite as spectacularly, partially due to an ill-founded time in the history of Montana politics. The State imposed a hefty severance tax on coal just as the industry was starting to take off. Nevertheless, Montana doubled its production during the same period.

What did produce the Powder River Basin growth? A number of things: competitive edge, low costs, relative ease of mining, thick seams, abundance of the resource, environmental changes, the Clean Air Act Amendments of 1990 (which tilted demand strongly in favor of the low-sulfur coals of the Powder River region), adoption of technology to use low-rank coals, changes in boiler design, more recently the switch to blending by eastern utilities to reduce sulfur dioxide (SO₂) emissions without adding scrubbers, and productivity and efficiency gains in both the mining and transportation sectors. Some of these same driving forces could apply to Alaska with respect to the Pacific Rim. Unlike the Powder River Basin, Alaska is right at the Pacific sea board.

The dynamics of Powder River Basin evolution were essentially domestic and internally driven within the United States, whereas we hope the dynamics that will drive Alaska coal production will be external.

Another historic perspective I would like to elaborate on is the emergence of the Indonesian economy. Ten to 15 years ago, Indonesia was unknown as a coal producing country. In the last decade, Indonesia has launched itself from nowhere to become a major player in the Pacific international steam-coal trade. Indonesia has experienced phenomenal growth, rising from virtually zero exports to current exports well over 30 million tons, with continuing rapid growth. Some Indonesian coals are sub-bituminous, and their acceptance into the market has helped promote interest in low-rank coals. Indonesia's entrance on the scene, with this enormous growth, might certainly have deferred growing interest for Alaskan coal. However, in the long run, this will be to our advantage because it creates an appetite for low-rank coals in the utility sectors of the Pacific Rim countries.

The Indonesian coal industry was helped by generous government policies and incentives to attract overseas investment, with a significant part of that investment coming from Australia. The other element, which characterized Indonesia's presence, was their policy of buying market share.

Decisions were made to produce coal, which has been accomplished with extremely low labor costs while mining in extremely thick seams of very good quality coals. This growth in Indonesia may have served to defer large-scale development of South Central Alaska coals, but it has not killed off interest entirely.

In addition, we are increasingly seeing signs that Indonesian export growth is not unlimited. There has been a tremendous internal growth of energy requirements, and huge projects have been undertaken to provide an internal energy engine with coal-derived systems. We likely will see a flattening of Indonesian exports, which will enhance the ability for other areas to participate. Hopefully, Alaska will be one of those.

Alaska certainly will not see the explosive growth of coal production that I have cited in the Powder River Basin and Indonesia. But, when the time comes, growth could be significant. I am convinced that part of the growth will be attributable to some technology initiatives, particularly the Clean Coal Technology (CCT) Demonstration Program.

Here in Alaska, we have two CCT projects that I think have promise in playing into this long-term export scenario. The first one is in Healy, Alaska -- the Healy Clean Coal Technology Demonstration Project, where two technologies will be demonstrated on a commercial scale for the first time: (1) a front-end combustion system developed by TRW, and (2) a gas cleanup system developed by Joy-Niro. These technologies, particularly the combustion technology, are an extremely good match for Alaska sub-bituminous coal. Success of this project should generate a lot of interest in the marketplace, and perhaps we can package the technology with sales of the Alaskan sub-bituminous coals.

The combined effects of these two technologies deployed in Healy, coupled with the fact that we have a low-sulfur feedstock, could result in the cleanest coal-fired plant system in the entire Americas. Interestingly, the TRW system, which is ideally suitable for sub-bituminous coal, can handle a wide range of feedstocks and may have a particular application in the utilization of high-ash bituminous and anthracite coals.

For example, India has large quantities of high-ash coals and the Koreans have a long-established industry mining high-ash anthracites. Incorporation of the TRW technology into the Korean anthracite power plants would improve the efficiency and extend the lives of those plants significantly. There also is a strong interest in China in the TRW technology.

TRW maintains that this system of advanced slagging combustion represents a least-cost life extension option for many coal-burning plants as well as for many oil plants. Therefore, success of the Healy Clean Coal project may lead to deployment of this technology, and in some instances, perhaps coupled with sales of Alaskan coals.

The other technology-driven initiative is the coal-fueled diesel engine demonstration project located in Fairbanks at the University of Alaska. This project has an interesting history, going back a number of years. The original host utility withdrew from the project after reevaluating its long-term need for power. Subsequently, DOE approved plans to re-site the project at the University of Alaska Fairbanks, where the engine will operate on sub-bituminous Alaskan coals

from the Usibelli mine. The project involves modifying a diesel engine to operate on coal-water fuel. The coal-fueled diesel engine could be particularly suited for small electric power generation markets (below 50 MW).

These are exciting developments. We hope to move forward with these successful commercial-scale demonstrations, which have particular relevance to the abundance of energy resources found in Alaska.

4.9 Oil and Gas Resources Development

Kevin O. Meyers
President
ARCO Alaska, Inc.

[Please see presentation viewgraphs in Section 7.4]

Welcome to Anchorage and the Great Land. Your interest in meeting our Nation's energy needs by fostering responsible energy development in Alaska is very encouraging.

Fossil fuels account for more than 90 percent of the energy used annually in the United States and our need for fossil fuels is not going away. "Sustainable America," a report prepared by the Clinton Administration predicts that even with major improvements in fuel efficiency and development of alternate energy sources, fossil fuels will still account for 75 percent of U.S. energy consumption in 2025. Oil is especially important since it accounts for 40 percent of all the energy used in the U.S. and 97 percent of all transportation fuels.

Today, I am going to talk about three areas in which Federal government can assist the oil and gas industry in Alaska in meeting the Nation's energy needs. The first is "land access." Today, almost all the oil and gas production in Alaska comes from a 130-mile stretch of State land on the North Slope of Alaska. This State acreage is flanked on both sides by large, Federal land management units with significant oil and gas potential. In the long term, access to Federal land on the North Slope is essential to maintaining Alaska production at high levels. I will also talk about heavy oil development. This is a giant resource: more than 20 billion barrels of oil in place. It could play a major role in our Nation's energy future, but first, we must overcome some major technical and economic challenges. Finally, I will talk about North Slope natural gas and our efforts to move that gas to market.

The Nation needs new sources of oil. Although U.S. oil consumption is now nearing the record levels of the late 1970s, our domestic oil supply is shrinking and U.S. production is at its lowest level in more than 40 years. According to the Department of Energy, domestic oil reserves have declined 30 percent since Prudhoe Bay began production in 1977. Domestic production has fallen 25 percent since 1986. Today, the North Slope accounts for 20 percent of U.S. production. North Slope production has been declining since 1988, when the Trans Alaska Pipeline System (TAPS) carried 2 million barrels/day. This year, TAPS will carry about 1.4 million barrels/day.

ARCO is making investments that will stabilize our net share of North Slope production, allowing us to achieve our production goal of "No Decline After '99." We believe, we can keep our net production on plateau for five more years. BP is pursuing a similar goal. In short, Alaska can play a major role in replenishing our Nation's shrinking domestic energy supply.

All of the producing fields on the North Slope are located in a 130-mile stretch of land between the Colville and Canning Rivers. All of the fields are located within 20 miles of the coast. To the east is the 1.8 million acre Coastal Plain of the Arctic National Wildlife Refuge. Alaskans

have been working almost 20 years to gain access to this highly prospective area. We are still waiting on the Congress and the Administration to agree on when oil exploration can occur. To the west is the National Petroleum Reserve Alaska (NPR-A). There has not been a lease sale within NPR-A since the early 1980s.

In the last 10 years, onshore exploration has been limited to State-owned lands. We have been remarkably successful. The industry has drilled fewer than 40 wildcat wells and made 14 discoveries containing an estimated 1.5 billion barrels of reserves. This is a world class oil basin. There is every reason to believe we can be successful if allowed to expand our operations on to Federal lands to the east and west. The Department of Interior is now preparing to resume leasing in the northeast quadrant of the NPR-A. This 70-year-old petroleum reserve has seen a lot of activity over the years. While there have been no commercial discoveries, there were oil and gas shows in many wells.

Since the last NPR-A lease sale, much has changed in our industry. A 30 percent reduction in historic North Slope development and operating costs has significantly reduced minimum field size for stand alone development. Oil accumulations of 100 to 150 million barrels of oil are now economic. The computer revolution has also greatly enhanced industry's ability to acquire, manipulate and interpret seismic data. Together, improved seismic capability and lower minimum field sizes have generated new ideas about where to search within NPR-A and elsewhere on the North Slope. Early NPR-A exploration focused on large prospects. The seismic grids were large and only a handful of wells were drilled in a very large area. We are talking about a density of one well per 750 square miles. NPR-A might not yield another Prudhoe Bay, but it could contain a number of 400 to 500 million-barrel fields.

We can explore and develop new fields within NPR-A with little environmental impact. Modern oil exploration leaves no footprint. Exploration drilling is done using ice roads and ice pads that melt in summer. If nothing is found, there is no evidence that you have been there. If you do find something, extended-reach drilling and roadless development minimize impacts to tundra and to fish and wildlife populations. Our new, 40,000 acre Alpine field will have a surface footprint of just 115 acres. It will be a discharge-free operation. We are committed to doing it right.

Access to Federal lands on the North Slope are essential if we are to stabilize Alaska North Slope production over the long term. It is important that we have an NPR-A lease sale in 1998 and it is important that the sale include significant prospectivity. All of the major fields on the North Slope have been found within 20 miles of the Barrow Arch. If that area is excluded, many companies are not likely to participate in a lease sale.

Heavy oil represents another major opportunity for adding new North Slope reserves and production. There is a lot of heavy oil on the North Slope. The West Sak formation contains more than 20 billion barrels of oil in place. The Ugnu has about 10 billion barrels. Most of the North Slope's heavy oil deposits are located in and around the Kuparuk and Milne Point fields, beneath existing drill sites and processing facilities. These heavy oil accumulations are generally poor reservoirs: unconsolidated sandstones; relatively low permeability rock; low API gravity oil; low reservoir temperatures; and high in-situ viscosities. The result, when compared other North Slope fields, can be high capital and operating costs and lower well rates.

The industry has been working to make heavy oil production on North Slope economic for many years. ARCO alone has expended more than \$200 million. This month, we will begin commercial development. Work on the first phase of West Sak development will consist of 50 wells tied into existing Kuparuk production infrastructure. The result will be 50 million barrels in new reserves and peak production of 7,000 barrels of oil per day in early 1998.

At West Sak, we are taking a careful, "pay-as-we-go" approach to development. If successful in Phase 1, we will move to Phase 2. Phase 2 and beyond will consist of another 500 wells, yield reserves of 400 million barrels, and increase West Sak production to 60,000 barrels of oil per day. These plans focus on the best of the West Sak, a core area we call the "sweet spot." Most of this giant resource -- some 10 to 15 billion barrels of oil in place -- remains uneconomic. The area outside the "sweet spot" represents a significant opportunity and considerable challenge. With technical progress and the right fiscal regime, the West Sak could yield another 3.5 billion barrels.

There are significant technical challenges. Many of the recovery mechanisms used in other heavy oil producing regions are not applicable in Arctic. Wells cannot be drilled on one to two-acre spacings. Instead, we will have 10 to 40-acre spacing. Permafrost makes steam injection difficult. Finally, production of the lighter crudes, needed for blending of North Slope viscous oils, is declining.

DOE can assist in capturing the multi-billion barrel heavy oil prize. First, we would appreciate any thoughts you have on the technical challenges we have already shown you. Most of our attention has been focused on the "sweet spot." Expanding to other areas may require new methods. Basic research into cold production of heavy oil would be very useful to us and have broad application around the Nation. Heavy oil production will require lots of wells and create lots of cuttings. It could also result in lots of sand production. Handling those solids responsibly and cost effectively is essential. Improved, automated well control would help reduce operating costs in a field with thousands of closely spaced wells. Fracture treatments might improve recovery rates from these shallow, unconsolidated formations. Finally, DOE could help shape an appropriate fiscal regime for North Slope heavy oil development. One idea is to modify Section 29 of the Tax Code to include Arctic heavy oil as a qualified fuel for a \$3 per barrel tax credit. This would balance out the transportation cost for moving Arctic heavy oil to tidewater and would help jump start development of this very large resource.

North Slope natural gas represents another significant opportunity for increasing North Slope energy production. The state of Alaska estimates North Slope gas reserves at 35 trillion cubic feet (Tcf). Most of this gas, 26 Tcf, is at Prudhoe Bay. We have been working since the late 1970s to commercialize this gas. Today, most of our time and money is focused on a proposed large scale liquefied natural gas (LNG) project with sales to the Far East.

Prudhoe Bay gas enjoys many competitive advantages compared to other green field LNG projects. Our gas reserves are proved and developed -- every day at Prudhoe Bay we produce and handle 7.5 billion cubic feet. We have good quality gas with 12 percent carbon dioxide, which is not that much compared to our competition. Consumers in the Far East want to diversify their sources of supply, making Alaska gas attractive to the market. We are also closer to the market than the Middle East, which means lower shipping costs. Our big disadvantage is the need to

build an expensive, 800-mile long gas pipeline. Most of the competition is on the water. The pipeline pushes the cost of this project into the \$12 to \$15 billion range. There are four keys to moving this project forward. They are:

- Reducing project cost -- must be confident that we can achieve the potential cost reductions we have identified.
- Confirm market and take -- we must be able to deliver gas to the market in volumes and at a price that makes sense for consumers and investors. We see growing demand for LNG in Far East. The question is when demand will grow enough and at sufficient rate to absorb the 14 million metric tons per year of gas we must place in the market.
- Define project structure -- in other words, determine who is going to participate in the project, and in which parts. We believe that consumers, trading companies, others will be investors.
- Finally, we must work with the State and Federal governments to develop a competitive fiscal regime that is appropriate for a project of this type.

Our goal is to begin LNG shipments in 2007.

ARCO and other North Slope producers are also working to commercialize North Slope natural gas by pursuing separate approaches to lowering the cost and improving the efficiency of existing gas-to-liquids (GTL) conversion technologies. The challenge now is to make GTL technology commercially viable. Can we profitably make a middle distillate product that can be blended into the existing pipeline? If we are successful, we will have another option for commercializing North Slope gas and other stranded gas around the world. Continued Federal support of GTL research could pay dividends for Nation, and for industry. Keep it up.

These proposed gas projects are not economic today. They are capital intensive and may require changes in Federal fiscal regime to make them competitive. This is especially true of an LNG export project. Accelerated depreciation and investment tax credits could really help. ARCO and the other producers are now working with the State on fiscal issues. Federal support may also be required on regulatory, permitting issues to provide certainty as to project costs.

In closing, I would like to say we are appreciative of DOE's efforts to increase North Slope energy production. Your efforts can make a difference. The North Slope is a prolific oil and gas basin. We need access to more of it. We hope you will work to increase access to Federal lands on the North Slope. Technology advances in heavy oil production and gas-to-liquids conversion could be very leveraging.

Known resources of heavy oil and natural gas on the North Slope hold the potential to become billions of barrels of production. Finally, changes in the Tax Code may be required to make development of these energy sources possible. They are not economic today and it may take more than technical progress to get us on production. Our Nation needs new sources of energy. The oil and gas industry in Alaska can play an important role in meeting that need.

Thanks for your time and attention. I have enjoyed this opportunity to speak with you.

4.10 Alaska Energy Infobank

Erik Dahl

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[Please see presentation viewgraphs in Section 7.5]

The Alaska Energy Infobank (AEI or Infobank) is an umbrella organization of 10 companies and State and Federal agencies involved in the Alaska petroleum industry that share a vision of the future where data of common interest and ownership are stored and managed from a central location(s). The primary focus of the AEI effort has been the elimination of low value, redundant information management processes and the creation of more streamlined business processes. Recognizing that achieving this on any large scale will be a formidable information management challenge (not to mention financial and political challenges), the AEI has adopted a “grow as you go” philosophy. This approach does not attempt to tackle the problem as a top-down project to be designed and funded centrally, rather this approach assumes that consolidation and streamlining projects will happen when they make economic sense. Through this approach, the greatest value the AEI can add is through establishment of technical standards and maintaining an open communication forum to ensure that independent efforts to build solutions do so in mutually compatible ways.

The nucleus of Infobank is a technical committee responsible for communications, ensuring that all Infobank members hear about things that are going on, such as the log data prototype system. Other responsibilities include maintaining Web pages and E-mail, and setting strategies to ensure that as we build things we build them according to standards upon which we have all agreed. The technical committee also provides the “glue” between the various project teams underway in the industry, providing the common thread and keeping people in touch with others who are doing similar things.

In late 1996, AEI launched a prototype project to manage log data delivery. The project provided an opportunity to examine how we, as an industry, can work together and how we might apply the principles of our mission statement. The prototype was less about technology and more about developing a process by which we were able to cooperate and participate with each other. It was also about building a common system and determining how to fund it, how to certify the data, and how to set up multiple contracts.

We also analyzed and tried to assess the cost of AEI -- what it would cost us to try to manage all of the different types of data we have, namely seismic, log data, geological and geophysical (G&G) information, production, surface, permitting, cultural, and environmental. We looked at what we are spending today to manage all that data versus what we theoretically could commit to. From the financial analysis, we learned that to manage a project of this size requires somewhere in the order of \$20 million over the course of 10+ years. We realized the risks

associated with a project of that nature and magnitude probably were too large. We could have walked away, but we realized we would continue data-sharing projects, building common data depositories, sharing information, and building connections between our companies. Thus, it makes sense to go forward with AEI but not as a monolithic project.

As companies and agencies see value in AEI and are willing to invest in building a component that is shared or collaboratively managed, they are likely to support the process. For example, the log data project is one that ARCO and BP are interested in. They have indicated that this was important, and that there was money to be saved today by managing a process of requesting and delivering log data electronically. What we built in the prototype system is something that ARCO and BP would have invested in anyway. The system would be available to the rest of the industry. We have been careful to build it in such a way that it is standards-based and expandable to other companies and other data types. The prototype should set an example, and we are expecting that other areas and other data types will follow.

The current projects listed (ongoing, planned, under consideration) are not Infobank-managed projects; they are independent projects (see Section 7.5). For example, the *Log Data Delivery Prototype* is one that ARCO and BP developed together. The *Prudhoe Bay Reservoir Description* is a cooperative effort between ARCO, BP, and Exxon, which has been kicked off to determine how they can share reservoir information. The *Electronic Production Reporting* project is based on a combination of Infobank discussions and on discussions with the State of Alaska about how the permitting and reporting process can be streamlined, how to eliminate production of reports on physical tapes and paper, and how industry can move into a more streamlined process through which all databases can either communicate together or can be the same. Knowledge management efforts, like the *Shallow Sands Knowledge Capture*, focus on recovering heavy oil and how we do this. It is not solely about sharing massive databases of production information. Rather, it is an initiative to share information about heavy oil recovery. It also deals with knowledge management and technology transfer. *Aviation, Permitting, GIS* are all other areas of work that either have started, are underway, or should be started.

Each of these projects is set up, managed, and funded by a cross-section of companies or agencies within the industry. From our perspective, we consider them all to be Infobank-type projects, and Infobank is responsible for passing on the word about what the standards are, what directions we are going in, the fact that these other projects are already underway, who is doing them, how they are being conducted, and how companies can interface with them.

5.0 BREAKOUT SESSIONS

5.1 SESSION I: ACCESS AND RESOURCE DEVELOPMENT

Introduction

The group discussed the following topic areas: access and oil and gas resources development, regulatory issues (“*Stop Raising the Regulatory Bar*”), oil and gas resources development in rural areas, and heavy oil resources development.

Session Participants

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5.1.1 Access

Main Issues

- Changes are made during (and even to the end of) the lease sale process that can cost companies money or even change the desire to finalize the sale. These changes include delays, lawsuits, cancellations, and reduction of the size of lands. Another factor posing difficulties for companies is the seemingly arbitrary delays in the process. Multiple public hearings and lawsuits after final lease sales cause further delays and expense to all parties.
- Opening the National Petroleum Reserve Alaska (NPR-A) and then reserving some or most of the best tracts hurts companies financially. They have spent time and effort studying and planning if and how they should bid. Reserving tracts makes it extremely difficult for companies to plan for the future. If oil companies try to have this practice changed, they are construed as being self-serving. The perception is that Alaska is pristine and should be protected.
- A second part of the access issue is excessive stipulations. When industry reaches the end of the lease sale process, stipulations on sales may be added. The stipulations are not always based on sound science, but may be predicated on the basis of who is vocal enough to have the stipulation added. In truth, the non-vocal majority may have no problem with the lease sale, and for that very reason, may not go to the public meetings (the "no problem, I have more important things to do" effect). The prevailing opinion by regulators, however, is usually one of reservation: if left alone, industry will not always follow proper procedures.
- The lease sale process can be derailed if a lawsuit is brought after the fact. It would be preferable to take time and work together to solve problems before the leasing decision is made. Environmental reviews need to have a scientific basis, and consensus must be reached before the lease is advertised. Issued leases then can be developed for commercialization.

Strategy

Goal: To have predictable, reliable, timely lease sales with stipulations based on sound science and risk assessment data.

- Education of the public, collaborative problem-solving with State and Federal agencies, and advance agreement on solutions form the basis for solving these issues. If that education is provided by a source other than industry, the public may find it more credible. Education from credible, believable sources is needed so the public will not unreasonably oppose access to Federal lands. Independents are believed more than the majors, but only two independents operate in Alaska.

- The oil and gas industry is doing things right in Alaska. Presentation of this information by neutral parties would be beneficial. A strategy of how the Nation's energy needs will be met in the future should provide insight. Without bringing some education and scientific data into the process, these issues will continue to have a negative impact on access and development.

Next Steps and DOE Role

- DOE could provide the lead in educating the public and Congress. The public perspective is that industry is not credible. If DOE could show that the resource is being developed using sound science, the message would be more believable. The message must be believed by the public, government agencies, and industry. Taxpayers and citizens expect government to provide sound science to support this process. DOE could provide a forum for these discussions and help attain decisions based on sound science and proper risk management.
- North Slope residents are in favor of more access. DOE could assist in efforts to gain greater access. DOE can provide sound information and is viewed as an independent advocate of sound science.
- In requesting new lease sales, industry must convince the public that it is a good steward of the land. DOE can present and support research to help show industry is maximizing use of current holdings in an environmentally sound manner.

Access and Resource Development Session Presentation

What Is the Issue?

- Unpredictable, unreliable, untimely lease sales for Alaska's public lands (ANWR, NPR-A, Canning to Colville, and Cook Inlet)
- Time frame: both near- and long-term (existing and new leases)
- Level of difficulty: (1 = least difficult, 5 = most difficult)
 - State leasing: 2 - 3
 - Federal leasing: 4 - 5

What Is the Goal?

- Predictable, reliable, timely lease sales with stipulations based on sound science and risk assessment data.

- **Barriers:**
 - Litigation by non-industry groups (leads to delays).
 - Scientifically unjustified stipulations and mitigation measures.
 - "Silent majority" problem: not vocal.
 - Decisionmakers do not always collect or consider scientific data.
- **Strategies/Next Steps:**
 - Consider the environmental partnership proposal offered by Idaho National Engineering and Environmental Laboratory (INEEL) and industry. [INEEL proposal is titled: *A Systems Approach to Address Environmental Issues Associated with Development of Arctic Areas*]
 - Research other States' actions to improve lease sales processes and to prevent or shorten delays caused by litigation.
 - Consider having MMS adopt the public participation process of the Alaska Department of Natural Resources (DNR).
 - Federal and State agencies need to conduct public surveys as part of the leasing process.
 - Change format of DNR's public hearings such as regulatory participation in addition to hearing officers.
 - DOE to continue and complete its study, "Environmental Benefits of Advanced Technologies," and show the evolution of the industry in the last 20 years to reduce environmental impact of operations.
 - Conduct two case studies: a past State leasing, and a past Federal leasing.

Participants

Participants (who will need to conduct more research):

- U.S. Department of Energy
- U.S. Department of the Interior
- U.S. Environmental Protection Agency
- Interstate Oil and Gas Compact Commission
- American Petroleum Institute
- Gas Research Institute

- State of Alaska (DNR)
- Stakeholders
- Universities
- National Laboratories

5.1.2 Regulatory Issues — “Stop Raising the Regulatory Bar”

Main Issues

- The leasing process allows many parties to place stipulations on a sale. Each agency adds its own stipulations as leases pass through a series of processes or permits. After a sale, agencies may say the process was flawed and add additional stipulations at the permitting stage. While companies can protest the addition of new stipulations to State commissioners, they often accept them so that work commitments can be met. Industry believes that often times stipulations are added on fear of the unknown, or public interest pressure, rather than on scientific evidence. This lack of certainty as to what exactly is required has resulted in some companies redirecting their exploration investment dollars and efforts elsewhere.
- There is a need to introduce flexibility, to combine good science and cost effectiveness to make decisions. Often, decisions are made without science or with science not specific to the problem or the site. Sometimes fear causes a disconnect between science and regulation. Regulations and stipulations may respond to people's anxiety, with no basis in science, to avoid litigation. Then, the bar keeps going up and up because there is no end to anxiety.
- A scientific basis applicable to one site may not be applicable to another site because of different conditions. Different results may occur for specific sites. Specifying distances or restricting activity without specifying local conditions results in arbitrary regulations.
- Alaska's stipulations on sale-prelease have transitional problems. Advisories to leases become stipulations, and industry agrees to them as a matter of expediency. Each time this occurs, it costs industry more money. Moving this to the lease sale process stage would be beneficial so it goes through regulatory and public reviews early in the process. Under the present system, review is conducted sequentially within the State agencies, and each agency seems obligated to add something.
- While regulators may have problems determining what is pertinent and what is not, industry still needs a decision at the end. There are more than 80 stipulations on NPR-A leases. When making bids, companies must consider whether promising leases will be factored out and whether stipulations are too severe. Stipulations also affect timing. If there are delays in the stipulation identification, bids may change or there could be no bid at all. For example, the Beaufort Sea sale recently had an area deferred because of whale migration. Once deferred, an area is removed for all time, rather than being a seasonal exclusion, which industry could accept while whales are passing through.

- Validity or a scientific basis is needed for lease stipulations, including site-specific stipulations. For example, drilling on the North Slope and the Kenai Peninsula takes place on ice pads. Due to a stipulation (requiring drilling only in winter), industry almost lost a drilling rig on the Kenai Peninsula in the thaw. That stipulation was removed, but it was very difficult to accomplish. Once stipulations are in place, they are hard to remove. Some stipulations are based on opinions and feelings, not necessarily on scientific facts.

Strategy

Goal: To analyze stipulations and ensure that science is considered in time-certain, site-specific stipulations, which are carried over from lease sale to the operational stage. The process should also stop changing the size of sale lands after lease announcement.

- DOE could bring State and Federal agencies together to streamline the entire process, giving industry a better ability to predict costs. DOE could help bring consistency to the process, which would benefit everyone, and involve all parties in addressing problem areas, such as duplication, overlap, and multiple agency inspection of the same facility or activity. DOE could review the process and past events, and provide a report on problem areas along with case studies showing the impacts on industry.
- DOE could facilitate meetings with Alaskan agencies (DNR, Environmental Conservation, and Fish and Game) to coordinate and agree on a process. Industry does not oppose public hearings; it is opposed to multiple hearings on the same lease and to the timing of hearings. Multiple hearings provide an additional opportunity to shut down the project. Broad area closures sometimes happen for no scientific or risk-based reason; DOE could review this from an operational viewpoint.
- DOE could work with regulators and other agencies to determine the basis on which stipulations are set, by looking at science and site-specific requirements. It is essential to obtain an agreement that the scientific data are acceptable (whether in industry's interest, an individual's interest, or the environmental group's interest), thereby making the process non-adversarial. Technical factors must be considered.

Next Steps and DOE Role

- It is proposed that DOE conduct a study of the basis of sale stipulations, timing, and tract deletions on Sales 149 and 85A, and provide feedback to the regulatory agencies. [Sale 85A is a recent controversial example. Why did the size of the area change? Was it because of endangered species or did an individual object to a drilling rig in sight?] The study should include costs associated with changing stipulations in midstream or at lease sale, and should show MMS and the State how this affects industry. It also could show at what stage activities are appropriate or time-dependent. DOE could mediate with industry, regulatory agencies, and the public, to move sale stipulations out of the realm of emotion and onto a scientific basis.

"Stop Raising the Regulatory Bar" Session Presentation

Issue

- The scientific basis behind regulations and stipulations is often questionable:
 - Lacking scientific evidence
 - Not considered on a site-specific basis
- Level of Difficulty: 5 ("no limit to the lunacy")

Goal

To develop a mechanism for increasing the emphasis on science while applying stipulations in a time-certain, site-specific manner.

Next Steps

- DOE to sponsor a systematic examination of stipulations based on case studies.
- Generate an independent opinion of stipulations.
- Follow up with a DOE-mediated workshop for interested parties to build consensus on how and when stipulations should be applied.

Who Should Be Involved?

- Industry
- State agencies
- Federal agencies
- Native groups
- All interested parties

5.1.3 Energy Development for Local Use in Rural Areas

Main Issues

- The cost for energy in rural communities is high. Rural Alaska depends largely on diesel fuel stored in tanks and distributed through local pipelines. Any water-powered or solar-powered generators are not very effective near the Arctic. Many coal and natural gas seeps are found in Alaska, yet Alaska is starving for alternative energy sources.

[Some of the issues raised were similar to those of the 1987 Alaska workshop, where compressed natural gas use was one of the options for rural area communities.]

- Methane is known to exist in coalbeds, but no one knows how much. Questions about market and cost competitiveness are irrelevant. If markets are found, this abundant resource will begin to be exploited.
- Lawrence Livermore National Laboratory (LLNL) and other National Laboratories are researching wind power and fuel cells. These are promising, but unproven technologies. Fuel cells are a good idea, but not at the expense of other projects. Are there technical solutions that can reduce coal costs? Coal power plants are very costly. Other possible gas sources, in addition to coalbed methane, should be investigated.

Strategy

- Solutions are needed that are more relevant and less technically complex than those being considered in the DOE National Laboratories. This is a great way for DOE to fund a relevant project investigating coalbed methane to determine the parameters in a permafrost setting. Is it necessary to change drilling practices to address environmental regulations and controls in this environment?

Next Steps and DOE Role

- A suggested study could involve coalbed methane, where cost of exploration is high (\$5.3 million for two wells). This could be investigated through a joint industry/DOE/village effort with appropriate financial resources, technology, equipment, and evaluation of product viability. The State will propose this idea (a proposal has been submitted to the FETC in Morgantown, West Virginia). The workshop group recommended that DOE endorse the proposal.

Local Energy Development Session Presentation

Issues

- Coalbed methane pilot project for rural Alaskan communities
- Time frame: near-term
- Level of difficulty (1= least difficult, 5= most difficult):
 - Drilling and completion (1)
 - Production (3)
 - Chance of success (4)

Goal

To demonstrate the use of coalbed methane as a viable source of energy in rural Alaska. No coalbeds have been drilled for coalbed methane, and it is not an energy source for all of rural Alaska. Coalbed methane use is applicable to about 10 percent of 400 villages.

Barriers

- Lack of capital.
- Perception of a panacea creates political challenges.
- Lack of data -- untried technology in the Arctic.

Strategies

- Partnerships: Federal and State agencies, industry, Native corporations, municipalities.
- Education and public information.
- "Just Do It" -- industry is willing and able to provide technical input.

Next Steps

- Carry concept through to demonstration in at least two sites:
 - Permanent permafrost
 - Discontinuous permafrost

Who Should Be Involved?

- Federal agencies: DOE, USGS
- State agencies
- Universities
- Industry
- Municipalities
- Native corporations

5.1.4 Heavy Oil Resources Development

[Following the plenary presentations and immediately prior to the breakout sessions, all attendees participated in an exercise to identify the universe of issues facing fossil energy development in Alaska. During this session, heavy oil received a considerable amount of attention by attendees. However, it was recognized that the magnitude of the issues relating to heavy oil production and refining warranted being the focus of a separate workshop. Although not the subject of a breakout session, the sense of the discussion pertaining to heavy oil issues and possible discussion areas of the proposed workshop is presented in this section as background to the reader.]

Main Issues

- Alaska has tremendous heavy oil resources, much of it on the North Slope. This oil is highly viscous and requires dilution with lighter crudes or conversion to liquids (via gas-to-liquids technology) prior to transportation through the pipeline or by tanker. These reservoirs are shallow and may abut the permafrost layers, adding the problem of low temperature reservoirs to the already viscous oil.
- The heavy oil formations are composed of soft rock. Fracture data on this type of reservoir at shallow depths are scarce or lacking. Compilation of scientific information on fracturing would be beneficial.
- Tax relief is necessary to provide incentives for heavy oil production.

Strategy

Goals: To: (1) produce and market the resource in the most efficient manner; (2) develop better science on heavy oil production; and (3) modify Section 29 of the Tax Code to provide economic incentives.

Next Steps and DOE Role

- Perform laboratory and pilot demonstration projects to generate scientific data necessary to produce heavy oil resources and to give a basis for the taxing authority to grant tax relief. Organizations that should be involved in the next steps include North Slope producers, service companies, the State of Alaska, and DOE.
- Generate basic scientific information for producing heavy oil from cold reservoirs. This includes basic and applied information on miscible flooding in cold reservoirs and soft rock fracturing, and improved production of viscous oils in Arctic conditions. Generate and provide data to the taxing authority to support qualifying Alaskan heavy oil for a \$3/barrel credit.

Heavy Oil Resources Development Presentation

Issues

- Tremendous reserves of heavy oil.
- Located in remote Arctic areas.
- Highly viscous.
- Reservoirs shallow enough to be cooled by permafrost zones.
- Located in soft rock formations.
- No tax relief.

Goals

- Produce and market the resource.
- Develop better science on cold production, soft rock fracturing, and viscosity reduction.
- Modify Section 29 of the Tax Code to provide economic incentives.

Strategies

- Study the science specific to this type of reservoirs in Arctic conditions.
- Conduct fundamental and applied research in miscible flooding in cold reservoirs.
- Generate fundamental scientific information on soft rock fracturing.
- Gain information on production of viscous oils in Arctic conditions.
- Study use of lighter oil as a diluent or gas-to-liquids conversion for transportation.
- Convince taxing authority to qualify Alaska heavy oil for a \$3/barrel credit.

Next Steps

- Laboratory studies and pilot demonstration projects.

Participants

- North Slope producers; service companies; State of Alaska; and DOE

5.2 SESSION II: POWER GENERATION

Introduction

Initially, coal resource development was a topic of consideration for this breakout session. However, it became clear that the main topic would be power generation, with very little discussion on coal. The group also focused on problems facing power generation in Alaska for urban (or "railbelt") and rural (or "bush") areas. Rural areas are defined as those in which the population density is too low to justify connection to electrical transmission power grids.

Main Issues

- In descending order of priority, the major issues raised were: cost of utilities, limited infrastructure, environmental regulations, basic understanding of bush (rural) problems, and deregulation. Although these issues were distinct, they all were related to differences between the scale of providing power to urban areas (and those areas along the "railbelt") and providing reasonable cost power to rural areas (away from the power distribution infrastructure). The group found many organizations do not have a good understanding of the problems faced by rural residents.
- Providing electricity to rural areas costs considerably more than providing service to urban populations. Rural communities lack the population density that supports urban infrastructure. The lack of infrastructure (power transmission grids, pipelines, availability of fuels, adequacy of roads, and the great distances involved), partly a result of Federally owned land, was identified as the main reason for this cost differential.
- Methods used to provide power in urban settings include gas turbines, coal-fired steam and a combined cycle electrical generation, internal combustion engines, hydroelectric generators, and fuel cells (in initial trials). Heat is supplied to urban areas with district heating and co-generation. In comparison, nearly 95 percent of power in rural areas is supplied by diesel-powered generators, about 5 percent is provided by hydroelectric generation, and the remainder, primarily on the North Slope, is provided by natural gas.
- "Power Cost Equalization" (PCE) is a program used in Alaska to partially subsidize the cost of electricity in rural areas; however, the breakout session suggested the possibility that cost-equalization funds would be better used to help offset costs of new technology development rather than to subsidize current usage, i.e., pay to correct rather than live with the problem.

Discussion

[The following criteria have been used to rank the issues discussed: time frame: near-term (less than 2 years), long-term: more than 2 years; level of difficulty: range is from 5 (very difficult) to 1 (very easy); priority: larger numbers represent higher priority]

Cost of Utilities (time frame: near- to long-term, priority: 11, level of difficulty: 3.8): electricity, heat, water/sewer, solid waste, power cost equalization.

- Fuel Cost
 - As a rule in the railbelt, cost is reasonable; outside of that area, fuel is very expensive and delivery is difficult. Urban: heating fuel cost is \$4.25/gallon, and diesel fuel is \$3/MMBtu. Gas is limited by transmission facilities. Rural is predominately fueled by diesel at \$6-\$14/MMBtu, and the main problem is fuel delivery -- transmission infrastructure and access, i.e., the lack and extreme difficulty of installing, roads, pipelines, and transporting fuel to sites. Is there a technology that DOE could help develop? Power storage for off peak periods?
- Technology (electricity)
 - Urban (railbelt) fuels include oil, natural gas, and coal. Current electricity generation methods include gas turbine, steam cycle, internal combustion, hydroelectric, fuel cells, combined cycle, industrial co-generation, and demand management (upgrading, refitting versus increased generation). Potential methods include storage batteries, inerties, co-firing (waste, fuels), coal-fired diesel, slagging combustor (Healy Clean Coal project). Tried and abandoned methods include wood burning.
 - Bush (rural) fuels consist of diesel (95 percent) and hydroelectric (5 percent). New methods include diesel, wind, coal steam, coalbed methane, fuel cells, fuel reforming (of complex fuels such as diesel) for fuel cells, gas liquids, storage, LNG, improved diesel, or hybrid. Old methods include wood-fired steam.
- Power Cost Equalization is a State power subsidy program (about \$18 million/year) implemented instead of buying down power costs. Could this money be better used to subsidize technology development?
- Heat alternatives: district heating, cogeneration, spent nuclear fuel rods.

Limited Infrastructure (time frame: long-term, priority: 9, level of difficulty: 4.8): access, fuel resources, and energy delivery; impact of generation by rural industries.

- Fuel resources or energy delivery problems are analogous to rural electrification efforts during the FDR administration, but some infrastructure such as roads existed then. For Alaska, the infrastructure does not exist. Can we realistically expect to see roads in rural Alaska? It may be physically impossible.
- Impact of power generation by rural industries (lack of understanding of the bush).

Environmental Issues (Emissions Mandates)

(time frame: near-term, priority: 6, level of difficulty: 4.5)

- Need to consider and differentiate between community and economic interests. Presidential directive regarding emissions mandates (CO₂) -- does it apply to point source, State, region?
- Mandates are selective -- do not apply to automobiles, but do restrict power plants.
- Externalities, i.e., what does it cost to develop technologies? Cost and impacts are not apparent at point of use.
- Political environment: Federal government does not have a plan to coordinate environmental, resource, and economic development issues.
- Environmental policies, regulations, and interpretations will affect the standard of living.

Basic Understanding of Bush Problems (time frame: near-term, priority: 5, level of difficulty: 3.2): availability of local fuel; infrastructure (access); restrictions; varying problems; and technical complexity (labor availability).

- Bush (rural) areas have different problems from urban areas, particularly in scale, with an average load of 100 kW -- majority of places are 100 kW or smaller, others are 500 kW and less, compared to urban operations requiring 30 MW or more.
- Bush area population is a major consumer of energy, requiring large power generation. Is it easier to build distribution lines or distributed power generation systems?
- Availability of local fossil fuel and other fuels (wind?), cost of alternative fuels, cost of delivered fuel (diesel).
- Rural infrastructure requirements are site-specific. Does land status allow infrastructure?
- Availability of skilled labor, lack of training for operators of complex facilities.
- Availability of local fuel, infrastructure restrictions, varying problems, and technical complexity.

Impact of Deregulation (time frame: near-term, priority: 5, level of difficulty: 3.0)

- Reduced R&D, "cherry picking," protection against higher cost, maintaining reliability, and access.

Technology Initiatives to Address the Problems

- Urban: mobile/transportable fuel cell (natural gas fueled); barge-mounted, coal-fired steam power plant; battery (40 MW) storage system study; transmission grid development;

exhaust problem study (plume downwash); and study with National Park Service on air quality monitoring.

- Rural: fuel cells for gas areas (co-generation power/heat); natural gas-fired internal combustion; wood-fired district heat; solid fuel/diesel hybrid (2-4 MW) base loaded, inexpensive (Rankine cycle) steam turbine; internal combustion diesel-fired with solid fuel supplemented; diesel hybrids of all above; improved diesel; energy storage; and diesel with bottoming cycle for ice production.

Current Activities (electric/heat, displace/augment diesel):

- Feasibility analysis of small-scale solid fuel for rural villages (atmospheric fluidized bed combustion, 600 kW); integrated cogeneration (hot water).
- Study on delivered cost of fuel; technology survey of combustion technology suppliers and vendors (coal, biomass); study on minimum cost of small natural gas production; and study of opportunities to intertie communities, and of small-scale hydroelectric power development.
- Analysis of applicability of compressed natural gas and liquefied natural gas. Goal is to demonstrate alternatives to diesel for rural communities -- widen fuel options.
- Vendor solicitation and preliminary proposal for a 2-MW, turnkey coal-fired plant.
- Fuel cells -- Russian American Fuel Cell Organization; wind/diesel hybrid project.

Strategies

The group identified the following technology approaches for consideration as future power generation options:

- Urban: storage, interties, co-firing (coal and waste solids as fuels), technology being developed in the Healy project, and coal-fired diesel engines.
- Rural: improved diesel or hydroelectric technologies, use of wind turbines to supplement diesel power, coal-fired steam (also with municipal solid waste), fuel cells with fuel reforming of long-chain hydrocarbons (petroleum), storage (either by pumping water or batteries), and compressed natural gas.

Next Steps and DOE Role

- DOE to provide funding support and collaborate in technology assessment of energy programs. Find a component that works with existing programs; provide technical assistance to solve some small-scale problems in rural Alaska -- technology does not appear to be available to solve these problems, DOE mainly has solutions for large-scale applications.

- A critical mass (sufficient resources and attention) is needed to overcome the barriers. DOE can assist by maintaining and fostering projects. It is essential that existing programs be sustained over long enough periods of time to yield meaningful results.
- The following groups were identified as necessary participants to develop solutions: users (utility customers and rural residents); environmental regulators (State and Federal); funding agencies; utilities; and fuel suppliers (petroleum and coal producers, distribution companies, equipment vendors).

Power Generation Session Presentation

Issues

Issue (ordered by priority)	Time Frame	Level of Difficulty
Cost of utilities	NT/LT	3.8
Limited infrastructure	LT	4.8
Environmental regulation	NT	4.5
Basic understanding of bush problems	NT	3.2
Impact of deregulation	NT	3.0

Time frame: near-term (NT) = less than two years; long-term (LT) = more than two years

Level of difficulty (LOD): range is from 5 (very difficult) to 1 (very easy)

Technology Approaches (Urban)

Current

Electricity	Heat
- Gas turbines	- District heating
- Steam	- Co-generation
- Combined cycle	
- Internal combustion	
- Hydro	
- Fuel cells	

Technology Approaches (Urban)

New

- Storage
- Interties
- Co-firing (waste fuels)
- Healy Project (DOE Clean Coal Program)
- Coal-fired diesel (DOE Clean Coal Program)

Technology Approaches (Bush)

Electricity

Current	New
- Diesel	- Wind turbine/diesel
- Small hydro	- Coal-fired steam (also with municipal solid waste)
	- Fuel cells
	- Fuel reforming of long chain hydrocarbons for fuel cells
	- Storage
	- Compressed natural gas
	- Improving diesel or hydro

Current Energy Programs

- Feasibility demonstrations
- Technology assessments
- Opportunity investigations

Current Initiatives (Urban)

- Portable fuel cells
- Battery storage study

- Transmission grid development
- Exhaust-plume downwash study

Current Initiatives (Bush)

- Fuel cells, co-generation
- Natural gas internal combustion
- 2-4 MW solid fuel steam plant, barge-mounted
- Internal combustion diesel with water jacket, solid fuel augmented
- Diesel with absorption refrigeration
- Wind turbine
- Diesel hybrids
- Improved diesel
- Energy storage

Next Steps for Problem Resolution

- Strengthening partnerships of stakeholders.
- Formation of a structured advisory group.
- Statewide education on the link between environmental issues and energy supplies.
- Promotion of energy issues and solutions (particularly in schools).
- Strong sustained support of ongoing programs (keep using defined strategies).

Necessary Participants

- Users
- Environmental regulators
- Funding agencies
- Utilities
- Fuel suppliers

5.3 SESSION III: ALASKA ENERGY INFOBANK (AEI)

Introduction

The Alaska Energy Infobank (AEI) is an industry and government initiative established to improve competitiveness and reduce operating costs. AEI is designed to coordinate development of a data repository for all members of the petroleum industry and related Federal, State, and local government agencies in Alaska. The AEI objectives include: (1) creating a greater sense of partnership in the energy community; (2) leading to cost reduction in information gathering and retrieval; (3) creating collective business process reengineering; (4) reducing redundancy of information and processing; (5) sustaining long-term cost savings; (6) adhering to industry standards; and (7) protecting proprietary, legal, and confidentiality interests of its members.

AEI participants include ARCO Alaska, Inc., BP Exploration, UNOCAL, Marathon Oil Co., Exxon, Alyeska Pipeline Services Company, Alaska Oil and Gas Conservation Commission, Alaska Department of Natural Resources, Bureau of Land Management, and the Minerals Management Service. The AEI concept was initiated in 1995, and a steering board was formed in the same year.

AEI activities in 1997 include development of operating principles and a streamlined organization model, completion of log data prototype, and development of plans to deploy Internet-based collaboration tools (shared database, web, and file sharing). Current AEI projects are: (1) Log Data Delivery Prototype, (2) Prudhoe Bay Reservoir Description, (3) Electronic Production Reporting, (4) Shallow Sands Knowledge Capture, (5) Shared Services Aviation, (6) Streamline Permitting Processes, and (7) Geophysical Information System (GIS) Interfaces to Data.

Session Participants

Feridun Albayrak, Technology & Management Services, Inc. (TMS), Gaithersburg, MD
Alan Bailey, KIS, Anchorage, AK
Godwin Chukwu, University of Alaska Fairbanks, AK
Glenn Gray, Alaska Division of Governmental Coordination, Juneau, AK
Bob Crandall, Alaska Oil and Gas Conservation Commission, Anchorage, AK
Erik Dahl, ARCO Alaska, Inc., Anchorage, AK
Joseph Dygas, Bureau of Land Management, Anchorage, AK
Brent Kirk, Computer Task Group (CTG), Anchorage, AK
Cat Larrea, BP Exploration, Anchorage, AK
Richard McMahon, Alaska Department of Natural Resources, Anchorage, AK
Jerry Simmons, BDM Petroleum Technologies, Inc., Bartlesville, OK
Ed Witterholt, BP Exploration, Houston, TX

Main Issues

- Discussions focused on potential uses and benefits of AEI, and areas where DOE could be helpful. As perceived by the participants, AEI would: (1) facilitate and improve the permitting process to achieve shorter process time and reduced cost; (2) expedite communication; (3) provide reference data useful for other purposes; (4) reduce redundancy and consolidate information; (5) achieve more effective use of resources; (6) reduce paper/materials handling; (7) streamline information for easier access and retrieval to increase business value; and (8) expedite behavioral changes in information sharing.
- Participants expressed great interest in starting projects aimed at electronic permitting, production reporting, and information/document repository. State representatives indicated that State participation and potential funding support would require identifying constraints of existing permitting processes, if any, and communicating and quantifying the benefits of Infobank (what problems, and how specific problems would be solved by AEI).
- Further analysis is required on proprietary data retrieval and storage, and use of electronic signatures on permit applications and data reporting. Discussions were held about the potential for University of Alaska Fairbanks to compile information for AEI projects. Participants also agreed that a front-end GIS system allowing access to different types of information would greatly enhance the system capabilities and its uses.
- Potential DOE research assistance could be sought to compile information on past and ongoing database management and similar systems.

Discussion

State Participation:

- Reduced permitting costs will make Alaska competitive globally and attract business, especially smaller companies.
- State should take the lead for electronic permitting. DOE also can facilitate the process and provide a forum to "hammer out" the issues.
- Need to show and/or communicate costs versus added benefits of AEI projects to the involved and/or interested parties, especially to the State of Alaska; show what has been accomplished.
- Need to show what is wrong with the existing State permitting process, and how streamlining can help.
- May need a high-level "champion" (from the State) to obtain the necessary attention for an AEI project.

- State participation will be contingent on dedicated funding; explore: funding commitment, prioritization of activity, and grant opportunities.

Current Permitting and Reporting Process:

- Need clarity on: problems, needs/efficiencies, constraints of existing permitting system (e.g., long lead time and redundancy); neither AEI nor the State made an effort to identify redundancies.
- Reporting production data is costly and time consuming for industry, and therefore is a possible AEI use area. During exploration and production, reporting requirements are so involved that a common system would be very beneficial. Once data is captured and stored through a uniform production reporting system and standards, then the State agencies could look up the information they need on their own.
- Current permitting process has redundancy of requirements by several different agencies. Streamline requirements and come up with a single application format, i.e., do it once and answer/satisfy everyone at the same time.

One participant stated: "It seems to me ... that the real advantage [of AEI] would be at the [permit] application stage. I can see that really clearly, and also at the reporting stage.... But, I know a lot of the permitters [in the industry] I talked to, they actually have to interpret all of the State and Federal permits' stipulations so that their people [at the site] will understand what they mean. In the application [stage] and then [for the] reporting requirements, you can save a tremendous amount of time by doing that electronically."

- Some of the problems experienced during the permitting process may be people related, rather than relating to the established process/procedures. How can AEI deal with these people problems? For the technology to work, what other problems need to be solved?

Another participant stated: "A lot of problems with permitting may be perceptions by permitters. My question would be, how could an electronic system deal with people problems? Are these people problems? Or do some permitters not understand industry well enough? Just by changing the permitting system and having an electronic system, you are not [always] solving the problem."

AEI Application/Uses:

- AEI is not solely for solving problems; it can be applied to improve a situation and/or to bring efficiency to areas where great cost and resource savings would be desirable or achievable.
- Show future benefits of AEI in an environment where electronic permitting process will be available and/or in place -- data entered once, on-line filing, on-line references.

- A participant stated: "We are still in a world of a paper system. Physical paper has to be copied, logged in, and all that [needs to be sent to] several State agencies and different representatives in those agencies.... At best, because of the Internet, they are able to send [some] information [through] E-mail. But, still, we are basically working with a paper system."
- With reference to benefits of electronic databases, a participant stated: "The idea is once you have entered information into the system, it goes into the database and everybody can have access to it 100 different ways, *if* they have the rights to do that. The same [concept can be applied to a process] like permitting. You would have basically gathered [information] from all of the forms everybody would ever fill out and capture [all of that information] at the same time. Then the rest of it would be just like generating a report. [For example, one can review or search for information in the database, and decide how to use or integrate it into permitting or reporting.]"
- A shared electronic information database would alleviate problems or difficulties experienced with loss of people and skills and knowledge.

A participant suggested that: "AEI could also be used for keeping/storing very voluminous environmental documents. That's where a GIS front-end system could be very useful. Data and information would be available behind the GIS [system for access]. [This application] can save a lot of money."

Other State Experience:

- Need to determine similar activities and information available in other States. Obtain more information on DOE-funded activities.
- Determine what has been done or what is being done in terms of on-line permitting process. There is no need to reinvent the wheel. For example, explore the scalability of the BLM system to State needs.

University of Alaska Fairbanks Role:

- Is there a role for the University of Alaska Fairbanks, such as database development? How do we manage/handle confidentiality?

DOE Role:

- Possible DOE role: help promote AEI projects, show business solutions the AEI approach is capable of. Is there a role for the Petroleum Technology Transfer Council (PTTC) in promoting AEI? A workshop by PTTC? Explore DOE funding opportunities.

A participant stated: "We want to make sure whatever we are doing is trying to minimize the cost of doing business, while at the same time we are able to meet all our issues. For reaching that goal, we have to really understand fairly well what [the needs are]. When we

were involved with [AEI], we made some discoveries due to the historical ways of doing business; it was difficult to steer the three different agencies [to] a common point. I think that's one important role that governmental coordination could help here.”

- DOE is experienced in online/electronic permitting; expert systems for environmental compliance; and State database development, coordination and management. For example, the Ground Water Protection Council (GWPC), with funding support from DOE, developed a Risk-Based Data Management System (RBDMS) that enables risk-based decisionmaking by State regulatory agencies. RBDMS is currently used by 10 States for managing injection well data. New advances and spinoffs include production well, geologic and hazardous waste data management; Internet access; mapping interfaces; and collaborative efforts involving State regulatory agencies and State geological surveys.

A current DOE project involves collaboration with BLM whereby architects of the BLM system (called EFPR: Electronic Filing, Permitting, and Reporting) and the RBDMS are exploring how RBDMS and the BLM systems can communicate with each other. They are working to determine if they can develop a common input for the operator, so that entered information populates both databases at the same time. The BLM system is required by law. RBDMS is a very modular system and can be adapted to various units of individual States.

- Once the present database development and online electronic permitting efforts of other States are compiled (e.g., New Mexico's online advisory system that leads to permitting), lessons-learned should be reviewed so that past experience is applied to implementation of the Alaska Energy Infobank.

Data Security and Standards:

- How do we deal with/treat confidential information? We need to develop a State protocol for receiving confidential information. Electronic signature is an issue.
- Everyone will be able to communicate better with standardized information.

AEI Enhancements:

- One priority, relative to oil and gas permitting processes, is to develop an Internet-deployable GIS front-end system for permitting and reporting, and provide the data behind it (e.g., being able to “click” on a “well icon” of a map on computer screen and obtain various facts about that well).
- Document management is a major issue for Alaska DNR. Is there a paperless office in the future? AEI can serve as a centralized, single data source/filing system; a repository for closed-out projects; and as day-forward/archives.

- Improving production reporting: need to finalize common product types/codes, reporting areas, geography, and names and references; and need to implement electronic delivery.

Next Steps and DOE Role:

- It was suggested that DOE consolidate all government experience in electronic permitting, expert systems for environmental compliance, and State database development and management. Specifically, this would: (1) identify and summarize what has been done elsewhere; (2) consolidate State and Federal efforts; and (3) identify problems that electronic permitting and reporting can solve.
- It also was suggested that DOE participate in the AEI steering board meetings, introduce AEI members/involved parties to individuals and organizations with experience in developing similar systems, and ensure that appropriate stakeholders are involved in AEI development and implementation.
- Participants identified the following areas where DOE could assist in addressing a number of technical issues involved with electronic permitting and data reporting: (1) electronic signatures; (2) information security (system access); (3) entitlements (confidentiality of information); (4) data standards (AEI compatible); (5) database development and management; (6) GIS application; and (7) electronic document management.

Alaska Energy Infobank Session Presentation

AEI Vision

A coalition of industry and government agencies working together to reduce operating costs and improve Alaska's position in the global market.

AEI Objectives

Promote shared data, applications, and electronic commerce:

- Create a greater sense of partnership in the energy community.
- Lead to cost reduction in information gathering and retrieval.
- Create collective business process re-engineering.
- Reduce redundancy of information and processes.
- Sustain long-term cost savings.
- Adhere to industry standards.
- Protect the proprietary, legal, and confidentiality interests of members.

Where We are Today:

Current projects and plans (percent complete)

- Log data delivery prototype (80)
- Prudhoe Bay reservoir description (10)
- Electronic production reporting (20)
- Shallow sands knowledge capture (10)
- Shared services aviation (90)
- Streamline permitting processes (5)
- GIS interfaces to data (1)

Where DOE Can Help:

- Participate in AEI.
- Assist in addressing technical issues.
- Streamline permitting and reporting.
- Consolidate government experience.

Participate in AEI:

- Attend steering board meetings.
- Identify DOE individual points of contact.

Technical Issues:

- Electronic signatures
- Security (system access)
- Entitlements (confidentiality)
- Standards (Infobank compatible)
- Database (development and management)

- GIS applications
- Document management (electronic)

Streamline Permitting and Reporting:

- Compare what has been done elsewhere.
- Consolidate State and Federal efforts.
- Identify problems that electronic permitting and reporting can solve.
- Ensure appropriate stakeholders are involved.

Consolidate Government Experience:

- Electronic permitting
- Expert systems for environmental compliance
- State database coordination

6.0 WORKSHOP SUMMARY CLOSING REMARKS

Sandra L. Waisley
Deputy Assistant Secretary (Acting) and
Associate Deputy Assistant Secretary
Office of Natural Gas and Petroleum Technology
U.S. Department of Energy

I would like to thank all of the attendees for being here the past two days and for participating in this workshop. I would like to thank BP and ARCO for their strong support of the workshop, and the State of Alaska and the Alaska Oil and Gas Association for helping us plan this workshop. I would like to thank Art Hartstein, Dexter Sutterfield, and the rest of my staff, who worked very hard to organize this workshop, which has been in planning since last winter. I also would like to thank Les Clark of the Independent Oil Producers' Agency, in Bakersfield, California, who told you about industry and State collaborations with DOE, and the regulatory streamlining efforts in California.

I would like to provide a few highlights to summarize the workshop. As indicated by Marilyn Crockett of AOGA, there are three clearly distinct, separate tracks that emerged from the breakout sessions: Alaska Energy Infobank, Power Generation, and Oil and Gas Development. We will have three groups of people with different interests, capabilities, and skills working on these three areas from now on.

In addressing DOE's role in AEI, I can say *yes*, we will participate in the Alaska Energy Infobank. We will attend the steering committee meetings. *Yes*, we will help you with the second recommendation of consolidating government experience, and provide you with a report on what we know, what we have done, and the lessons we have learned. I also can say *yes*, that we will help you with your third recommendation on streamlining permitting and reporting. We can help you with that and assist you in coordinating and collaborating with the State of Alaska.

In the Power Generation area, five issues were brought out, and the one ranked as most difficult was the limited infrastructure. We also talked about current and new technology approaches and initiatives to meet energy needs in urban and rural (bush) areas. As next steps, formation of a structured advisory group and Statewide education effort were suggested by the group. What was not well defined just yet was DOE's role. However, the group desired DOE's participation in various collaborations, including R&D support. As requested, I can say *yes*, we can provide more information on how to do business with DOE, and on oil, gas, and coal R&D program contacts.

Some of you desired more forums like this, and I can also say *yes* to that. If you would like DOE to facilitate, mediate, or chair discussions, we can do that. Again, this meeting is just the first step and a more specific DOE role can be defined later for the Power Generation area.

The three subgroups formed in the Oil and Gas Resources Development area were: Access, Regulatory (“Stop Raising the Bar”), and Local Energy Development. Marilyn Crockett of AOGA summarized the access issues, barriers, and strategies; and focus areas ranged from litigation and the need for sound science, to education and communication needs. In regard to our commitment in the access area, *yes*, we will commit to consider the environmental partnership proposal that Idaho National Engineering and Environmental Laboratory developed with industry. *Yes*, we also will commit to continue and complete our ongoing study on environmental benefits of improved and advanced technologies. The study will include a case study of improved operations on the Arctic North Slope over the last 20 years.

The Regulatory Group, “Stop Raising the Bar,” indicated that the scientific basis behind regulations and stipulations often is in question, lacking, or not considered. “Sound science” was a common theme among the Access Group and the Regulatory Group. They ranked this as “5,” or very difficult, but they did state a goal for developing a mechanism to increase emphasis on science when developing stipulations. They outlined and summarized next steps for DOE, such as sponsoring systematic examination of stipulations based on case studies. The Access Group also supports this recommendation. Regarding DOE’s role, I can say *yes* to mediating a workshop with all involved parties. It is a good role for us, and we will commit to that.

Let me end with these three messages. **First**, in DOE we believe that the Alaska energy industry has been vital to the U.S. economy and national security. **Second**, we believe that the energy industry of Alaska is key to America's strength and security in the 21st century. We need continued development of the energy resources in the next century. **Third**, we have heard in the last two days that future growth in Alaska lies in heavy oil production, natural gas production (including gas hydrates), and continued oil resources development in both explored and unexplored basins. As pointed out by John Sims of Usibelli Coal Mine, there is a huge potential for coal. These are the reasons we are here and why we held this workshop, to listen to you about this future growth, the potential, and how DOE can assist the State of Alaska to ensure the future growth of its energy industry.

I think there is a role for DOE as outlined today in the summary reports. Let me say that we are not regulators, we do not drill wells, and we do not enforce anything. But, we can and we do conduct research and develop improved and advanced technologies. In the last 10 years, we have conducted many R&D projects in Alaska. We can perform economic analysis and modeling on the impact of proposed and existing legislation and regulations on the industry. We provide sound science and data to other Federal agencies, States, and industry. We have a strong role in technology transfer and we can be a broker, facilitator, mediator, or chair to bring people together in partnerships.

We need to continue to hear from you and all of our stakeholders. We have listened to you this week and we now have an initial summary of these discussions. We will prepare a workshop report and distribute it to all the attendees and other interested parties. We look forward to hearing from you about how we can assist you. We are committed to a long-term and a trusting relationship where you can feel comfortable working with us.

7.0 WORKSHOP PRESENTATIONS

7.1 ALASKA OIL AND GAS ACTIVITIES

**Kenneth A. Boyd
Director
Alaska Division of Oil and Gas**

Alaska Oil and Gas Activities

Division of Oil and Gas
October 1997

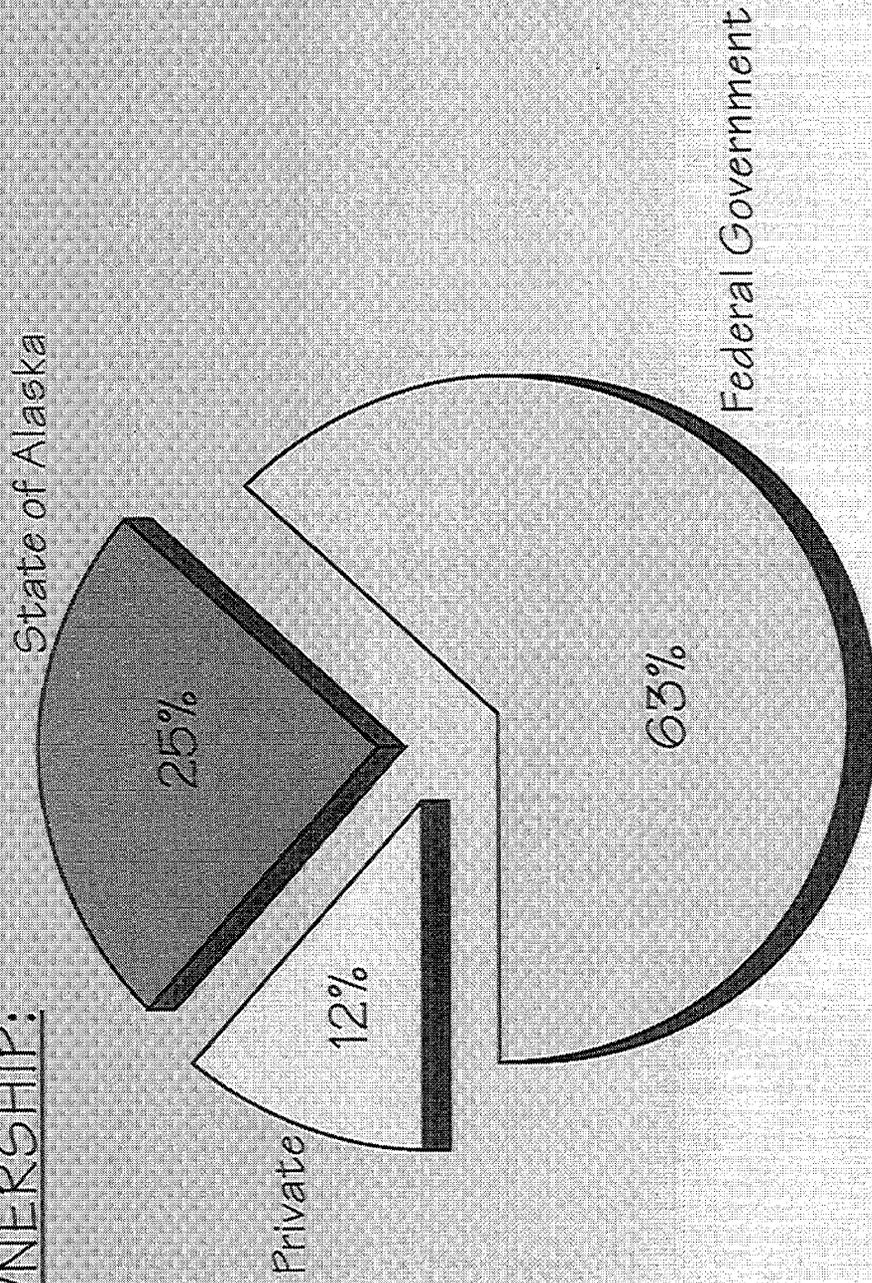


Alaska Department of
**Natural
Resources**

ALASKA:

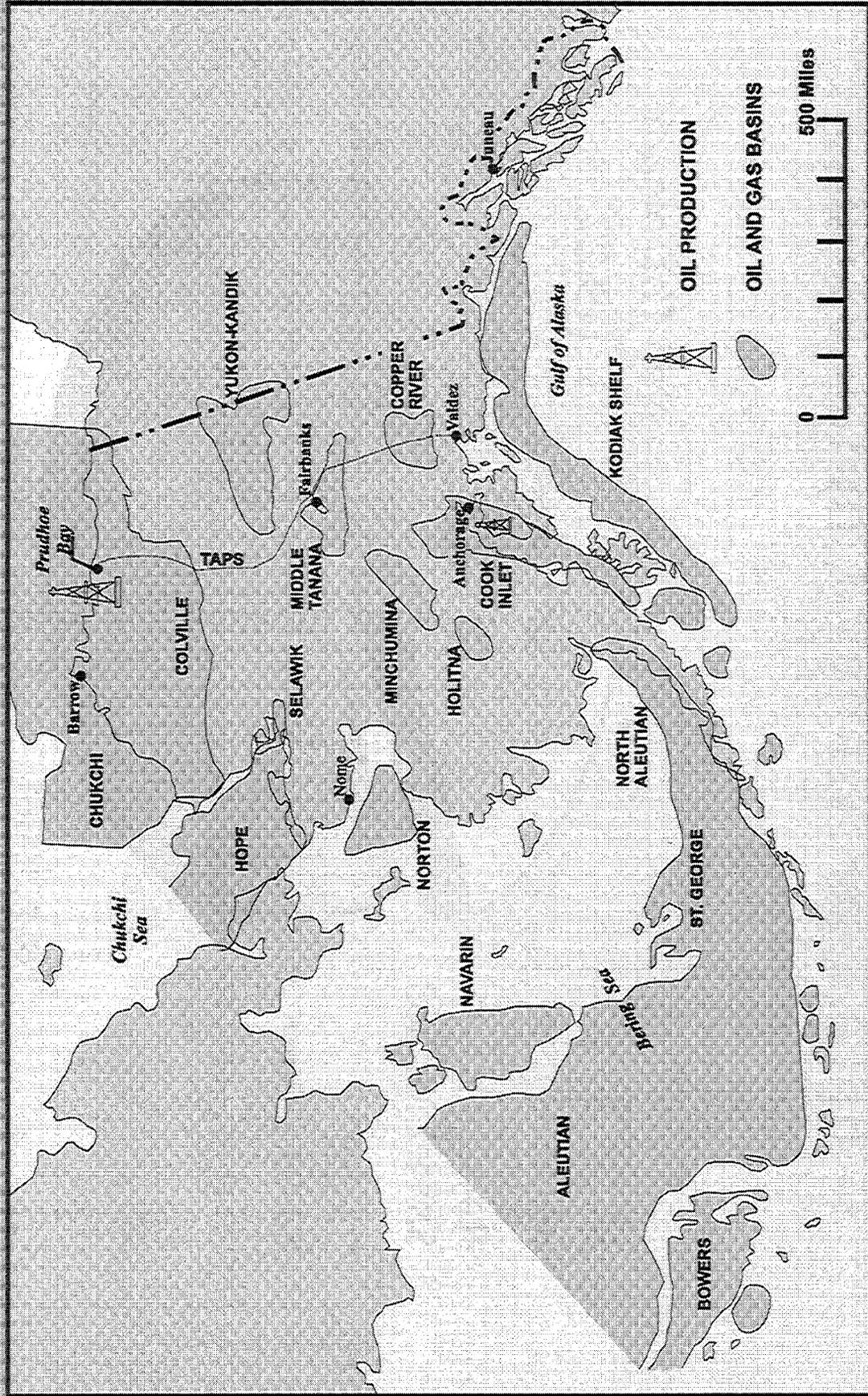
570,000 Square Miles
1.48 Million Square Kilometers
365 Million Acres

OWNERSHIP:



Majority of known petroleum reserves are on state-owned lands
About 25% of proven U.S. oil reserves are located in Alaska

Alaska Oil and Gas Basins



Where Our Money Comes From

Sources (FY96):

Bonus & Rents:

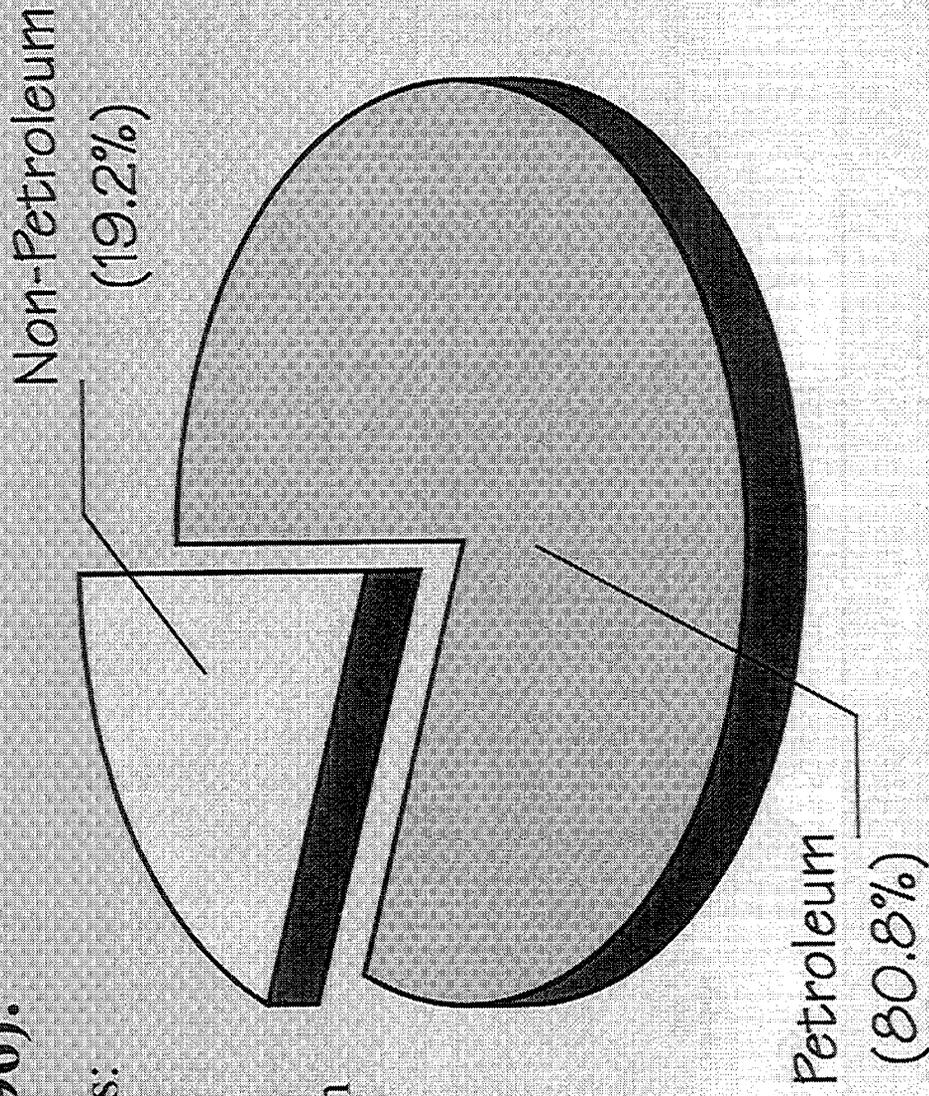
\$31.3 Million

Royalties:

\$884.2 Million

Taxes:

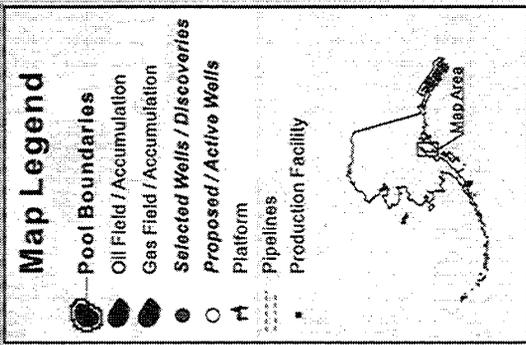
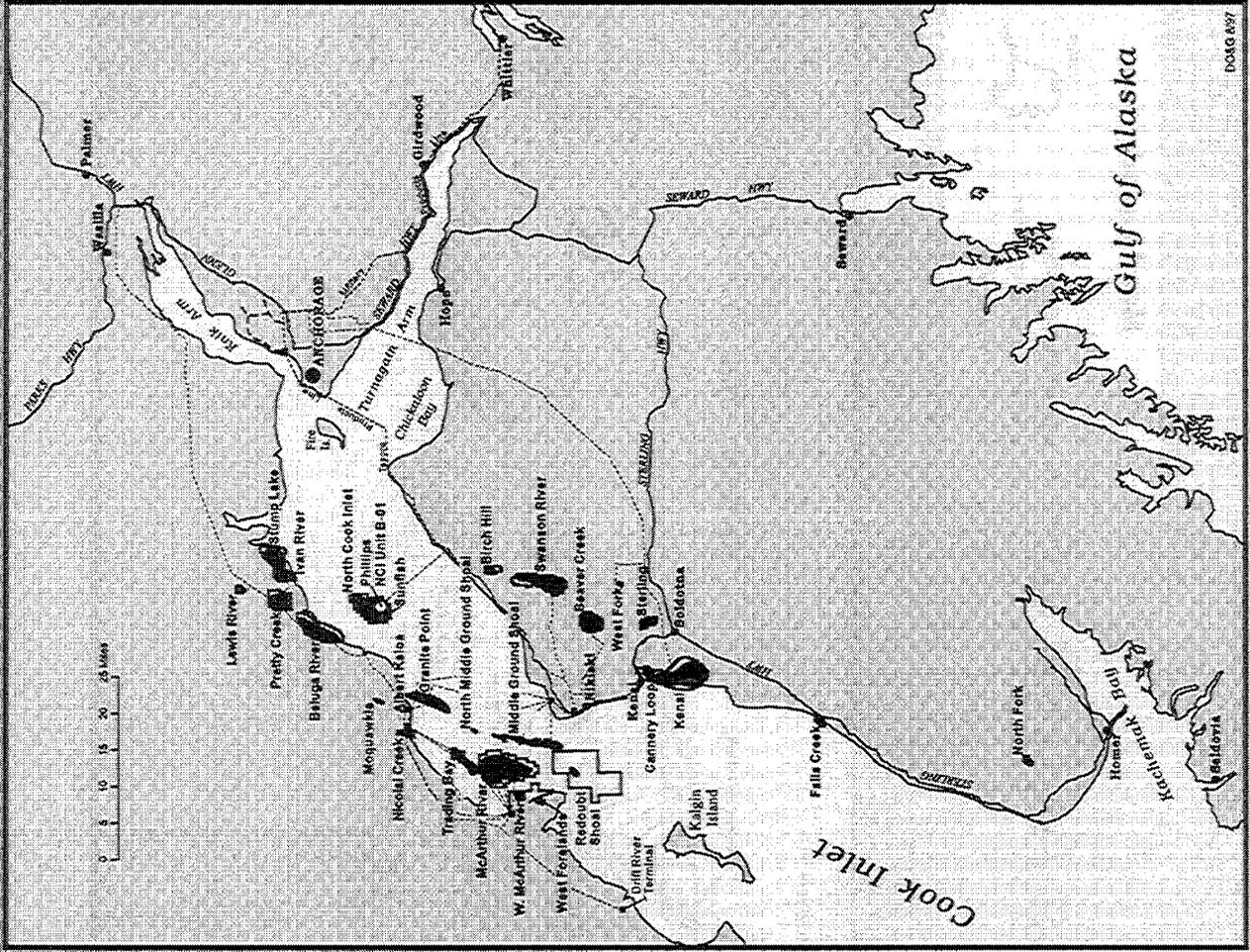
\$1.02 Billion



Source: Table 19 Fall 1996 Revenue Sources Book, Division of Oil & Gas

DO&G 6/97

Cook Inlet Exploration Activity



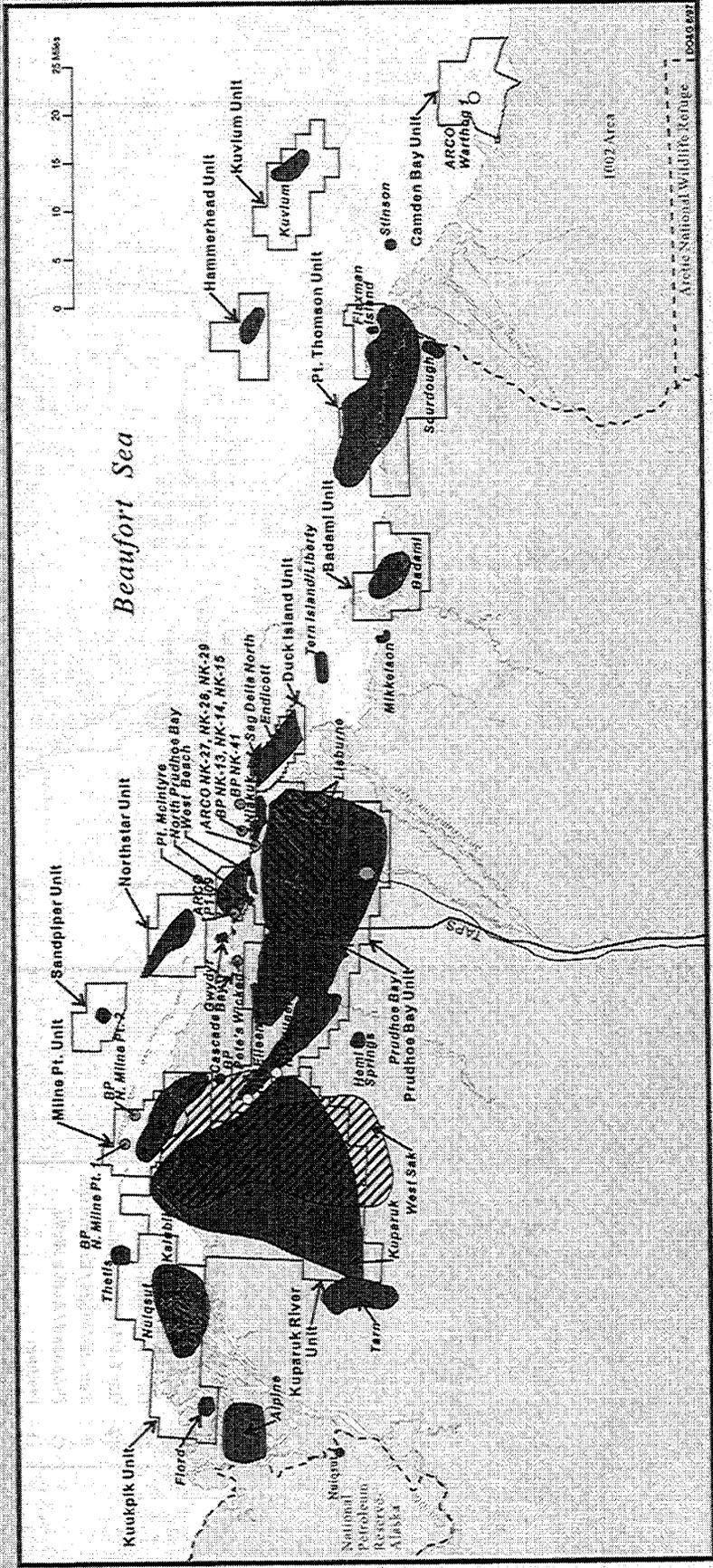
Northern Alaska Activity

Map Legend

Units

- Oil Field / Accumulation
- Selected Wells / Discoveries
- Proposed / Active Wells

Map Area



Primary Producing Oil Fields

Northern Alaska (February 1997)

Name Discovery Date	Projected Avg. Dly. Prod. 1997 (x 1,000 bbls/d)	Cumulative Production Thru '96 (x 1,000,000 bbls)	+	Remaining Reserves As of 1/97 (x 1,000,000 bbls)	=	Est. Ultimate Recovery As of 1/97 (x 1,000,000 bbls)
Prudhoe Bay ¹ 1967	788	9,464		3,684		13,148
Kuparuk River ² 1969	260	1,393		1,554		2,947
Endicott 1978	69	340		258		598
Point McIntyre Area ³ 1988	193	180		460		640
Milne Point ⁴ 1969	56	56		510		566

¹ Includes Satellites

² Includes West Sak

³ Includes Pt. McIntyre, Lisburne, Niakuk,
West Beach, North Prudhoe Bay & Larch

⁴ Includes Schrader Bluff & Sag River

Note: Primary means greater than 50 Mbbls/d projected
Numbers reflect Oil + NGL's - Injectant

Undeveloped Oil Accumulations

Northern Alaska (February 1997)

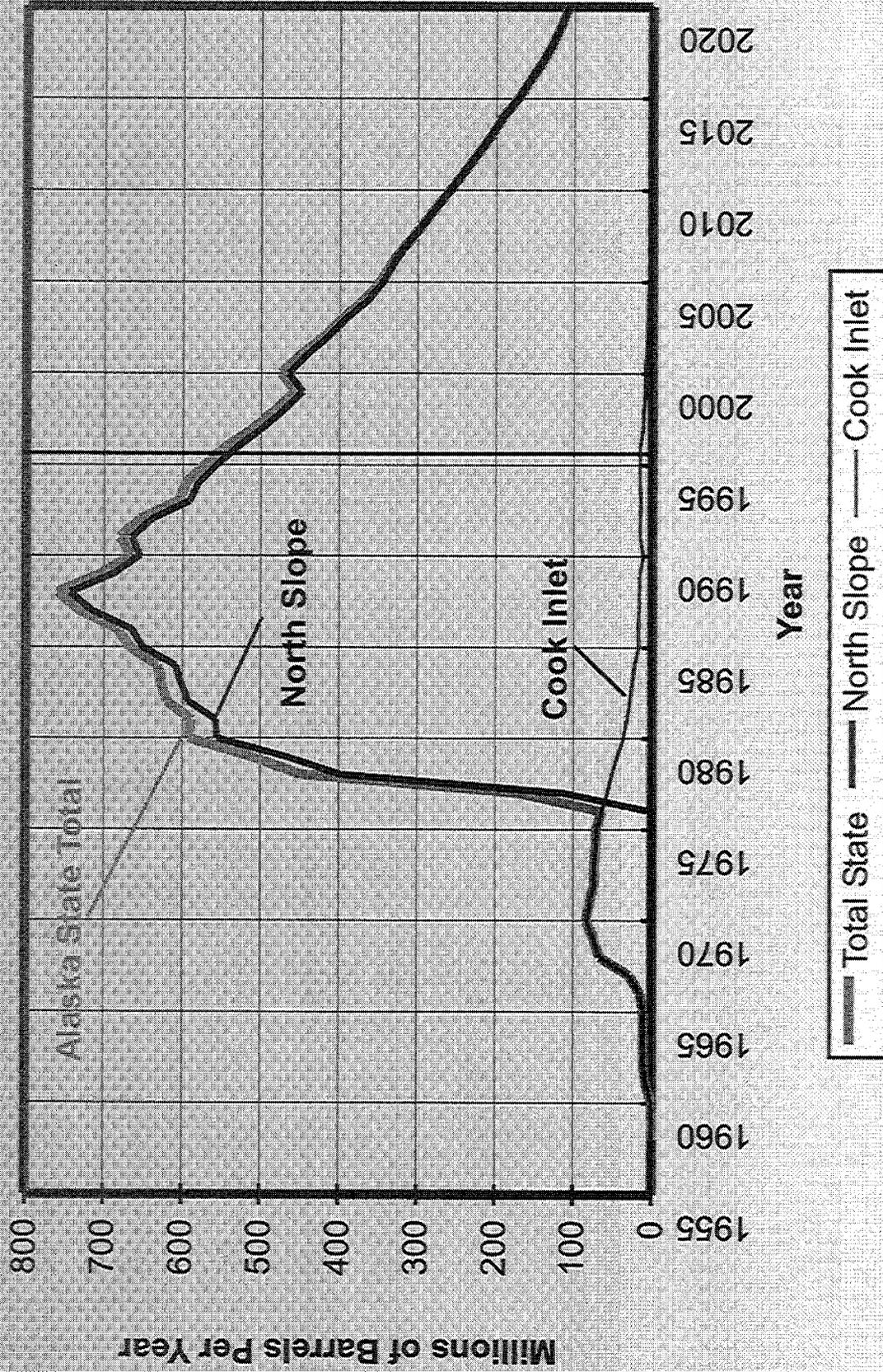
Name	Discovery Date	Estimated Recoverable Reserves	Comments
West Sak *	1969	279 MMBO**	Variable Oil Gravity
Schrader Bluff *	1969	281 MMBO	Variable Oil Gravity
Flaxman Island	1975	? Oil	Tertiary Turbidites
Point Thomson	1977	200 MMBO 3.5 TCFG	Gas, Condensate, and Oil
Northstar *	1984	144 MMBO	Beaufort Sea, including Seal Island
Alpine *	1994	290 MMBO	Adjacent to NPRA
Colville Delta	1985	? Oil	Near Kuparuk Field
Fiord	1992	? Oil	Two Intervals at 1245 BOPD
Kalubik	1992	? Oil	Two Intervals at 1610 BOPD
Hammerhead	1986	? Oil	OCS Waters North of Pt. Thomson
Badami *	1990	120 MMBO	Tested at 4250 BOPD
Kuylum	1992	325 MMBO	East Beaufort OCS, Tested at 3400 BOPD
Prudhoe Bay *	Satellites	241 MMBO	At least 5 Separate Accumulations

* Development Planned in the Near Term

** West Sak "Core Area"

Alaska Oil Production

Historical and Projected



Projects Under Development

Northern Alaska (February 1997)

Project	Status	Expected Start Up Date	Expected Peak Production Rate (Mb/d)
Badami	Construction Work Underway Project Sanction Approved Drilling to start in September	1999	35
Northstar**	Final Design and EIS Underway	1999 ?	40
Alpine	Final Design and Permitting Underway	2000	60
Prudhoe Bay Satellites	Exploration / Delineation Underway	1998 *	40
Kuparuk River Satellites	Exploration / Delineation Underway	2000 *	25
West Sak	Final Design and Development Underway	1998 *	56
Schrader Bluff	Design for Expansion Work Underway	1998	56

* Various Facility Sharing Agreements Needed Prior to Start-Up

** Construction of modules halted, moving forward with permitting.

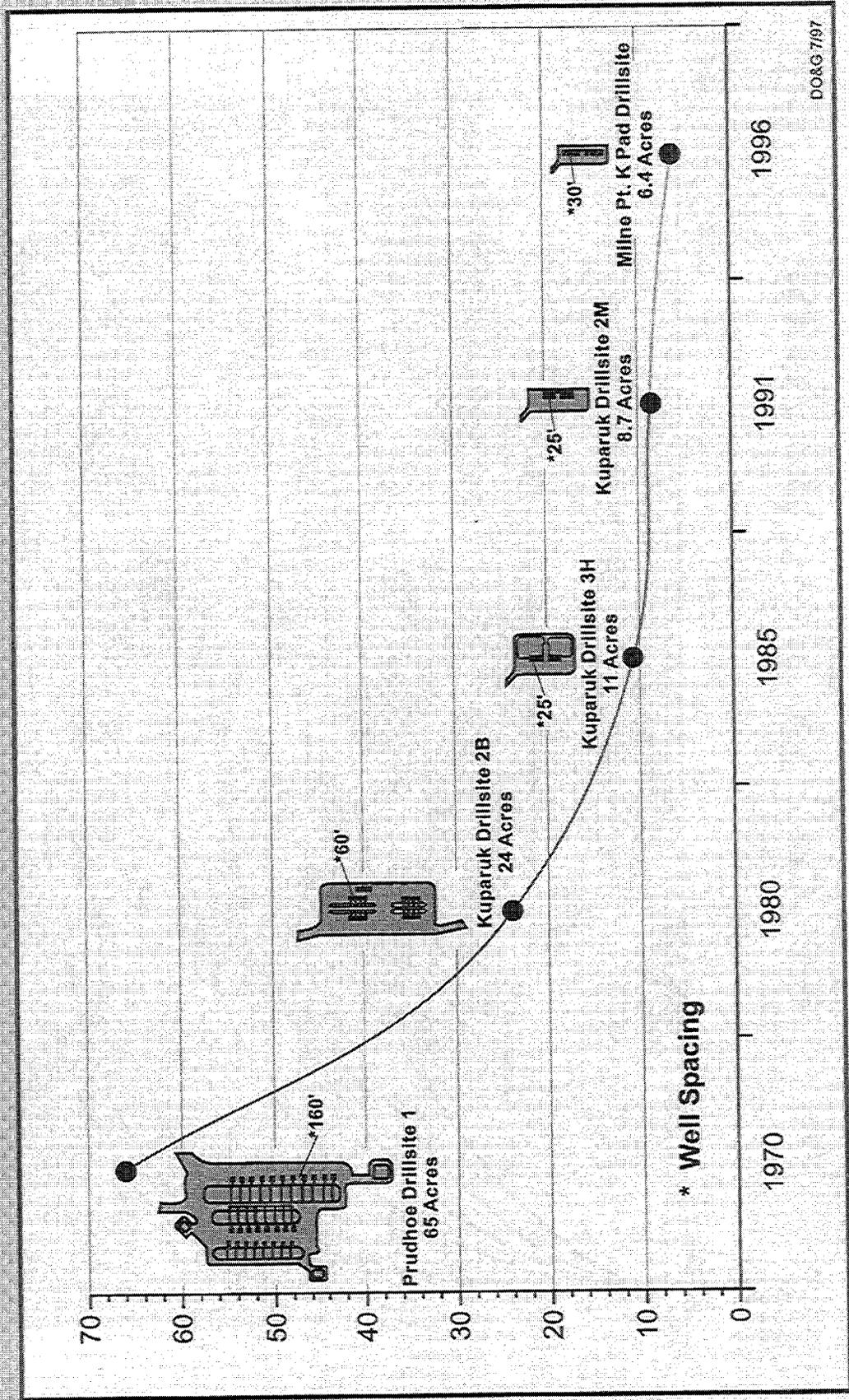
Five-Year Oil and Gas Leasing Program

Public Notification Schedule

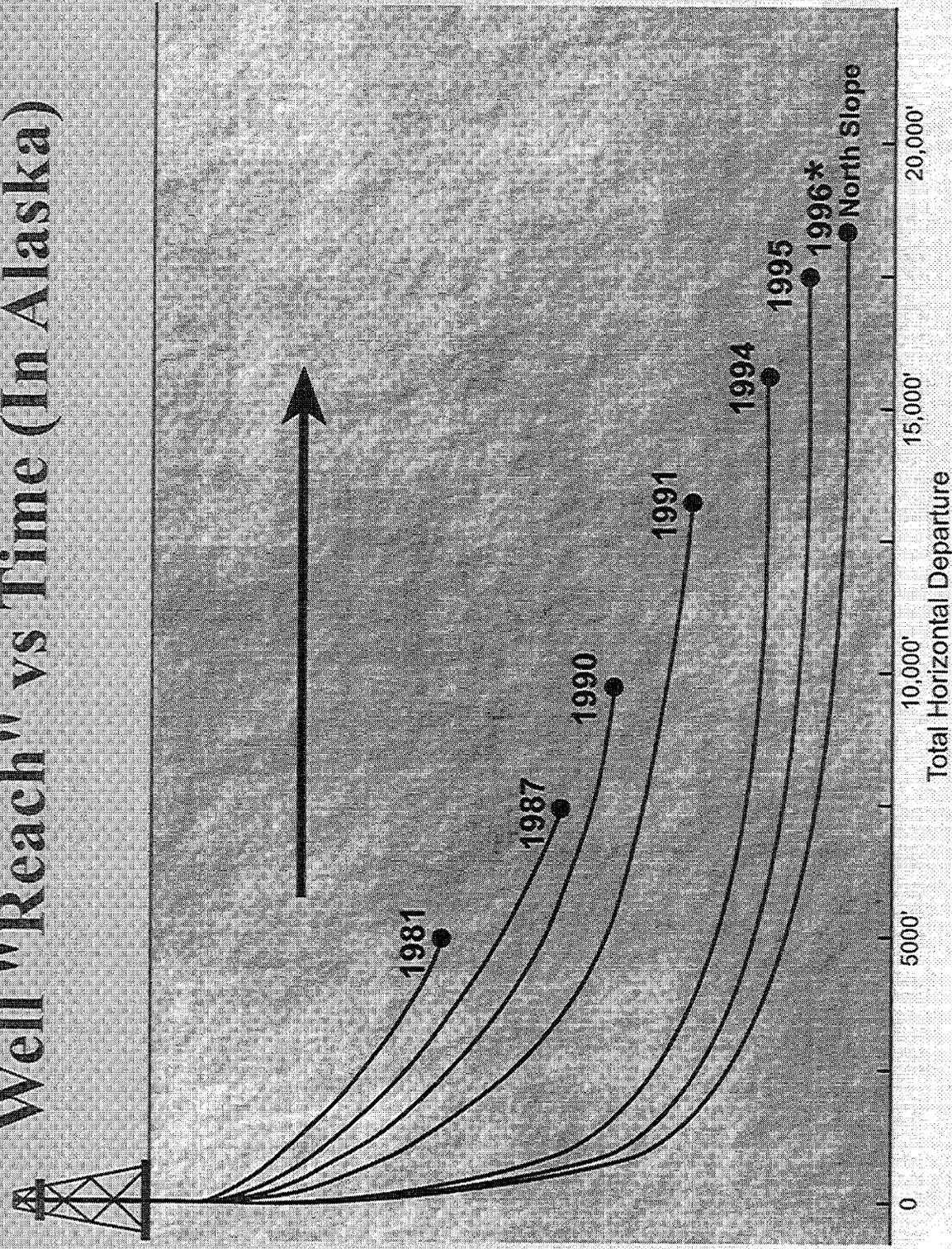
Proposed Sale Area & Date	1996			1997			1998			1999			2000			2001		
	J	A	S	J	A	S	J	A	S	J	A	S	J	A	S	J	A	S
86 Central Beaufort Sea 9/97				P	E	S												
85A-W Cook Inlet Reoffer 2/98				A	C ₄	N												
87 North Slope Area-wide 6/98																		
North Slope Area-wide 1999 Feb																		
85 Cook Inlet Area-wide 4/99																		
Beaufort Sea Area-wide 1999 Oct																		
North Slope Area-wide 2000 Feb																		
Cook Inlet Area-wide 2000 Aug																		
Beaufort Sea Area-wide 2000 Oct																		
North Slope Area-wide 2001 Feb																		
North Slope Foothills Area-wide 2001 April																		
Cook Inlet Area-wide 2001 Aug																		
Beaufort Sea Area-wide 2001 Oct																		

A = Sale Added to Schedule.
C = Call for Comments:
 1 = New Sales and 5-Year Program Revisions.
 2 = Request for General Information.
 3 = Request for Socioeconomic and Environmental Information.
 4 = Request for New Information Made Available Since Last Finding.
E = End of Comment Period.
P = Preliminary Best Interest Finding / ACMP Consistency Analysis. (if required.)
N = Notice of Intent to Issue Final / Supplement to Finding.
F = Final Finding and Notice of Sale and Terms.
R = Supplement to Final Finding and/or Notice of Sale and Terms.
S = Sale.

Decreasing Development Footprint Minimizes Environment Impact (Smaller Pad Size and Greater Distances Between Well Pads)

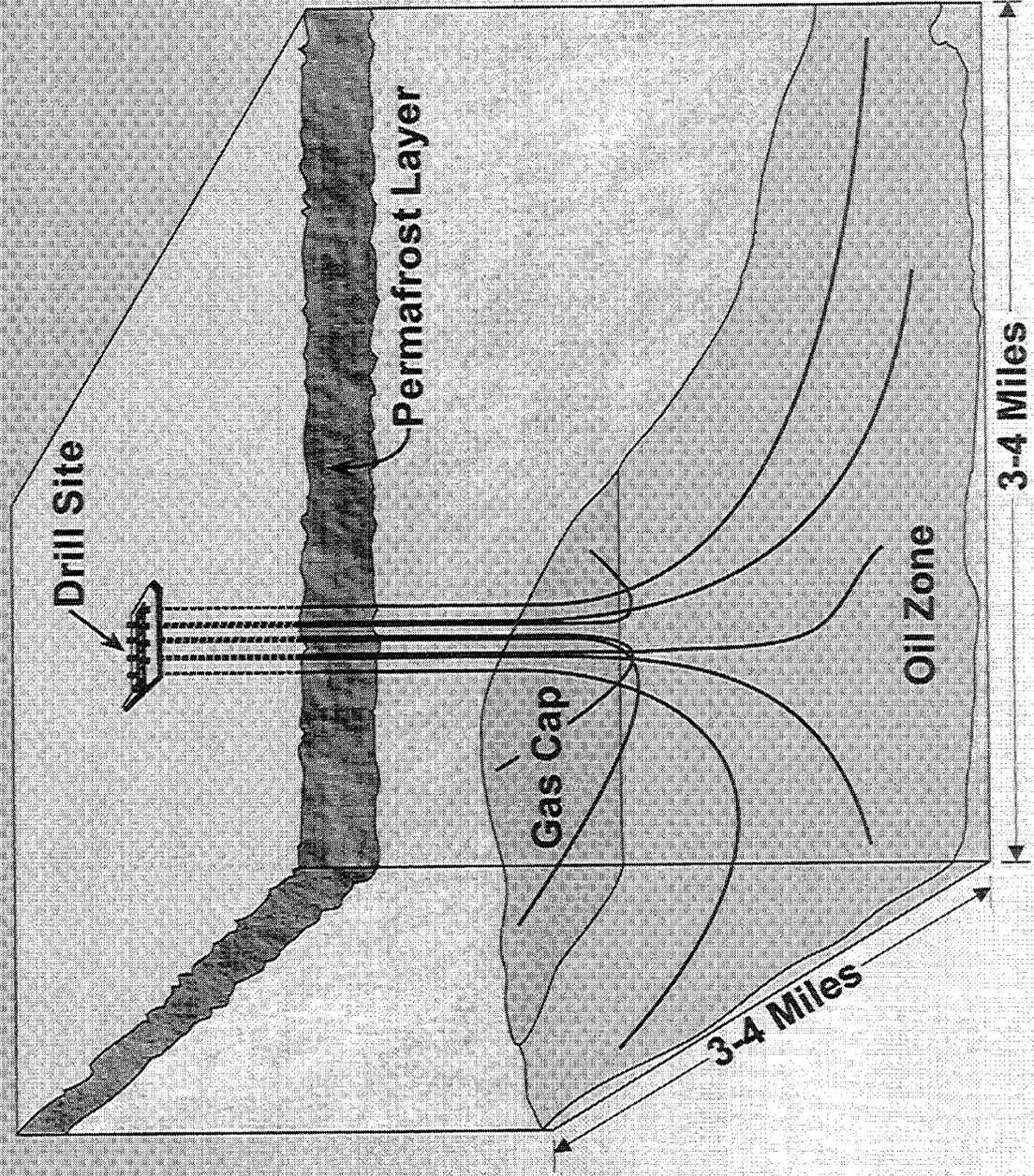


Well "Reach" vs Time (In Alaska)



* Current North American Record held by ARCO NK-28 (West Niakuk #2) at 18,098 feet. Well reaches greater than 20,000 feet are planned for the North Slope.

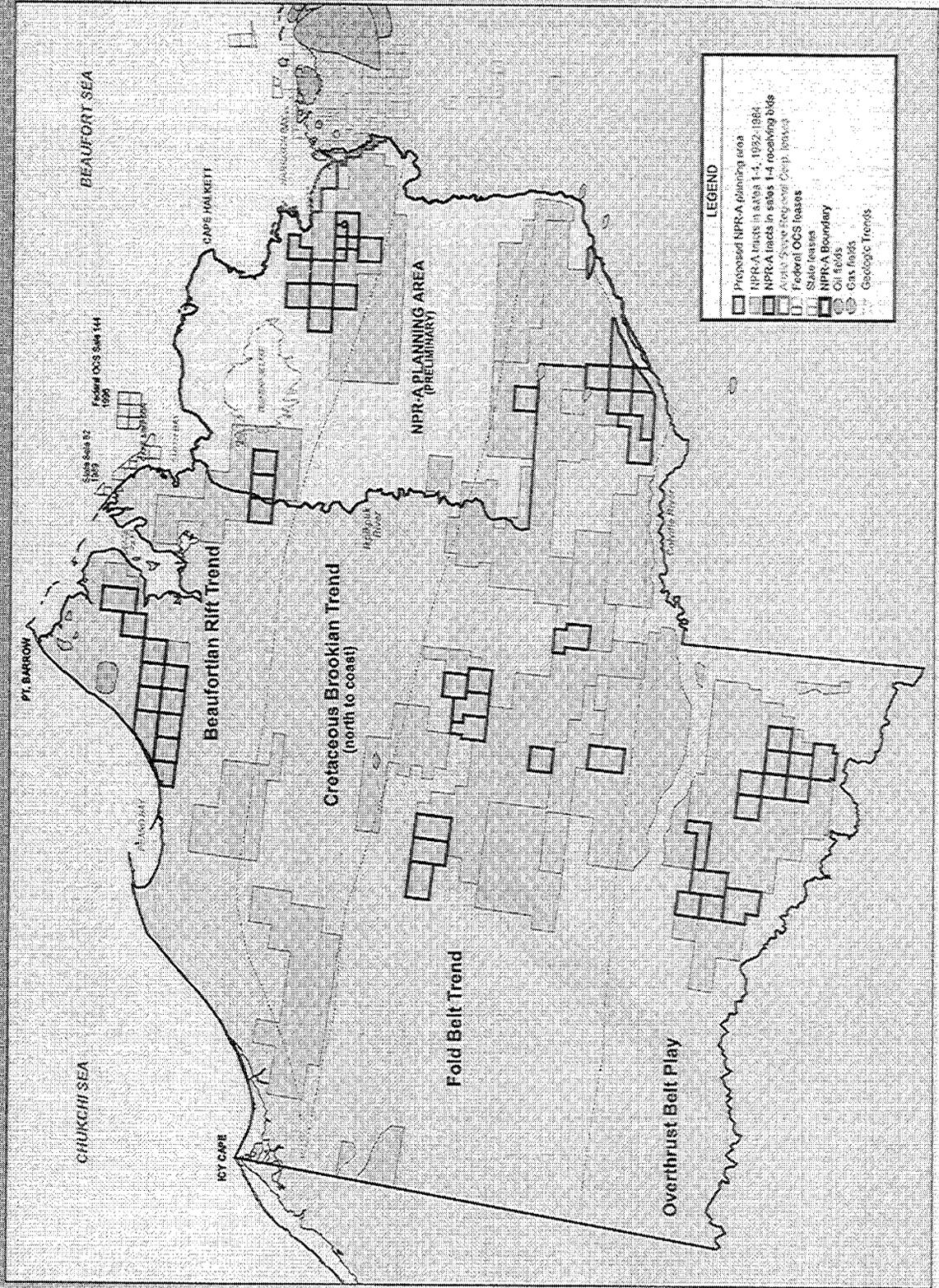
3-D View of North Slope Development Pad



Drawing is not to scale

DO&G 1/87

National Petroleum Reserve-Alaska (NPR-A)



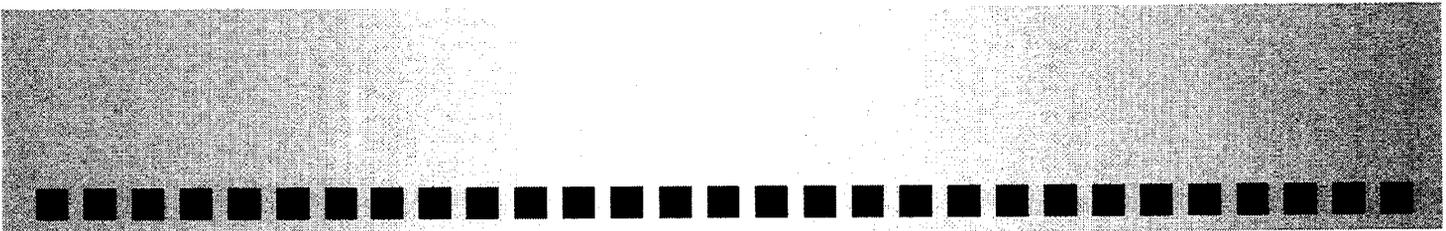
North Slope Natural Gas

Proven Reserves	
Prudhoe Bay	23.0 Trillion Cubic Feet (TCF)
Point Thomson	3.5
Other	<u>3.5</u>
Total	30.0 Trillion Cubic Feet (TCF)

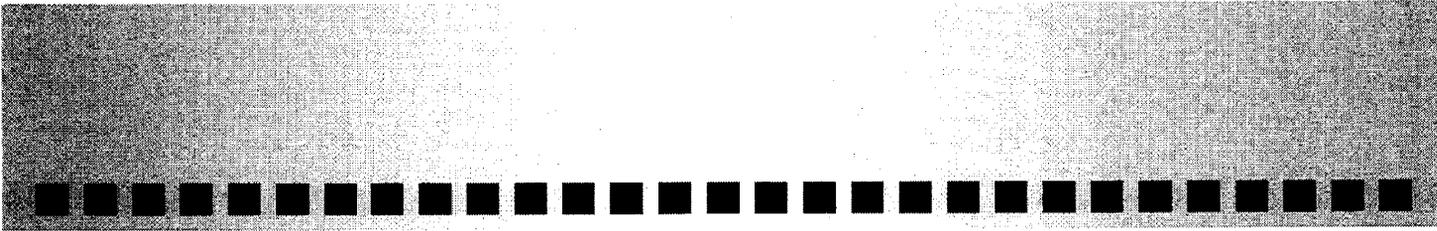
- There is no transportation system in place to move natural gas off the North Slope.
- The TAPS oil line can not carry oil and natural gas at the same time.
- Natural gas is produced in association with the oil.
- Natural gas is used to fire many of the pieces of equipment in the oil fields and is used for fuel in the power plants in those fields.
- Natural gas liquids are separated from the produced gas stream.
- Some of the more stable natural gas liquids are blended with the oil and sent down TAPS.
- Produced natural gas is injected back into the oil reservoirs. This helps maintain reservoir pressure, push oil and liquids-rich natural gas towards the production wells and vaporize residual oil.
- Some of the more volatile natural gas liquids are used for enhanced oil recovery operations in fields where they are produced. Natural gas liquids that could be sent down TAPS are used for enhanced oil recovery operations in some fields that do not have their own adequate supply of NGLs.

**7.2 CENTRAL AND DISTRIBUTED POWER
IN THE STATE OF ALASKA**

**Peter Crimp
Development Specialist
Alaska Department of Community & Regional Affairs
Division of Energy**



Alaska Fossil Energy Workshop Division of Energy Presentation

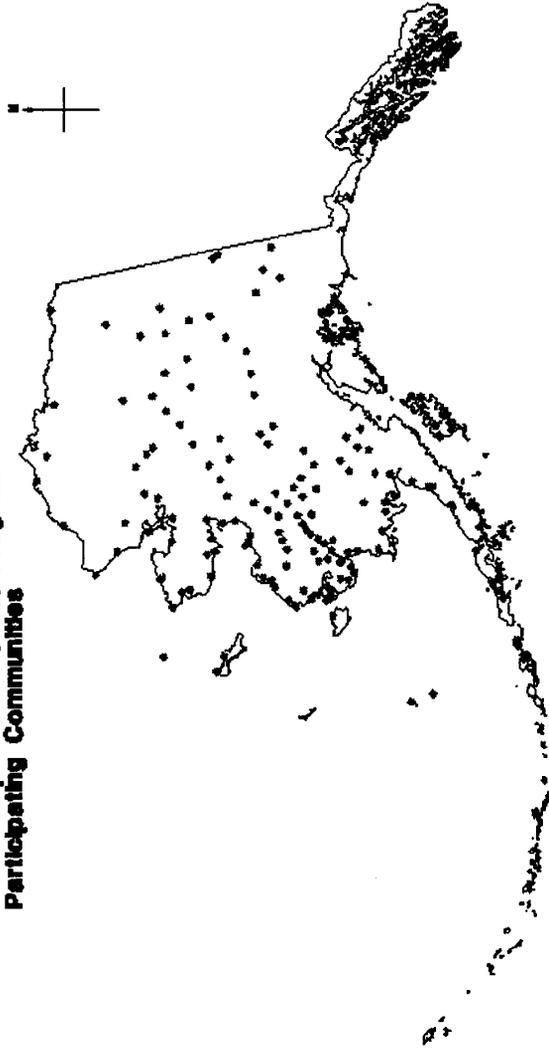


Division of Energy Mission:

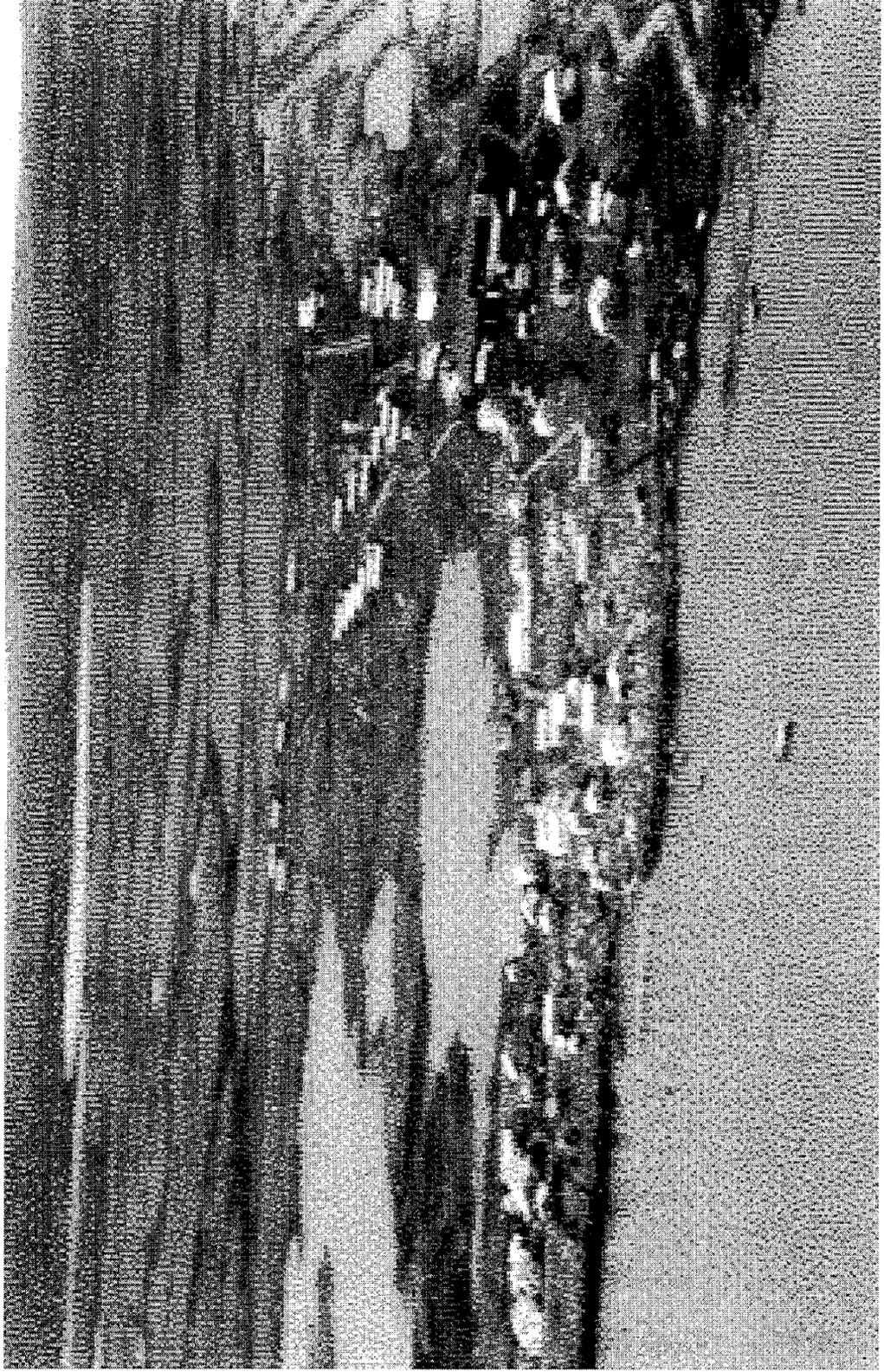
- Throughout Alaska, the Division of Energy will assist in the development of safe, reliable, and efficient energy systems that are environmentally sound and are managed and maintained independent of state financial assistance.

Power Cost Equalization Communities

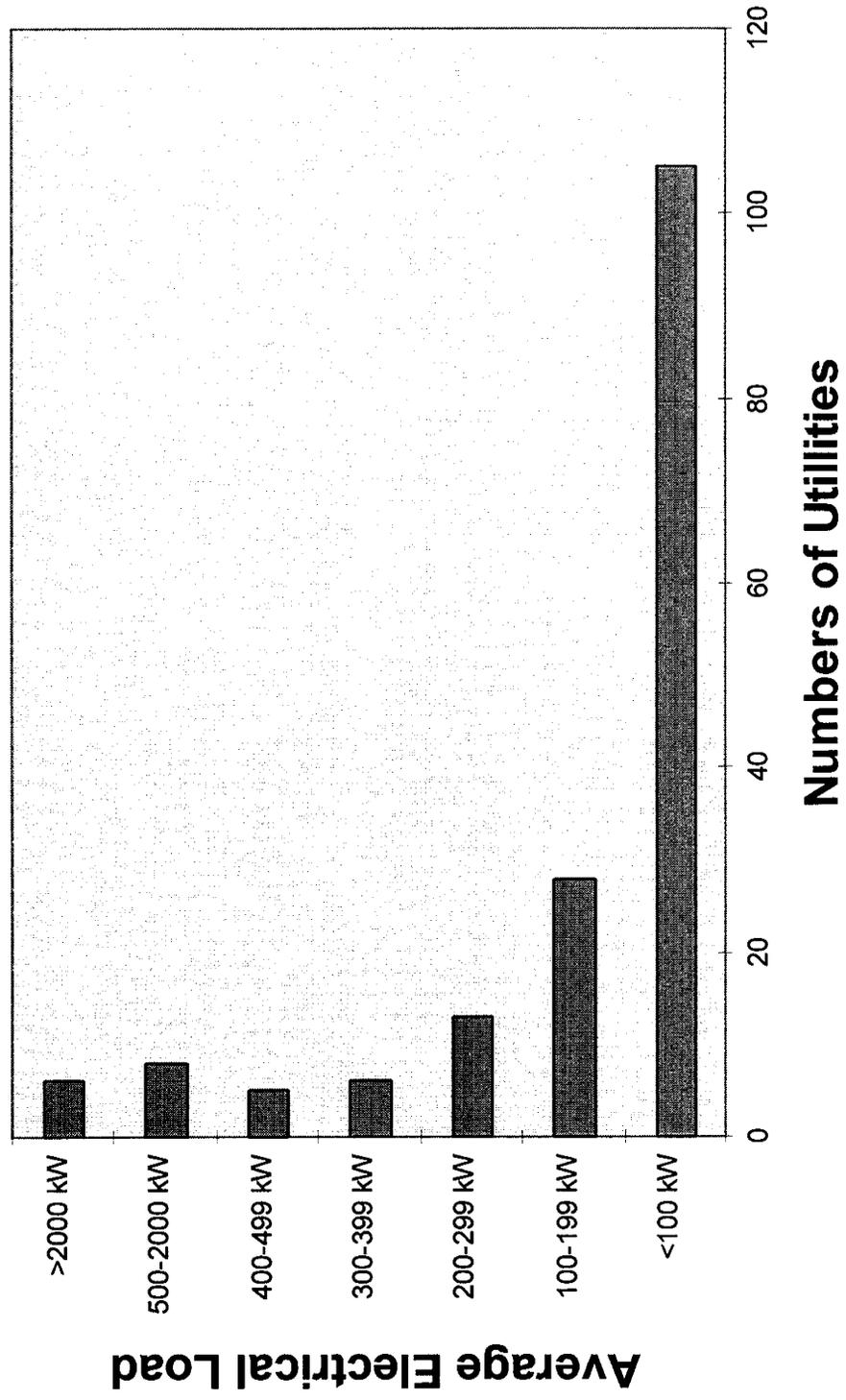
Power Cost Equalization (PCE) Program
Participating Communities



Cheformak



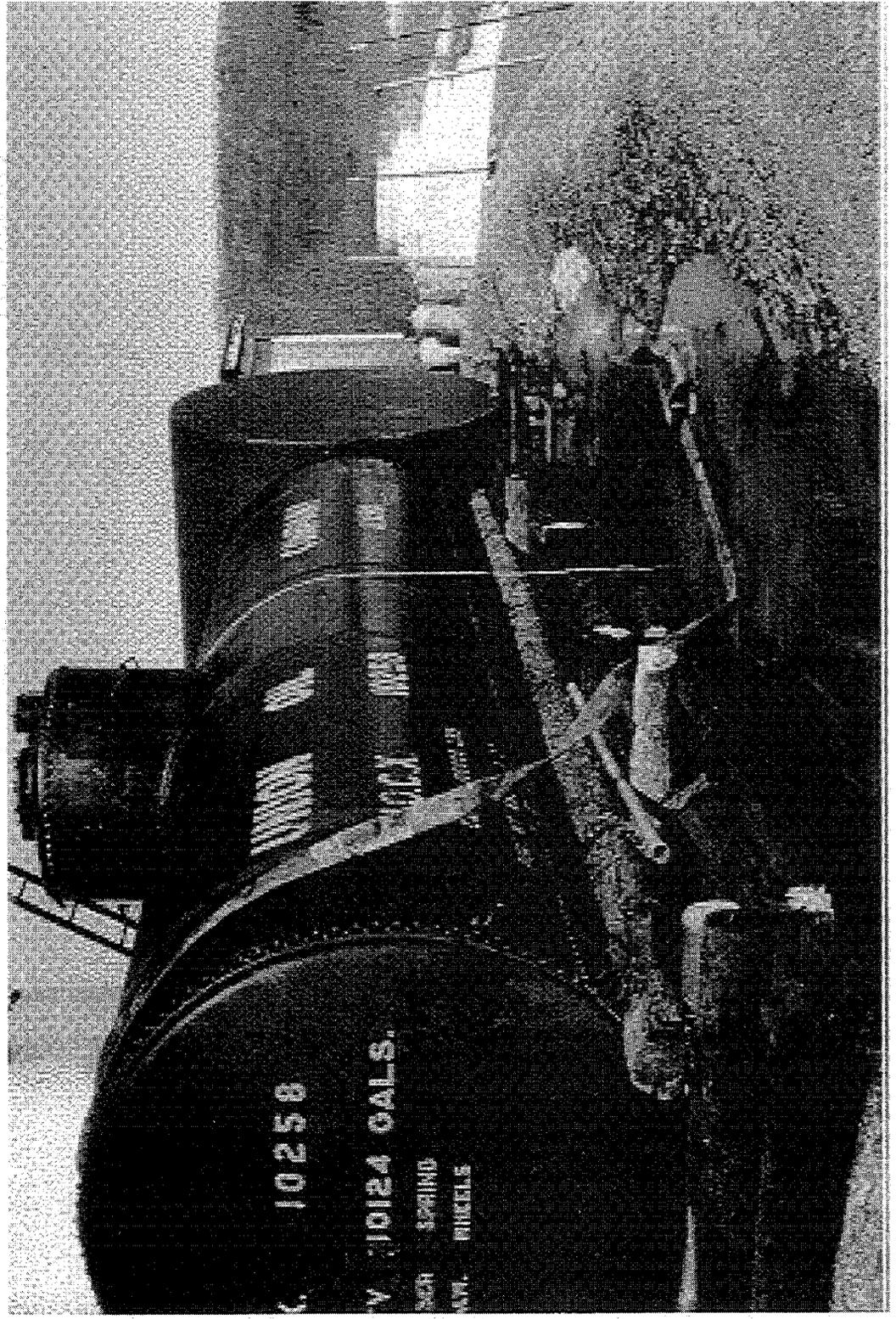
Average Electrical Load



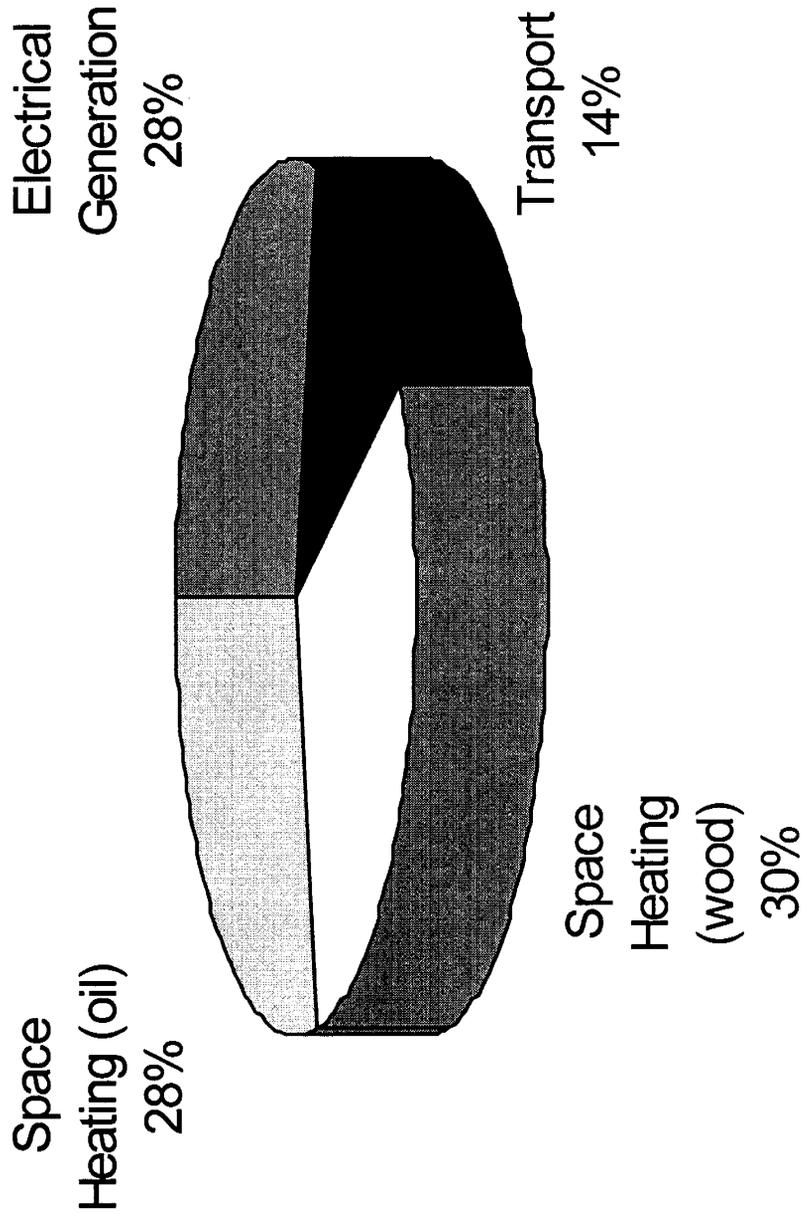
Rural Power Statistics

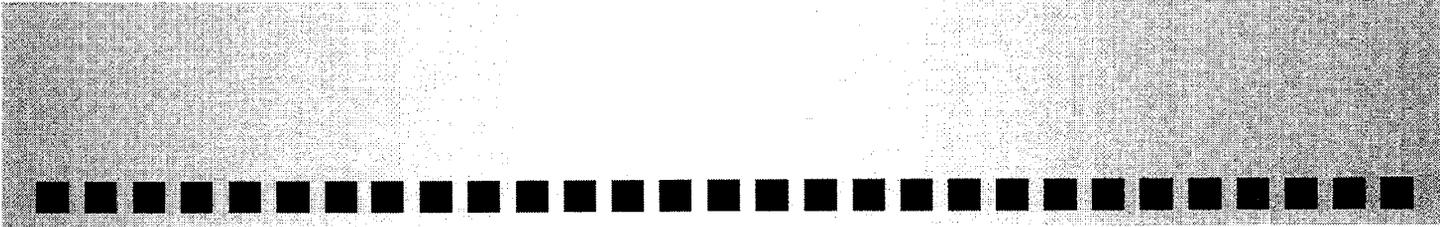
- Cost of power is as high as \$1.00 per kWh, averages 32 cents/kWh.
- Power Cost Equalization payout in FY95 was \$17.9 million.
- 95% of power production is diesel; 5% is small hydro.
- 27.9 million gallons of oil were used for power production.

Kaltag Tank Farm

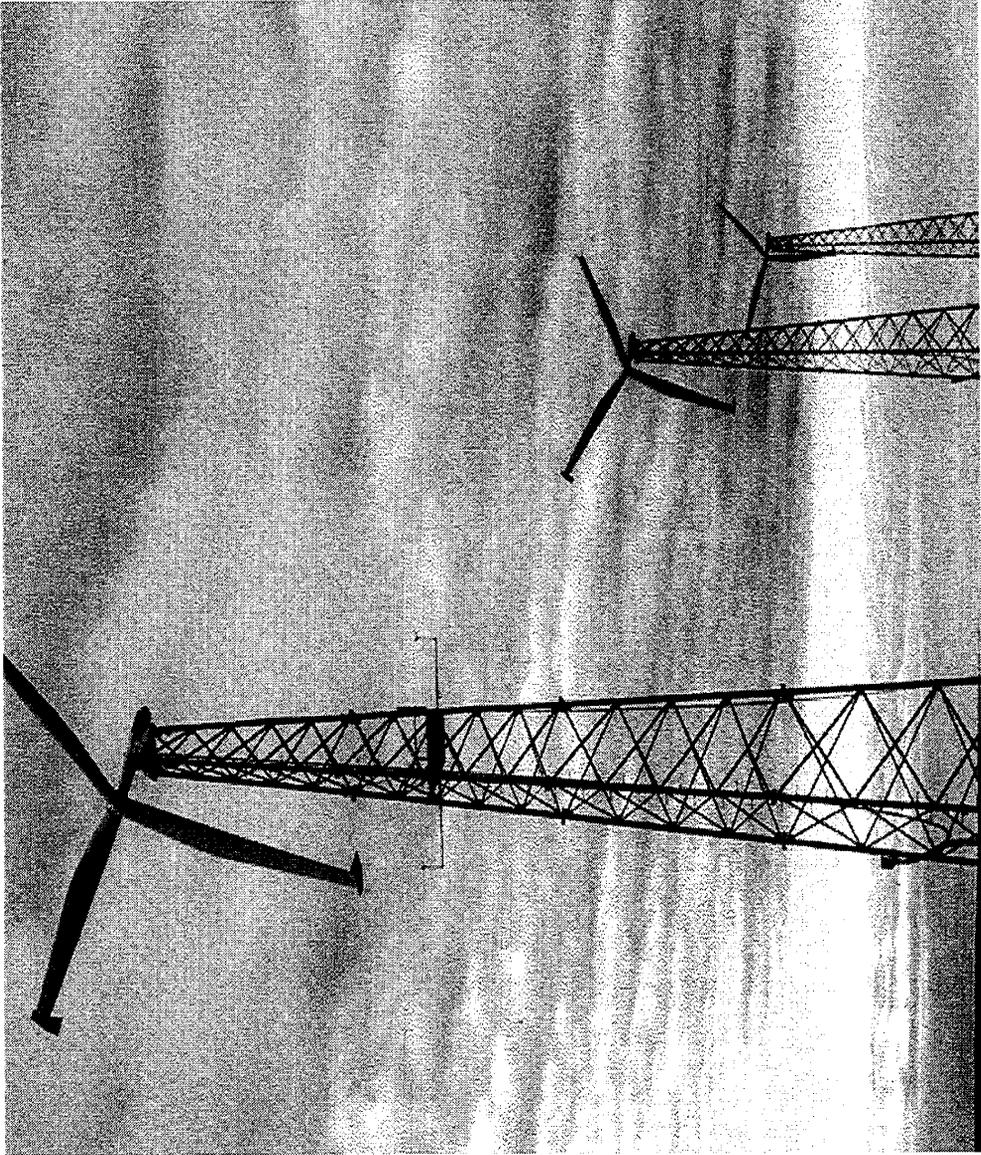


Nikolai Energy Usage





Kotzebue Wind Project



Small Natural Gas Study

Competitive with diesel in

- Communities larger than 3500
- Community near high quality resource
- Successful exploration program of less than \$3 million cost.

Small Coal Systems

- Agreements with FETC / UNDEERC.
- Studied feasibility of 600 kW fluid bed combustor in McGrath.
- Currently studying feasibility and preliminary design of 500 to 5000 kW systems.

7.3 COAL RESOURCES DEVELOPMENT

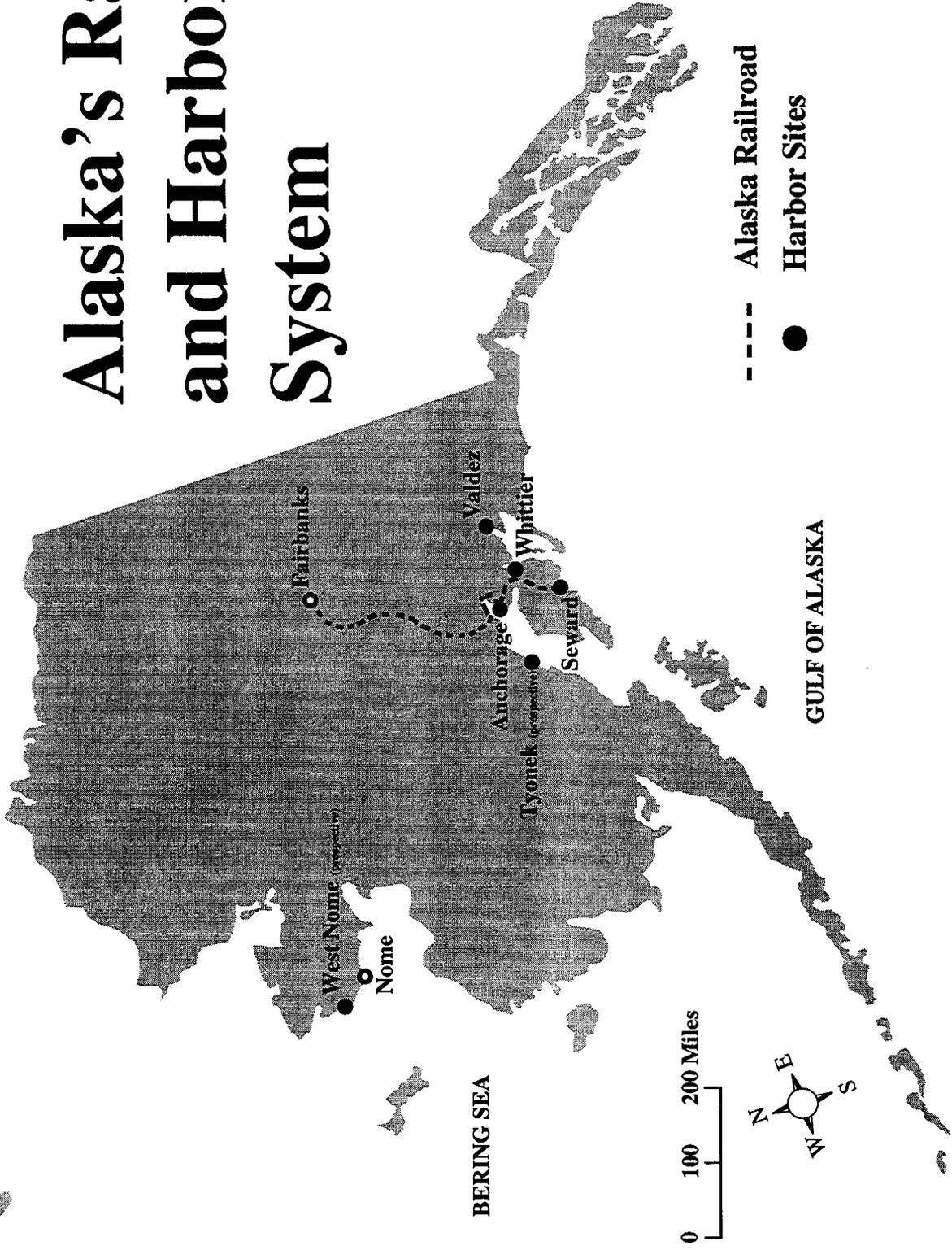
**John F. M. Sims
Vice President, Marketing
Usibelli Coal Mine, Inc.**



USIBELLI COAL MINE, INC.

ARTIC OCEAN

Alaska's Rail and Harbor System



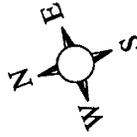
----- Alaska Railroad

● Harbor Sites

GULF OF ALASKA

BERING SEA

0 100 200 Miles

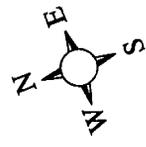
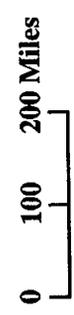
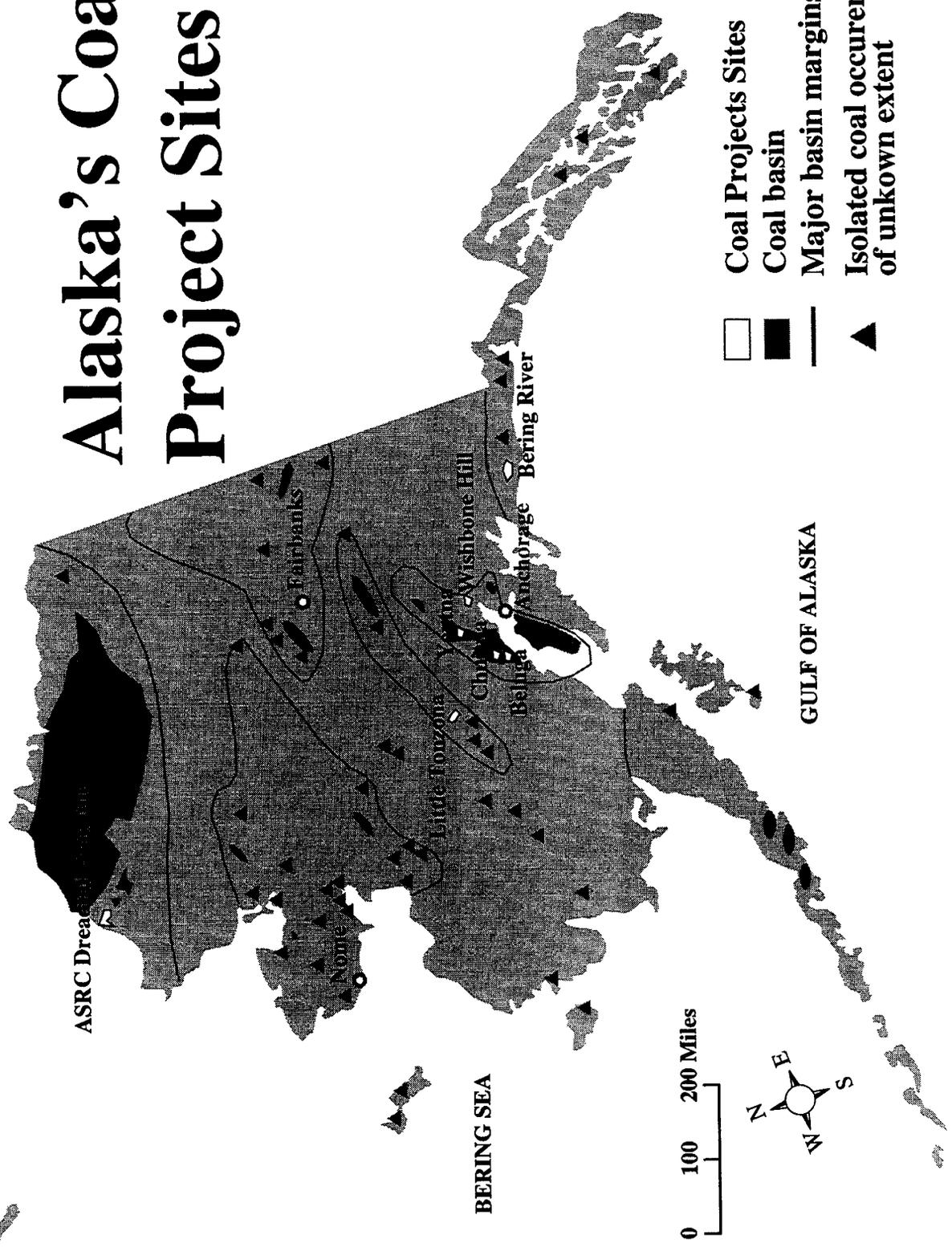




USIBELLI COAL MINE, INC.

ARTIC OCEAN

Alaska's Coal Project Sites



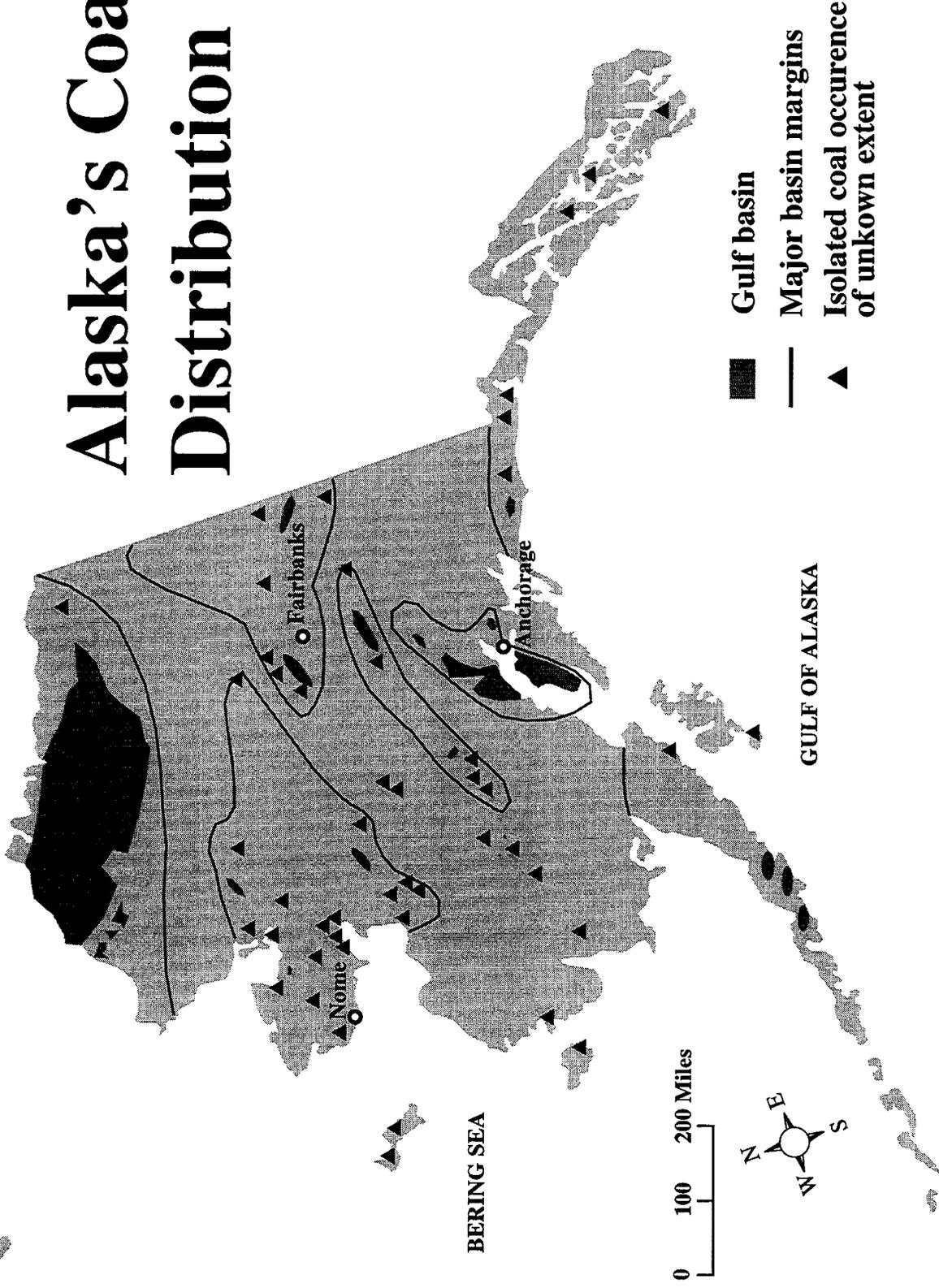
-  Coal Projects Sites
-  Coal basin
-  Major basin margins
-  Isolated coal occurrence of unknown extent



USIBELLI COAL MINE, INC.

ARTIC OCEAN

Alaska's Coal Distribution



7.4 OIL AND GAS RESOURCES DEVELOPMENT

**Kevin O. Meyers
President
ARCO Alaska, Inc.**

**Department of Energy
Fossil Energy Workshop
Anchorage, Alaska
October 28, 1997**

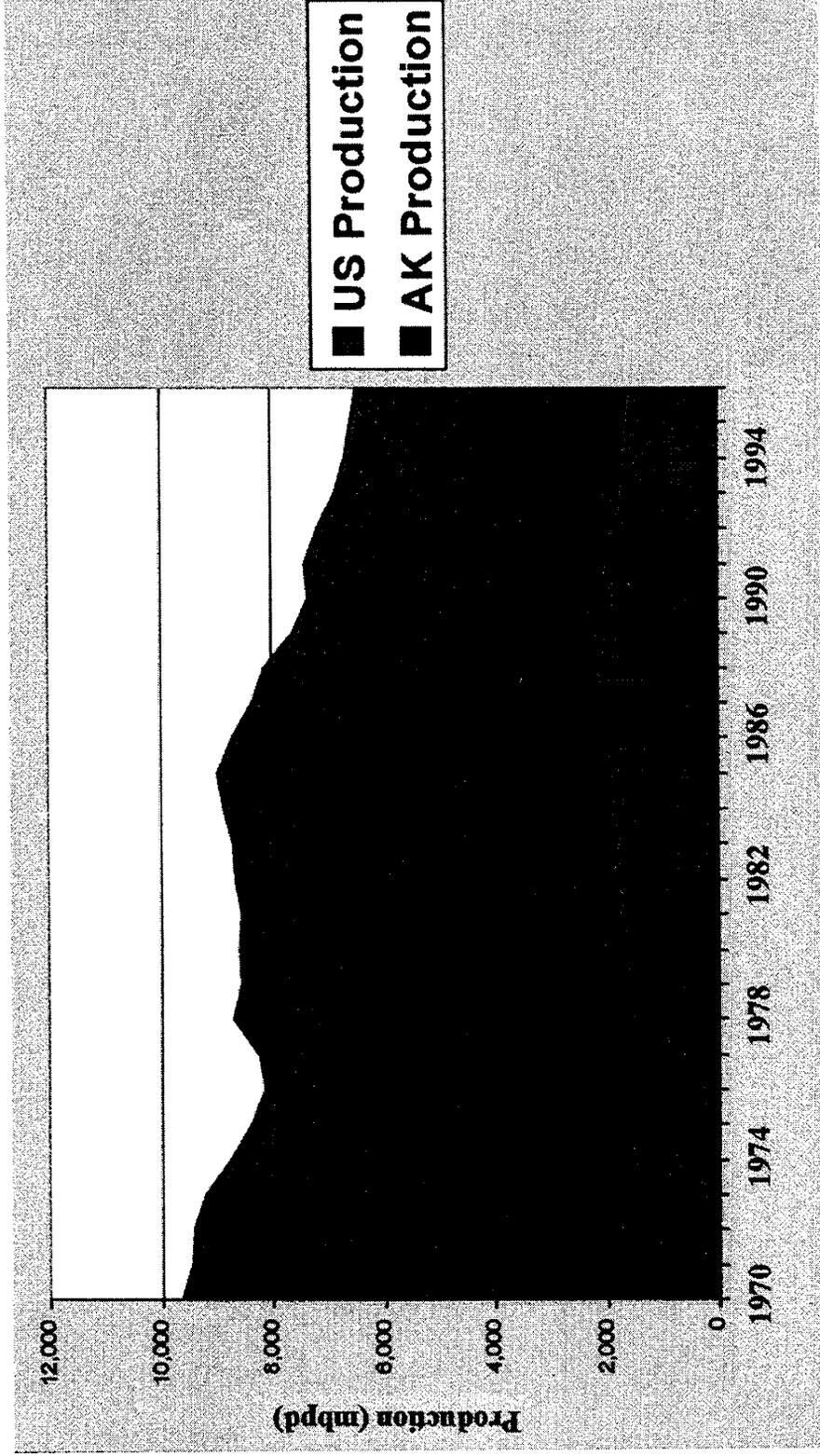
Outline

Land Access

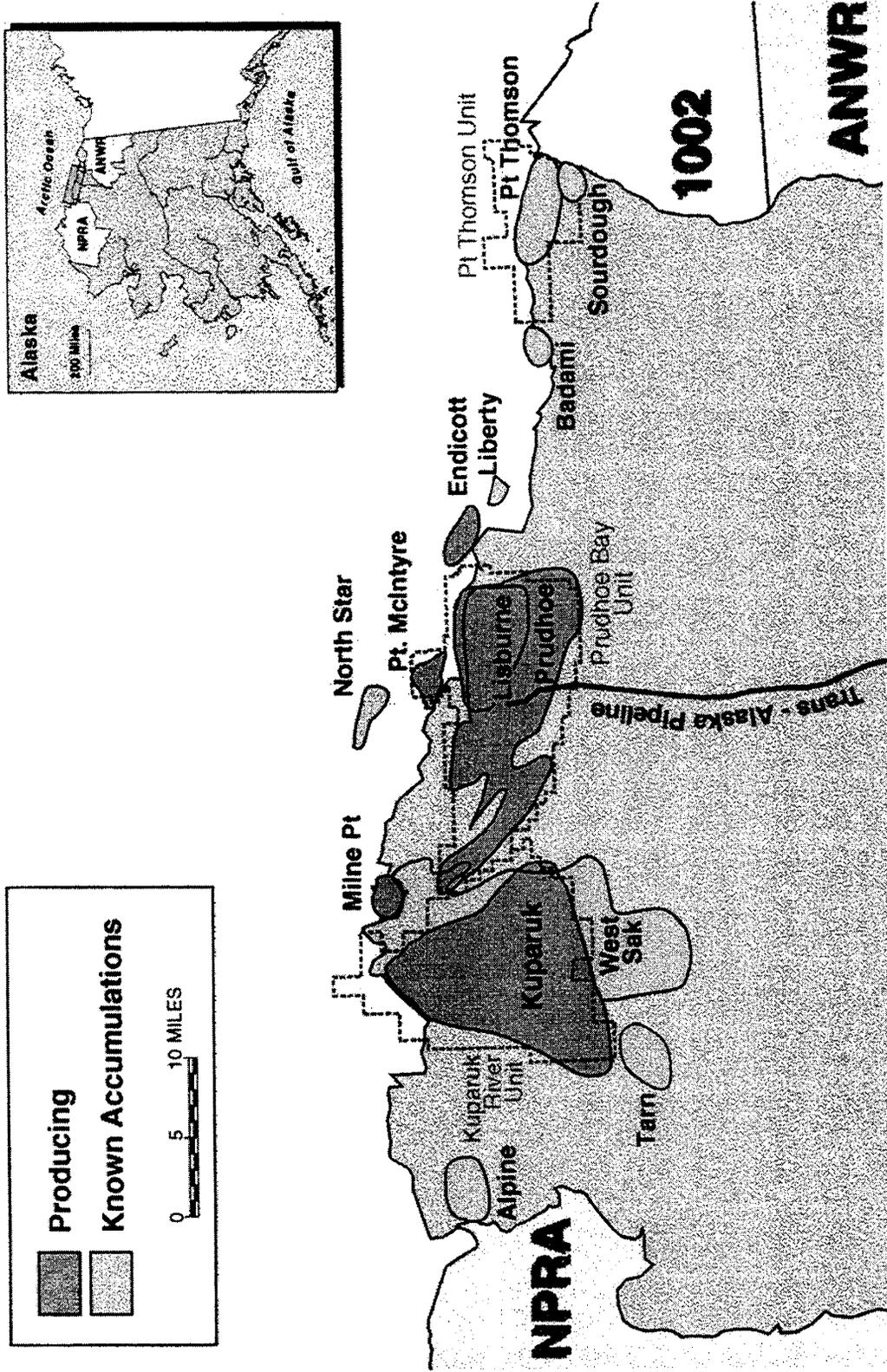
Heavy Oil

Alaska North Slope Natural Gas

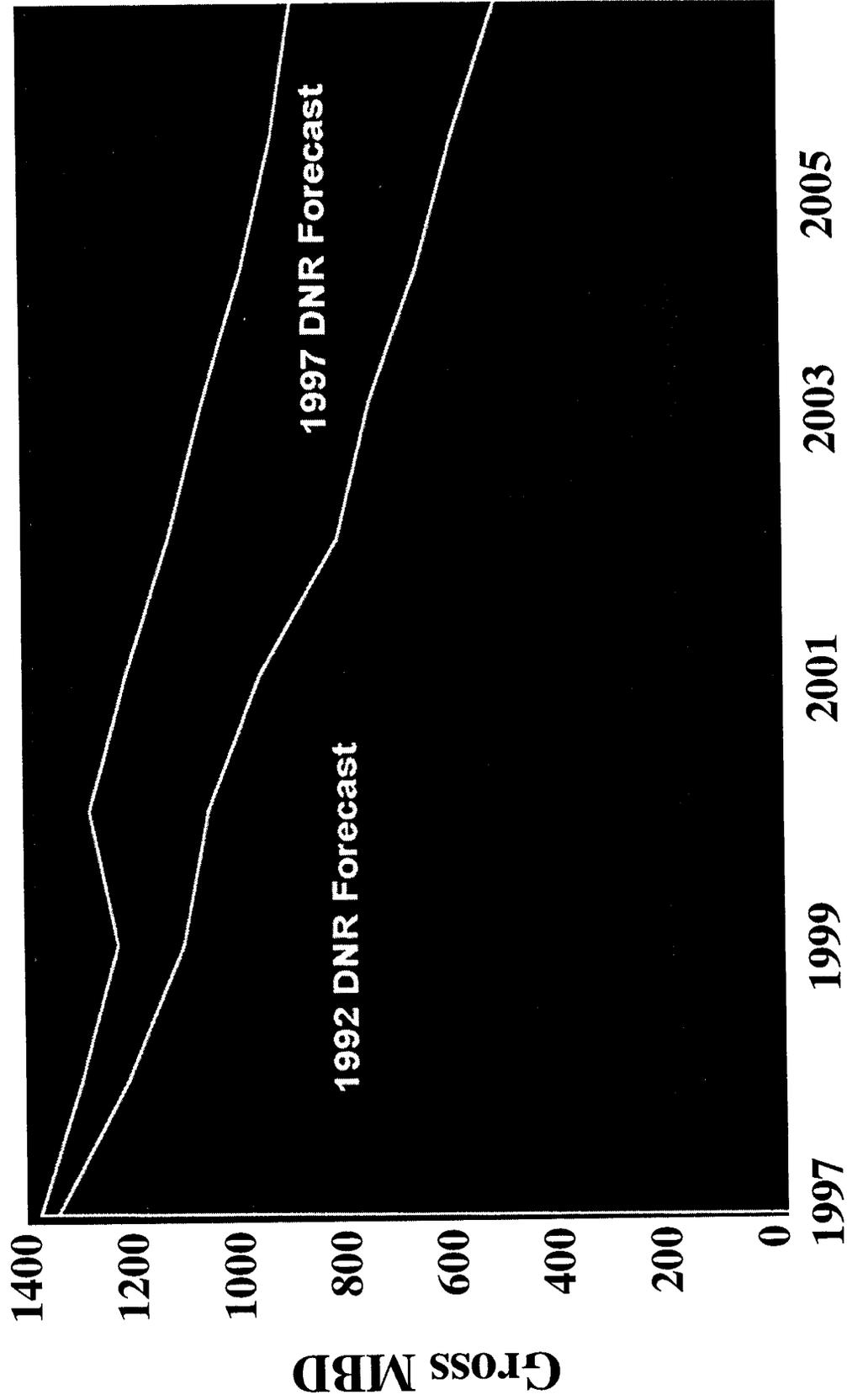
Alaska Production Over 20% of US Total



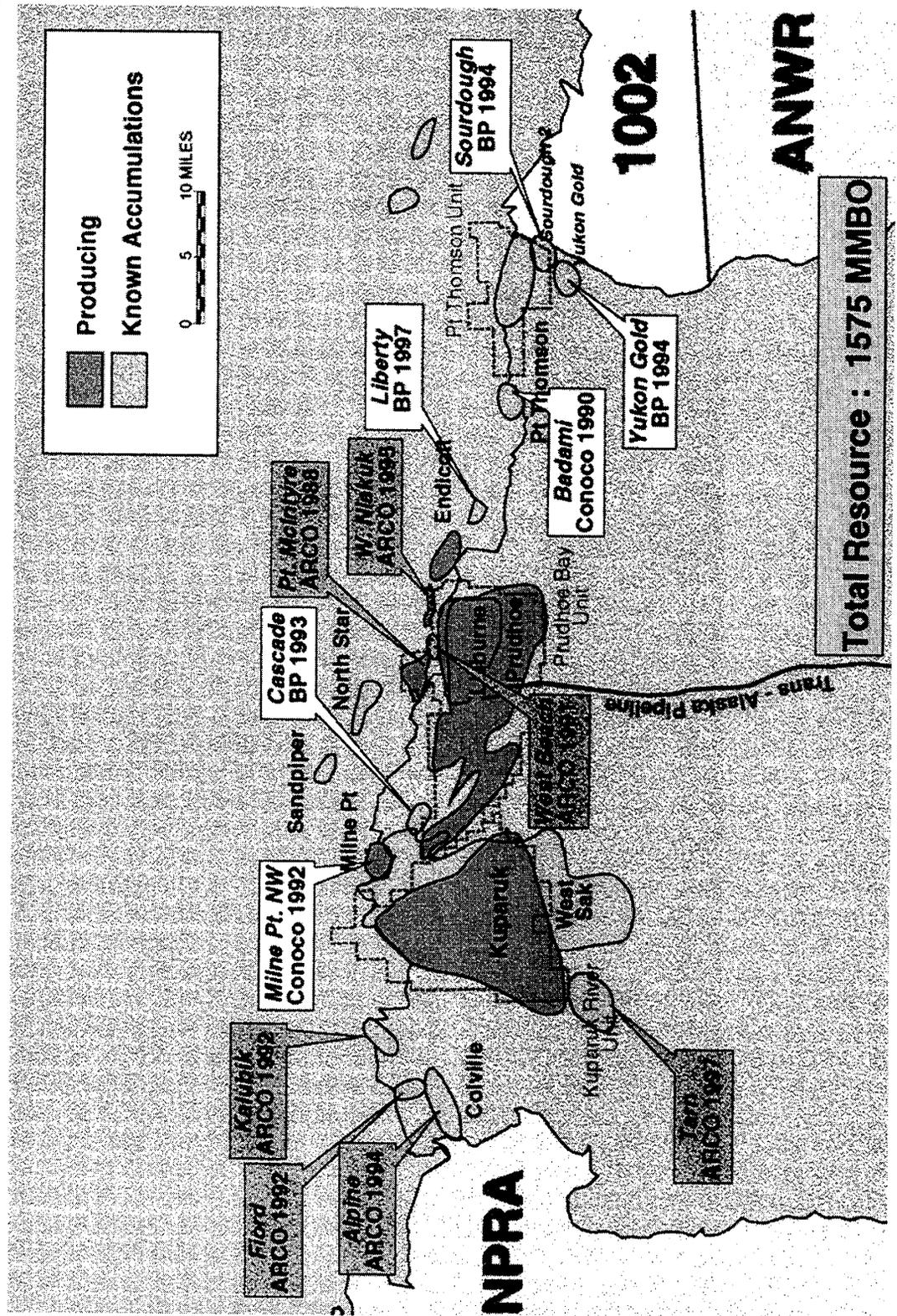
Alaska - North Slope



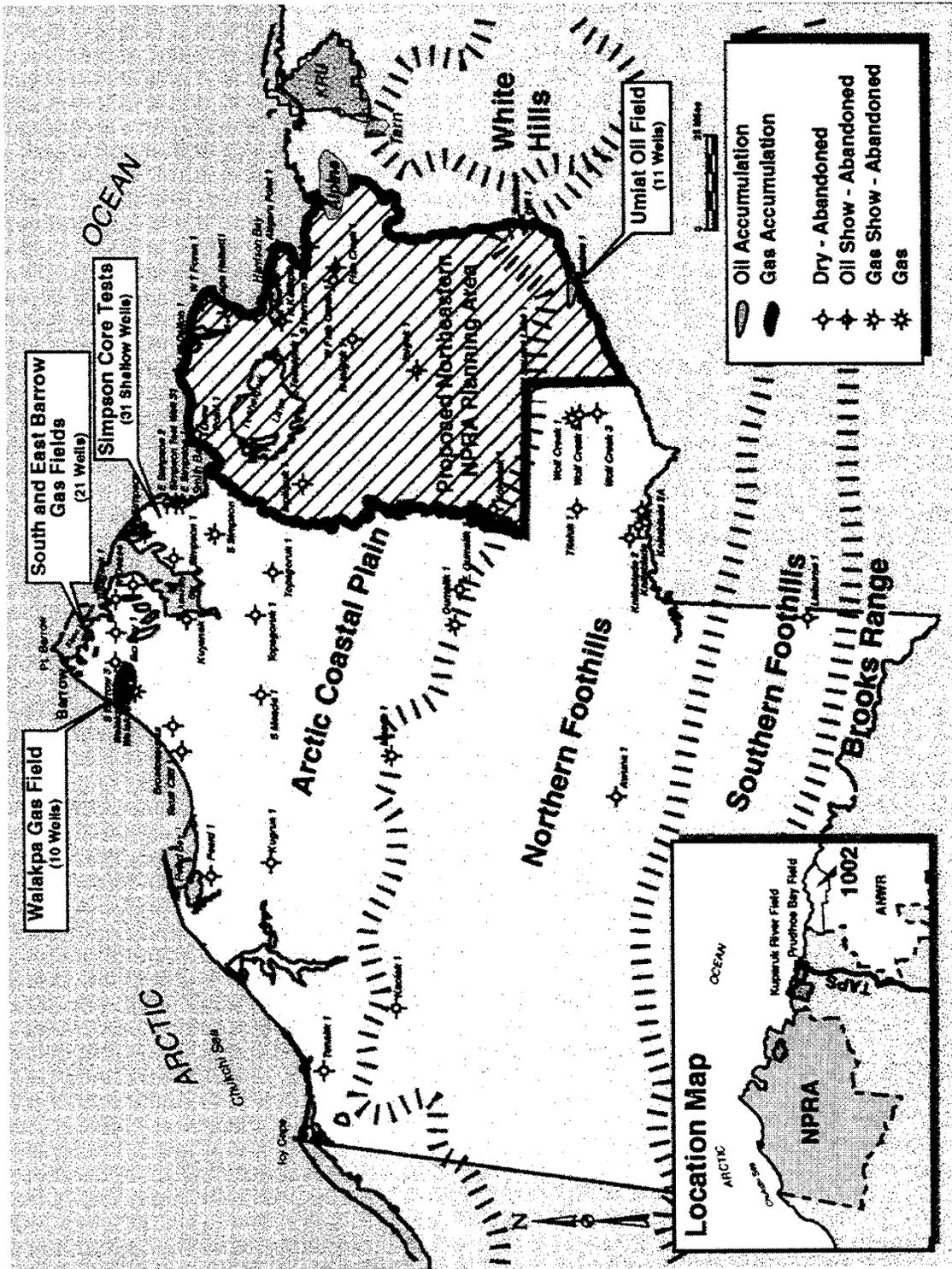
North Slope Production



Alaska North Slope Discoveries 1988 - 1997



NPRA - Exploration Drilling



Why do we think we can find commercial reserves?

- ✓ **NPRA is under-explored**
 - **1 well per 480,000 acres**
- ✓ **New Geologic concepts and Techniques**
- ✓ **Lower Costs and Less Environmental Impact**

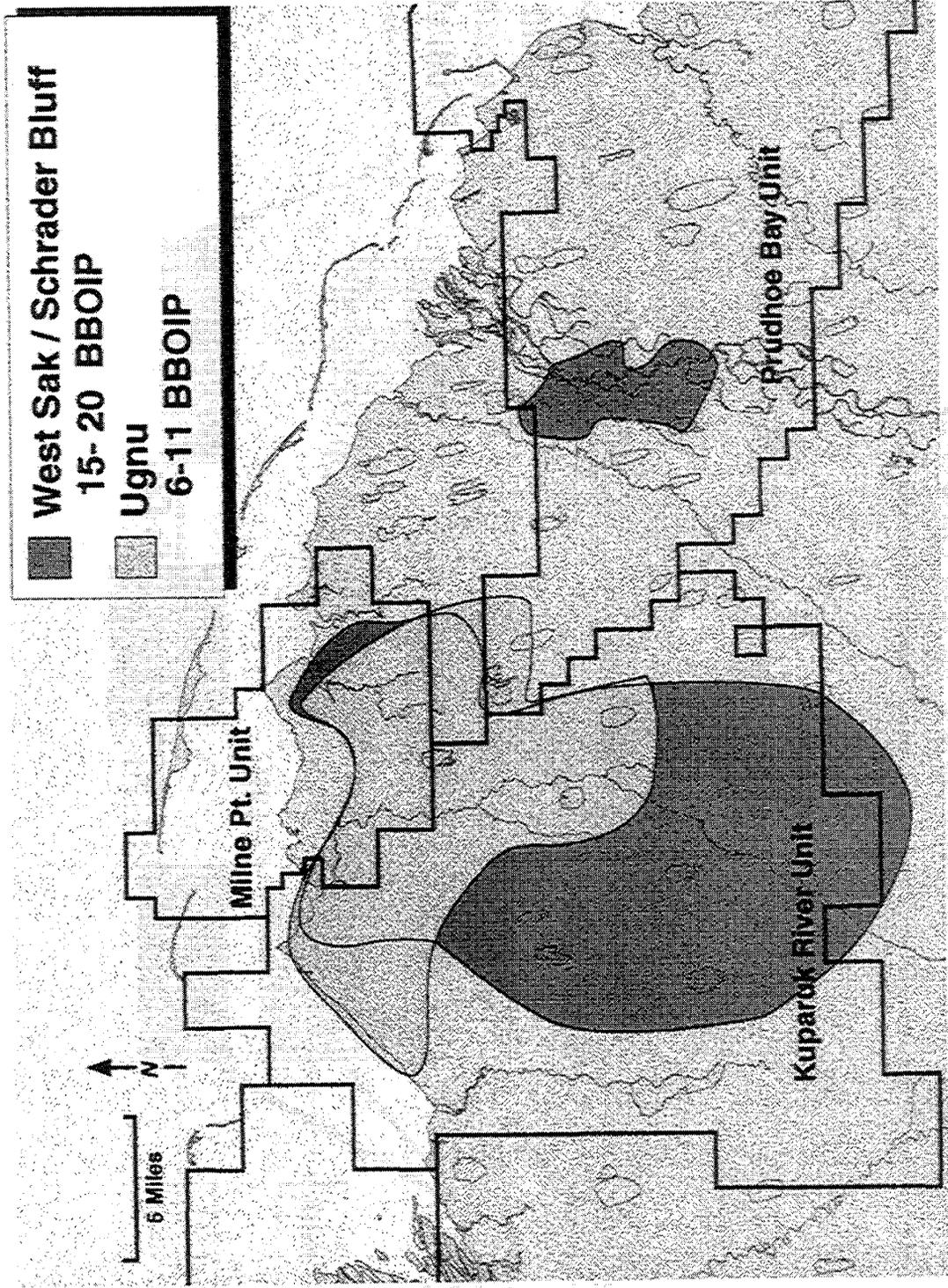
Less Environmental Impact

- ✓ **Footprint free exploration**
 - **Ice roads, ice pads**
- ✓ **Alpine prototype development**
 - **Roadless (offshore paradigm)**
 - **2 drill site, 115-acre development**
 - **Facilities located to avoid wildlife impacts**
 - **Discharge-free operation**

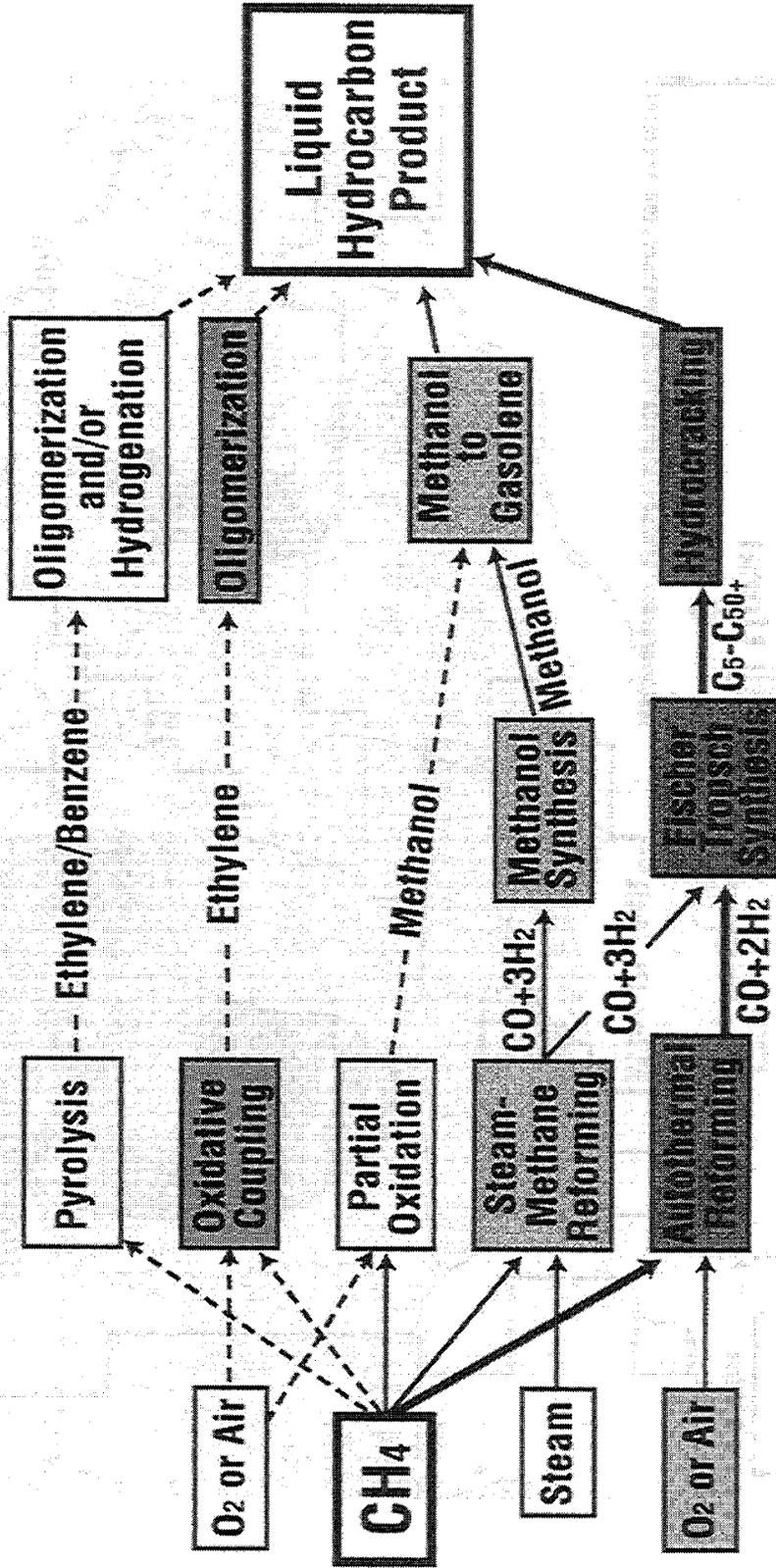
Land Access / DOE Role

- ✓ **Access to Federal lands essential to stabilize production over the long term**
- ✓ **NPRA, ANWR Coastal Plain among nation's most productive areas**
- ✓ **Industry needs DOE as advocate for Alaska exploration**
- ✓ **Support NPRA leasing resumption**

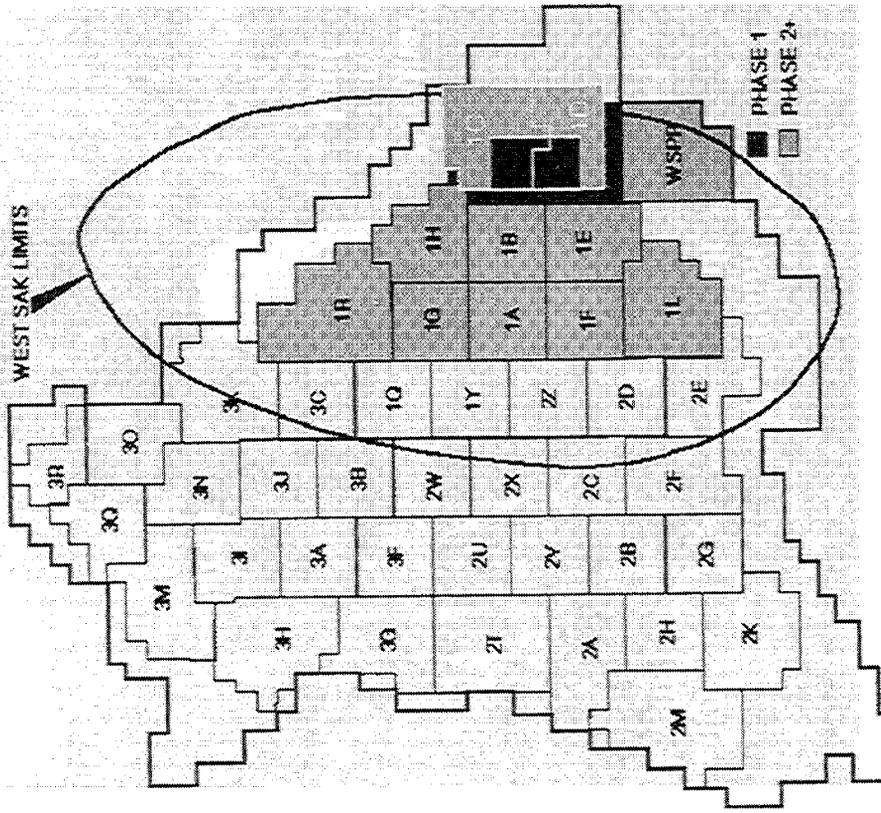
North Slope Heavy Oil Resources



Gas Conversion Routes



West Sak Development Map



✓ Phase 1 (Gross)

- 50 Wells

- 7000 BOPD Peak

- 51 MMBO

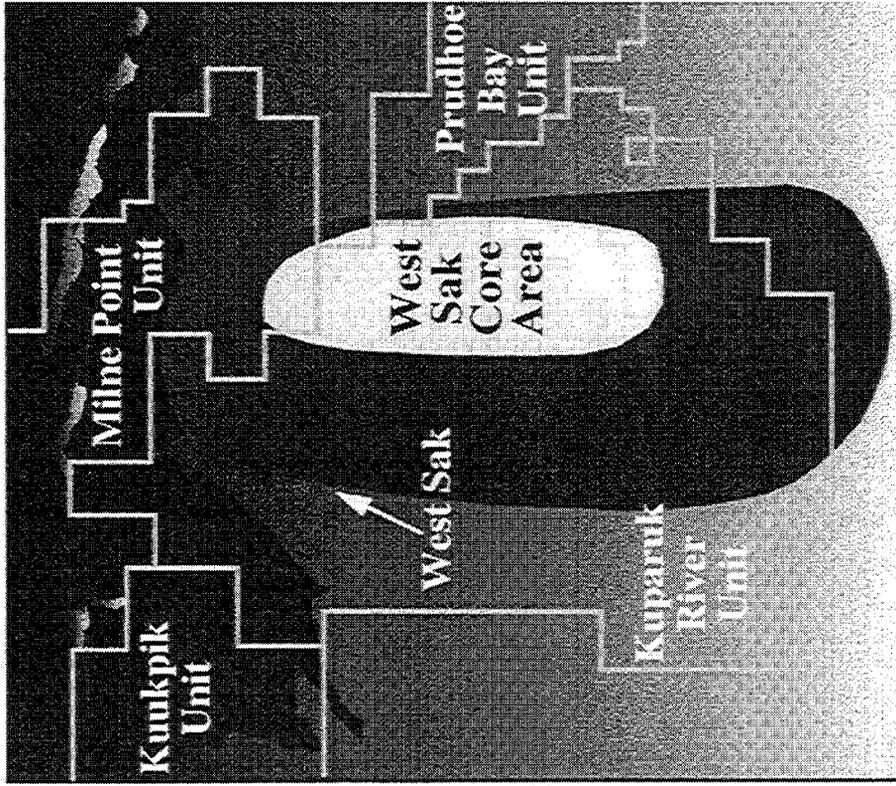
✓ Phase 2+ (Gross)

- 510 Wells

- 410 MMBO

- 59,000 BOPD Peak

West Sak



✓ 1997 Plans

- AFC approval
- Drill 13 Wells
- First oil 4Q97

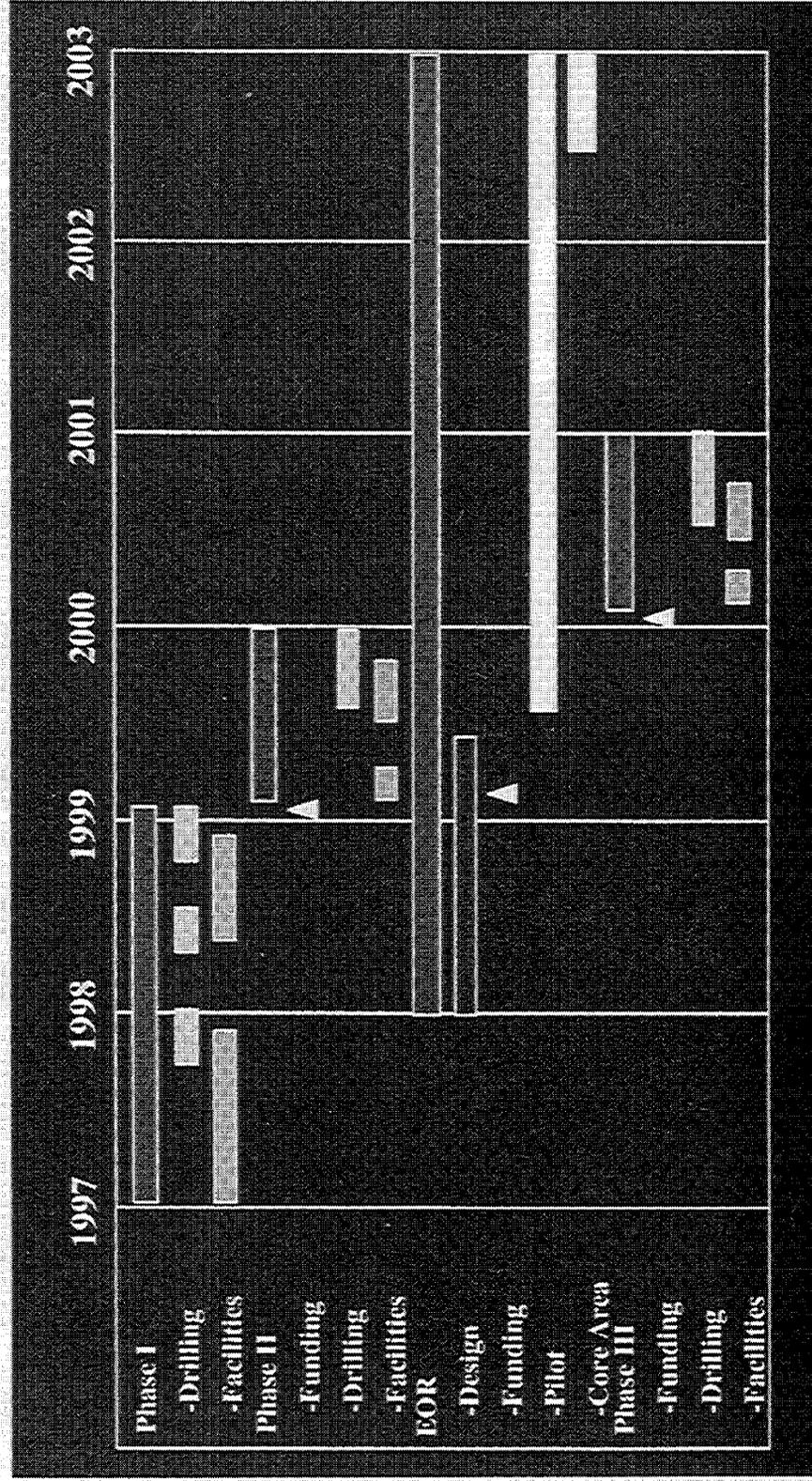
✓ Phase 1 (Gross)

- 50 Wells
- \$98 MM
- 50 MMBO
- 7 MBD Peak

✓ Phase 2+ (Gross)

- 500 Wells
- \$875 MM
- 400 MMBO
- 70 MBD Peak

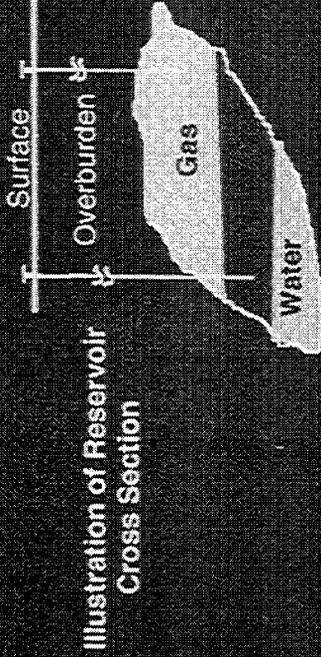
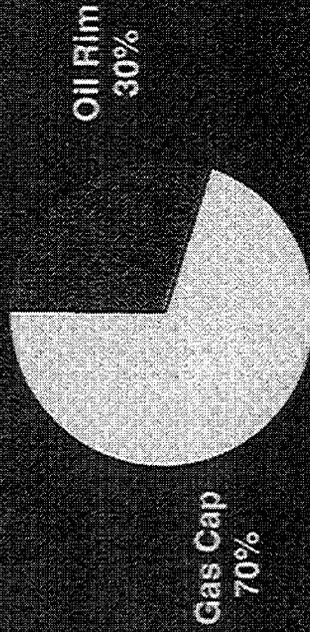
West Sak Timeline



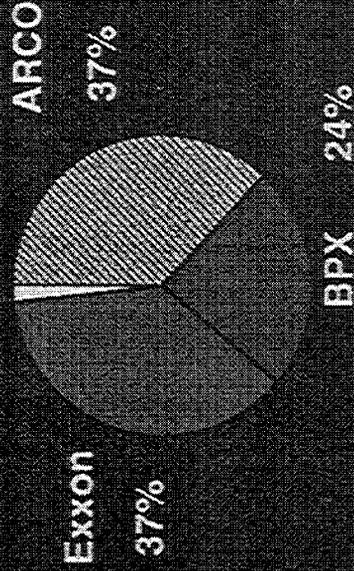
ANS Gas - Ownership

Total 26 TCF

Source of Gas Reserve



Combined Gas Ownership

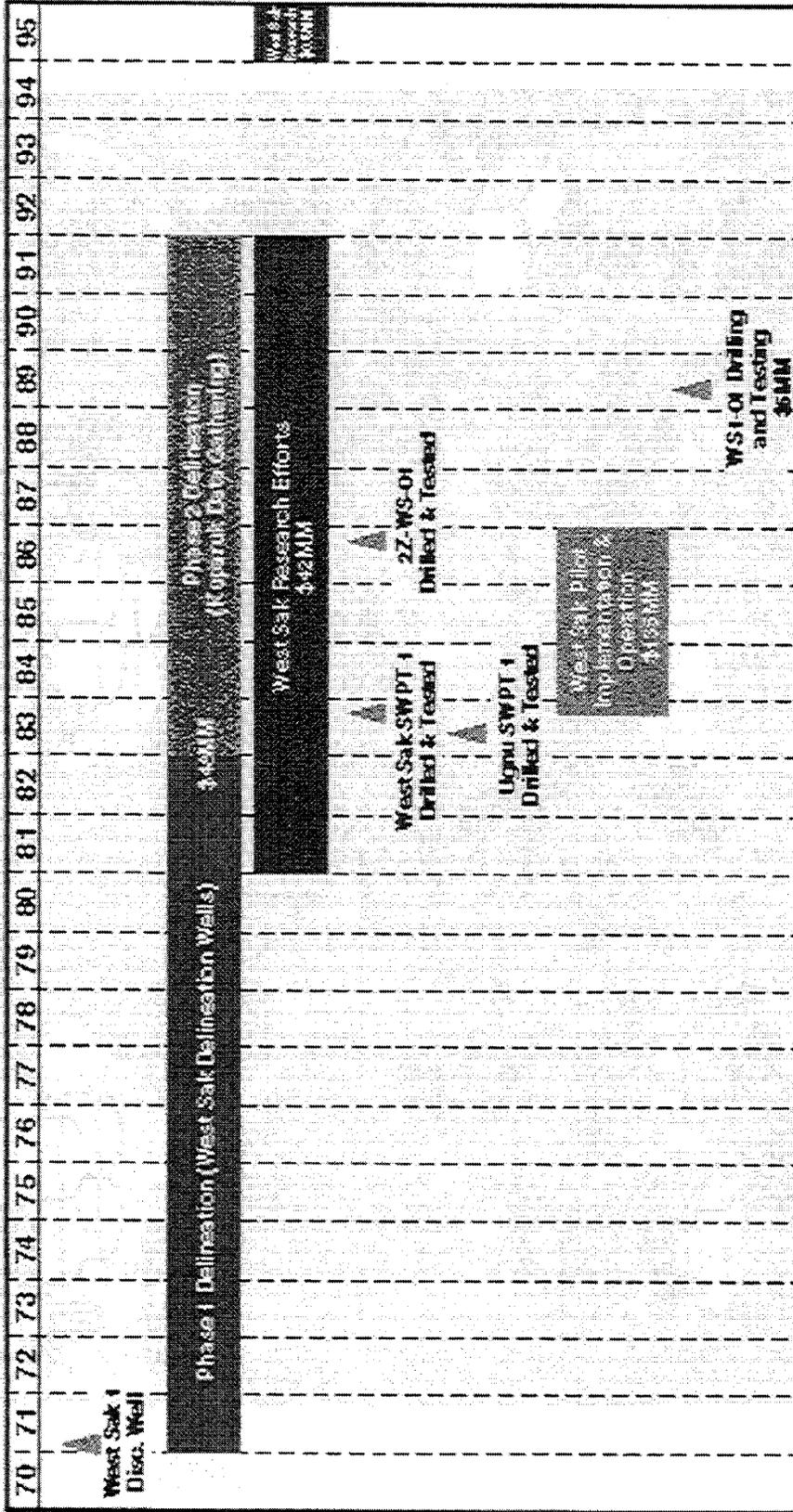


Ownership of Participating Areas

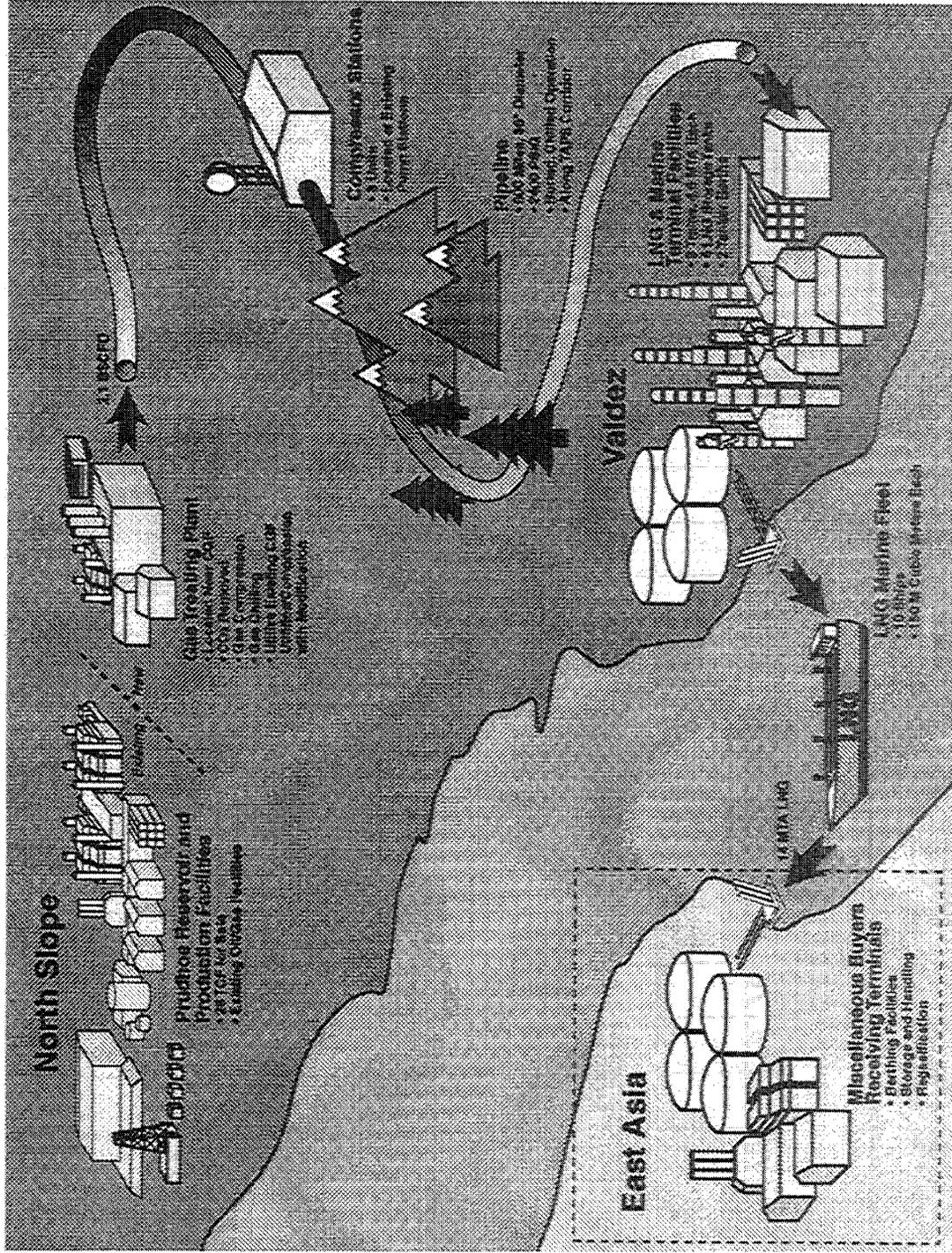
	<u>Oil Rim</u>	<u>Gas Cap</u>
ARCO	22	43
BP	51	14
Exxon	22	43
Others	5	1

State of Alaska Royalty Interest = 12.5%

West Sak Historical Timeline



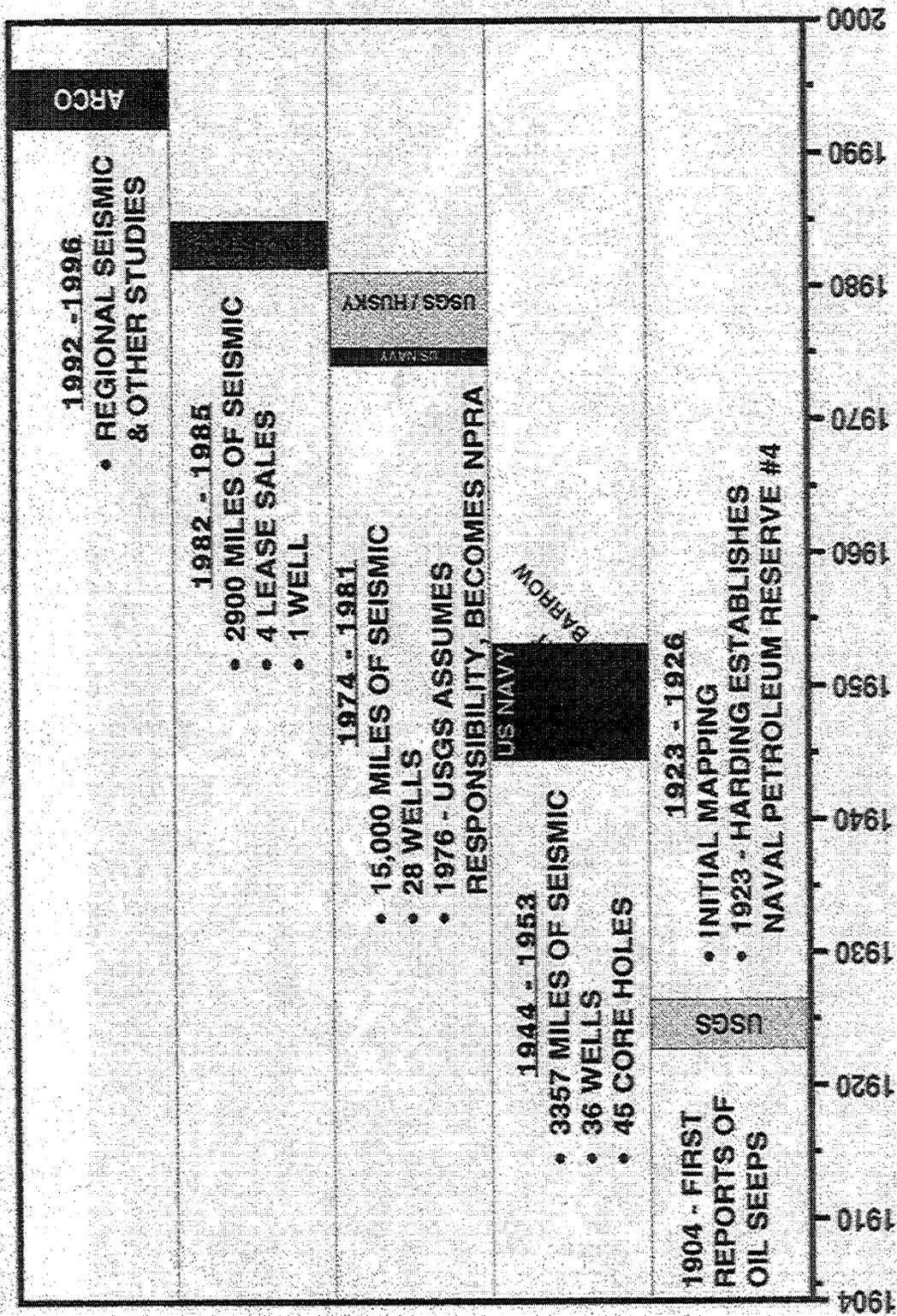
ANS Gas Project Diagram



ARCO **Safe** **Low-Cost** **& Long Term**

*no decline ↓
after '99*

NPRA - Exploration History



North Slope Heavy Oil Resources Reservoir-Specific Challenges

- ✓ **Poor net-to-gross (West Sak, Kuparuk)**
- ✓ **Unconsolidated sands (Ugnu, West Sak)**
 - **1. Sand control**
 - **2. Sand tolerant artificial lift**
 - **3. Solids handling and disposal**
- ✓ **Permafrost stability (Ugnu - thermal)**
- ✓ **Low permeability (West Sak, Kuparuk)**
- ✓ **High asphaltene content (Kuparuk)**
- ✓ **Resource mapping (Kuparuk)**

North Slope Heavy Oil Resources Common Technical Challenges

- ✓ Remote / Arctic location
- ✓ High in-situ viscosity
- ✓ Depth
- ✓ Well performance
- ✓ Recovery options
- ✓ Well spacing
- ✓ Completion design
- ✓ Diluent source

GKA Viscous Oil Resources

	OOIP (BBO)	Gravity (°API)	Temperature (°F)	In-Situ Viscosity (cp)	Permeability (md)
Ugnu	6	8-12	50-70	2,000-300,000	1,000-10,000
West Sak (core)	3	17-21	70-80	20-100	50-100
West Sak (updip)	10-15	12-17	50-70	100-3,000	50-100
Kuparuk	~0.1	10-20	155-160	25-immobile*	10-50

* High asphaltene content

OOIP: Original Oil in Place BBO: Billion Barrels of Oil

ANS Gas Project

Federal Issues:

- ✓ **Federal tax take has significant impact on project economics**
- ✓ **Federal tax help could take form of:**
 - **accelerated depreciation**
 - **investment tax credits**
- ✓ **Project is working on state fiscal issues first**
- ✓ **Federal support may also be required on regulatory, permitting and environmental issues**

DOE Summary

- ✓ **Land access advocate**
- ✓ **Research**
 - **Heavy oil**
 - **gas-to-liquids conversion**
- ✓ **Help create appropriate fiscal regimes**
 - **Heavy oil development**
 - **ANS gas commercialization**

Heavy Oil / Fiscal Regime

- ✓ **Modify Sec. 29 of tax code**
 - **Include Alaska heavy oil as qualified fuel credit**
 - **Define heavy oil as less than 20 degree API gravity**
 - **Produce North of 54 degree North Latitude**
 - **Exclude from Inflation Adjustment**
 - **Extend to investments by 2003, sales by 2008**

ANS Gas

✓ Steps for success

- Reduce costs**
- Confirm market take & price**
- Define project structure**
- Develop competitive fiscal regime**

Heavy Oil / DOE Role

- ✓ **Technology Development / Testing**
 - **Cold production**
 - **Completions**
 - **Solids handling / disposal**
 - **Artificial lift**
 - **Automated well control**
 - **Soft rock fracturing**
 - **Viscosity reduction**
- ✓ **Creation of appropriate fiscal regime**

West Sak EOR

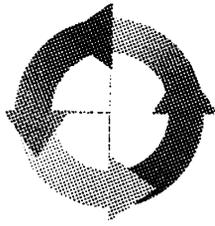
- ✓ **Bring in expertise from KRU**
- ✓ **Secure access to KRU MI processing by 1/98**
- ✓ **Review existing plans and studies by 1Q98**
- ✓ **Design pilot by 3Q98**
 - **Select solvent**
 - **Well spacing**
 - **Location**
- ✓ **Implement pilot in late 1999 / early 2000**
- ✓ **Path to the up-dip West Sak**

7.5 ALASKA ENERGY INFOBANK (AEI)

**Erik Dahl
Supervisor
Technology Planning and Information Resources
ARCO Alaska, Inc.**

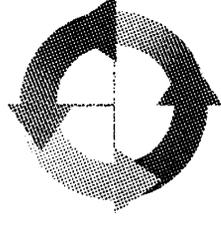
The Alaska Energy Infobank

- About the AEI
- Where have we Been?
- Where are we Going?
- Where we are today
- Some of the next steps



The Alaska Energy Infobank

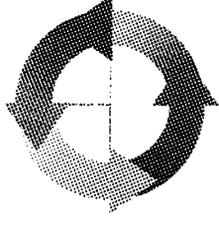
An energy industry and government initiative to improve competitiveness and reduce operating costs.



What is the AEI about?

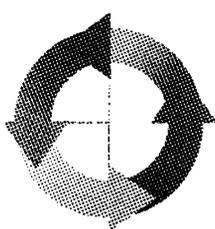
■ The AEI Mission:

- The Alaska Energy Infobank will become a data repository for all members of the petroleum industry and related federal, state, and local government in Alaska. Through it members and the State will benefit through:
 - 1. Making the state more competitive and attractive in the global market;
 - 2. Creating a greater sense of partnership in the energy community of interest;
 - 3. Cost reduction in energy information gathering, management, exchange, and retrieval;
 - 4. Creation of energy industry/government collective business process re-engineering
- In achieving these goals the Alaska Energy Infobank will protect the proprietary, legal, and confidentiality interests of its members.



Who is Involved?

- ARCO Alaska, Inc.
- BP Exploration
- AK Oil & Gas Conservation Commission
- UNOCAL Corporation
- BLM
- Marathon Oil Company
- Alyeska Pipeline Services Company
- Mineral Management Services
- Alaska Department of Natural Resources
- Exxon



The Alaska Energy Infobank

Attributes

- Centralized
- Neutral
- Computerized
- Trusted

Relationships

- Brings people together
- Breaks down barriers
- More cooperation
- Improved communication

AEI Vision

Enables

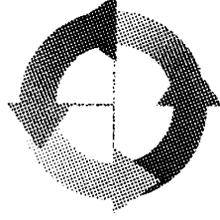
- Competitive advantage
- AK more attractive to investors
- Business improvements
- Access to expertise & technology
- Expansion to energy related companies

Implementation

- Simple
- Flexible
- User friendly
- Data oriented
- Standards
- Data vendors involved

Success

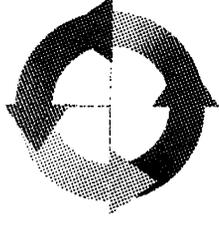
- Cost savings
- Higher quality, single source data delivered faster
- Large number of users
- Fewer report filings
- Government more accessible
- Shift from paper to electronic media



AEI Participants

Members of the Alaska Energy Infobank agree to:

- Reducing redundancy of information and process
- Achieving consensus within AEI membership
- Adhering to industry standards
- Sustaining long-term cost savings
- Making Alaska attractive for investment



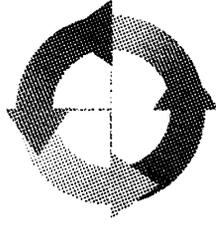
Where have we Been?

■ 1995

- Initial Alaska Energy Infobank Conference
- Formation of the AEI Steering Board

■ 1996

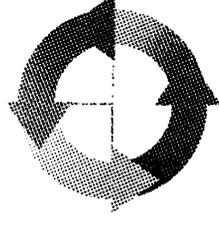
- Examination of other national and regional data repositories.
- Issuance of an industry wide Request for Information (RFI).
- Kick-off of Infobank Prototype project for log data delivery.
- In depth examination of costs, options and implementation criteria.



Where have we Been?

■ 1997

- Development of operating principals and streamlined organization model.
- Completion of log data prototype.
- Developing plans for deploying Internet based collaboration tools (Shared database, web and file sharing).



Where are we Going?

■ Areas of Strong Interest

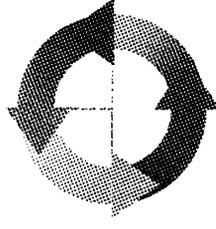
- Well Header
- Well Logs
- Production, Injection & Testing Data
- Other Reservoir Information

■ Areas of Interest

- Deviation Surveys
- Well Documents
- Permits

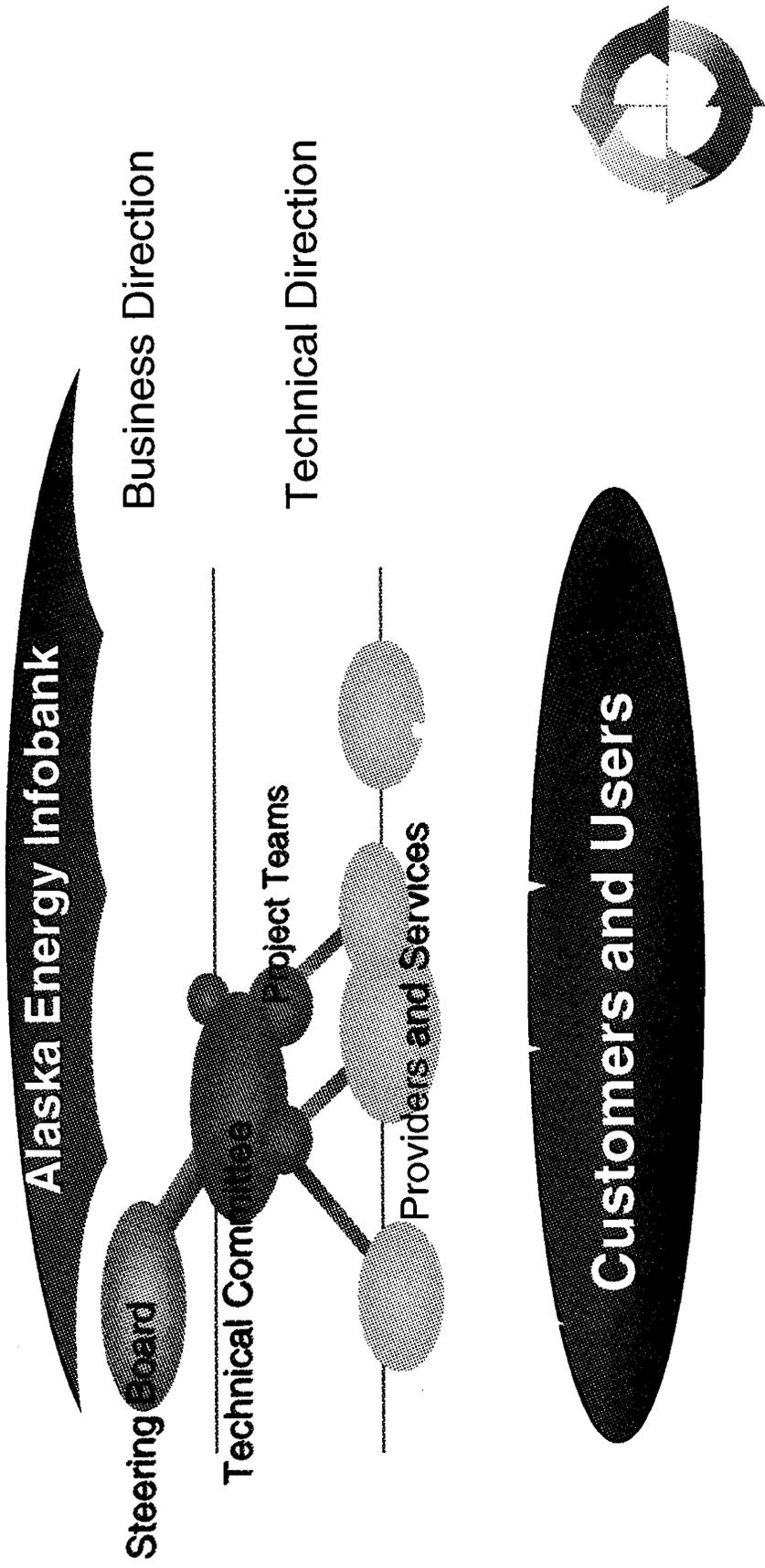
■ Areas Needing further study

- Seismic Data
- Asbuilts & Engineering Docs
- Marker Picks
- Maintenance Data

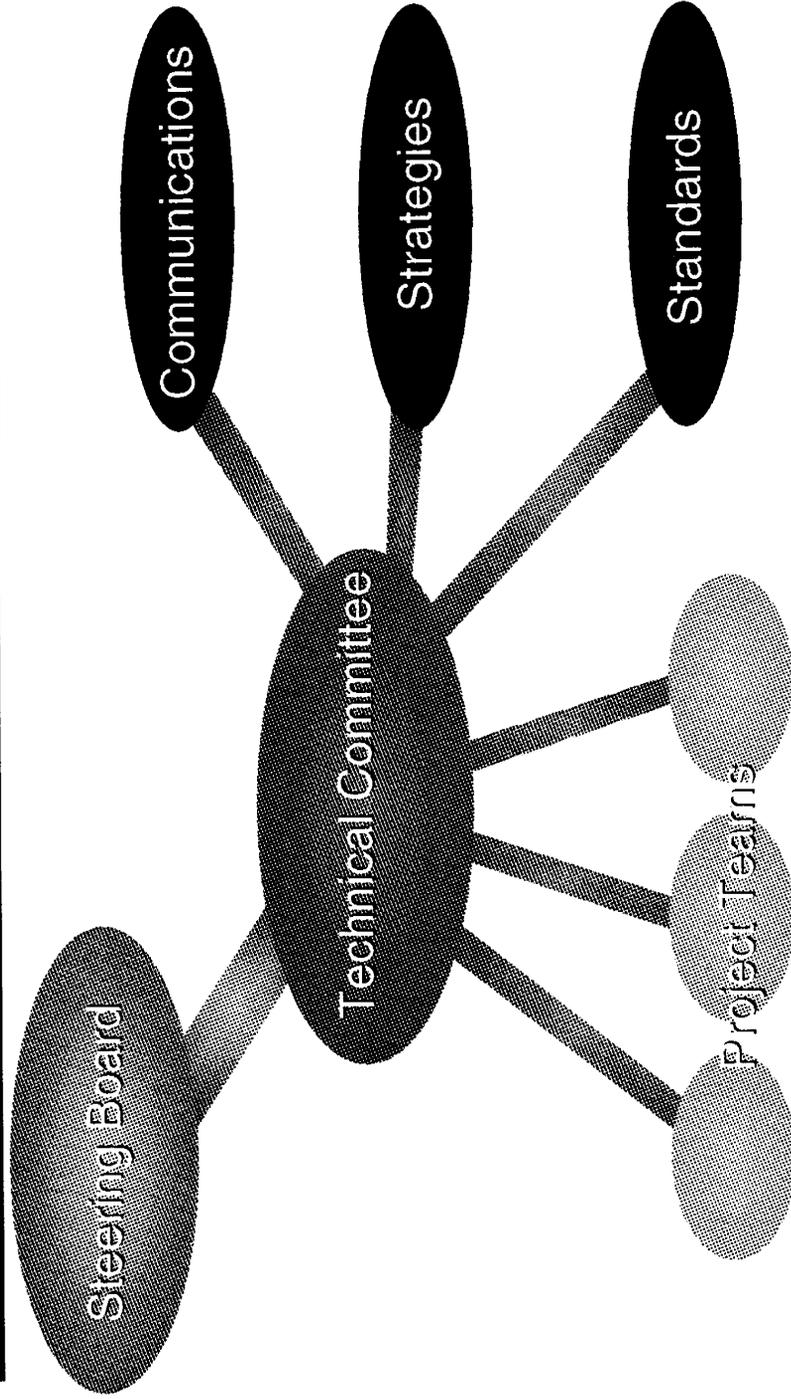


Where are we Today?

■ The General Business Model



Where are we Today?



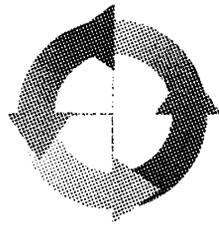
- Web site
- Newsletter
- Public updates
- Press releases

- Priorities
- Funding procedures
- Integration plans
- Vendors & products

- Hw, Sw and Network
- Data Exchange
- Data Access
- Quality Assurance

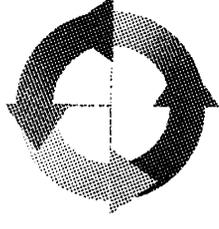
Infobank Project Responsibilities

- Project coordination & management
- Cost benefit analysis
- Identification of funding and resource requirements
- vendor contact and product evaluations
- communication and/or coordination with AEI Technical Committees

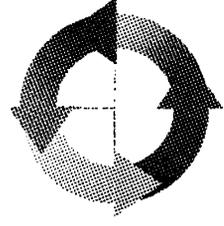
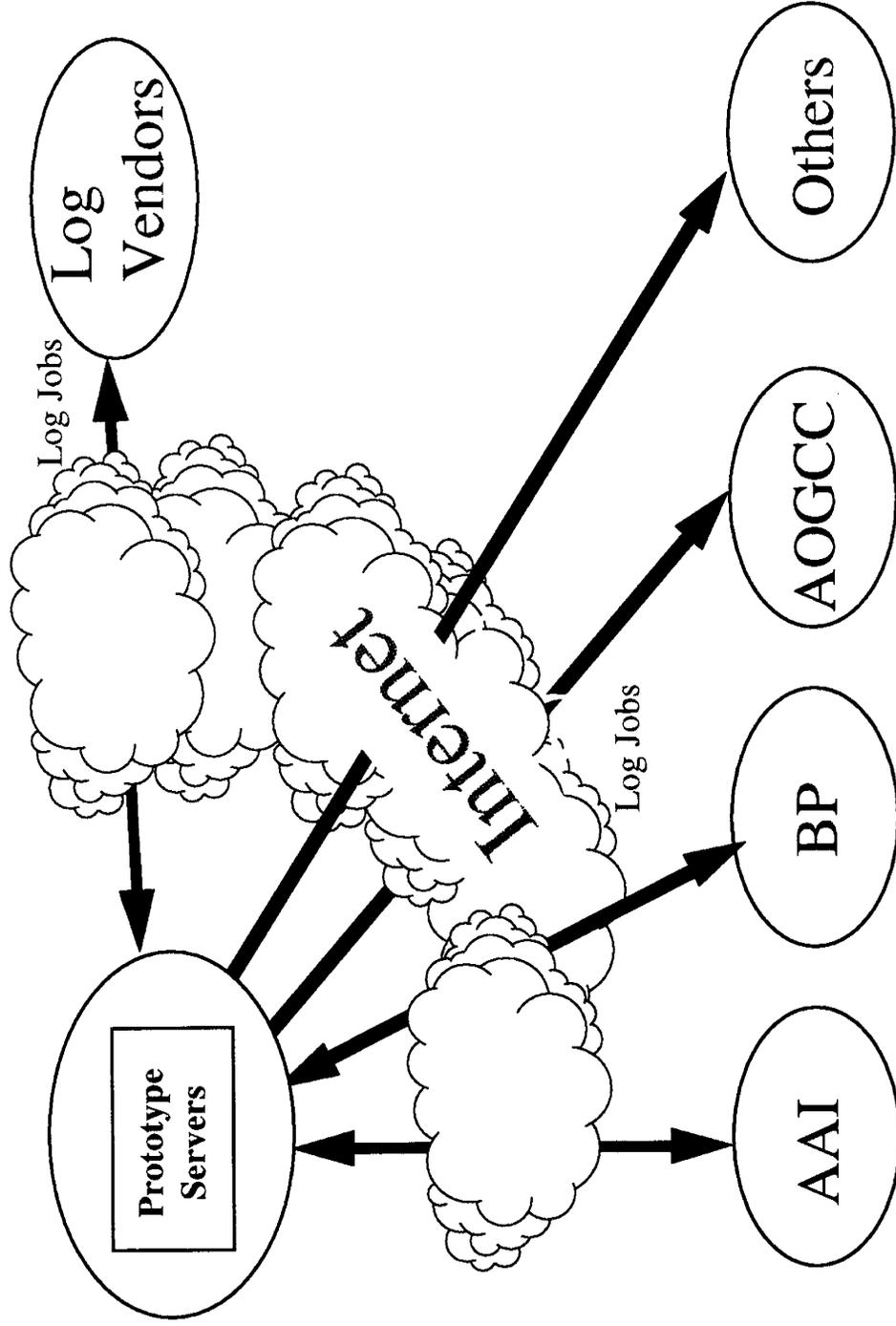


Log Data Delivery Prototype

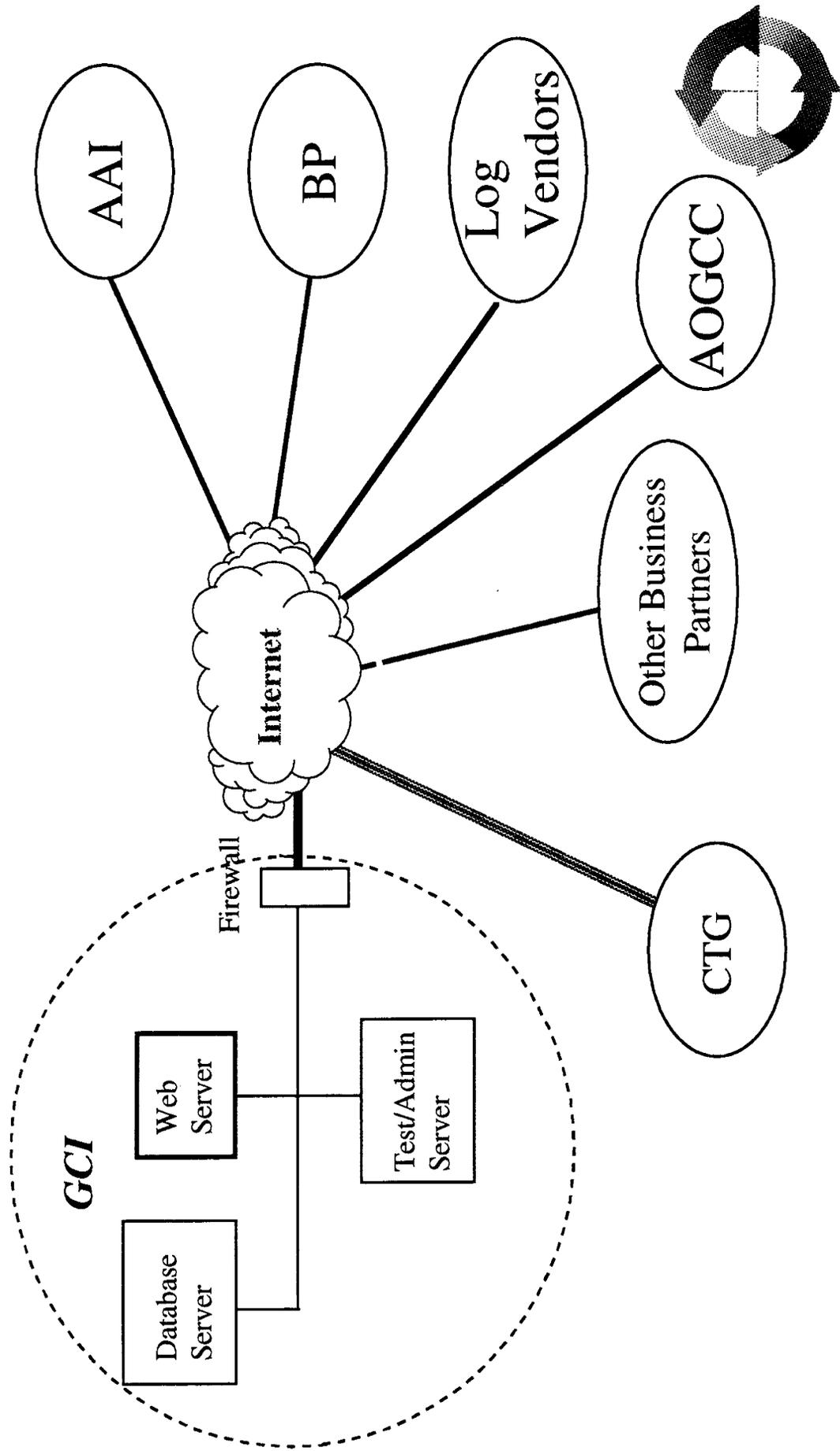
- Log Data distribution - Low hanging Fruit
- Cash benefits: \$400/job * 400 jobs = \$160M/Year
- Process Benefits: faster delivery, fewer mistakes, less administration
- Development costs approx. \$200M
- Currently running and ready for deployment in December 1997.



Log Data Delivery Prototype

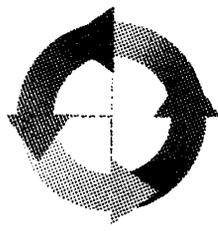


Log Data Delivery Prototype



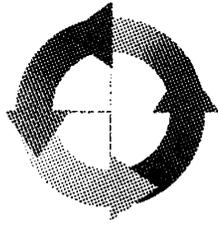
Log Data Delivery Prototype

- Deployment Costs:
 - <\$300M 1st Year
 - \$75M/year for 2nd year forward
- Cost Sharing
 - Prudhoe, Kuparuk, Milne Pt., Alpine, etc.
 - AAI, BP, AOGCC, Exxon, Marathon
- Proposed Cost Split, 1st 12 Months
 - 50% AAI, 50% BP



Where are we Today?

- Current Projects and Plans
- Log Data Delivery Prototype (80%)
- Prudhoe Bay Reservoir Description (10%)
- Electronic Production Reporting (20%)
- Shallow Sands knowledge Capture (10%)
- Shared Services Aviation (90%)
- Streamline Permitting processes (5%)
- GIS interfaces to data (1%)



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