

LOAN COPY ONLY

**PERSPECTIVES ON OIL REFINERIES  
AND OFFSHORE UNLOADING FACILITIES**

**CIRCULATING COPY  
Sea Grant Depository**

**PROCEEDINGS**

**The Fourth New England  
Coastal Zone Management Conference**

PROCEEDINGS

THE FOURTH NEW ENGLAND COASTAL ZONE MANAGEMENT CONFERENCE

"Perspectives on Oil Refineries and Offshore Unloading Facilities"

May 13-14, 1974

Sponsored by:

New England Marine Advisory Service  
New England River Basins Commission  
New England Center for Continuing Education  
New England Council for Economic Development  
Southern New England Marine Sciences Association

Mary Louise Hunter, Editor

The New England Center for Continuing Education  
Durham, New Hampshire

## PREFACE

The Fourth Coastal Zone Management Conference of New England focused on the subject, "Perspectives on Oil Refineries and Offshore Unloading Facilities," a question which had become crucial for the region because of the winter fuel crisis and the mushrooming of proposals for new oil refineries. The conference planning committee attempted to put together a program that would bring to bear on the subject a wide range of perspectives and information.

The New England Marine Advisory Services (NEMAS), a recently formed regional cooperative effort to explore and develop ways to coordinate existing marine and advisory services, initiated the conference and sponsored it jointly with other regional organizations concerned with coastal zone and marine problems.

The speeches printed in these conference proceedings bring together material from many different approaches and backgrounds. During the conference they provided the basis for mutual exchange and further exploration of the issues, and perhaps through wider distribution they can do the same for a broader audience.

CONTENTS

Page

Conference Planning Committee . . . . .	1
Conference Program . . . . .	2
 <u>"DOES NEW ENGLAND NEED REFINERIES?"</u>	
Introductory Statement . . . . . R. Frank Gregg	4
Facility Site Selection Factors Deepwater Terminals - Offshore Operations . . . . . J. R. Jackson	6
What The Region Needs . . . . . John G. Buckley	27
Trade-Offs--Economic Considerations . . . . . John Devanney	33
Alternatives To Present Proposals . . . . . William Bulger	41
 <u>"WHERE SHOULD OIL REFINERIES BE LOCATED?"</u>	
A Consultant's Approach . . . . . W. Nicholas Kruse	45
Experience With Refinery Siting . . . . . Col. Charles Osterndorf	51
Environmental Constraints In Site Selection . . . . . Wallace Stickney	55
Social Considerations . . . . . Richard Williams	61

CONTENTS CONTINUED

"WHO MAKES THE FINAL DECISION?"

Local Approach To Decision Making . . . . . Alden Winn	74	
State Approach To Decision Making . . . . . Joe C. Moseley	81	
State Approach To Decision Making . . . . . Neil Rolde	90	
Regional Approach To Decision Making . . . . . Glenn Kumekawa	94	
Regional Approach To Decision Making . . . . . Norman Faramelli	98	
Federal Approach To Decision Making . . . . . Frank J. Kelly	101	
Summary Comments . . . . . R. Frank Gregg	108	
 Appendix A List of Conference Participants . . . . .		113
 Appendix B Bibliography . . . . .		118

CONFERENCE PLANNING COMMITTEE

Arthur L. Barrett, Administrative Assistant, New England Council

Harry P. Day, Director, New England Center for Continuing Education

Bernard L. Gordon, Associate Professor, Earth Sciences, Northeastern University; Vice Chairman, Marine Resource Development Committee, New England Council

Walter J. Gray, Director, Marine Advisory Service, University of Rhode Island

R. Frank Gregg, Chairman, New England River Basins Commission

William F. Henry, Chairman, Resources Development Center, University of New Hampshire

Dean A. Horn, Executive Officer, Sea Grant Project Office, Massachusetts Institute of Technology

Harold E. Kimball, Assistant to the Director, Sea Grant Program, University of Maine

Barry R. Lawson, Senior Resources Planner, New England River Basins Commission

Bruce Miller, Director, Sea Grant Marine Advisory Service, University of New Hampshire

CONFERENCE PROGRAM

"Perspectives on Oil Refineries and Offshore Unloading Facilities"

Conference Chairman: Walter J. Gray

Opening Session - Monday, May 13

"Does New England Need Refineries?"

A discussion on whether or not we need refineries, the trade-offs inherent in either decision, how many refineries might be needed, and alternatives to present proposals

Moderator:

Frank Gregg, Chairman, New England River Basins Commission

Oil industry viewpoint:

J. R. Jackson, Jr., Manager, Exploration Department, Environmental Affairs, EXXON Company

What the region needs:

John G. Buckley, Vice President, Northeast Petroleum Industries, Inc.

Trade-offs--Economic considerations:

John Devanney, Professor for Marine Systems, M.I.T.

Alternatives to present proposals:

William Bulger, Massachusetts State Senator

Second Session

"Where Should Oil Refineries Be Located?"

Moderator:

A. Thomas Easley, Executive Vice President, The New England Council

A consultant's approach:

W. Nicholas Kruse, Petroleum Coordinator, The Badger Company (Subsidiary of Raytheon Corp.)

Experience with refinery siting:

Colonel Charles Osterndorf, Deputy Division Engineer, Corps of Engineers, Department of the Army

Environmental constraints in site selection:

Wallace E. Stickney, Director of Environmental Impact Office, EPA, Region I

Social considerations:

Richard Williams, Consultant, Arthur D. Little Company

Third Session - Tuesday, May 14

"Who Makes the Final Decision?"

The role of local, state and federal groups in the decision-making process. Is there a need for a regional approach?

Moderator:

Norman Faramelli, Co-Director, Boston Industrial Mission

Local needs:

Alden Winn, Chairman, Durham Board of Selectmen

State:

Joe C. Moseley II, Executive Director, Texas Coastal and Marine Council

Neil Rolde, Member of Maine State Legislature

Regional:

Glenn Kumekawa, Executive Assistant for Policy and Program Review, Office of Governor of Rhode Island

Norman Faramelli

Federal:

Frank J. Kelly, Deepwater Port Coordinator, U. S. Department of the Interior

Final Session

Summing up and long-term perspective

"DOES NEW ENGLAND NEED REFINERIES?"

Introductory Statement

R. Frank Gregg

The question posed for this first panel is "Does New England need refineries"? Of course, the answer to that is "yes" and based on the present average size of refineries, something like five or six. The real question is, of course, do we want them in New England, and, if so, where, and owned by whom, and producing what, and under what environmental controls, and producing what economic benefits to whom. But we have to acknowledge in the beginning that New England needs refineries, somewhere, in order to meet the requirements that we have for petroleum-related energy.

Obviously somebody thinks we need refineries because proposals pop up almost weekly like surprise targets in a shooting gallery. It's almost impossible to keep track of them. My staff put together this past week a little sheet we've distributed at this conference which gives very brief thumbnail descriptions of some major petroleum proposals. Since we buttoned this up, I think at noon on Thursday a new proposal for a refinery and port off the mouth of the Connecticut River in Long Island Sound has popped up.

The result of this array of activity is that the public is confused, and I think elected officials are confused. I know I'm confused. I would hope that we can begin at this session today to develop a clear understanding of the real dynamics that are at work in the question of whether and where and under what circumstances refineries may be located in New England; how the decision should be made; who should participate; and how the interests of the region, the individual state, the nation, consumers, and investors can be rationally analyzed as a basis for making these decisions.

Let me note a couple of ground rules. Let's wait until all the presentations have been made before we question. The reason is that there are so many things on so many people's minds that I'm afraid we'll conduct the entire session in response to the first presentation. So, if you'd make

*\*Mr. Gregg has been Chairman of the New England River Basins Commission since 1967. His career in conservation began with the Colorado Game and Fish Department in 1951, and later he served as staff assistant to the Secretary of the Interior and as Executive Director of the Izaak Walton League of America. Prior to his present position, he was Vice President of the Conservation Foundation.*

notes of the points you'd like to cover, we'll address them to the individual speakers afterwards. I might also note that this is not a referendum on Durham, Newington, or any of the other specific proposals that are of keen interest to many people here.

So, with that I will introduce J. R. Jackson, who is manager of the Exploration Department of Environmental Affairs of Exxon.

FACILITY SITE SELECTION FACTORS  
DEEPWATER TERMINALS - OFFSHORE OPERATIONS

J. R. Jackson, Jr.

The discussion in this paper will address four areas: petroleum supply and demand, facility site selection factors for major petroleum and chemical facilities, deepwater oil terminals, and offshore petroleum operations.

Let's start with the energy problem and some of the real reasons for our energy shortfall. Illustrations on Charts 1 through 5 (pp. 8-12) will help put the problem in perspective. These illustrations are taken from a newly published study by the Center for Strategic and International Studies for the Congressional Joint Committee on Atomic Energy. The study is entitled "Understanding the National Energy Dilemma."

The first chart and the following four illustrate the total energy flow patterns from fuel sources (oil, gas, coal, hydropower) through the paths to electricity generation, residential and commercial use, industrial use, transportation, and non-energy forms. Note particularly the used energy shown below (a measure of efficiency) and the lost energy shown above. The numbers displayed are in millions of barrels per day of oil equivalent to provide common reference points. Looking at Charts 1 through 5 for 1950, 1960, 1970, 1980, and 1990, please note the indicated growth in energy use and the indicated efficiency changes.

The illustrations provide a basis for making several important points:

- 1) Energy use in our nation is growing at a high rate and must be moderated. Our total energy requirement has grown from almost 16 million barrels of oil equivalent per day in 1950 to almost 30 million barrels per day in 1970 and to an estimated almost 63 million barrels per day in 1990, and therein lies the key reason for our energy shortage. Domestic supply has simply not been able to keep up with this large increase in demand, and this has created a need for large imports of foreign petroleum from 4% actual in 1950 to an estimated 55% in 1990 if domestic demand and supply growth continue along their current trends.

*\*Mr. Jackson is Manager of the Exploration Department, Environmental Affairs, of the Exxon Company. He holds a B.S. Degree in Geology from Texas A and M University and an M.S. Degree in Geology from the University of Texas. He is active in American Geological Institute and American Petroleum Institute affairs and is chairman of API's Atlantic Offshore Committee.*

- 2) Our efficiency in use of energy as displayed by the upper and lower segments is not good and is declining. In 1950, our use efficiency was 54% and in 1990 it is estimated to be only 44%. In other words, quite apart from wasted energy by excessive use, we are losing about one half of our total energy supply by inefficient use primarily in electricity generation and transmission and in transportation. These areas offer great potential for reductions in energy use by increased efficiency.
- 3) The energy supply pattern through this period of time is dominated by oil and gas which supplied 59% of our total energy in 1950, and is estimated to supply the same percentage in 1990, declining from 77% at present. This continued reliance on energy in the form of oil and gas, for which no viable alternatives appear possible in the near-term frame, plus the uncertain availability of large increases in foreign supplies, clearly demonstrates our need for increased development of our domestic resources of these fuels.
- 4) During the period from 1950 to 1990, only three new energy sources are indicated to appear, and of these three, nuclear is the only source expected to develop substantial capacity. Nuclear's percentage of the total energy supply picture is expected to be 17.5% in 1990. The other two new sources--geothermal and shale oil-- provide only negligible amounts of energy by 1990, and sources such as solar energy, nuclear fusion, and other exotics have not appeared on the chart by that time.

In addition to the high growth rate of energy use and its impact on declining domestic supply, another element that contributed to the development of our energy problem and shortage was the continuing growth of population which creates an additional demand for all types of products and in turn creates demand for more energy. In the year and a half prior to the embargo, demand for petroleum grew at an annual rate of 7%, almost twice the historic growth trend. This trend must be moderated, but also the needs of the people must be satisfied, and this means new facilities.

Companies have a continuing need to obtain sites for major petroleum and chemical facilities in locations which are compatible with both operating business requirements and local economic, environmental, and social needs.

Facility site selection decisions are based on a wide range of factors. Often the relative importance of selection factors is misunderstood or misinterpreted.

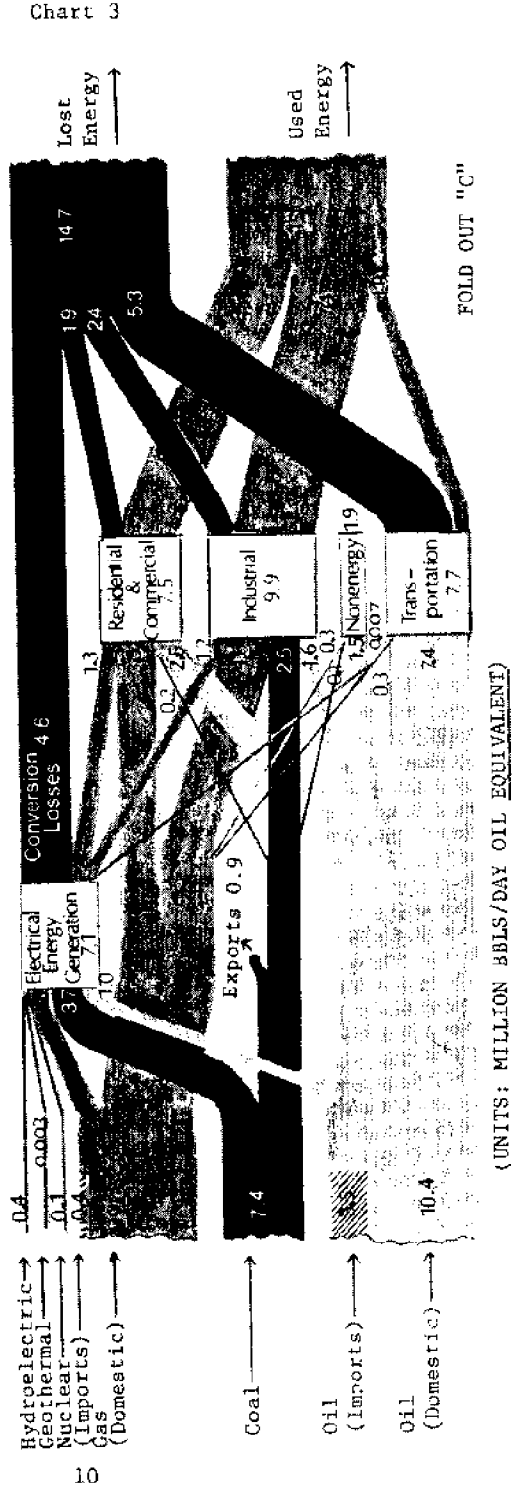
Site selection factors can be grouped in five major categories: environmental, general business, government-related, marketing, and production/manufacturing/transportation. Each of these categories will be discussed briefly.



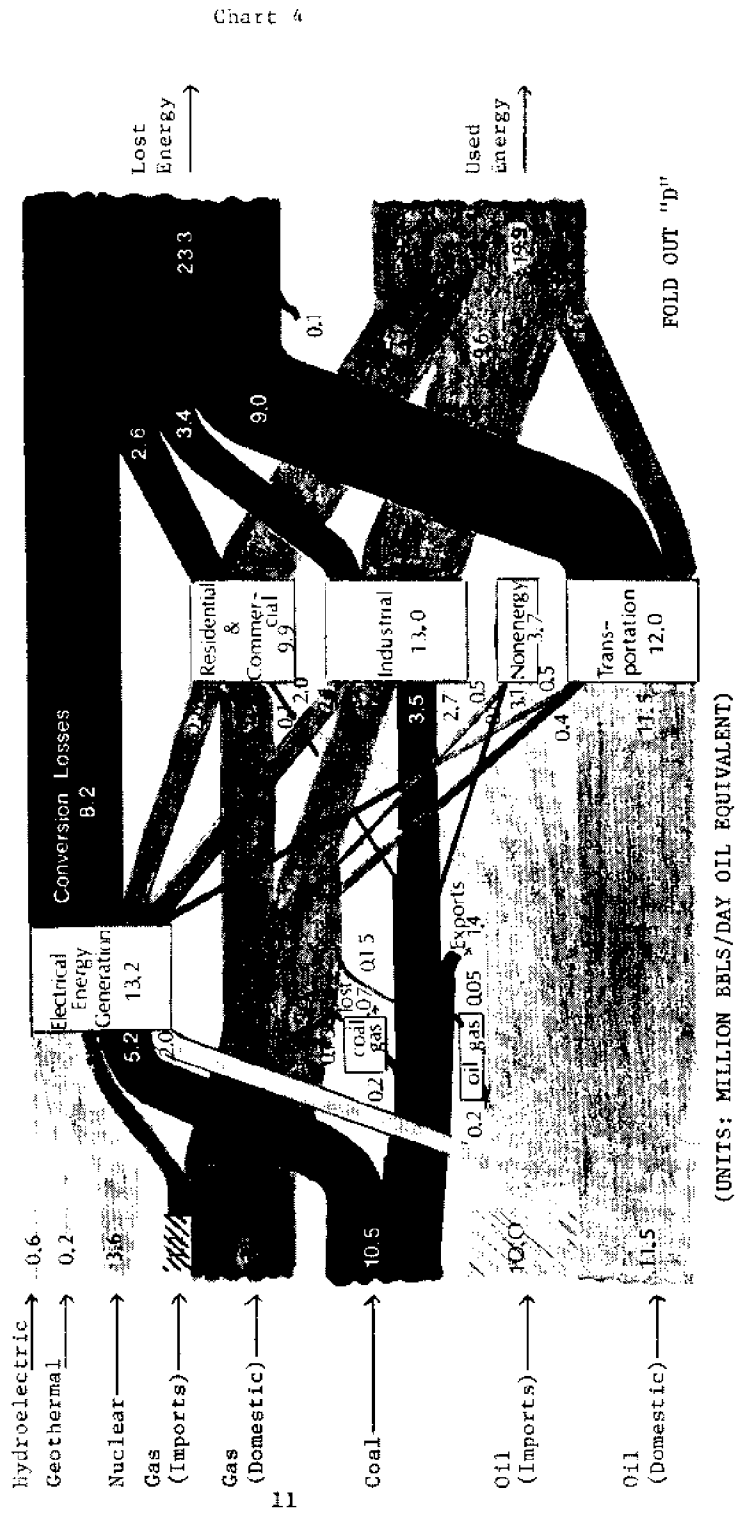


C

# TOTAL ENERGY FLOW PATTERN 1970



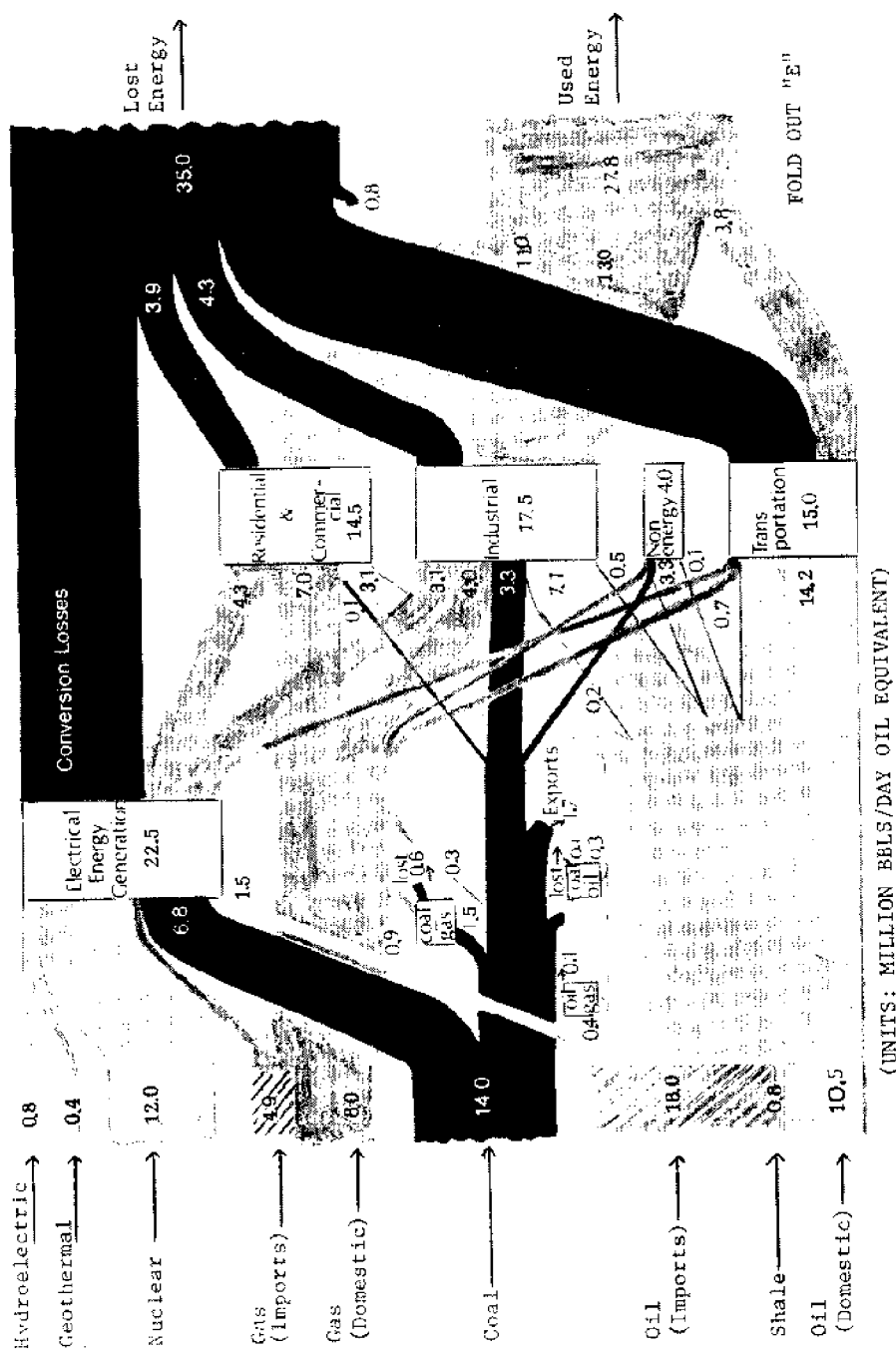
# TOTAL ENERGY FLOW PATTERN 1980



# TOTAL ENERGY FLOW PATTERN 1990

E

Chart 5



## Environmental Factors

Conservation of the environment is of major concern for companies to assure that operations and products do not create a significant hazard to public health and are compatible with community needs and environmental, social and economic aspirations. Additional objectives are to work with outside groups for a consensus on desirable and attainable standards, to work with governments to foster timely development of regulations, and to adhere to all environmental standards and regulations. In many respects, locating a facility in an area with an established, sound and well-planned program for further improvement of environmental standards is preferable to seeking out a "pollution haven."

Based on experience, there is little cost advantage in seeking out pollution havens for new facilities. The costs of environmental protection are real and represent about 10% of oil companies' annual capital expenditures in recent years. However, the cost of transportation of raw materials and products outweighs the cost of pollution abatement by more than a factor of five, and most of the factors noted later assume similar relative importance and so will enter more heavily in consideration of alternate sites.

The geography, population density, and ecology of the desired facility site must be taken into account. Access to transportation which minimizes environmental disruption is extremely important. Availability of water and waste disposal facilities must also be considered. Suitable living areas for employee residences, recreation, etc. are also taken into account.

## General Business Factors

Companies are not in business to earn quick returns, recover their capital, and then "get out" of business in a given project. On the contrary, decisions to make additional investments for expansion and modernization, for example, are likely to follow the initial capital commitment, so that the project is in a nearly constant state of evolution.

In the case of the extractive industries, of course, investments must be made where the raw materials are located. Successful discovery of petroleum resources, for example, generally leads to a chain of investments in producing, refining, transporting, and marketing the output. Beyond the producing state, these investments generally occur along the economically optimum transportation routes from producing areas to consuming areas.

## Government-Related Factors

Although some governments are concerned about certain negative aspects of industrialization, most seek to achieve a high and rising level of new industrial investment. Industrialization is seen as the principal means of maintaining an adequate pace of economic and social progress. Company facilities must integrate into the government's plans for the area. The company may be able to provide employment in underdeveloped areas where jobs are needed, or to serve as an energy and raw material source for industrial development goals.

Governments may act to ensure local production by means of tariffs, tax credits, investment grants, quotas, or other restrictions and incentives. Such actions can be constructive, but they can also inhibit the efficient use of resources if they are no more than shortsighted and defensive policies. In any case, these economic tools of government policy will be weighed into industry decisions on facility locations.

#### Marketing Factors

Marketing strategy is another dominant element in investment decisions. Investments targeted at large, prosperous and rapidly growing economies are highly desirable and must be consonant with government objectives.

The petroleum industry builds large, economically sized units for maximum efficiency. The industry initially moves products from one set of facilities to others within the region so that maximum advantage can be made of installed capacity. As market demand grows in the area immediately tributary to established facilities, products which were exported are shifted to the local market. This, in turn, results in a need for new facilities elsewhere. The new facilities become the source of products for exports. The same growth and shift in markets and distribution affect refining facilities, ports, pipelines, chemical plants, and terminals.

#### Production, Manufacturing, and Transportation

In producing crude oil and products, two critical factors which shape facility location decisions are transportation costs and raw material availability. The location of crude production facilities is, of course, dictated by the location of oil deposits.

Transportation is a significant factor in the cost of petroleum products, and transportation economics also are a key factor in establishing manufacturing locations. Since it is cheaper to transport crude than it is to transport products, refineries tend to be located at deepwater harbors or on crude pipelines in proximity to tributary demand centers.

The petroleum industry is capital-intensive, not labor-intensive. Since wages are only a small fraction of the total cost of petroleum products, they are a minor factor in decisions about the location of refining facilities. However, the initial availability of skilled labor in a potential plant site is a desirable feature from the point of view of both the company and the area.

Overall, production efficiency is one of the most important factors. Refineries are located to make efficient use of existing waterways, railroads, roads or pipelines, and to achieve economies of scale.

#### Summary

In summary, the selection of sites for new facilities in the petroleum industry is a complex affair. Because of the large investments that are required, decisions are taken with due regard for all the factors which

have been discussed. No single factor is determinant. Environmental protection is, however, an essential factor and we are determined that we shall not impact adversely on the environment, wherever new facilities are installed.

We have been actively supporting deepwater oil terminals for the United States since the late 1960's because we believe that very large crude carriers, or VLCC's, in combination with deepwater crude unloading terminals, provide the most environmentally sound and lowest cost system for handling the large volumes of imported crude which will be required to meet U. S. demands over the next decade or so.

Chart 6 shows the sources of crude oil supplies to East Coast refineries from 1970 through the first 10 months of 1973 in thousands of barrels per day. Historically, much of this crude came from domestic supplies--principally by tanker from the U. S. Gulf Coast. However, the Gulf Coast has changed from a crude export to a crude import situation, and the availability of domestic crude to East Coast refineries has been reduced dramatically. In 1970, about 55% of East Coast refinery runs were domestic crudes. During early 1973, domestic supply dropped to 15% of East Coast refinery runs while long haul Eastern Hemisphere sources increased to 60% of runs. If foreign oil is available, this trend will continue into the future.

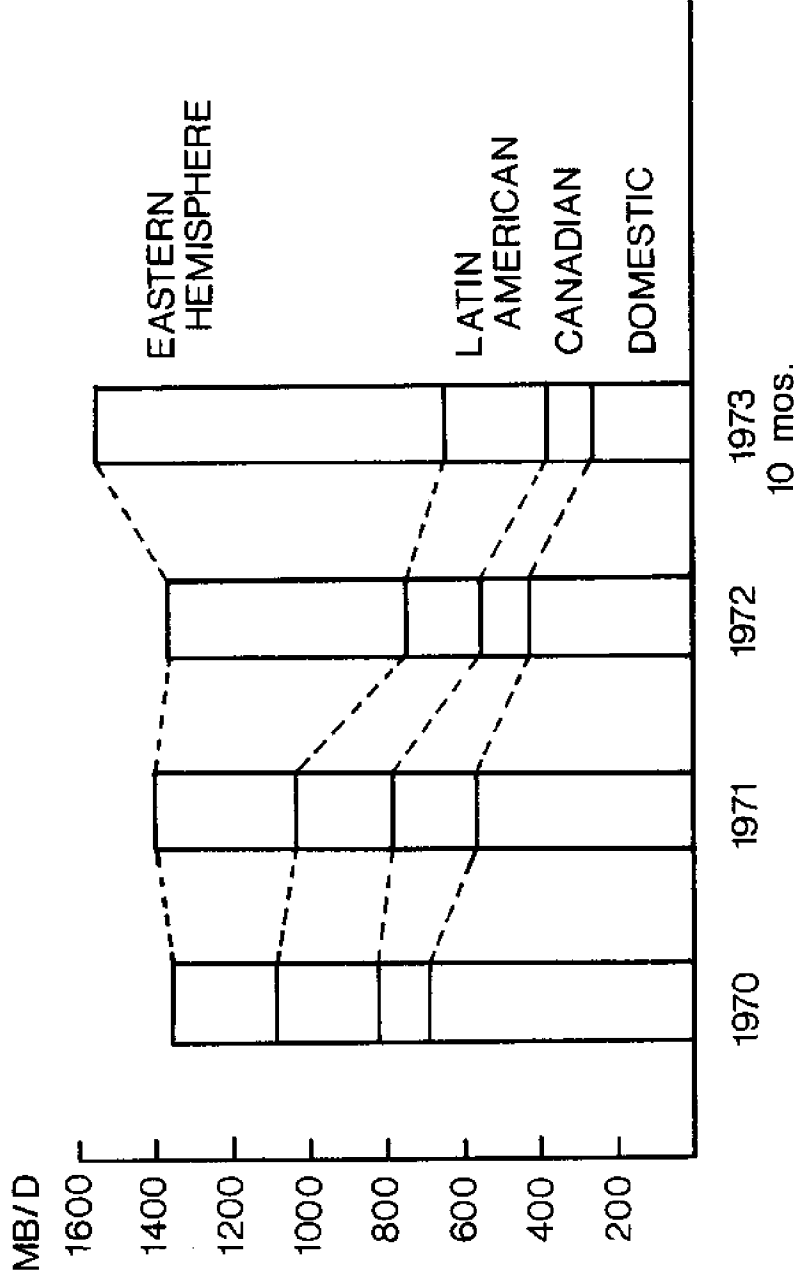
We are optimistic that in the long term the East Coast will develop crude producing capability offshore. However, long lead times are required to develop significant amounts of offshore production after exploratory rights are granted; and in the meantime, existing reserves will be depleted and demand will increase. Thus, even with significant new discoveries, we believe the East Coast will continue to require imported oil for many years.

Such foreign imports will continue to be predominantly from the Eastern Hemisphere. Now that the embargo is lifted, and if the Arabs continue to expand their producing capacity, imports will increase and can be expected to continue for some time. We, therefore, believe that long haul crude imports to the East Coast will be of sufficient quantity and duration to justify planning for construction of a deepwater terminal.

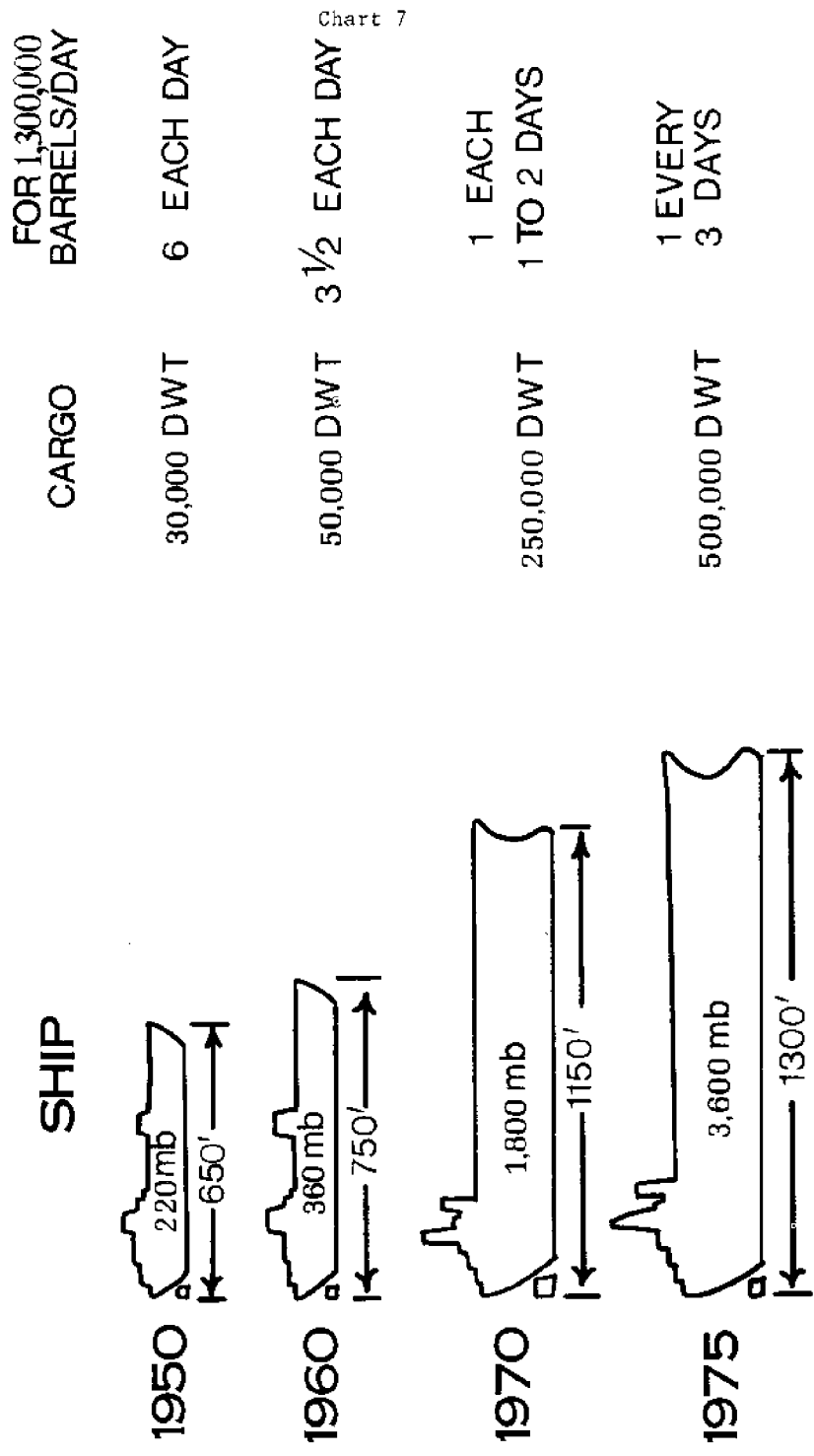
Let's look next at the impact of VLCC's on long haul shipping requirements. As shown on Chart 7, the 500 thousand dead weight ton class of VLCC currently under construction will carry 3.6MM barrels of cargo or over 15 times the cargo capacity of a 30 thousand ton vessel which carries only 220M barrels. It is, therefore, apparent that significantly fewer ships of VLCC size are required to transport crude imports than would be required with smaller vessels. Here is a key to reducing oil losses--reduction in ship traffic.

Unfortunately, the U. S. does not have existing ports capable of handling modern VLCC's. The largest vessels commonly used for delivering crude to the U. S. East Coast can carry only 75 thousand tons, but very few of our existing ports can handle even these tankers. In order to accommodate

# SOURCES OF CRUDE OIL EAST COAST REFINERY RUNS



# TRENDS IN TANKER SIZE



deep draft VLCC's, deepwater crude unloading terminals are needed. The Federal Council on Environmental Quality<sup>1</sup> has concluded that utilization of very large crude carriers, in combination with deepwater terminals, would reduce spills by a factor of 10 compared to current operations.

VLCC's and deepwater terminals also offer substantial economic advantages over smaller vessels. Thus, Chart 8 indicates that a 250 thousand ton ship can carry crude for about 45% of the cost per barrel of a 30 thousand ton ship. Similarly, the relative cost of a 500 thousand ton ship is only 38% of the cost of the smaller ship. We believe that potential environmental and economic advantages of deepwater terminals outweigh the associated investment risk and that an East Coast deepwater terminal should be constructed as soon as practical.

Let's look now at some of the important criteria for selecting a deepwater terminal site:

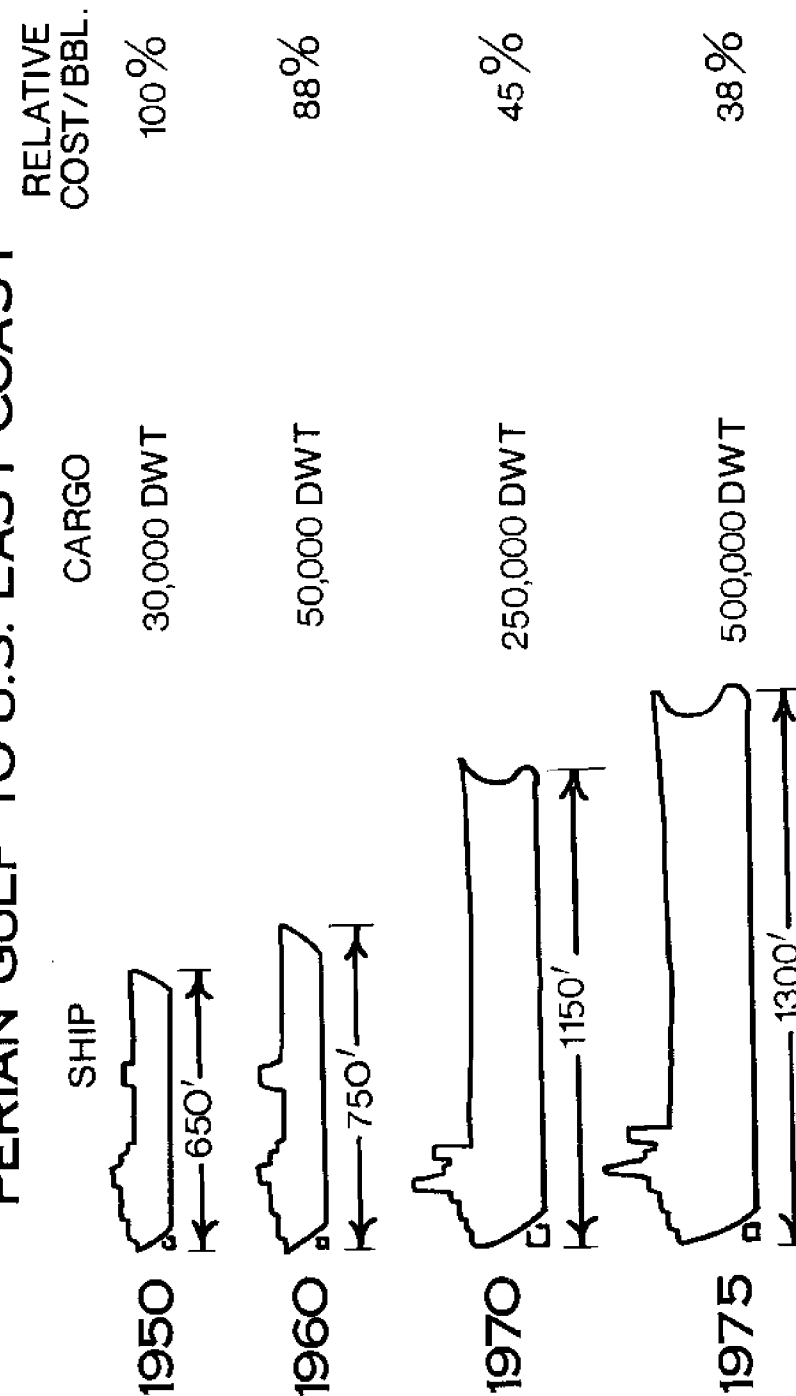
- 1) First is proximity to refining centers. Since the cost per barrel declines as thruput increases, economies of scale favor building large terminals to serve more than one refinery.
- 2) Second is adequate water depth for VLCC's expected to call. As we saw earlier, the 500 thousand ton class of tanker may draw 95 feet when fully loaded. Use of the largest VLCC's reduces long haul costs.
- 3) Favorable weather and sea conditions are needed to prevent excessive unloading facility downtime.
- 4) The fourth item is environmental impact. Consideration must be given to the potential positive and negative impact the facility could have on the near shore ecological system. This includes such factors as dredging, effect of potential spills and changing ship traffic levels and patterns.

One terminal design, Chart 9, which is being developed for Gulf Coast locations may also be attractive on the East Coast. This is the single point mooring (SPM) or monobuoy cluster as shown here. The tanker is moored to a monobuoy far offshore with connecting pipelines to a pumping platform and onshore storage facilities. SPM's are capable of operating in considerably rougher seas than other terminals and can, therefore, be located much farther offshore and in relatively unprotected areas. Over 100 SPM's are in use around the world. They offer a high degree of safety and minimum construction impact.

With the SPM facility, tankers stay far offshore. This results in several environmental advantages. By virtue of the remote offshore location, ecologically sensitive bays and estuaries will not be harmed by minor accidental spills. In the unlikely event of a major spill offshore, the toxic portion of the crude has a chance to weather, and there is less chance that any of the material will reach shore. In addition, the offshore facility further

Chart 8

### TRANSPORTATION COST - 1980 PERIAN GULF TO U.S. EAST COAST



# SPM OFFSHORE TERMINAL

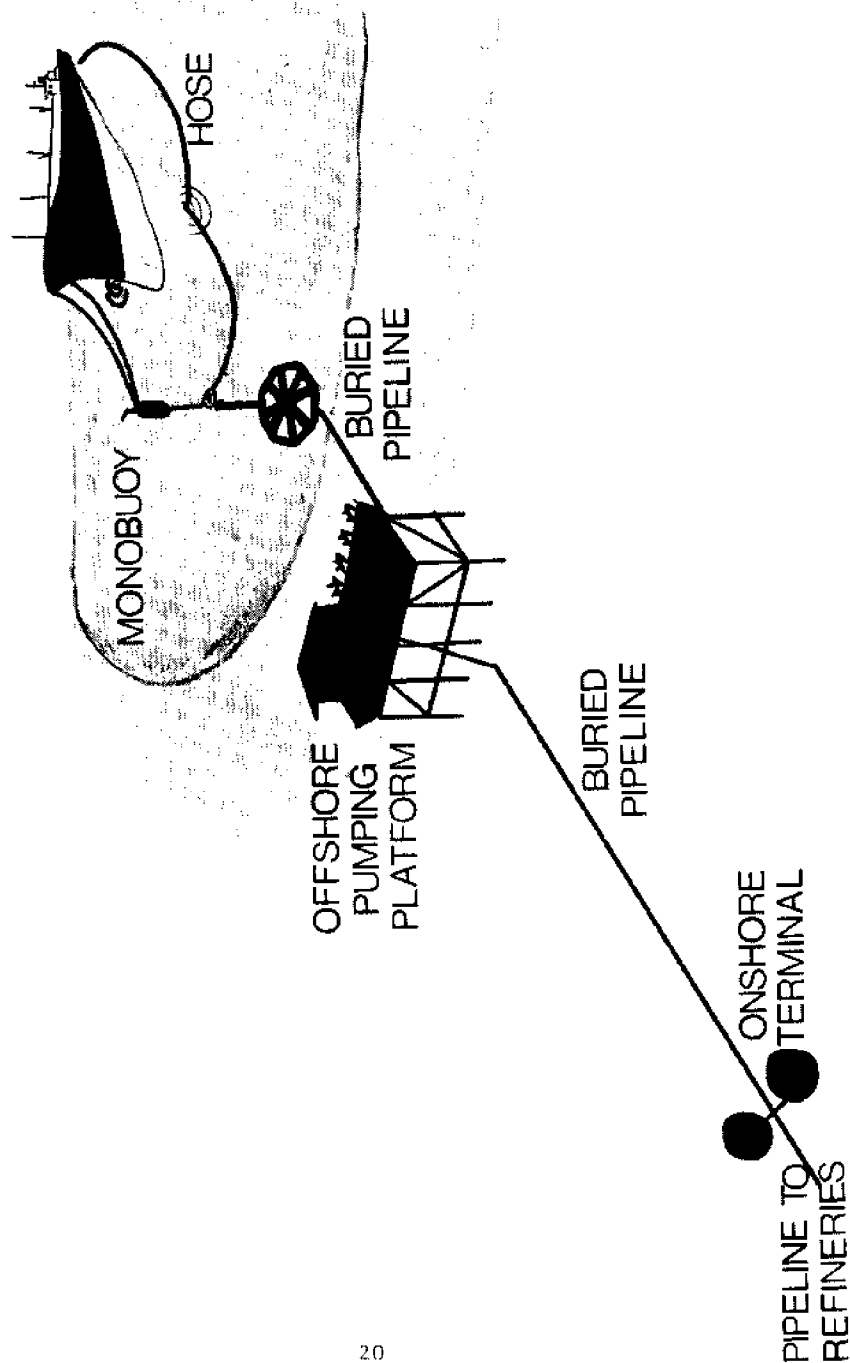


Chart 9

reduces the chance of tanker accidents due to a substantial reduction in tanker calls and by allowing the ships to maneuver in the open sea rather than in narrow channels, harbors, and bays.

Chart 10<sup>2</sup> shows historical data on collisions and groundings and dramatically demonstrates that most oil spill accidents occur when harbor congestion is great and where ship maneuverability is restricted by narrow, winding channels. As you can see, such accidents are quite rare on the open sea. Exposure to this type of accident will certainly be reduced if the VLCC delivers its crude to an offshore deepwater terminal which would utilize the latest traffic control and communications technology.

We are aware that the potential impact of a deepwater terminal on regional development is one of the major concerns of the citizens of areas considered potential sites.

There is an economic incentive to expand East Coast refining capacity. This incentive will exist both with or without a deepwater terminal. Expansion of East Coast refining capacity would provide jobs and add a significant tax base. Also, the location of both new refineries and expansions can be controlled through state land use planning that will permit multiple uses in a compatible manner. We do not believe prohibition of a deepwater crude terminal is either an effective or intelligent way to control industrial land usage.

As mentioned earlier, resource extraction must take place where the resource is located and this applies offshore as well as onshore. We believe the offshore areas of our continent offer the best chance for the U.S.A. to improve its domestic energy supply.

Shown on Chart 11 is the continental margin of the United States out to 2500 meters of water. Less than 3% of this approximately 1.3 million square miles of area has been offered for lease, and the remainder offers much potential albeit mostly in deeper waters and more hostile environments.

The small portion of our continental margin which has been explored and developed now produces some 17.3% of our domestic oil and 18.9% of the natural gas. This is projected to have the potential to rise to approximately 30% of our domestic production by 1985. In the U.S., over 18,000 offshore wells have been drilled without any evidence of permanent damage.

Exploration and producing operations on the continental margins of the various countries is a worldwide activity. At the present time, some 40 countries have or are about to have offshore production and some 60 other countries have offshore exploration activity. These countries are all using U.S.A. technology.

Since 1960, U.S. oil companies have been exploring the East Coast as a potential source of new oil and gas resources. This effort, primarily geophysical, has resulted in the location of three major areas which appear to be promising: (Chart 12) the Georges Bank area off New England, the

CHART 10

LOCATION OF TANKER ACCIDENTS

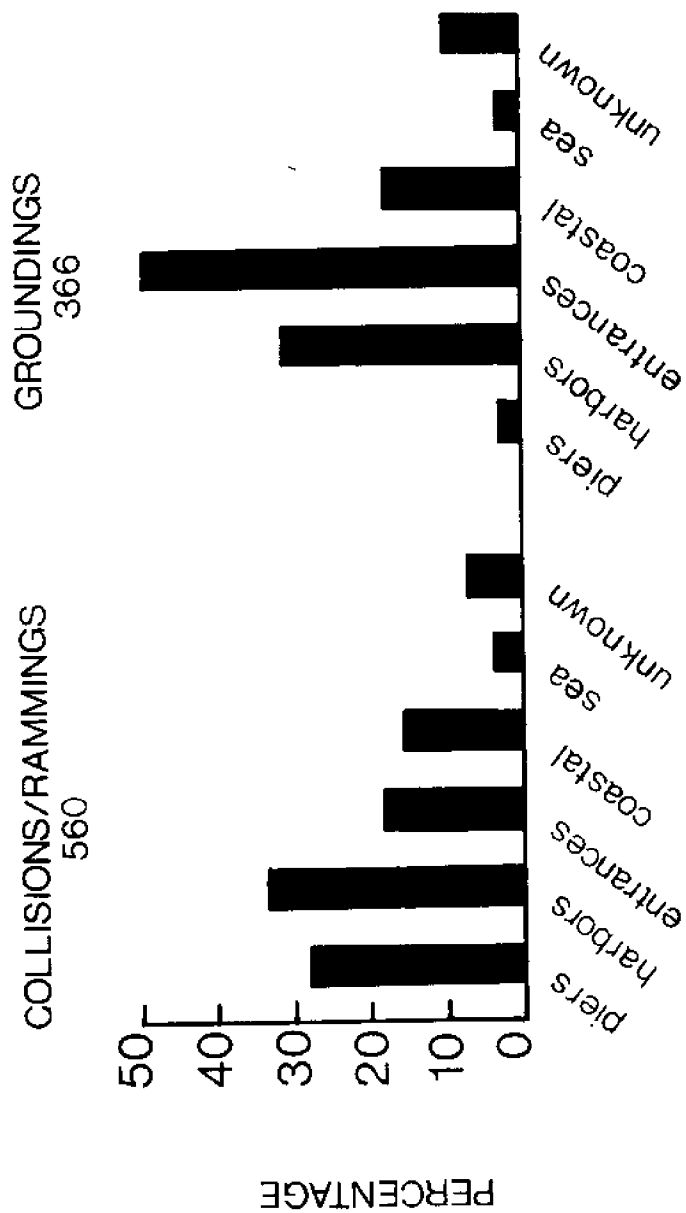


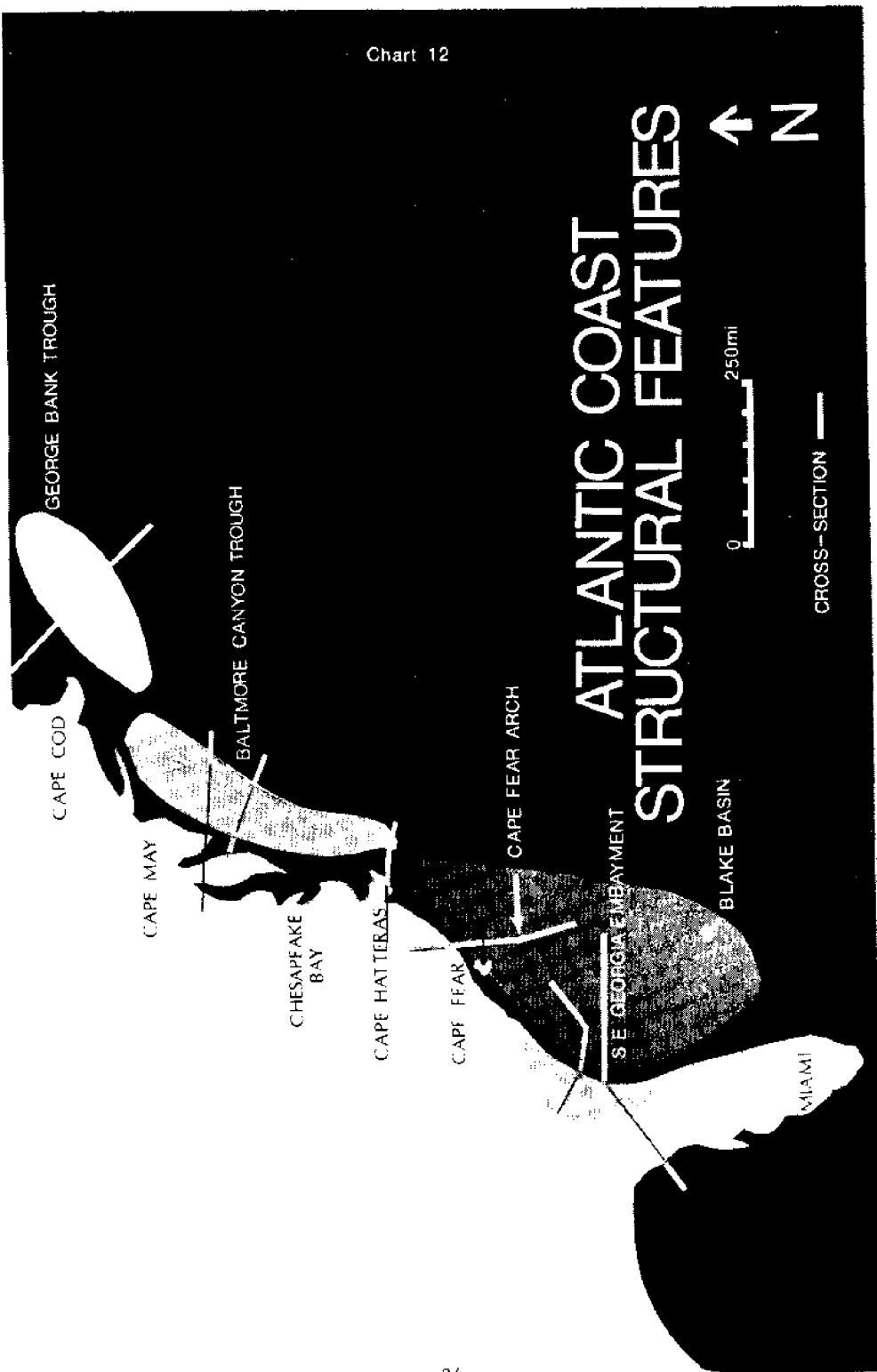
Chart 11

CONTINENTAL MARGIN



HDQ. 18-KK





Baltimore Canyon area off the Mid-Atlantic states, and the Blake Plateau off the southeastern states.

Optimism concerning the areas is encouraged by the thickness of sedimentary rocks shown on Chart 13. Onshore rock sections are thin and offer few possibilities for production. The area above the dark color indicates rocks that potentially could produce oil and gas. You will note these thicknesses occur far from shore, in this case, approximately 100 miles offshore. The Atlantic has never had a well drilled offshore from the top of Maine to the tip of Florida. The only way we can determine whether oil and gas is present is by means of drilling wells.

Information from the exploration efforts has permitted the United States Geological Survey to make estimates of potential oil and gas resources in offshore areas. Their latest estimates indicated the U.S.A. offshore may contain potentially recoverable resources of 65-130 billion barrels of oil and 395-790 trillion cubic feet of natural gas. Of these, the Atlantic may contain 10-20 billion barrels of oil and 55-110 trillion cubic feet of natural gas. I must emphasize these are only estimates and drilling will be required to determine the amount, if any, of petroleum present and economically recoverable.

Before drilling can take place, environmental impact statements must be prepared, public hearings conducted, and comments obtained from governmental agencies. Then, if a favorable decision is reached, a competitive lease sale will be held and leases awarded to the successful bidders. Then, only after proper governmental approvals can drilling be conducted under strict government agency supervision.

Our job is to furnish the nation with adequate energy while preserving and protecting the environment.

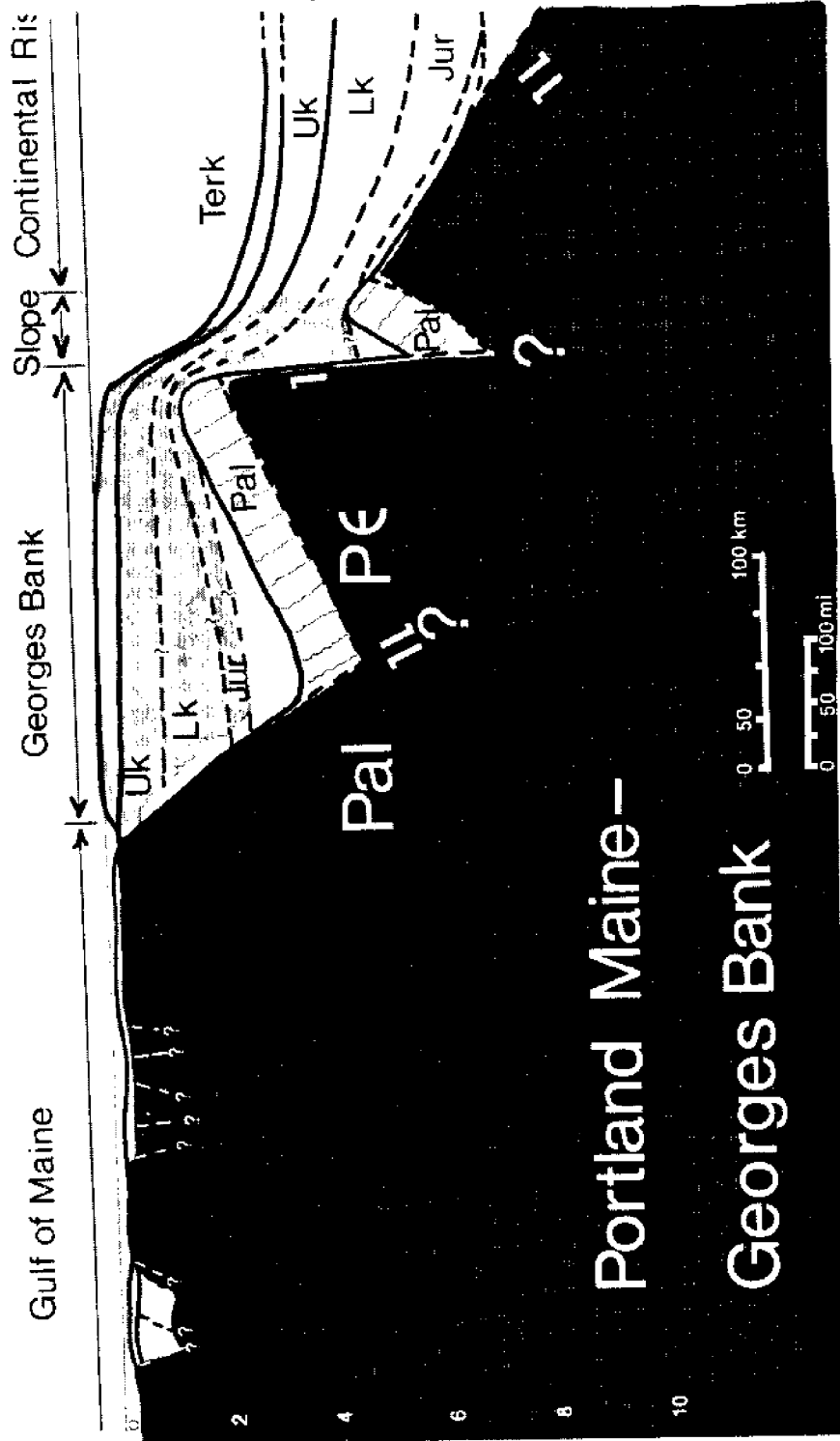
Given the proper incentives and governmental climate, the private free enterprise energy industries can accomplish this objective.

<sup>1</sup> Statement by Russell Train, Chairman of CEQ, before Senate Commerce Committee, March 6, 1973. (Based on data supplied by U. S. Coast Guard.)

<sup>2</sup> Tankers and the Ecology, Joseph D. Porricelli, Virgil F. Keith and Richard L. Storch, U. S. Coast Guard. Society of Naval Architects and Marine Engineers Transactions, Volume 79, 1971.

<sup>3</sup> An Analysis of Oil Outflows Due to Tanker Accidents, V. F. Keith and J. D. Porricelli, Undated (about 1972).

Chart 13



WHAT THE REGION NEEDS

John G. Buckley

I want to talk about the changes that have occurred in the last six months, because they have been very dramatic; about the impact of those changes on New England's competitive posture; and then a little about how many refineries are needed here, what kind, and where they ought to be built.

First of all, with respect to regional needs, New England has a unique demand pattern, unlike any other region in the United States. Prior to the embargo and to the reductions in demand that occurred this last winter in the use of heavy fuel, industrial fuel, and heating oil, we had a demand pattern that called for roughly 1,100,000 barrels of oil per day. This means that this small six-state area with 6% of the U.S. population uses about twice as much oil as is used in the country of China and more than Brazil and Argentina combined.

Among the various oil products, our largest single product use is accounted for by heavy industrial fuel, sometimes called number 6 oil, sometimes called residual fuel. I'll simply call it heavy industrial fuel. We used almost half a million barrels a day of that product prior to the embargo, about half of it used by utilities to generate electric power. Just prior to the embargo the electric utilities were generating about 69% of all their electric power in New England by burning heavy industrial fuel. Of the remaining half of heavy fuel, almost half of it was used by industry, primarily for process use, generating (creating) steam to run process equipment, and also a small part of it for heat. The balance is used by commercial and residential buyers. These users include large apartment houses, schools, hospitals, stores, and others who have large furnaces, and have found economies in the past in burning this fuel rather than the lighter home heating oil.

Our second largest product demand is for home heating oil, sometimes called diesel fuel, and it does just what it says; it heats homes. It is used to some extent by industry for heat load as well, but about three quarters of our homes in New England are heated with home heating oil. It accounts

*\*Mr. Buckley is Vice President of the Northeast Petroleum Industries, Inc. He is a graduate of Tufts University and has a Master's Degree in International Economics from the Fletcher School of International Law and Diplomacy. He has seventeen years of experience in international and domestic fuel marketing and presently serves as a member of several industry councils and also the Governor's Emergency Petroleum Committee in both Massachusetts and Rhode Island.*

for--or did account for--about 360,000 barrels a day of demand. About 22 or 23% of the nation's heating oil is used in New England.

The third product, of course, is the familiar product of gasoline, slightly smaller in demand than heating oil. Then we have all the other products--such as jet fuel and kerosene--relatively small in their total but important in some regions.

So we stand, then, with a unique demand pattern. All the rest of the country, every other region, uses more gasoline than any other product. Residual fuel is an important industrial fuel elsewhere on the east coast, but it accounts for a far smaller share of total energy use in the mid-Atlantic or the south Atlantic area. Heating oil is basically a northeast U.S. product. I told you New England accounts for 22% of the nation's use, and if you add in New York, New Jersey, and Pennsylvania you've got about two-thirds of the total demand for heating oil nationwide. Other parts of the country use other energy forms, primarily natural gas and coal.

With our unique dependence on these few products, which are not used to nearly the same extent elsewhere, we found ourselves this last winter, with the embargo on, with foreign crude oil prices rising sharply, and with foreign product prices rising even more sharply, in a very similar situation to Europe and Japan. Our currency--our competitive posture--has been hit just as those countries' currencies have been hit, or just as the U.S. dollar has risen in value relative to those countries, because the U.S. as a whole has been impacted less than Europe or Japan, whose economies are much like New England's--that is, very dependent on heavy fuel use. Industrial fuel is the largest product used in all of these areas. So we in New England face and have faced a unique problem in the U.S. similar to the problems facing Europe and Japan. Our own competitive position has grown much worse in the last six months.

I would like to note that all of our heavy fuel, our industrial fuel, is imported. Thus a dependence on it makes us uniquely vulnerable to international changes in supply and changes in price. We did have about a 25% shortage of industrial fuel this past winter. It could have gone to 30 or 40% had not Europe been relatively freed from the embargo early so that supplies could keep flowing from that source. But we did have about a 25% reduction in industrial fuel oil availability starting in December.

This shortage was overcome largely because we had a much milder than normal winter, particularly in January and February, and because companies and individuals conserved. Some of the conservation figures were very dramatic. So we did end up getting through the winter, although it was very, very precarious for some time. U.S. refineries made more fuel products. They received the incentive to do so through changes in pricing by the Cost of Living Council, and they were asked to do so rather vehemently by Secretary Simon. So we had more fuel products coming from U.S. refineries. We had a smaller demand due to weather. We had a small demand due to conservation, and we got through the winter.

We got through at a very high price, though, because in November Venezuela (which is the largest single source of our heavy fuel imports, either directly from refineries there or from Caribbean refineries that run Venezuelan crude oil) doubled its tax reference value on which taxes are paid by the companies that produce and refine in Venezuela. Then on January 1 they doubled their tax reference values again. These tax moves really hit hard at heavy fuel prices. For example, 1% sulphur heavy fuel, the type used commonly in most of Massachusetts and Rhode Island, (a lower percentage of sulphur is required in Connecticut and Boston and a somewhat higher level is permitted here in the northern three states), sold last October at about \$3.50 per barrel.

This was already two and a half times higher than it sold for back in 1969, but the sulphur content back in 1969 typically ran 2.2, 2.5, or 2.8%. The more recent sulphur requirements and the general tight supply of heavy fuel had brought the price up to about \$3.50 in October. In late February or early March this year, our own company, which supplies a large volume of industrial heavy fuel in New England, had a posted price at our rack of \$14.68 per barrel. Now, with the embargo over, Arab oil is flowing to European refineries (Arab oil from the Middle East is still much less costly than Venezuelan), and European refineries are in turn selling heavy fuel to the U.S. east coast. Venezuela rather than dropping its price has dropped its production, and so we have been able to bring that price down from \$14.69, and the industry average now in Boston Harbor for 1% heavy fuel is in the \$12.50-\$13.00 a barrel range. Still, compared to \$3.50 last October, it's been a very dramatic escalation in price, and there's no indication that that price is going to do anything except stay where it is--perhaps go down a few cents--but we're looking at this kind of price level from here on out.

What does that mean? What it means is that any industrial operation in New England that uses very much industrial fuel has some problems with cost competitiveness. If it happens to be a fuel-intensive industry, one that uses a great deal of heavy fuel, the problems are worse. An industry like the pulp and paper industry (and I'm talking not only about newsprint but fine bonded paper, electrostatic-treated paper, corrugated boxes, and any of those paper-related businesses, of which there are many here in New England including many in New Hampshire) tends to use a large amount of heavy fuel both as a percentage of their total cost and in absolute terms.

Typically a large paper company here in New Hampshire, or in Maine, might use a million and a quarter to a million and a half barrels of heavy fuel a year, so at \$3.00 a barrel or \$3.50 a barrel, such a firm was looking at a \$5 to \$6-million annual expenditure. At \$12 or \$13 a barrel they're talking about \$16 to \$19-million a year of expenditure. That's a very significant part of their cost. These firms are not operating in a vacuum. New England firms are competing with paper companies that are located in the southeast where trees grow faster, where labor costs less, and where there are other alternative fuels which have not risen in value anywhere near this percentage--particularly natural gas, which is, of course, sold on an interstate basis at prices controlled at extremely low rates.

What was a significant disadvantage has now become a very, very serious problem for firms of this type, firms like plastic companies, chemical companies, greenhouse operators. If any of you bought any flowers for Mother's Day, you know what I mean. Brick manufacturing and some other companies that don't have a high percentage of total cost in fuel but still use a lot of it are affected. General Electric in Lynn, for instance, makes turbine engines. They may also use a million barrels of oil a year. Three and a half million dollars for fuel costs a year ago was significant. Twelve or thirteen million dollars of cost--a ten million dollar differential--comes right out of the bottom line. And you have to fear that with so many New England companies with headquarters outside New England (if you go over the list of big manufacturers and big companies in New England, you'll find many of them headquartered in New York or Pittsburgh or Philadelphia or Kalamazo, Michigan), the management of those companies, looking at their New England operations, have to look at the effectiveness and competitiveness of those New England operations. If there's any one place where they're going to cut back, they're going to cut back the least efficient unit. If there's any one place where they want to grow, it's not going to be in an area that's completely dependent on imports and with high cost energy.

So we are facing a situation in New England where our competitive posture has been dramatically altered in a negative way, and realistically we ought to be thinking about how we can solve this situation, how we can indeed become competitive again. There are those who would like to see New England become a national park. I suggest to you that this is not really an attractive way to go, that part of our success, part of the charm, part of the fun of living here is that we're a viable economic area, and we keep some of the attributes of the beauty that we have as well. It would not do and will not do simply to let companies go out of business, to remain uncompetitive, and to see the general economic viability of New England continue to lag behind that of the rest of the country.

Obviously, oil refining here would help. How would it help? Well, I mentioned that we depend on imports for virtually 100% of our industrial fuel. We also depend on imports for a significant portion of our home heating oil. If we had refining capacity located in New England, then we would be drawing supplies of these products from our own refinery, not from a Caribbean plant or from a Venezuelan plant or from any other plant that was under control of a foreign governmental entity where prices could be changed arbitrarily and have been changed arbitrarily at the will of those governments.

Refineries in New England, particularly refineries that were attuned to New England's unique demand pattern, refineries that would turn out a large percentage of industrial fuel and a large percentage of home heating oil--that type of refining would not only give us more security of supply (companies worry about security of supply after this past winter), but would also give us more attractively priced supply.

Why do I say that? Well, there are two federal programs that directly impinge on the cost of our fuels. The first is a program that was put in place in April, 1973, taking the place of the mandatory oil import control program. As you know, up until a year ago there were mandatory quotas on imports of products and on imports of crude oil. That program was tossed out, and we now have a tariff or fee system. The fees are set up to encourage refining in the United States. The fees are gradually growing on product imports, so that two years from now every barrel of product will bear a fee of 63 cents a barrel. That's about a penny and a half a gallon. The fees for crude oil imports are set at 20 cents, and for a new refinery three-quarters of that 20 cent fee is eliminated for the first five years of operation. So in looking at a new refinery in New England producing fuel products and some gasoline, you can see a 58 cents a barrel advantage compared to bringing in the same products from an eastern Canadian refinery or a Caribbean refinery. These lower fees, or incentives for domestic refining capacity, certainly would make us somewhat more competitive on fuel cost than simply continuing to do what we do now, bring in products from abroad.

Secondly, in November of last year the President signed into law an Emergency Petroleum Allocation Act. Under that Act, imperfectly regulated to now but constantly being revised, there is a stipulation that new refining capacity will share on a pro rata basis a percentage of domestic crude equal to the average U.S. refinery use of domestic crude. At the present time we produce about 70 percent of the total crude oil needed by domestic refineries, so that the first new refinery would get about a 70 percent allocation of domestic crude oil. Why is this important? Domestic crude oil is under price control. About 70 percent of our total domestic production is currently price controlled at \$5.25 a barrel. The average cost of landing even the lower cost Middle East crude in the United States is up in the \$11-\$12 a barrel range. Now, if you built a New England fuel refinery, you wouldn't have to actually physically use that domestic crude. You probably wouldn't. You'd probably build a plant designed to run Middle East crude because most of our domestic crude is "sweet," low sulphur type crude, and many of our refineries can only operate on domestic oil. A new one, thus, should have flexibility to operate with foreign "sour" crude. But via exchange or via selling our entitlement to domestic crude, you would put U.S. domestic crude economics behind such a refinery, and I suggest to you that there may be two or three or four dollars a barrel advantage as compared to simply depending on imports of foreign product.

So these two federal programs add up to an enormous incentive both to have fuel capacity and storage capacity of that fuel here, but more importantly to get our relative cost of fuel back down towards the energy cost of other regions in the country so that our general industrial base is and remains competitive with the rest of the country.

How many plants would we need? Mr. Gregg suggested six or seven. I would think if we looked at three or four of the 200-250,000 barrel a day size plants, we're getting up close to our 1,000,000 or 1,100,000 barrels a day

of needs. Plants can always be expanded, and most are built to be expanded, and I would think that probably the number three or four would be a more realistic number to look at over the balance of this decade.

I'm perhaps flawed somewhat as an oil man here, because I'm also on the Advisory Board of Save the Bay in Rhode Island and have gone through an exercise of trying to win approval for a plant, a refinery, and been turned down. So I'm somewhat scarred, but I'm also somewhat realistic about the tradeoffs needed to get refining built. I think I've also learned something about the legitimate concerns of people with respect to plant siting, and I would suggest to you that what we have to do to get this kind of refining capacity is not to have an oil company simply surfacing with a project that everybody reacts to, but to develop political and environmental leadership to back refining projects. New England in my view needs refining far more than the oil companies need New England. We're going to have to have political leaders, and responsible environmentalists, working with oil companies and the oil industry to develop the criteria, to develop the positive atmosphere needed to build these plants. That means that they have to be built in a responsible way.

In my own view, they probably all have to be built inland. We have some beautiful coastline in New England and, unfortunately for the oil industry, most of it is used today in a very heavy recreational way, in a tourist-oriented way, and these are economic facts. I think we're going to have to look not at the coastline, just because it's the most economic way to go. We're going to have to get a regional refining capacity making the right kind of products for our demand, and we're going to have to tie those plants into a coastal area which merely serves as a point from which to bring crude oil in. Then by underground pipeline off a right-of-way of a railroad or a highway we will move it to an inland site that can't be seen from the water so that the recreational value, the aesthetic value, of the existing coastline is kept.

At such an inland site one should find enough land to build a refinery with a sufficient buffer around it, so you don't have light problems, you don't have odor problems, and don't have noise problems. Certainly with existing new EPA standards on refineries, you don't have water problems or air emission problems. That doesn't mean you can build a plant that doesn't have any emissions. Of course a plant will have emissions, but I'm talking about a plant that, let's say, has an air quality emission problem equivalent to that of the University of New Hampshire--not a steel mill, but the University of New Hampshire. Technology is there to do that today. The land use and siting function is a critically important one, and I do think that the day when an oil company could simply raise its head and say, "We're going to build a plant here," is over. There aren't going to be any successful plants built that way. There's going to have to be a coordinated effort with political leaders in both the legislative body and the executive branch, with environmental leaders, and with the general public participating in the decision of exactly where you build in a way to minimize the environmental impact.

#### TRADE-OFFS--ECONOMIC CONSIDERATIONS

John Devanney

I'd like to start off by saying one word about the problem definition: "Does New England need refineries?" It seems to me that we're a little bit too loose in our usage of the word "need." Interpreted strictly, I think the question, "Does New England need refineries?" is easily answered, and the answer is "no." If the region opts not to have any internal refining capacity, the world won't end. The region will not become an energy desert, at least not much worse than the rest of the world. We might, probably will, be slightly poorer in terms of market wealth without regional refining than with it. But there is no law of nature or economics that says we have to supply our own refining capacity. It should be a conscious decision on our part.

A more interesting question, it seems to me, is "Would New England be better off with domestic refining?" That question is a lot harder to answer, and I for one certainly can't answer it, but I am going to attempt to show some insight on one of the dimensions of the answer, which is the effect of regional refining on regional income, real regional income--that is, the market value of all the goods which this region can consume.

Now, real regional income is only one measure of New England's well-being. However, it is undeniably important. Almost all the homes in New England would welcome a little more income. Certainly mine would. Many can ill afford a little less. But the interesting thing to me about real income is not its importance, but the way people get twisted around on it. Fallacious reasoning about the economic impact of a development on a region advances to the point where it approaches conventional wisdom. And I'm going to attempt to back this statement up with a very rough analysis of New England refining.

In order to have something concrete in mind, let's think in terms of the provision of a single refinery with the general characteristics shown in illustration 1.

*\*Mr. Devanney is Associate Professor for Marine Systems in the Department of Ocean Engineering at the Massachusetts Institute of Technology. He did his undergraduate work also at M.I.T., and earned his Master's Degree there in Naval Architecture and his PhD. in Operations Research.*

ILLUSTRATION 1

GENERAL CHARACTERISTICS OF BASE UNIT REFINERY

Simple Fuels, 250,000 BPD	
Permanent Payroll	About \$4,000,000 per year
Construction Payroll	About \$40,000,000
Property Taxes	\$250,000 - \$2,500,000
Value Added	About \$150,000,000 per year
Total Value of Output	Roughly one billion dollars per year
Profits	???

This is a fairly simple fuel refinery of about 250,000 barrels a day. As it has already been pointed out, the New England oil market is large enough to support three or four more of these. However, since the effect on regional income of two such refineries will very roughly be about twice that of one, we can use this refinery as kind of a basic unit. Such a refinery would involve initial investment on the part of the developer of about 400 million dollars. It would employ perhaps 400 people on a permanent basis and require about 3,000 to 4,000 man years of construction labor. The permanent payroll would be in the neighborhood of about 4 million dollars per year. Construction payroll would be up in the neighborhood of 40 million dollars. Local property taxes? UNH recently looked at property tax laws of several southeastern New Hampshire towns and came to the conclusion that under present rules such a refinery would pay somewhere between \$250,000 and \$2,000,000 plus in property taxes, depending on the town. It will cost the refiner about \$1.50 a barrel to turn crude oil into something approaching the New England product mix. The value added would be about \$150,000,000 per year. Total value of the output at today's prices is going to be in excess of 1 billion dollars a year. So we certainly have a strong backing up of Mr. Jackson's comment that labor is quite small. This is an extremely capital-intensive business. Labor is not an important dimension in this problem as far as the investor is concerned. The interesting question it seems to me is, "How much money is this refinery going to make?" This is interesting from two points of view. First, if that money is a substantial share of the value added to the output, that's a big figure that we should consider. The second thing is that the question of whether or not the reduction in costs due to the savings associated with local refining is going to be passed on to consumers is intertwined with the refinery's profits. There are going to be savings--transport savings, distribution savings--associated with putting a refinery capacity in the region. The interesting question is, "Who's going to get it?"

At this point, I'm going to make two very important assumptions, and this is just so that we can think of one thing at a time. Mr. Buckley has already referred to two things that are of utmost importance to this problem. I am going to assume that this refinery will not be faced with embargo, that the refiner, whoever he is, will be able to purchase crude at the going market price. And I will also assume that there is no domestic price control of either crude or products. As Mr. Buckley has pointed out, at least the second one is patently false at the moment, but these two simplifying assumptions will help us get our thinking started. Under these assumptions, the local price at which the local refiner will be able to sell his products is going to be determined by his competition. It's going to be determined by competition on the margin. Price for each of the products will be determined by the most expensive source of those products which actually supplies the region. This most expensive unit of product might come from a European refinery--OPEC crude to a European refinery and then to the region--or might come from a country closer to home, either in eastern Canada or the Bahamas. If domestic refining did expand quite a bit, it might come from the U. S. Gulf or Puerto Rico or the Virgin Islands domestic refinery still using OPEC crude. And finally it's at least conceivable that domestic refining could expand to the point where the most expensive alternate source of fuel would drop to a refinery in the middle Atlantic. I've listed these possibilities in illustration 2.

ILLUSTRATION 2

ALTERNATIVES WITH RESPECT TO MARGINAL COMPETITOR

- 1) Europe
- 2) Eastern Canada-Bahamas
- 3) U. S. Gulf-Puerto Rico
- 4) Mid-Atlantic

Assuming that there are deepwater terminals in all these areas, and the domestic refinery has a deepwater terminal, I've listed, in illustration 3, these possibilities in rough order of most expensive to least expensive, and I have come up with a very rough estimate of what the differentials are between these sources. These differentials are approximate--probably only right plus or minus 25 percent. We asked several regional organizations to give us money to run through these hypotheses in detail, but nobody seemed to be interested.

ILLUSTRATION 3

DEVELOPER DIFFERENTIALS

Rough Estimates Of Deepwater New England  
Versus  
Deepwater Outside (per BBL)

	Crude	Transport	Tariff	Refining	Products Dist.	Total
Europe	0		50¢	-20¢	40¢	70¢
Eastern Canada- Bahamas	0		50¢	-30¢	15¢	35¢
Gulf-P. Rico	0		0	-20¢	45¢	25¢
Mid-Atlantic	0		0	0	15¢	15¢

It is typical of how we handle things that whenever we look at a development, we always concentrate immediately on employment, property tax, etc., but nobody ever looks at the output side. Assuming that we're basing our marginal oil on OPEC crude and deepwater terminals, all these alternatives to refinery locations will face essentially the same crude costs. All these sites are about the same distance away from the Persian Gulf. So that differential is small. We've listed it as zero. Now, the foreign refineries are at a disadvantage under present tariff laws, as has already been pointed out. I estimated that differential at 50 cents, but I certainly would be willing to go along with Mr. Buckley's 58 cents. It's made up with the 40 cents differential crude versus products plus the forgiveness clause. The domestic refineries will probably be somewhat at a disadvantage with respect to costs. They're subject to higher environmental standards and perhaps higher labor costs. I've roughly estimated these at the figures shown so that the foreign refineries get an advantage. In terms of product distribution, all these refineries are at a disadvantage in respect to the local refinery. Illustration 3 shows my rough estimate of the disadvantages facing them.

So the last column under these very rough estimates represents the unit profit above those required to obtain a normal return on invested capital available to a New England refinery depending on who his marginal competitor is. For example, if New England is forced to import some of its products from European refineries, this differential has been estimated at 70 cents a barrel, or about \$60,000,000 per year in profits in excess of normal return on capital. These are profits before income taxes. However, if refining capacity in eastern Canada or the Bahamas expands to the point where all European products are forced off the New England market, then the price of products would drop about 30-35 cents a barrel. And the excess

profits would drop to about 35 cents a barrel or \$30,000,000 a year. In this context I'm using the term "excess profits" not in a pejorative sense, but in a technical sense--profits in excess of the normal return on capital. If domestic refining capacity expands to the point where all imported products are forced off the New England market, then the differential drops to perhaps 25 cents or maybe even 15 cents in the extremely unlikely case of an excess of refining capacity in the middle Atlantic arising. That would require the middle Atlantic refineries to quadruple their present refining capacity. As you can see, the major advantage that the domestic refinery has over the foreign refinery, especially the near foreign refineries, is the tariff differential.

A natural question then arises: "Is there any way that the region can appropriate a share of these tariff-transport savings to itself?" The answer is "possibly." It's important to realize that assuming no price control, the savings associated with these differentials will not be passed on to the regional consumer in the form of lower product prices. Even under perfect competition, price will be determined by the delivered cost of the most expensive oil consumed in the region. Now, of course, if the installation of this regional refining capacity--250,000 barrels a day, say--just happened to knock the last unit of European products off the local market, then assuming effective competition, price will drop to the next expensive source with subsequent increase in real regional income in the form of lower product prices. But in that situation this differential will still exist. It will now be 35 cents instead of 70 cents.

It's also important to realize that a share of these excess profits will automatically accrue to New England. Uncle Sam will take a portion of these profits away from the refiner, and a portion of this Federal income will return to New England in the form of either public services or Federal taxes. Also, the shareholders of the corporation owning the refinery will retain a portion of these profits, and some of these shareholders may and almost certainly will be New Englanders. But, unless the corporation is owned largely by New Englanders, the proportion of excess profits which will automatically accrue to the region will be an extremely small share of the total.

The question then remains: "How do we latch on to a substantial share of these savings?" I think we've got three basic options which can at least be considered. They are listed in illustration 4-

ILLUSTRATION 4

BASIC OPTIONS

- 1) Modification of state income or local property taxes
- 2) Monopolistic pricing of sites
- 3) Monopolistic pricing of crude terminals

First I'll talk about modifying the state income or local property taxes.

Automatically a portion of these excess profits will return to the local states in the form of state corporate income taxes. Under present rules, depending on which state you're in, we're talking somewhere in the neighborhood of 6 or 7 percent, assuming no glaring loopholes exist. The region would take something like this percentage off the top. As we've already seen, the property taxes at present would be a small amount of these potential profits. The question arises, "Could these devices be modified to take a substantial share of the excess profits?" Well, maybe. I don't know anything about tax laws, but my guess is "no." A blatantly discriminatory taxing policy which is, of course, what we want would run into all kinds of legal problems, and the option of increasing everybody's taxes and somehow redistributing the proceeds only to residents would be an administrative nightmare. And the whole process of selectively adjusting tax laws would almost certainly become a boondoggle where everybody who has special interests would try to get the tax law changed to his advantage. So I just think the original idea would be quickly submerged in a welter of these interests. And, finally, any such changes in taxes would have to be made in a coordinated fashion by the states. If one state upped its cut against a refinery and the others did not, then the refinery would say, "Well, I'm going next door." So I don't think this is the way to go.

I think option two is a little bit more interesting. This would involve the region saying, "Look--here is the only site you can put a refinery on," and somehow make this statement stick. Under this situation, it could theoretically appropriate the bulk of refiners' future excess profits in the form of land-lease payments. Due to uncertainties with respect to what these future profits will be, because it is not known with whom the refinery will be competing on the margin, and more importantly the future availability of crude and the form that price control might take are not known, these agreements would undoubtedly have to be explicitly based on a share of the future profits actually realized rather than a fixed front-end loaded payment. That is, the region would have to share some of the refiner's risks, and if the refinery was put in here and couldn't get crude or didn't make any money because of price control, then the region would not be collecting a portion of its excess profits. There wouldn't be any. I think the real knock against this option is political feasibility. For practical purposes the towns control the sites, with the states having some veto power, and if a town went to a prospective refiner and said, "Here's a site for 50 percent of your annual excess profits"--which would be an extremely large sum for any one town to swallow--another town is going to crop up quickly and say, "I've got an equivalent site for 45 percent," and compete among each other. And even if the coastal states control the sites directly, it's not clear that they could agree to bargain collectively, and the states might end up competing with each other. Certainly the recent past gives us no reason to be sanguine in this regard.

My own guess is that if any of the options has a chance, it's the third. I think it is not inconceivable that the coastal New England states could

agree with each other on one or possibly two locations for offshore crude terminals and agree that there be no other crude terminals within the region. There are some obvious environmental advantages to such an agreement. The states might then set up a corporation owned by the states to build and own these terminals. This corporation would price its services not on the cost of its operation, which would be in the neighborhood of 2-4 cents a barrel, but on the pre-tax excess profits earned by the refineries it serves. This would have the effect of not only transferring a portion of the refiner's profits to the region, but also a portion of Uncle Sam's profits, since the terminal corporation would get to the refiner first. Assuming an agreement could be reached based on a substantial share of the refiner's profits, (and the refiner would still make more money than if he didn't take advantage of the terminal's offer,) the terminal would be an extremely profitable organization. The terminal corporation would in turn distribute its profits to the owner states in proportions agreed upon by the terminal's enabling charter. Each state would then be free to spend its income in any way it chose. Presumably, the original agreement would be written so the state in which the refinery was actually located would receive the lion's share of this income, the other states being paid off to keep them from competing with this state for the refinery. In this manner all the states would be better off with the agreement than without. Given such an agreement, it's not inconceivable that the region could take, say, 50 percent of the refiner's excess profits off the top. You're going to have to give him something more than the opportunity cost of capital, because this is a risky business, given the uncertainties about crude oil, etc. How much is up to your bargaining strength. And in the near term, as we said, depending on the competition, this amount could run to 30 or 40 million dollars per year per unit refinery, a figure which dwarfs the other real regional income impacts of the refinery: local property taxes, state income under present rules, and impact of payrolls. It is a figure which is almost entirely in addition to these other effects. Whatever their size, this is in effect gravy.

Now, this whole argument that I've given you depends on two things: no embargo and no price control. So let's look at the effect of the no embargo assumption. In fact, I've already talked about it. If the refinery cannot obtain crude, it will not be a profitable business and will not be able to pay any excess profits tax, whatever form they take. Both the refinery and the region will lose. This is one of the very real risks the region takes when it opts for a regional refinery. However, this risk is a double-edged sword. If the region takes this risk and the other regions do not--say, the middle Atlantic or Gulf--then refineries will remain in short supply, and if they can get crude, they will be earning profits. It's just a matter of whether you take these risks. These risks are also slowing down refinery development elsewhere, which means that refineries which are successful in obtaining crude will make more money than if the risks do not exist.



Finally, the most important assumption I made is no price control and, of course, what I've been describing is a situation without price control. Our present price control policies can hardly be regarded as stable. The whole system has been in effect a little over a year. It's impossible to predict how long the present system will last or what will replace it. The Federal Energy Office already came up with a different allocation, and the whole process is a very ungainly one. It's hard to see that it's going to be permanent. However, as Mr. Buckley points out, under the present system, a new refinery in the region will be entitled to a pro-rated share of old, domestic crude. Old crude is just shorthand for oil priced at \$5.25 a barrel, less than one-half the uncontrolled price. Further, and this is just as important, under the present rules the prices of the products produced by the refiner are regulated in an attempt to prevent the refineries from earning any excess profits above the normal cost of capital.

There is considerable question about how well this allocation regulatory system is working. But if it worked perfectly, the transport and tariff savings associated with regional refining would be passed forward to the consumer and would lower product prices without the region doing anything. These savings that we talked about would go forward. Further, if the effect of the crude allocation system plus the regional refining were to increase the amount of old crude consumed in the region and price control worked perfectly, this differential would also be passed forward. Mr. Buckley pointed this out. To the extent that we consume more old crude with the regional refinery than without, this could be very significant, because we're talking about \$5 or \$6 a barrel. It is really impossible without a lot more work than I've done on this problem to say anything useful about what the increase, if any, in the amount of old crude consumed regionally would be. It is not clear to me that there would be any. And it is certainly impossible for me to estimate how well price control is actually working, and it's impossible for anyone to say anything about how long the whole ungainly structure will last and what it will be replaced by. But, in a sense, these issues are unimportant to the suggestion that I've raised, because the option I have suggested is viable in any case. In the unlikely event that the allocation/regulatory system is fully accomplishing its intended purpose and lasts, the refiner will not make any excess profits, will not pay a share of these profits to the terminal corporation, but the transport tariff savings will be passed on to the regional consumer. Great! We've done what we wanted to do, which is appropriate a large share of those savings and push them onto the region. In this case, the terminal corporation just breaks even. If price control is scrapped, or to the extent that it isn't working, the refinery will make some excess profits and pay a portion of these to the terminal corporation, who will distribute them to the states' general coffers. In the first case, the region has lost nothing in real income terms by setting up this controlling force. In the second case, it could gain quite a lot.

## ALTERNATIVES TO PRESENT PROPOSALS

William Bulger

I am pleased to be in Durham this morning and honored to be with such a distinguished panel of experts.

The issue of the introduction of oil refineries and offshore tanker facilities into New England has, as have so many other dimensions of the oil issue, become confused, misrepresented, and propagandized.

The arcane and complex nature of this industry, its corporate activities, pricing structure, control over other sources of energy, immense political strength, and potent economic power have not only set the limits of debate on this issue, but have placed the public and their officials in a reactive and non-deliberative posture.

What New England is experiencing is the onslaught of the cowboy economics of the oil industry, no better exemplified than by the audacious and cynical effort of the Onassis group to bamboozle the people and officials of New Hampshire into accepting a coastal refinery and offshore tanker facility on the Isles of Shoals.

Two facts are clear from our recent investigation in Massachusetts: (1) as regards the public interest, the case for building refineries in New England is not a strong one, but as far as the private entrepreneur is concerned, a New England refinery would be a very profitable venture; (2) that New England does not have to accept the siting of a refinery on its coastline, and that the issue of an offshore tanker terminal is not only separable from the refinery question but in fact must be considered as a separate policy matter for New England.

Under present institutional arrangements, any cost savings from a New England refinery would not be passed on to consumers.

It is my feeling that New England must not accept such a facility until the economic benefit can be shifted from the private entrepreneur to the public, bearing in mind that a refinery is a nice thing to have but not a

*\*Mr. Bulger represents the third Suffolk District in the Massachusetts State Senate, where he serves as Assistant Majority Floor Leader. He is a graduate of Boston College and Boston College Law School. At present he is chairman of the Special Legislative Commissions on Marine Boundaries and Resources, on Boston Harbor Pollution, and on Power Plant Siting, and the Joint Special Committee on Reform of the Judicial System.*

necessity from the stand point of either the region's consumers or economy under the present arrangement.

It also must be stated that the entire national energy picture is in a state of flux, that it appears premature to plan local energy facilities until it is clearer what kinds of energy will be available and at what cost.

We must ask the question, "Where is the National Energy Policy we have been promised for so long?" Maybe, Mr. Jackson of Exxon can tell us.

What is startling about recent events here in New Hampshire is the cavalier attitude with which officials are willing to jeopardize the viable economic base provided by tourism and other service-oriented industry for an industry whose benefits are at best illusory and will have the potential to eclipse that which provides New England with a major portion of her income.

There is no public or economic imperative for New England to forsake this obviously important industry.

The scent of high profits will keep the oil industry at New England's door even if the region were to place the kinds of constraints on its activities that New Englanders deem necessary to safe-guard other industries, the aesthetics and amenities of their land and coastal resources.

I am convinced that industry can both function and profit within the reasonable social constraints imposed by government.

New England's awakening to the cowboy economics which the oil industry and some elected officials, particularly in New Hampshire, seek to impose on this region provides us really with an opportunity to take charge of such New England development in an intelligent way.

At best, New England political and industrial leaders have exhibited an uncanny ability to be predictably myopic and unimaginative, in matters which will determine the future of our economic development and environmental integrity.

It perhaps is the nature of both the political and industrial animal that their mental processes lend themselves better to extending the present state of affairs into the future than to reconceptualize and innovate more constructive and effective courses of action.

It is the disjointed incremental planning in the energy and other public areas that dictates the notion that the solution to New England's oil problems will ipso facto disappear when a refinery is on the line in this region.

As the people of Durham recently came to recognize, what may at first glance be seemingly correct intuitively--that close proximity to a refinery would produce lower consumer prices and provide security of supply--is in fact not true under the present institutional scheme of things.

What the oil industry, majors as well as independents, must do if it wants to undertake successfully the refinery business in New England is to develop a sense of candor and honesty and not to expect New England to fall into line like Texas and Louisiana at the prospect of a quick buck. There is more than distance that separates the two regions.

Today's oil management scandal may yet provide some long term benefit for New England.

Aside from its added benefit of convincing the rest of the nation of what New England has been saying for over a decade, that the interests of the major oil corporations and the long term public interest are at war with one another, it can provide the impetus for the New England states to come together for their own welfare.

New England regionalism as a concept has been much touted and discussed--its time has come.

Such a concept, of course, will remain an academic exercise unless the legal framework for such interstate action is laid down.

The formation of a New England States Oil Compact could provide the framework upon which the necessary institutional changes can take place.

This kind of interstate arrangement would require Congressional approval, and for that reason the New England Congressional Caucus in Washington, upon my request to Congressman Thomas P. O'Neill, Jr. of Massachusetts, its Chairman, is researching and considering such a proposal. I hope they will give it serious consideration or find some comparable alternative.

The New England States Oil Compact would be empowered to undertake the following actions:

- 1) To share, among all six New England states, tax and other revenues to be derived from refineries, offshore tanker terminal facilities, and other petroleum-related activities, in order to remove the tax revenue incentive from the siting decisions so that more rational consideration can be given to the land-use constraints; (In other words, New Hampshire would, for instance, think twice about jeopardizing its 16 miles of coastline if it were to share some portion of the revenue from an inland refinery in Maine.)
- 2) To plan, construct and control a New England petroleum pipeline distribution system for product and crude oil linking New England refineries (if they are to be constructed) and major markets in the region; (The pipeline system has enormous possibilities for New England when you consider Portland now pipes oil 235 miles to Montreal.)

- 3) To standardize among the New England states pollution control regulations as they relate to oil and oil facilities, so that competition among the New England states would not be based on the lowering of such standards to attract this kind of development;
- 4) To standardize among the New England states industrial controls as they relate to oil in order also to eliminate such unhealthy competition;
- 5) To determine the location, size and number of refineries and related facilities for the region;
- 6) To plan, construct and operate, if necessary, a publicly held refinery for New England.

What the hearings of the Massachusetts Special Legislative Commission on Marine Boundaries and Resources on this matter have revealed is the need for a region-wide entity to do the bargaining with the refinery entrepreneur. This compact would bargain to gain the best tax and consumer price advantage for the region.

These experts also advised us that the first refinery in the region would reap windfall profits because the pricing would be determined by national price structure and transportation savings would go to the refiner, and in order to bargain for this excess profit a united regional front must be put forth. One state must not be played against another to the detriment of the region as a whole. Experts have testified, Professor Jack Devaney among them, that the region acting together could derive more benefits for each state than any one state acting alone could exact from the refiner. The New England Governors' Conference and New England Regional Commission over the past several years have been, at best, disappointing in this area. With the pressures to drill for oil off New England, it should be an added incentive for these six neighboring states to act to strengthen their bargaining position vis-a-vis the Federal government and the major oil corporations. This can only come if an interstate compact is fashioned.

New Englanders have the time and the obligation to future generations to plan the future of their region in a thoughtful and intelligent manner and to demand the best technological alternatives.

We have not engaged in such planning. We have not made such demands. New Englanders must reject the fast-buck offers of any pitch man whether he resides in Texas or happens to be the Governor of New Hampshire.

I would urge the citizens of New Hampshire to pressure their Chief Executive to cooperate with the other New England states in fashioning regional solutions to these matters, or we will all be losers.

## "WHERE SHOULD OIL REFINERIES BE LOCATED?"

### A CONSULTANT'S APPROACH

W. Nicholas Kruse

I would like to begin by first answering the question, "Does New England need or want refineries?" I believe the answer is, "No--New England basically does not need refineries nor, at the moment, does it seem to want them." It does need fuel oil and gasoline; the market exists and the demand will be supplied at whatever price the products can command. During the past twenty years, a half a dozen refinery projects have been proposed for New England sites but have failed to proceed. From these failures has developed the widely held belief that New Englanders do not want any refineries.

In every case, the failures have been related to siting. Also, they have been the result of inadequate information, poor communication, and lack of understanding on the side of the oil companies on the one hand and the local communities on the other. A principal shortcoming on the side of the oil companies has been the unfortunate site selections, which created massive confrontations. Such a face-off pits the marginal advantages to the project of a coastal location against the traditional romance of New England's lobstermen, clam diggers, fishermen, yachtsmen, ornithologists, biologists, and others who cherish their ocean, their seashore, and their tidal wetlands.

The major fault on the communities' side has been a lack of knowledge of, and sympathy with, the petroleum industry in general and oil refining in particular. Not only the people themselves but their elected representatives, and their mentors in academia and in the media, have objected vigorously to any proposed new industry bearing any relation to an oil refinery. Despite the economic advantages possible, it would seem that the people of New England will never permit an oil refinery to be built in the area.

In an effort to put the problem in perspective, let us begin by characterizing an oil refinery. Petroleum refineries are nothing but large, capital-intensive, manufacturing facilities which can convert a relatively

*\*Mr. Kruse is currently Petroleum Coordinator for the Badger Company, a subsidiary of Raytheon Company. He has a degree in Chemical Engineering from Cornell University and has worked for over twenty-five years with new refining projects. Before coming to the Badger Company, his work was with Universal Oil Products Company in pilot plant research, technical service to refiners, project engineering of refinery installations, and engineering sales.*

useless raw material, crude oil, into very useful and essential finished products. The raw material is in liquid form, which is somewhat unusual for a major industry, and with a few exceptions the products are liquids. Refining operations are continuous. They proceed day and night, three hundred and sixty-five days a year, except for periodic shutdowns of short duration for inspection, maintenance, or in case of an emergency.

Refineries can be small, or they can be very large. They can be simple plants, or complex. The smallest and simplest refineries in the United States occupy less than one hundred acres, including tankage; utilize only a very few basic processes such as crude desalting, distillation, treating, and blending; and produce only a few products. The plant capital investment would be less than \$1,000 per barrel a day of throughput. The larger, more complex refineries require over 1000 acres of land and involve many additional processes such as desulfurization, reforming, cracking, alkylation, coking, solvent extraction, dewaxing, and deasphalting. They produce dozens of products and cost more than \$2,000 per barrel per day. Any inclusion of petro-chemical manufacturing vastly complicates the refinery scheme and multiplies the investment cost.

The factors that influence site selection for refineries are primarily economic and are not much different from those for other continuously operating manufacturing facilities such as power stations, chemical plants, or steel mills. They include delivery and storage of raw materials; storage and distribution of products; proximity of markets; transportation options of pipelines, roads, rails, or tankers for crude oil and products; availability and suitability of the land for construction; local zoning and weather conditions; availability and cost of utilities, power, labor, water; local and state and federal statutes, building codes, and permit requirements; and any special or local restrictions or incentives that might apply to the project.

In recent years, there has been a wholesome concern for appropriate land use and for the environment which has made it necessary to devote considerable time and effort to environmental, aesthetic, political, and social considerations. The one overriding factor, which many people overlook in this regard, is the cost. The design of the plant to accommodate to the physical characteristics of the site and to adapt to the local conditions and laws is, in the last analysis, a cost consideration. The technology does exist or can be developed to meet almost any physical condition or imposed environmental requirement, but certainly at some added cost. Therefore, it must be kept in mind that the consumer ultimately will pay for the benefits of this technology in price increases for the product.

Obviously, an oil company looks for sites which will result in the lowest total cost of the product from the oil well to the consumer's tank. Historically, this lowest cost was achieved by siting refineries either in or near the oil fields, or near the market or consuming center, and occasionally along transportation routes. Oil refineries in western Pennsylvania, southern Illinois, Oklahoma, Louisiana, Texas, and Los Angeles are typical of the first category, near the oil fields. Those in New Jersey,

Philadelphia, Detroit, Chicago, East St. Louis, and San Francisco are typical of the second category, near the consuming centers.

Half of the 246 refineries presently operating in the United States are found in the 7 states of New Jersey, Pennsylvania, Mississippi, Louisiana, Oklahoma, Texas, and California. The other 123 refineries are widely distributed over 33 other states. Only 11 states have no refineries: the 6 New England states (with the possible exception of a small asphalt plant in Rhode Island), Iowa, the two Carolinas, South Dakota, Idaho, and Nevada.

The United States refining industry is currently the product of its past. Many refineries are still operating in the same location after fifty years. One reason is that it is usually less expensive to make additions or modifications to existing refineries than to build in a new location. This fact has caused many of our refineries to be overbuilt in one location, and has resulted in the congestion that you have observed in many refining centers. There are scores of petroleum projects actually underway in the United States, but only a very few are so-called "grass roots projects," that is, on completely new sites. The activities of local ecology groups, in addition to the increased costs associated with all the factors previously cited, have tended to discourage the seeking out of new sites for refineries. And a refinery in New England would obviously be of that category.

The question has been asked, "Why are there no refineries in New England?" The reasons, which are sometimes a bit obscure, are probably more related to economics than to the problem of finding a suitable site. Until recently, the market share of any one oil company, major or independent, has been too small to justify a sufficiently large and economic refinery in New England. Competitive marketing conditions and low prices did not promise sufficiently high profitability. In addition, the market for gasoline, which is the big profit-making product, is small in relation to the demand for heating fuels.

Until April, 1973, the United States Government policies on crude oil and product imports discouraged the building of any refineries. When the government required oil companies to maximize domestic crude use, it was more economic to ship finished products to New England than to refine crude oil there. Furthermore, the so-called "incremental barrels" of overcapacity that the refineries were able to squeeze out of their supplies were sold at a very low price on the bulk market to independent oil marketing companies, who in turn sold at a low price in direct competition with the major oil companies. A few poorly conceived projects which failed to get approval tended to discourage others from making the attempt. Lastly, New England is not noted for low labor costs, or low construction costs, compared to the South where most refineries are located.

In any case, the decision on whether New England as a region, or one specific locale in the region, becomes the site of a refinery lies first with the investor, the oil company. The company must make the hard decision on, "Can we afford to spend \$400 million, and will we get an adequate return on that investment to justify building the plant?" Second, the actual community to be affected by the refinery has an important role to play. Third, consideration must be given to the government, state and federal, authorities. If a company and a community cannot get together and agree on the conditions acceptable to both for a refinery project, there is considerable doubt that any amount of "regional planning" aimed at obtaining the economic benefits a refinery might bring to the area could succeed. If a local area and a company do get together on a refinery, the benefits will accrue to the region far beyond the local community.

The engineering considerations deriving from the physical characteristics of a site rarely have a major influence on the oil company's decision, although they do affect costs. More important are such considerations as:

SUPPLY - Assuming that foreign crude oil will be the feed for a New England refinery, can the crude be transported by VLCC (very large crude carrier) and delivered to the refinery by pipeline? John King of Massport is making very serious efforts to provide facilities for the refining industry that would afford transportation savings by means of a deepwater terminal. Are rights of way available for a pipeline from this facility to the refinery?

MARKETS - Can the products be readily and cheaply distributed to the markets by pipeline, rail, tanker, or truck? Probably all of these various means will be used.

ENVIRONMENT - What are the specific pollution control requirements that need to be considered in the design of the plant? Can they be met at reasonable costs? Air quality, water quality, solid waste disposal, noise levels must be evaluated. Many states and cities use vague terminology such as "best available technology," and technology is continually changing. Someone has to establish very precisely what is acceptable and what is the design form.

APPROVALS - What are the requirements for approvals? Do we know, for example, how many people must approve a refinery project? Is an Environmental Impact Statement required, and of what must it consist? Is baseline ecological data necessary--that is, a measure of the cumulative impact of the plant from pre-installation throughout the duration of its operation?

SITING - Is sufficient properly zoned land available at reasonable cost, and does it provide adequate screening for aesthetic acceptability? Is the proposed land use acceptable to the local area?

SOCIAL - Is adequate attention paid to social factors? Does the community welcome industry and provide pleasant living conditions? Will industry take heed of the community's needs and be a good neighbor?

GOVERNMENT - What is the impact of the existing statutes, local laws, ordinances, state and federal agencies, storage regulations? Is the project in line with Federal Energy Administration (FEA) policy?

COMMERCIAL - The very basic and fundamental commercial considerations are price stability and market stability. Can the refinery get a sufficient share of the market to make it a feasible project? What kind of competition will it face? Will it build a plant and then find that it isn't competitive and cannot pay out its investment costs? What kinds of products will be needed in the next ten years? What will be the ultimate return on the investment?

In conclusion, let us return to our original question of whether New England needs or wants refineries. With all of the foregoing considerations in mind, it seems more likely that the question should have been asked whether there is any likelihood that a refinery could ever be built in the region. Without a doubt, oil refineries will be built in New England during this decade, not because they are needed but because the new energy economics will justify the investment. They will be sited at locations which represent a satisfactory compromise between the interests of those presently in favor of or opposed to their construction.

Finally, it might be interesting to speculate on the characteristics of a petroleum refinery that might be built in New England during the next decade. The location would probably be a wooded, inland site within fifty miles of Boston, the center of New England's market. It would encompass about one thousand acres of land, of which perhaps fifteen percent would be developed as plant facilities, and the remaining eighty-five percent would be left in open fields or woods to provide a "green belt" or distance factor. Transportation would be by pipeline, for both the crude coming in from a deepwater terminal and the products to distribution centers in the New England market.

The capacity or output of the plant would probably be at least 100,000 and possibly 300,000 barrels per day of products tailored to the New England market: 25 percent gasoline, 5 percent jet fuel, 30 percent heating oil, 40 percent residual oil. If the company couldn't acquire sufficient market to justify the gasoline production, some of the gasoline might be diverted in substitute natural gas (SNG) production.

Distillation, desulfurization, treating, and blending would be the processes involved in this simple, European-type, "hydroskimming" refinery. It is European in type because traditionally the United States refineries make, on the average, about 50 percent gasoline and 50 percent other products. Because of the lower demand for gasoline in relation to home heating oil and residual oil in New England, this refinery would make less

gasoline than those in other areas. It would meet or exceed all federal, state, and local requirements; it wouldn't smell, smoke, or pollute. Quiet, clean, safe, and out of town, the refinery would be self-sufficient and not burden the community with costs for utility services, fire protection, or road maintenance. It would pay taxes, provide jobs, and be essentially a good neighbor.

If the refinery provides the economic advantages to the region envisioned by its advocates, it may well be that New England will find it wants a refinery, although it may not actually need it.

#### EXPERIENCE WITH REFINERY SITING

Colonel Charles Osterndorf

I am going to start off by clearing the air. I personally have no experience in siting refineries, nor does the New England Division of the Corps of Engineers have any experience in siting refineries. In fact, if you want to find an objective individual, a guy that hasn't made up his mind because he doesn't know the facts, I'm probably about as objective as anybody around here today.

This morning's speaker made a couple of comments about the attitude of the people of Louisiana toward the energy crisis. I have a son who was born in New England, and I also had a son born south of the Mason Dixie Line, and so I feel I should take the opportunity to speak for the Southerners here, though I am a Yankee myself. I understand down in Louisiana they have a bumpersticker which reads something like, "Drive 80 miles an hour and freeze a Yankee."

The Corps of Engineers does have a statutory responsibility, however, with petroleum refinery siting, development, and environmental controls. The refinery developer would be required to apply for a permit for any structures which would extend into navigable waters. For a refinery complex this would include water discharge structures as well as tank and terminal facilities, and would include any dredging requirements. We have developed quite a bit of background information in deepwater port facilities. In the late 60's the Corps' Institute for Water Resources commissioned Arthur D. Little, Inc., to prepare a report on "Foreign Deepwater Port Developments, A Selective Overview of Economic, Engineering and Environmental Factors." That report provided guidance which we feel would be very helpful in avoiding many undesirable side effects of port development. For example, foreign experience shows that unless carefully regulated, development of deep port facilities is likely to generate substantial expansion and a refinery petro-chemical complex. However, the report concluded that this is in no way an inevitable course of events, and these industrial expansion issues could be resolved by the proper use of land planning.

*\*Colonel Osterndorf is Deputy Division Engineer, New England Division, U. S. Army Corps of Engineers, sharing responsibility for design, construction, and maintenance of multiple-purpose water resources; comprehensive river basin studies; improvement of rivers and harbors; operation and maintenance of federal flood control reservoirs and hurricane barriers; and the Cape Cod Canal. He received his B.S. Degree at the U. S. Military Academy and an M.S. Degree from M.I.T., and has served with Engineer units in Europe, the Far East, and the United States.*

This study was followed by three regional studies. In 1970, Congress authorized a study of regional and navigational requirements with particular reference to economies afforded by the use of supersized bulk transport vessels and tankers. This study pertained only to the Texas Gulf coast. Later, it was expanded to include the entire Gulf coast from Brownsville, Texas, to Tampa, Florida, and additional studies then were authorized for the North Atlantic and the Pacific coasts. These studies examined various alternative sites and transportation systems to accommodate crude petroleum imports and showed that there is economic justification for one or more deepwater ports on each coast to serve superships. Also, the conclusion was that deepwater ports are environmentally preferable to the present method of using small tankers or of dredging existing channels to required depths. By decreasing the number of ships, chances of collisions and potential groundings and the chances of oil spills could be reduced.

After looking at all reasonable alternatives, the conclusion of the study was that private or non-federal ownership, financing, and operation of a regional deepwater supertank terminal is compatible with the public interest. The one big condition, of course, is that effective federal controls and regulations be provided to insure the proper environmental controls are designed into the facilities and that the operations are carried out in a safe, clean manner.

Now let's look at the area we're most interested in, which is the North Atlantic region. Since New England at the time of the report had no refineries and is relatively remote from existing refineries, the cost of transshipment was too high to warrant detailed consideration. However, the report did allow that the volume of petroleum products, particularly residual and distillate fuel oil, did merit further study with regard to supertanker handling.

Of course, this conclusion would have to be altered quite extensively if a refinery were to be located in the New England region. The Corps considered ten sites in New England. Seven of these were along the coast of Maine, two in Massachusetts, and one in Rhode Island. Five were rejected due to incompatibility with the existing environment, and the ones remaining as potentials were Eastport, Machiasport, and Portland, Maine; Massachusetts Bay off Boston; and the East Passage of Narragansett Bay. Let me stress, now, that the Corps is not necessarily endorsing the development of any of these areas. I'm merely stating that these are potentials for a deepwater port development. Now a siting of a refinery in conjunction with the development of this port, of course, would require a review substantially in as great depth, if not greater depth, than the port study itself.

The statutory regulation under which we operate is the Rivers and Harbors Act of 1899. That seems like a long way back when we talk about deepwater ports and refineries, but none the less that is the one that has been upheld. The procedures, however, with which we operate have been revised recently, and I would like to give you just a thumb-nail sketch of what they would involve. The first action after the application is to

determine whether an Environmental Impact Statement would be required. This is a requirement under the National Environment Policy Act of 1969. Now this E.I.S., as we call it, would have to cover the total complex-- that is, all offloading facilities, the refinery, and other ancillary systems such as pipelines and shore storage facilities. I think this is only fair to the people, as they should have the right to review the E.I.S. so that they have a complete picture of what the whole action is about and don't have to try to make judgments on each individual action. Because of the complexity of this E.I.S., it would be a requirement that one federal agency would be determined to be the lead agency. The agency official would be responsible for coordinating all of the input in the development of one E.I.S. Just who that agency would be has not been determined yet because we do not have an application thus far.

So, let's assume that the Corps was given this responsibility. What would our actions be? Well, first of all we would issue a public notice of the application. After the draft E.I.S. is published, we would have to hold a public meeting; and comments received at this meeting, together with comments submitted on the draft E.I.S., would have to be incorporated into the final E.I.S. After all this coordination is complete, the Division Engineer would then approve or deny the permit request based on the evaluation of the effect on the public interest. The factors affecting the public interest have been defined and are essentially outlined in the NEPA, and they include such things as conservation, economics, aesthetics, general environmental concerns, historical values, wild life values, flood damage prevention, land use classification, navigation, recreation, water supply, water quality, and, above all, the needs and welfare of the people.

No permit will be granted unless its issuance is found to be in the public interest. This includes local approvals, state approvals, certification that state water quality standards will not be violated, performance with state wetland laws, coastal zone management plan, and any other applicable state requirement where the port and refinery would be located. Throughout this review process (and I think everyone realizes this would be lengthy), there should be every opportunity for anyone to express his views and to examine the records and views of all others. The ultimate decision is not based on the view of one agency or one interest group but weighs and balances all the views expressed.

I just returned from a visit to the refineries in the states of Washington and California and from discussions with federal, state, and local agencies as well as refinery operating personnel. I gather the strong impression that refineries are not environmental monsters and do not pose any unmanageable environmental problems. There is concern on oil spills. The emotionalism by which this subject has been discussed has certainly confused me as to just what is fact and what is fiction. However, I think two basic facts have been established. First, oil spills have happened and possibly could happen in the future, and second, these spills have an adverse environmental effect. Based on these two facts, and only on these two facts, I feel it is imperative that the refinery applicant design a system that not only handles the oil but prevents oil spills. Much of the

discussion that we had on oil spills was "a human factor," and I think the design of the oil handling system should include the "human factor" in design. This is not an unreasonable thing to request, because I think one of the agencies that has had extreme success in designing just that in their system testing is NASA. And I know that as far as the Corps' interest is concerned, this would be one requirement that we would lay on the applicant--that his oil handling system be designed to prevent oil spills and not just to handle oil.

#### ENVIRONMENTAL CONSTRAINTS IN SITE SELECTION

Wallace E. Stickney

EPA sought early involvement in the refinery issue because it was obvious to us that the initial siting of the refinery is one of the most important factors in determining the environmental impact, the amount of money that it will take to control the environmental impact, and the very fundamental question as to whether or not the impact could or couldn't be controlled. We circulated a policy paper and a review guidance paper in hopes that we would be able to get our position on the line early, that local, state, and regional reviewers would know what the policy was, and that industrial groups trying to site refineries would also know what it was. There was another factor in our thinking, too. There is only one state with extensive experience in refinery siting and with the proven mechanics developed on how to handle the issue. That, of course, is Maine. I believe Maine to be one of the national leaders in this type of review. But the other states really have nothing upon which to depend.

So we did get in early, and among the items that are in that policy, if you haven't seen it already, is the indication that large amounts of land are required--we believe 1,000-1,500 acres--that pipeline crude supply and product distribution are essential, that metropolitan areas probably could not sustain the air impacts, and that a deepwater offshore port, probably a monobuoy, apparently represents the best tradeoff you can get.

But our early involvement doesn't mean that we're not convinced that there must be some fundamental thinking involved, more fundamental than has gone on here today, as to just what we do need and where we are going. That fundamental thinking is going on, but it usually involved someone else's interests. For instance, a couple of weeks ago, there was an excellent Exxon ad in the paper which utilized about a fourth of a page to show that due to the 55 mile per hour speed limit, about a quarter of the people that would have died on the highways this year didn't die. They were saved, and a tremendous number of traffic injuries did not occur because of the lower speed limit. As an ancillary benefit, of course, motorists got increased mileage. But if you try to discuss fundamental aspects of safety with a

*\*Mr. Stickney is the Regional Director of the Environmental Impact Office of EPA. He came to this office from the Federal Water Pollution Control Administration of the Department of the Interior, having been an instructor of physics and engineering mechanics at Wentworth Institute of Boston. He holds a B.S. Degree in Engineering from New England College and an M.S. Degree in Environmental Engineering from Northeastern University.*



highway safety person, someone who's interested in maximizing highway safety, but based on the given that you've got to have a highway, he'll say, "Well, we've got to rebuild the highway because we've got to get our incidence of traffic deaths down from 5.6 per million passenger miles to 3.5 passenger miles." The obvious response is, "Yes, but if you build that highway, more miles will be driven and the number of traffic deaths will up. What are you really doing? Are you building highways, or are you saving lives?"

Here in New Hampshire we've got a highway safety commission with an active campaign against drunken drivers. We all know that. And yet, where do we as a state get most of our money? We get it from the booze that's making the drivers drunk. If you really want to think about the fundamental issues, that's the level to begin.

Look at the massive investments in energy facilities--\$400-500 million in a large power plant or refinery. It stirs your imagination. All that construction, all those kilowatts going out the line, and all those people getting their power. But it seems to me that the technology is the same sort of technology that Edison used when he first fired up his original equipment. Oh, I know it's a lot better, but it hasn't changed fundamentally. It seems to me that it is just as imaginative and perhaps a safer investment to use this money to find some way of getting 70 or 80 percent of that power out of the energy instead of 40 percent.

What I'm trying to illustrate here is that EPA really is yet to be convinced. We haven't folded on this issue. We believe that over the long term, we've got to apply this fundamental thinking, because we've got to decide just where our limited resources are going to go. They certainly can't all go into developing energy resources and using energy.

We all agree that environmental considerations and siting considerations are related, and this relationship has many facets. For instance, there would be no problem at all if at the refinery site, you built a condominium with a picture window overlooking the cooling towers, no insulation so the residents could hear what was going on outside, the landfill near the patio out back, and most importantly perhaps the water discharge from the refinery placed upstream of the water intake of the building I'm describing. Then you move a corporate vice president, the corporate counsel, and maybe the industrial hygienist in there, and make them live there.

What I mean to illustrate here is that one of the difficult problems with siting is that the benefits accrued do not accrue equally across the board. Some people benefit while others suffer due to refineries or any large industrial complex. We must develop some way of equalizing the burden and the benefit, no question about it. I don't mean to pick on refineries, either. My house is about an equal distance from the Hewlett-Packard industrial plant proposal in Andover, Massachusetts (which will provide 5,000 jobs in four or five years), and the area that is proposed for the Dracut refinery. As a member of the local planning board and the regional planning commission, I have to deal with more than just the apprehension of somebody changing my way of life. I've really got to try to make a

determination of just what is going to have the greatest effect on my area. Is it those 5,000 jobs coming in with Hewlett-Packard, a very clean, dry industry with the socially redeeming value of producing medical-electronics equipment, or is it from that refinery proposed seven or eight miles the other way which will employ 300-400?

This fundamental realization that all industrial complexes will create secondary effects is extremely important. But also important is the idea that in many cases and in many locations, we have only so much of our natural resources left. We've only got so much more room for SO<sub>2</sub> or particulates, or a finite amount of hydrocarbons and oxidants, that we can put into the air, and we've got to make decisions based on this realization.

Of course, the environmental considerations are both human and natural, and the National Environmental Policy Act talks about the "human environment." I'm going to leave those to Rick or to the discussions afterwards, however, and discuss the "natural environmental considerations." I must say, however, that the decision as to whether or not to allow a particular use of the land belongs to the local community. It should determine what it wants for its future and what it wants for quality of life--provided, of course, that this decision does not adversely affect other communities.

Generally speaking, the overriding environmental requirement as we see it is the protection of unique environmental values. Unique coastlines for instance. In our policy we suggested that refineries should be located inland, and not on the coast. And if there is some sort of a unique area inland which is practically irreplaceable for one reason or another, then the refinery would be best sited somewhere else--say in the midst of the scrub oaks of which we've got a lot in central New England.

The specific federal laws that the builder would have to comply with are related only to air pollution and water pollution. We don't have specific laws to regulate other forms of pollution. By the way, I hasten to add that these are federal-state laws. All of our authorities are based on the premise that the states have primary responsibilities and the Feds have secondary, although I'm sure that in actual practice, this might be argued in some quarters. But, this is the basis. The states do have the primary responsibility.

Regarding water discharges, we have a requirement that a refinery or any other industrial complex having water discharge must be issued a permit by the Environmental Protection Agency or by the state if the state has been delegated the authority by EPA (if not, it's a combination state-federal permit). This permit will control the constituents of the effluent from the refinery. I should also clarify our water supply authorities as well. Water quality considerations, it goes without saying, are site specific. Refineries are a lot drier these days than they ever were before. In the southeastern New England area, however, the 3-5 million gallons per day which is required is an important factor. Water supply is an existing problem but is not within the purview of the Environmental Protection Agency. Regulation of this (except for interstate water uses) has to occur through state legislation.

This permit relating to water discharge will be based on standards which have just been published in final form, although the proposed standards were circulated some time ago. They regulate biochemical oxygen demand, chemical oxygen demand, total organic carbon, total suspended solid, oil and grease, phenols, ammonia, sulfide, chromium, zinc and thermal discharge. None of these are zero discharge criteria; a certain discharge of each is allowed. If a refinery were sited upstream of a water supply, therefore, it could meet the federal discharge criteria for phenols, for instance, and still be discharging enough phenols to disrupt the downstream water supply. These considerations have to be very site specific. Under no circumstances, however, could the discharge violate the target water quality standard and inhibit the beneficial uses for the stream. In other words, the water discharge must meet the EPA criteria, or, if required, has to be that much better so that it can meet the standard for the stream.

We have also certain authorities under the Clean Air Act to control air pollution. Once again, we are sharing authority with the state. Standards exist for carbon monoxide, nitrogen oxide, sulfur oxide, particulates and oxidants. We also have a fuzzy thing called a hydrocarbon guideline which is not really a standard but is used to measure whether oxidant levels will be met. We also have some new source performance standards for air discharges which new sources of pollutants have to meet, although they are not all encompassing. Those that have been written for refineries so far include the hydrocarbon emissions from storage facilities and the emissions from process heaters, boilers, and waste gas disposal systems. They only apply to particulates, oxides and sulfur and carbon monoxide. So once again, if anybody tells you that you can put a refinery anywhere you wish and that the federal standards will protect you, then they're not being completely accurate, because any one of those emissions which will be allowed could cause a violation of air quality standards in any particular location. Once again, we have a site specific consideration.

I should stress that there are no federal regulations on ambient noise (I don't believe that the OSHA regulations are sufficient), odors, illumination, solid waste disposal, and, of course, water supply. I'm not saying we wouldn't discuss these things or make them public in the Environmental Impact Statement that we, the Corps of Engineers, and maybe the Department of the Interior would be involved in, but air and water are the only two for which we have real enforcement authorities.

I am totally convinced that we can't really count on the corporate entity over the long run doing any more than it must do under the state, federal, local, or regional legislation. You might find an independent in New England who would come in and say, "This is my region. My forebears have been here for seventeen generations. I love New England, and I'm not going to change it," and he probably would not do so. Over the long run, however, that manager who has to run a refinery in competition with the refineries around the rest of the country has to show a proportionate profit or he loses his job. The company has to justify to the stockholders that they're investing another \$6 million in environmental controls for a particular refinery over and above that required by the federal and state regulations just because they want to be good neighbors. The only things we can really

count on, therefore, are those things governed by federal or state or local regulations. Furthermore, under both the Clean Air Act and the Federal Water Pollution Control Act Amendments of 1972, citizen suits are allowed under certain conditions. In this case, the violator, the state, and the EPA, have to be notified. If no action is taken, the citizen can act. The citizen action, however, can't be based on a discretionary duty of the EPA or the state. The suit has to be based on a non-discretionary duty. In a case where there is no governing regulation, the citizen suit provision is not operative.

Finally, I would like to discuss the relationships between the Environmental Impact Statement, the site selection, and the environmental criteria for the site. I've got to make a pitch for the Environmental Impact Statement because, although I'm not sure whether we will write it (the Corps may write it, or the DOI will write it if there's an offshore port involved), the statement must consider the economics. It must consider not only what is gained but who gains it. I'm reminded of the LOOP study--and this is probably an oversimplification--which predicted an overall benefit/cost ratio of about five to one. The benefit/cost ratios to the governmental agencies involved, however, came out to be about 1.1 to one or almost nil. In other words, they'd have to put in a buck for about every buck they got back because of the increase in infrastructure costs and capital investments. So we have to know who gains what. All feasible and prudent alternatives have to be discussed including the no-build. There's got to be public proof that these things are really needed. The impact statement must be based on site specific environmental data, some of which would take several months to a year to accumulate.

It's got to balance the short-term benefits against the long-term disbenefits. In one document recently, these were defined as negative advantages. You know, we're really not equipped to judge the short-term benefits against long-term problems. And if you want a really good illustration of that, all you've got to do is recognize that the venereal disease rate now is higher than it's ever been before. Even the new generation can't balance those short-term benefits and long-term benefits!

The secondary effects also must be discussed. I've got to disagree with a previous speaker to a certain extent in that secondary effects have to be planned for because they are often a self-justifying prophecy. Once you set the wheels in motion, there's little you can do in order to prevent them. You've got to remember that if because of the initial action, there's industrial pressure to locate something else in the area, and land values start going from \$3,000 per acre to \$5,000 or \$50,000, your best planning procedures begin to cave in and the best citizens working on these boards begin to cave. Therefore, there are certain givens that you can come to expect as secondary effects, and you have to be aware of them. This is, by the way, one of the reasons why I think refinery locations are regional business and not just local business.

Finally, the Environmental Impact Statement provides a formal vehicle for public participation in areas where there is no other vehicle. Maine has that, the New Hampshire Site Selection Board has that, but it is not

available to citizens in all of New England. I think that it's important that the public have this vehicle. Of course, one of the things we have to do is to work out a procedure on the federal side so that those states that have a far-reaching policy aren't placed at a disadvantage because after they get through a review we have to begin one. We're very concerned about that, and we plan to do our best to integrate the reviews as much as possible--certainly as much as we can within the procedural requirements of our regulations.

We pledge to be uniformly critical of all proposals. We recognize that if one proposer is driven to a significant environmental investment because of our pressure and the same pressure is not put on the next one coming down the pike, we are causing more problems, probably, than we are solving. This is a goal which we have in sight all the time and a line which we intend to hew to.

In addition to the cooperation with the existing review processes, we will do our best to make sure that the issues that we're involved in are the real environmental issues. We don't mind going head-to-head on the environmental issues, and we don't mind delaying projects for significant and real environmental issues, and we will do that as long as we need to. However, we won't tolerate bureaucratic delays in recognizing the problem and in going head-to-head.

We hope that by doing this, by getting in early, by defining our role as best we can, and by sticking to the important issues, we can provide balance to the refinery siting issue in New England.

## SOCIAL CONSIDERATIONS

Richard Williams

New Englanders are now learning of the massive shifts taking place in petroleum supply patterns and the economics of supplying petroleum products to New England. The changes in crude sources, ship sizes, and tariff regulations now allow, and in fact encourage, the location of new crude off-loading facilities and associated refineries near the New England petroleum markets.

A large petroleum refinery has the potential for generating significant benefits for a region, and it also has the potential for economic and environmental damages. As with any large industrial project, the magnitudes of various benefits and costs will depend on the size of the facility, its location, its management, and its design. The impacts will also depend, among other things, on the adequacy of local planning and the enforcement of federal, state, and local regulations. The magnitude of various benefits as well as damages can be huge or insignificant depending on the specific project.

Part of the evaluation of whether New England should allow refineries to be built in the region is an analysis of the economic and social impacts which can be expected from such developments. The communities or states considering refinery proposals should consider the balance of new jobs and taxes against potential environmental damages and other economic developments discouraged by the refinery.

This paper outlines the potential economic and social impacts of refinery developments on the local community and region. In addition, the implications which can be drawn from the form of the impacts are discussed as they relate to the roles of public agencies in evaluating proposals for refinery developments.

One must begin the analysis of refinery impacts by realizing that the benefits and costs of such projects accrue in different amounts to different groups and individuals. Thus, the first point to bear in mind is that there are different groups and economic sectors which benefit more or less from the refinery development:

*\*Mr. Williams is a consultant with the Arthur D. Little Company, working in the corporate public management division. He has been the director of several programs for EPA on the economic and financial impact of air and water pollution control costs on various segments of American industry. Also he made a special oil refinery study for the Board of Selectmen of Dracut, Massachusetts. His undergraduate work was at the University of Pennsylvania, and he attended an Advanced Management Training Program at Harvard Business School.*

- \* the oil company and others involved with building and operating the facility;
- \* the community in which it is built;
- \* the surrounding communities;
- \* the state and region;
- \* the consumers in the region; and
- \* the general business community in the area.

The second point is that refinery developments can be greatly different in their size and impact. A landmark study completed last year by Arthur D. Little, Inc., for the President's Council on Environmental Quality<sup>1</sup> examined some of the potential onshore economic and environmental impacts if deepwater ports are built in the United States.

The range of possible onshore developments went from a small port in Maine with limited regional impacts to a massive petroleum refining and petrochemical industry development in the mid-Atlantic. Looking at the mid-Atlantic served by a single deepwater port in southern New Jersey, the study projected new refining capacity as high as 3.7 million bbl/day by 1985, 25 billion pounds of ethylene-based new petrochemical complexes, and new direct, indirect and induced employment of 515,000. By 1985, 127,000 acres could be used by this refinery, petrochemical industry, and related industrial development. The pollution loads could be correspondingly massive. The estimates were made prior to the crude embargo and the "Project Independence" proposal. Current projections of East Coast crude imports by 1985 are much lower than those used in the CEQ study, and thus it is unlikely the refinery and related developments would reach the magnitude discussed above if a deepwater port were built in the region.

Machias Bay, Maine, was studied as an example of a secondary development site removed from existing industrial development. It was concluded that by the year 2000, no more than 650,000 bbl/day in refining capacity would be built in the area and most of the received crude would be transshipped to refineries closer to the petroleum markets. In addition, no petrochemical industry development would take place. More than the 650,000 bbl/day refining capacity was felt to be necessary to stimulate petrochemical industry development in an area where it does not presently exist.

Perhaps the third point of this paper should be that only considering the impacts from a refinery may too narrowly define the subject, since much of the impact of refinery development comes from the induced secondary development. For example, the induced petrochemical development can have a heavier pollutional load than the refinery itself. Going against my own advice, I will, however, be concerned here primarily with impacts from refineries.

Some of the categories where impacts from a refinery could be seen are:

- \* jobs;
- \* taxes -- local/state;
- \* projects to the private sector
- \* petroleum product supply;
- \* petroleum product prices;
- \* pollution loads -- air/water/solid waste;
- \* land use;
- \* housing demand;
- \* social character of the local area; and
- \* opportunity costs of employing such local resources as land.

From currently available work, one can get a general idea of the anticipated impacts in these areas.

#### Jobs

The 250,000 bbl/day refineries being discussed in New England would employ from 200 to 500 people. "Simple" refineries producing primarily residual fuel oil and naphtha employ about 200, while the "complex" refineries producing gasoline and lighter distillates employ about 500 people.

The indirect employment multiplier will depend on where the facility is located. For a refinery in eastern Massachusetts, Arthur D. Little, Inc., estimated in a report to the Massachusetts Port Authority<sup>2</sup> that there would be 1500 additional indirect and induced jobs in Massachusetts from a 500-employee refinery. (See Table 1.) A recent University of New Hampshire study<sup>3</sup> on the economic impact of an oil refinery in the southeastern part of that state estimated the number of indirect and induced jobs would be lower than 1500 in a rural area.

During the three-year construction period, the construction work force would average 2,200, according to the ADL report to Massport (as seen in Table 2). In 1972, earnings of petroleum refinery workers along the mid-Atlantic averaged approximately \$10,000. At that rate, a 500-employee refinery would have a payroll of about \$5 million per year. ADL's report for Massport also estimated that secondary and induced employment in Massachusetts would result in an additional \$11.5 million in annual earnings. During the three-year construction phase, the yearly direct earnings were estimated to be \$29 million, while indirect and induced earnings were estimated at \$25 and \$11 million respectively.

TABLE 1

## ESTIMATED EMPLOYMENT FACTORS FOR NEW 250,000 B/D REFINERY

	Estimated Employment	Estimated Employees Relocated to Mass.	Estimated 1972 Average Yearly Salary/Wage Level
Total Employment	500	50 <sup>1</sup>	\$10,000 <sup>2</sup>
Administrative Employment	50	10	13,800
Executive	10	10	25,000
Administrative Support	40	--	11,000
Operative and Maintenance Employment	400	35	10,600
Skilled	360	35	11,000
Semi-Skilled	30	--	8,000
Unskilled	10	--	5,000
Other (Lab., Safety, etc.)	50	5	10,000

1. Assumes 6-12 month training program in Massachusetts before refinery operations begin.
2. Average straight-time earnings. Excludes premium pay for overtime and for work on weekends, holidays and late shifts. An additional 5-10 percent should be added to reflect such additional earnings.

SOURCES: Shell Oil Company, U.S. Bureau Labor Statistics, and Arthur D. Little, Inc.

Reported in: A Preliminary Economic Study of Alternative Methods of Supplying Petroleum Products to Eastern Massachusetts, Arthur D. Little, 1973

TABLE 2

## ESTIMATED CONSTRUCTION LABOR FACTORS FOR NEW 250,000 B/D REFINERY

	Estimated Average Work Force	Estimated Peak Work Force	Estimated Construction Duration (Months)	Estimated Peak Con. Duration (Months)	Est. Employees Temporarily Relocated to Mass.	Estimated 1972 Average Yearly Salary/Wage Level
Total Construction Force	2,200	3,600	36	12	580	\$13,000 <sup>1</sup>
Construction Management	200	300	36	24	180	16,000
Skilled	1,400	2,300	36	12	400	14,000
Semi-Skilled	400	660	36	12	--	10,000
Unskilled	200	340	36	12	--	8,500

1. Miscellaneous time loss (vacations, holidays, sick leave) assumed to be offset by overtime pay.

SOURCES: Raytheon Company, Inc. and Arthur D. Little, Inc.

Reported in: A Preliminary Economic Study of Alternative Methods of Supplying Petroleum Products to Eastern Massachusetts, Arthur D. Little, 1973

While refineries are capital intensive facilities with relatively few employees, related petrochemical industry development is cited as the source of large numbers of new jobs. However, one must keep in mind the projected need for refining capacity "substantially in excess of 650,000 bbl/day in a new area" (ADL report for CEQ) before there would be any significant petrochemical development in virgin areas. The question of how much petrochemical industry development would result from refinery developments in New England has not been resolved and must be examined further. However, even in urban areas, New England currently has a relatively undeveloped primary petrochemical industry and thus may require substantial refining capacity before a significant associated petrochemical development would appear. The location of such development may or may not be in the immediate vicinity of a particular refinery. Table 3 lists the current employment in the petrochemical industry in New England and New Jersey.

### Taxes

Local communities tend to regard a potential refinery as a tax bonanza. However, such expectations may not be borne out. Under typical tax laws, most of a refinery's asset value is not taxable as real property by the local community, since process equipment and manufacturing equipment are exempt from coverage by the property tax. A recent study of the effect of a \$400 MM refinery on a community of 20,000 in Massachusetts estimated the town's tax rate could drop no more than 6% in the first year of operation, assuming no community expenditures as a result of the refinery. Other communities around the country where refineries have located have not experienced significant declines in their tax rates, in part because of the tax exemptions and in part because the communities used the new revenues for new services. One must keep in mind that if a refinery does pay significant tax revenues to the local community, the community can decide to purchase new services, lower the tax rate, or a combination.

If a community uses the new revenues to reduce the tax rate, it will probably find its tax rate again comparable to other similar communities in a few years. Historically, communities experiencing industrial development have not experienced sustained reductions in their tax rates relative to similar communities without industrial development. The pattern is a reflection both that short-term tax reductions tend to attract housing and other developments requiring net increases in taxes and that in practice public officials will tend to buy more services rather than reduce taxes, given the choice.

The level of state tax revenues from the refinery will depend on state tax laws and perhaps new court interpretations. The ADL tax evaluation in the Massport report assumed the refinery valuation would be split 65% to 35% between the local community and the state for taxation by the local property tax and state tangible property tax. Under such a split, the state of Massachusetts, it was estimated, would receive \$6.55 million in new taxes from the refinery and indirect and induced development (5% personal income tax, \$7.48/\$1,000 valuation tangible property tax, 3% sales tax, and 8.5% tax on net business income). If the local-to-state split were 20% to 80%,

TABLE 3  
PETROCHEMICAL INDUSTRY EMPLOYMENT IN NEW ENGLAND  
(1972)

Industry (SIC Code)	New Jersey	Connecticut	Maine	Massachusetts	New Hampshire	Rhode Island	Vermont
Plastics & Resins (2821)	8700	3,215	nil	6,375	200 approx.	864	160 approx.
Soaps & Detergents (2841)	4,240	125 approx.	nil	483	nil	85 approx.	nil
Surface Active Agents (2843)	1,950	nil	nil	3,215	nil	130	nil
Cyclic Crudes & Intermediates (2865)	8,875	nil	nil	nil	nil	nil	nil
Organic Chemicals (2869)	13,040	1,730	nil	645	nil	565	nil
Total State Work Force	2,144,707	991,939	255,346	1,891,109	219,146	292,412	120,684

SOURCE: U.S. Bureau of the Census, County Business Patterns, 1972

as may be more likely, the total state revenues would be about \$11.9 million per year.

### Profits

The refinery would produce real economic gains in the local region, as reflected in the additional jobs. The resulting profit generation can be a stimulus for other unrelated economic development. The refinery is the major profit generator, which will not typically be locally owned. Thus, this portion of the profit would not typically be locally reinvested. ADL's report for Massport estimated there would be approximately a 50¢ per barrel savings over current petroleum product delivery methods resulting from the construction of a deepwater port and of land refineries in eastern Massachusetts. But the savings were not expected to be reflected in lower product prices to the consumer. Rather, the savings would be an additional profit incentive to induce the company to undertake the venture.

### Petroleum Product Supply

Simply stated, there is no reason to believe that the supply of petroleum products to the consumer will be any greater in a local area because a refinery is located in the area. The level of product demand is a function of product price. In the absence of federal allocation and price controls, prices will rise and fall to assure that the demand (at that particular price) is met.

In any long-term sense, supply is not the issue. It is price. Thoughts of New England being "cut off" from petroleum products are as pointless as thoughts of New England closing its colleges to students from other parts of the country, refusing to sell its missile and spacecraft components to other parts of the country, or refusing to sell its ball-bearings to the remainder of the country. The relevant question for New England is whether the construction of local refineries will reduce product prices. At lower prices, there may be increased demand and thus increased "supply." This certainly need not be the only rationale for encouraging refinery developments. But if the belief is that accepting refineries means accepting certain associated damages, then increased product supplies should not be thought of per se as a counter-balancing benefit.

For short-term dislocations such as the recent crude embargo or a shutdown of a major refinery, the so-called "security of supply" may be a question of concern. Unlike Europe, the U.S. has historically maintained only a 15-20 day product supply in storage in market areas without refineries. The refineries themselves normally operate with an average of 45-60 days of combined supply of crude oil and products on hand. During short-term dislocations, this additional supply could provide an added cushion. Of course, one does not have to build a refinery to get added storage capacity.

In a serious crisis, one would expect federal allocation regulations to be in effect, as in the recent embargo, and reduce any local advantage over other parts of the country.

Unlike petroleum product supplies to the individual customer, petroleum supplies to major industrial users such as utilities may be relatively more secure with a local refinery supplying the industrial user. The rationale for this proposition is that some oil companies were able to maintain substantial levels of crude imports during the recent embargo. Firms having established supply relationships with local refineries served by such companies are thus believed to have relatively more assured supplies of petroleum products if there is a similar embargo again.

### Petroleum Product Prices

The ADL study for Massport referred to earlier examined the question of the relative costs of transporting and refining petroleum products by various methods, including the continued receipt of products by smaller ships and the construction of a deepwater port for supertankers and associated refineries. The cost savings of the latter over the former was estimated to be about 50¢/bbl (.01¢/gal.). The report concluded that these savings would not be passed through as reduced product prices to the consumer if one or two refineries were built in New England. If a larger number of refineries were built by different firms, over a period of time the local competition might result in some restraint on future price increases.

### Pollution Levels

Great advances have been made in the technical capability to control air and water pollution from refineries. However, the subject should be approached with great caution. A recent report for the EPA by the Radian Corporation concluded that new refineries could not meet the Agency's guidelines for ambient hydrocarbon (HC) levels. Other new source air and water standards were believed to be realizable, though they may not be environmentally acceptable at a particular proposed location. In addition, important effects such as noise, odor, and illumination are not fully controlled by EPA standards. Yet some of the problems of a refinery involve the periodic spills and process accidents not falling in the category of normal operations. The local community must be particularly concerned because state and federal agencies are often not adequately staffed and equipped to monitor closely whether plants actually comply with pollution control standards on a continuing basis.

Communities must also bear in mind that pollution levels can impose very real economic losses on the residents and firms in the area. If pollution levels are allowed to get high, the region can experience added costs for medical bills, water treatment costs, cleaning bills, and the costs of shortened life expectancy. There can be losses in the productivity of

shellfish and fin fish habitats, recreational areas can be less productive, and some businesses may be discouraged from locating in an area because of pollution levels. The costs of pollution are less dramatic than the benefits of industrial development, such as new jobs. But the pollution costs are just as real.

#### Land Use

The land sought by oil companies for a 250,000 bbl/day refinery is about 1500 acres. Some of the buffer zones for newer refineries amounting to several hundred acres have continued in their previous use, such as farming.

What other facilities might locate near a refinery is an important element of the land use issue. A community considering a refinery development must look beyond the refinery itself to consider whether its zoning, land use control, and overall development plan are adequate to deal with related industries, new housing, and related public services.

#### Housing Demand

The effects of a refinery on housing demand will depend on how many people move into the area to take the new jobs at the refinery and to take the secondary and induced jobs. There will be large differences between the effects in a rural area and a developed urban area. The ADL Massport report estimated that about 70% of the refinery jobs could be filled by the local labor force if it is available and there is a 6-12 month training period. (See Table 1.) About 75% of the construction force could also come from the local labor force. (See Table 2.) However, the employees transferred into the area will not be the only new demand for housing, particularly if there is not a high unemployment rate. New job opportunities will exist at the jobs which the new refinery employees left. To an undetermined degree these jobs will also be taken by new people moving into the area. There are also more induced and secondary jobs than there are in the refinery itself, but these tend to be scattered over a larger geographical area.

The importance of changes in housing demand is greater in areas where there is not presently an excess housing stock. Rural areas, some older urban centers, and suburban communities trying to discourage new housing development might experience problems if there is a significant new housing demand.

#### Social Character of the Local Area

Like the pollution damages, the effects of changes in the area's character are difficult to quantify. The effects will depend on the size of the total petroleum development and the size of the existing community. A single refinery would have little social impact in the immediate Boston area but would be a big addition to a small community. During the construction

period, there would be a peak influx of about 3,600 construction personnel, some of whom would need temporary housing, though not many would bring their families with them. During the operating phase, the new people moving into the area will require housing and school for their children. However, the housing and school problem is not unique to a refinery, since it would result from any new industrial development. The problem communities have in terms of social impacts is not so much the refinery as not adequately planning for and controlling any industrial development so as to minimize the negative effects.

#### Opportunity Costs of Employing the Local Resources

The opportunity costs are an important and often neglected cost of a new project such as a refinery. The two clearest examples of opportunity costs are, first, the alternative uses of the 1500 acres of land which are no longer available for development and, secondly, the foregone development in the area due to the refinery. The University of New Hampshire refinery study cited housing, recreation, white collar businesses, insurance, and R&D activities as ones which could be discouraged from locating near a refinery. These opportunity costs are in the form of jobs and tax revenues which the area will not receive due to the refinery. The costs could be large or small. To estimate or evaluate the magnitude of these costs, a community or region would have to assess realistically the alternative economic development patterns open to it over a period of time and estimate how the refinery would change those patterns.

While there are other refinery impacts which could be considered in a more complete analysis of refinery impacts, one can take those touched on above and follow their implications for the various decision-makers.

The oil company and other businesses with a major involvement in the project will receive their returns largely independent of where the refinery is located. They will look for adequate land, water supply, transportation, and a community which will accept them.

The community in which the refinery is located will benefit modestly from taxes and new jobs. It will also pay a cost which can be significant in terms of pollution damages, requirements for community services for new residents, and the opportunity costs of some foregone future economic development.

The surrounding communities may or may not experience a net benefit. Some of the jobs will be available to their residents, and they may get some secondary development. However, their costs from the refinery and secondary developments can be significant, since they may also experience pollution damages and opportunity costs from other economic development discouraged from locating in the area.

From the perspective of the state and region, the benefits can be large because the state can receive substantial taxes, and local economic dislocations tend to cancel out at the state and regional level. The costs



to the region become relatively large only when the proposed development becomes large relative to economic activity of the whole state and disruptive of the economy and environment of the whole region. The potential for massive onshore development in the mid-Atlantic states has contributed to the reluctance on the part of state officials to allow deepwater port developments in that area.

The consumer should be largely indifferent to a refinery locating in his or her region since there will be no significant changes in petroleum product supply or price.

The general business community in the local area of the refinery should be divided in its desire to see the refinery built. The general service sectors and materials supply sectors will benefit, while some other sectors could be hurt in the long run, such as recreation, tourist, and some white collar industries.

Having outlined some of the potential impacts, one can now see that the distribution of the benefits and costs of a refinery development tell a great deal about what the objectives should be of different actors in the process of considering and controlling such developments. As examples, one can consider the local communities and the state and federal agencies with jurisdiction over the developments.

Taking first the local community, one can see that there are real benefits for the community in which the refinery locates. But there is also the potential for substantial damages. Thus, the community should approach the question of accepting a refinery with substantial caution and seek through its arrangements and contracts with the oil company and state and federal agencies to protect itself in terms of fair tax payments and adequate enforcement of pollution control regulations. The adequacy of local land use control and the impact of future demands on public services must be established before a decision to accept a refinery is made.

The state and also the federal agencies should act on the realization that there may not be an equitable distribution of benefits and costs among the communities and groups near the refinery. For example, there is currently no mechanism for surrounding communities to be compensated for environmental damages. Thus, the state which benefits from the overall regional growth has an obligation to protect the smaller entities who pay much of the cost of the regional development. As examples, the state could consider new approaches to sharing tax revenues, the encouragement of multi-community approaches to land use controls, and more direct ways for local communities to assure that pollution control standards are enforced.

An evaluation of the impacts of a refinery development leads one to understand more clearly why the decision to authorize such a project should not be made by a single level of government or a single government agency. There are a large number of conflicting public and private interests which legitimately have a role to play in deciding whether, and if so where, refineries should be located in New England.

## References

- <sup>1</sup> Arthur D. Little, Inc., Potential Onshore Effects of Deepwater Oil Terminal-Related Industrial Developments, for the President's Council on Environmental Quality, 1973.
- <sup>2</sup> The University of New Hampshire, The Impacts of an Oil Refinery Located in Southeastern New Hampshire: A Preliminary Study, 1974.
- <sup>3</sup> Arthur D. Little, Inc., A Preliminary Economic Study of Alternative Methods of Supplying Petroleum Products to Eastern Massachusetts, for the Massachusetts Port Authority, 1973.

## "WHO MAKES THE FINAL DECISION?"

### LOCAL APPROACH TO DECISION MAKING

Alden Winn

Our recent experience in Durham, New Hampshire, with Olympic indicates a confusion about the local role in a refinery site decision. A little thought will reveal that this confusion arises from the fact that local roles will vary from state to state, and even within one state, depending on the political structure of government, the availability and trust in state control organizations, local social traditions and aspirations, the local economic situation, and the local environment.

#### Political Structure of Government

In a formal sense, New England local communities are empowered to act autonomously only in areas specified by charter in the case of cities, or by general legislation in the case of towns. It is a general principle that towns and cities are the creations of the legislature, and that their powers are subject to its will. In general, city charters may not be changed without a referendum process. No such written restriction applies to a town, but there is a well established tradition that the states will not selectively impose its will on a town in these areas (such as zoning, for example) where it has generally granted power to all towns.

Between the powers granted by charter or by general legislation, there are great differences. Although in both cases decisions regarding zoning are made by the legislative body of the town or city, there is a great difference in the composition and speed with which these bodies can react.

The legislative body of a city is usually an elected city council which meets frequently during the year and which can react with a speed limited only by required public hearings. One needs only in this case to present at the public hearing such information as will persuade a majority of the city council that it is in the best interests of the city and politically expedient for the council to adopt enabling legislation required for a refinery.

In New Hampshire towns, the legislative body is the town meeting, and on issues which are controversial, this means some 50 to 80 percent of all the voters in the town. Although a sizable portion of the voters will

*\*Mr. Winn has been the Chairman of the Board of Selectmen of the Town of Durham, New Hampshire, for over three years. Before that he served on the Town Planning Board. He has been for twenty-five years a professional engineer in the State of New Hampshire, having received his Bachelor's Degree at the University of New Hampshire and his Master's at M.I.T.*

appear to vote on the final decision, relatively few will appear at the required public hearings, and most of these will be those opposed to what-ever is being proposed. Thus, extraordinary public-information procedures will be required to obtain a well informed electorate. The speed with which a town may react is deliberately and discouragingly slow. The regular town meetings are annual, and legislation petitioned by the voters can come to a vote only in a regular town meeting.

Legislation initiated by selectmen or planning boards may come before a special town meeting, authorized by a Superior Court Justice or petitioned by 50 or more voters.

It should be noted that only voters may petition for action at a town meeting. A potential developer must persuade a sufficient number of voters to petition his required legislation, or he must convince planning boards or selectmen that his needs deserve a referendum.

It should be noted in the above description that city and town executives, although important in a leadership of public opinion role, do not in fact have the power to make the vital decision. It turns out that it is probably easier for them to lead the town against the change, since it is easier to defend in detail the status-quo than it is to defend a not well understood and technologically complicated change, such as would be made by an oil refinery installation. Finally, it is important to note that although cities have full-time executives and planning directors (perhaps in some cases councilmen), the entire leadership of towns is with low or non-salaried, part-time people who have been accustomed to devoting, at most, one or two evenings a week to town government matters. It is not easy for them to find the time necessary to understand the full meaning and significance of a radical change in the nature of town industrial operations. Moreover, town budgets, almost entirely dependent on property taxes, are set as much as eighteen months in advance and do not easily accommodate to the expense of hiring necessary legal and other professional advice usually required for an intelligent reaction.

#### Availability and Trust in State Control

In the twentieth century, the state governments have developed a number of commissions, executive offices, and agencies concerned with controlling the installation, taxation, and operation of industries which have a high potential for economic or environmental hazard. In some states these agencies have achieved an excellent reputation for protecting the public interest as opposed to the private interests of the developers. It is well understood that all industry has as its prime motive the production of profits with which they will pay dividends to their investors. There are few which will voluntarily accept anti-pollution installations and procedures until they are convinced that it will not be possible to continue operations without them. For many, the decision to install protective measures to prevent adverse environmental and economic impacts is one of the elements of the bargaining process to obtain the initial rezoning and building permits. Once these are obtained, the only impetus for continuing operations in an environmentally and economically safe manner is that provided in advance by some control mechanism--a state agency with power to inspect and, if required, to shut down until safe procedures are instituted,

or a large bond or escrow fund together with a monitoring agency with powers to enforce forfeiture and correction in the event of non-compliance.

It does not take detailed examination to discover that some states, even when ostensibly equipped with the proper agencies, do not have a performance reputation which encourages trust in the protection of the public interest. In New Hampshire, for example, there are two obvious indicators that our state control may not be adequate. First, the site review committee charged with making a detailed study of the siting of a refinery and with devising conditions for the safety of the environment is composed of a number of excellent people who have full-time jobs elsewhere in the state government. They are expected to perform this work, much of it overtime in evening hearings, in addition to their other duties. Such an important task obviously deserves but does not get full-time attention. Secondly, anyone experienced in dealing with that primary state pollution control agency, the State Water Supply and Pollution Control Commission, finds it understaffed, even to perform its routine inspections and issue permits as required by law in a reasonable manner and time. For example, they are charged with issuing permits for all on-site sewage systems. More often than not, they do so without site visits. If they cannot meet present requirements effectively, how can one hope for the detailed monitoring and control necessary for an oil refinery? Add to this the fact that our Governor has openly advocated no increase in attention to environmental control of an oil refinery in the state, and it is easy to see that a local community cannot feel much dependence on state agencies for effective control. Without this, the only alternative would be to devise appropriate local power, but the time and money and expertise necessary for the development of suitable local control measures are rarely adequate to the solution of the problem.

#### Local Social Traditions and Aspirations

In New Hampshire, and I suspect, nearly everywhere else, each city or town develops a tradition based on its history and on its population characteristics. The tradition is seldom deliberately arrived at. It is, I suspect, often the result of external decisions or perhaps even chance. Thus Portsmouth, New Hampshire, has a character greatly influenced by a colonial history, and more recently by the Federal Government decisions to locate a major naval base and an air base in or near the city. Durham, New Hampshire, is primarily influenced by the presence of the University. This is not to say that nothing changes in such towns. More often the changes which do occur happen without conscious determination by the citizens or, I guess, sometimes in spite of the desires of the citizens. In discussing the local readiness for installations such as oil refineries, the characteristics of the town in a sociological sense are exceedingly important. As an example, and because I know it well, I shall attempt to describe my own town, Durham, New Hampshire.

The pre-World War II University was seen by the citizens of the state as largely oriented towards agriculture (a cow college). The faculty, who comprised a large portion (and still do) of the citizenry of the town (even if they were originally from out of state) quickly adopted the Yankee mores and manners so characteristic of New England. Among other things,

these characteristics included a strong affinity to open space, natural beauty, simplicity, and the rural atmosphere. They were joined in this by the historically old Durham families, who have remained, in a number of cases, as large land holders in the town; not exceptionally wealthy, and increasingly pressed by the growing burdens of real estate taxes. The post-war University grew rapidly, both in size and in sophistication. A rapid increase in housing was accompanied by a much more rapid turnover in occupancy. The new population, coming much more from urban areas all over the country, came to Durham, in part at least, because of the relatively rural character of the town. These people brought with them an abhorrence of urban and industrial sprawl they had seen in many other parts of the country. In this they are joined by old-time residents, who knew all along that rural was what they wanted, and by a significantly large number of new professional people--doctors and industrial executives practicing in nearby towns, who sought a living situation different from that in which they practice or work. With this orientation, it is not surprising that the town adopted a relatively strict zoning law which deliberately excluded heavy and even light industry.

With a relatively high educational background and with the larger professional salaries, the town also constructed a better than average school system and accepted a consequent high tax rate which, by and large, they are willing to pay so long as few changes are made in the character of the town. The townspeople are, in general, public spirited to a high degree and are vocal and literate about public matters.

As with the citizens of almost all New England towns, they are resistant to change, but will accept change when accompanied by sincere and open presentation of the need by people in whom they have confidence (which most often means local people). Even though most of the land is privately owned in town and is not considered as accessible to the public, the visual availability of large open tracts and an extensive shorefront are considered by many to be one of the most treasured resources of the town. Although a large student body is present in the town, its impact is primarily commercial and hardly at all political. From the above it should be apparent that the sudden presence of an oil refinery, even with no environmental hazards, would radically change the nature of the town. To get voter acceptance of such a change would require the conviction that either there was no better site and that it is required by overriding state, regional or national interest, or that the benefits, economic and otherwise, are impelling. Of special concern is the social (and even political) impact of the owners and operators of the refinery as a new component of the citizenry.

#### The Local Economic Situation

For a major industrial organization to be especially desirable to a town, it should promise to solve some pressing economic problem. Examples might be to lower unemployment, to improve local wage rates, to increase the tax base, or to provide lower cost and better supply of scarce products. If, for whatever reason, there is no sizable unemployment and no competitive industry to upgrade in wage rates, the first two elements are missing. The new industry could only operate if it brings with it its own labor force,

thus bringing (probably unwanted) growth and further demand on already saturated housing, school systems, and other town services. The increase in tax base is problematical, not within the control of the town and, in New Hampshire, it turns out, undeterminable with any accuracy in advance. The ability of a local oil refinery to give petroleum products with more assurance of lower cost is questionable indeed in the light of present price practices or federal control.

#### The Local Environment

A new industry is ordinarily most acceptable where there is present industry, especially of a similar nature, so that people have a chance to compare proposals with practice. Lacking this, local people are required to find suitable comparisons elsewhere requiring much time and effort. Even if such comparisons convince them that the environmental impact will be acceptable, the question still remains as to whether the officials of the company will, in fact, build and operate to be environmentally safe. A judgment on this point will usually depend on an assessment of the character and the motivation of the owners and operators as well as the engineers and contractors. Personal judgments, even though of no guaranteed reliability, will be of extreme importance in the decision process.

#### Conclusions

In summary, the local situation is characterized by reluctance to change, coupled with a skepticism with respect to any "out-of-towner with a profit motive" and to the reliability of state and federal control to prevent a whole host of unfavorable impacts which will be imagined and feared by the uninformed citizen or which may be evident in like installations elsewhere. Favorable reaction of long lasting duration will require an extensive information and negotiation process in which undue haste or evidence of "shady" procedures will raise many objections and suspicions.

A proponent for an oil refinery to be placed in a virgin environment would be well advised to embark on the following program, with respect to the local scene.

- 1) Before any announcement is made, an extensive survey should be made of all possible sites in the region, so that when the question is raised, "Why this site?" a good explanation can be made. However desirable a site may be, it will be hard to defend if other sites turn out to be openly receptive, unless these other sites can be shown to have serious disadvantages (not just less economical).
- 2) Before any announcement is made, an extensive study should be made of the social, economic, and environmental character of the tentative site. It is recognized that this will be difficult to do without disclosure, but there are techniques for discovering the necessary information from people who know how to keep confidences or who will refrain from open speculation. The information gathered should reveal important decision leaders in the community and should especially search out the factors described above. If a well done

comprehensive plan is available, much of the required information will be contained therein.

- 3) The acquisition of land should be free of any misleading statements, even though this may be standard real estate practice. There is nothing so damaging to the reputation of the promoter as a disgruntled option giver, under attack by fellow townspeople for "selling out," while under the impression he was participating in something else. It would be reasonable to assume that if one cannot get options except by subterfuge, one has little chance of getting public acceptance in a vote.
- 4) If approval of the project involves legislative process such as zoning change, the promoter should make himself thoroughly familiar with the necessary process and should carefully identify those who will vote on the decision. Local legal advice is necessary.
- 5) In making the first announcement of intentions, great care should be taken as to the manner, the audience, and the timing. If a vote by townspeople is crucial, it is a grave mistake to make the first public announcement to any other group. Governors, mayors, Congressmen, and selectmen, although perhaps necessary in making arrangements for a public announcement, should not be allowed to take an early position of sponsorship. It is their duty to provide access to the public. It is neither their duty nor their privilege to seem to make decisions in advance of full disclosure.
- 6) The first disclosure should be in sufficient detail to bound the proposition; sweeping generalized claims to good intentions, superior cleanliness, great public concern, good citizenship, etc., are worthless. Specific examples of means and guarantees of how good citizenship of the new installations will be maintained are most useful. Especially valuable will be an indication of the awareness of the public need to learn the full details of the operation and its impact on the community. Detailed plans and aid to the public (not just the elected leaders) in gaining this knowledge should be offered. Since, obviously, no one meeting could explain the whole scheme, a series of well planned public information meetings, reasonably well spaced to permit absorption of details and formulation of questions, is necessary. All questions should be answered fully and honestly and authoritatively.
- 7) It is especially important that the public be told exactly what the timetable is for the various steps leading to a decision.
- 8) Throughout the whole process there must be frequent opportunity for the public to meet with and debate with the principals involved in the promotion of the idea. They will need to see and come to believe in their ability and willingness to meet the commitments being made in the presentations.

Much more can be said, but these are some of the principal elements missing in the presentations made by Olympic in New Hampshire. Omission of these was so significant that the rejection came even without a specific request by Olympic. It might have happened anyway, but the procedure followed gave little chance for confidence of the voters in the company. Olympic officials have said they were abused. The people of Durham were convinced that the company was not reliable. Why not, when the company's primary negotiations were with the Governor and, via lobbyists, with the legislature.

#### STATE APPROACH TO DECISION MAKING

Joe C. Moseley

I was in New Hampshire last in early February at the invitation of the New Hampshire Legislature to provide them with information on possible impacts of deepwater ports, related refineries, and other associated development such as petrochemicals and related transportation facilities. The Legislature's interest was not just academic. Onassis had very nearly pulled off a coup on the New Hampshire coast, buying up most of the land on the Durham peninsula in anticipation of a refinery to accommodate a projected deepwater port. (Finding the climate inhospitable for his endeavor, he subsequently acquired land options in Texas for his visions.)

While the weather is much milder now in New Hampshire than it was three months ago, the atmosphere of feelings and emotions concerning deepwater ports and refineries hasn't changed significantly--if at all. Two prevailing attitudes still are salient, either "I am for them" or "I'm against them", with relatively little receptiveness toward changing one's mind based on facts. Moreover, it seems that most efforts to gather data are not attempts to develop more factual information to make rational decisions. Rather, they are attempts to gain ammunition to reinforce one's position while attacking the "other side."

When it comes to superports, this apparent cold-blooded, single purpose attitude is certainly not indigenous to New England--it's found everywhere including my home state, Texas. Such attitudes are not necessarily all bad. They force a thorough airing and assessment of all sides of an issue and, consequently, stimulate public officials to finally settle down and learn what the something's about. Unfortunately without the controversy and mounting heat as catalysts, most public officials will not become substantively involved with serious issues.

After the close call with a refinery, New Hampshire took a second look at its coast. The subsequent symposium on "Perspectives on Oil Refineries and Offshore Unloading Facilities" is trying to pinpoint where the final responsibility for such earth-shattering decisions as refineries and deepwater ports lay. Asked to participate in this search, I did some serious

*\*Mr. Moseley is the Executive Director of the Texas Coastal and Marine Council for the State of Texas. Before taking on this assignment, he was with the Coastal Resources Management Program in the Governor's office. He has a B.S. Degree from Texas A and M, a Master's Degree in Environmental Health Engineering from the University of Texas, and a PhD. in Civil Engineering from the University of Texas.*

thinking and reflected on my previous trips to New England. Possibilities of different presentations came to mind, such as lining up all the pros and cons of a DWP (deepwater port), discussing experiences elsewhere, etc. These approaches would all be reruns, however, of reams of number/data that everyone I'm sure has already heard and recoiled from, statistics and slides that have been seen before.

I've tried to rise above the morass of minutiae and focus instead on the basic public policy issues presented to New England by the promise and/or specter of a DWP and all the related trimmings. To accomplish this, I borrowed from Moses and Joe Bodovitz and came up with my own home grown variety of "Thou Shall . . ." and "Thou Shall Not . . ." commandments for use when considering a DWP and refinery complex for a neighbor. (See Table A.) I've backed this up with a summary of what I think to be the principal responsibilities of the private citizen, industry and government-- local, state, and national.

#### COMMANDMENTS FOR CONSIDERING A DEEPWATER PORT AND REFINERY FOR A NEIGHBOR

Thou Shall Think Through What Is Involved with a minimum of rush, undaunted by threats that your thinking is apt to destroy a project. No serious viable project could be destroyed by asking searching questions. Conversely, offering a friendly reception toward what is really a poor project is not likely to suddenly make it successful. Ask questions; check answers with other parties; ask for documentation of all facts and figures; and read the rest of these commandments.

#### Thou Shall Realize That A Large Deepwater Port And/Or Refinery Complex Is A Permanent, Irreversible Commitment

The decision to proceed with such facilities is a one way street. Once done, it's essentially done for the life of the world's petroleum resources. It may grow even bigger, but it is not going to shrink or go away. This makes careful scrutiny of all the pros and cons of such a decision even more critical. Refineries, like taxes, don't go away.

#### Thou Shall Learn Something About The Oil Business - Something Other Than EXXON Ads And Common Cause Press Releases

The oil business, from exploration and production to marketing, is big; however, it's not markedly different from other vertically integrated industries. Basic corporate decisions are still made for the same reasons: minimize costs (including taxes), maximize profits, expand sales, etc. I strongly suggest that before going too far you learn what makes the oil industry "tick." Only if you know and understand these things will you be able to rationally and intelligently comprehend and evaluate the potential consequences of various proposals. Until you develop this capability, you will have to listen to promises, charges, and counter-charges, and with stakes of this magnitude I doubt that you are really willing to gamble with New England's future on second-hand hearsay and PR handouts.

#### Thou Shall Realize The Difference Between Evolutionary And Revolutionary Actions/Impacts In The Context Of DWP'S And Refineries

You may not believe this, but it's true. That "un-owned minority" gives the industry unmitigated hell - just come down at election time and watch the industry's friends work like the devil to get their folks into office. Things get very nasty at times. It is important to realize that a large influx of refinery-related activity will bring a distinct, although subtle, change to the local political climate. Don't kid yourself - after all, everyone talks of the economic and social changes that are projected to occur. Thus, since the political system is largely a product of social and economic conditions, it is not very logical to expect political conditions to remain static. Incumbent office-holders beware! Of course, this presents an attractive situation for those who now hold no office but wish to - they'd just better be cautious; as the saying goes, "there ain't no silver medals in politics."

#### Thou Shall Realize That Credibility Is Usually Proportional To Size

The concept of a neighborhood corner grocery store with benevolent proprietors doesn't apply to the oil business. There are a few exceptions, but they are few and far between. In the oil business, however, usually the biggest operations are the most trustworthy. The Big Boys, from the well to the tank, have a responsibility and profit margin to uphold. Their retail activities provide an incentive to behave.

There are several theories to support the thesis that with the oil business credibility is proportional to size and experience. These theories include the following: (a) The Big Boys are best able to finance the extra fills, such as environmental protection, that they promise.

(b) The Majors have the experience to come through with such promises. They have more collective hours of scientific and economic experience than any individual or bureaucracy could hope for. A lot of resources have gone into their "schooling."

(c) Larger companies are more afraid of regulatory agencies. (Who ever heard of a young prosecutor becoming famous for nailing "Uncle Joe's Grease Factory?" But, winning a major law suit against a corporate giant-- well, that ought to be good for a good job with a large firm at ten times a government lawyer's salary. Besides he can probably now represent that corporation and help them get back what he cost them earlier!).

(d) Another theory maintains that the Big Boys are simply afraid of adverse publicity, and this includes getting caught telling a lie. No one has ever figured out how much paid advertising it takes to overcome just a few critical headlines.

I'll leave it up to you to consider why credibility is proportional to size, but I am much more apt to believe what a large, experienced outfit tells me than what a small or inexperienced group says. Think about it yourself. After all, who stands to lose the most?

### Thou Shall Realize The Magnitude Of The Stakes Involved

We are talking about initial investments of hundreds of millions of dollars with daily cash flows in the many millions of dollars, and all this just for the central facility. Some experts have predicted that there may be as much as \$50 billion in short and intermediate future investment hinging on the simple fact of whether Louisiana or Texas gets the first deepwater terminal, and this assumes that the other state will also get a similar facility shortly thereafter.

Some specific proposals can be identified. For example, DOW Chemical has announced plans to build a long-distance, interstate ethylene pipeline connecting the petrochemical complex in Houston-Galveston area with the one between Baton Rouge and New Orleans. (Ethylene is a basic building block used in almost all petrochemical products.) The interesting thing is that DOW does not, at this time, know which way the pipeline will flow! They are postponing this decision until it is determined whether the first superport will be off Louisiana or Texas. Then they will build a one billion pound a year ethylene plant, designed to operate with crude as the sole feedstock, near the port site. They already have land in both places. This example is only the tip of an iceberg. As you can imagine the thought of losing \$50 billion in capital investment introduces near-fatal heart flutter in some, but just the faintest thought of winning does the same to others. Realizing the magnitude of the stakes should help prepare you for some of the pitfalls, sales pitches and hysteria you must ultimately face.

### Thou Shall Consider A DWP/Refinery And Outer Continental Shelf Oil And Gas Development As Related Issues

I flatly disagree with those who emphasize that these are separate and distinct issues and that New England should consider the two separately. The two are not dependent on each other, but I strongly suggest that the impacts on New England of either are apt to be quite similar. For anyone disagreeing, let him consider two things. First, look at the horizontal - as well as vertical - corporate organization, and then tell me how, in the overall corporate functioning, pumping oil out of the ground is much different from taking it off a tanker. Secondly, if you still are an unbeliever, come down to the Texas-Louisiana coasts, and I'll show you some areas where both activities now occur, and I'll defy you to trace the difference much beyond the shoreline.

### Thou Shall Not Believe The Promises And/Or Threats Of Promoters And Hysteria Peddlers

Heating oil and gasoline aren't going to suddenly become plentiful up here if New England gets a refinery. Conversely, they are not going to totally disappear if you don't get one. Similarly, a DWP doesn't mean instant destruction for your beautiful environment, any more than not getting a refinery guarantees that all will stay beautiful forever. Remember, everybody, including yourself, whether you know it or not, has some stake in this game, and is apt to believe what he wants to and forget what may be convenient. I am not suggesting that the parties involved are going to lie (the stakes are too big to risk getting caught telling a "boldface lie");

however, half truths, three-quarter truths etc. abound. A simple story here is enlightening. It's about the fellow who stopped at a bar after work to have a few drinks and ended up also having an affair with the barmaid. When he got home, and was asked by his wife where he had been, he simply said he'd stopped for a few drinks. And, he didn't tell a lie. You folks here are in the same position as the guy's wife of having to look for tell-tale lipstick smudges and use these as indicators to ask more revealing questions.

### Thou Shall Not Act Hastily Nor Finally With Either Closed Or Open Arms

Think things through. Adopt a position, try to defend it while probing for weaknesses in the opposition. Be strong in your positions but stay alert for the pros and cons of both sides. Time is one thing that is available. As a result of all the competing forces, final decisions are not apt to be made quickly. Be sure when you make your final decision. You don't want to have to try and change it later.

### Thou Shall Not Naively Believe That Things Can Be Completely Controlled Once Development Starts

As pointed out above, the stakes are unbelievably high. As social and economic changes occur, it is only logical to realize that political changes will also take place. Such changes may cause some of the safeguards that you establish today to be discarded tomorrow. After all, essentially all such controls are legislative/administrative actions, and is it not reasonable to expect that if future legislators or administrators have been "assisted" by development interests, they will utilize their positions to return the favor? You bet! And just as the drawing out of oil from the ground has caused subsidence in some areas on the Texas coast, so too there may be a corresponding sinking of the political character with the advent of refineries and the profits thereof. Be aware of this sinking tendency. Unfortunately, there's damn little you can do now to prevent this in the future, except to keep up your vigilance!

### Thou Shall Not Become Confused By Lawyers (or Engineers, or Planners, or Ecologists, or etc. . .) Debating The Finer Points Of Facility Siting/Regulatory Legislation And Lose Sight Of The Major Public Policy Issues

Deepwater ports, refineries, and other such facilities offer endless possibilities for study and debate. Virtually every discipline can find an intriguing tidbit to tinker with, and, granted, all are necessary before a facility is ultimately built. However, these disciplines are simple technical tools to be used to assess the implication of alternative public policy decisions, and thus should remain in a supportive role. Being rigorously trained in one of these narrow disciplines, I recognize that this is heresy to many of my professional colleagues. However, I maintain that in many areas, the underlying policy issues are lost in a flurry of activity by the technocrats. This brings to mind another saying: "It is much easier to answer the wrong question than it is to ask the right one."

I consciously saved this commandment until last, because only if one has a feel for the many issues involved and their magnitude is it appropriate to admonish my followers (if anyone has been following me) not to get bogged down in hopeless detail. The danger is that you wouldn't be able to see the refinery and its impact, for all the facts and statistics. So much for the Commandments. I hope they will be of some value in helping you ask all the right questions concerning deepwater oil ports and refineries for New England.

#### RESPONSIBILITIES IN DECISION-MAKING RELATED TO DEEPWATER PORTS AND REFINERIES

Everybody has some responsibility. Anyone who is willing to call himself a citizen of this township, of this state, of this region, or of this country must be willing to share some of the awesome responsibilities of making decisions, which will affect all of us gathered here today for some years to come. At the risk of oversimplification, I'd like to identify distinctly different groups and set forth what I believe to be the basic responsibilities of each.

The Private Citizen is in a unique and difficult position. His responsibility begins with electing responsible officials, evaluating their performance, and either re-electing or replacing them. At times an individual is required to cast his vote either for or against a specific issue. This frequently gets difficult, because many such issues are submitted directly to the voter and are particularly important and controversial. All sides launch heated campaigns to convince the individual voter they deserve his support. Here the individual is expected to carefully evaluate all sides of the issue and render a concise 0-1 (no-yes) vote that all the elaborate machinery of administrative/legislative government failed to produce! On the issue of deepwater ports and refineries the private citizen's responsibilities include:

- \* Seeing that all the appropriate issues are raised and revealing questions asked.
- \* Pressing his elected/appointed officials to thoroughly pursue the matter.
- \* Insisting on full and accurate disclosure by all included parties.
- \* Not quitting and throwing in the towel by saying, "This is too complicated for me. . ."

Private Industry has a particularly rough row to hoe. Industry is expected to produce all the goods and many of the services society demands with the least adverse impact on the other elements of society and at the lowest possible cost. It's expected to do all this while paying enough return to the investors to generate future financing. In the case of the oil industry, the private sector is immediately labeled a profit-monger, and anything it may say in defense of itself is immediately labeled a self-serving lie. In this environment, when dealing with deepwater ports and related refineries the private sector has the following basic responsibilities:

- \* Be truthful, by answering all inquiries with the best available information.
- \* Practice the fullest possible disclosure of all plans or proposals commensurate with trade secrets.
- \* Be reasonable and patient with a public that is totally unfamiliar with a particular industry and who is not apt to be very trusting.

Public Interest Groups occupy a unique position. They are generally much less constrained than government to ask potentially embarrassing - and enlightening - questions. They also have many resources at their command and can investigate an issue in much more depth than a typical citizen. Thus their potential for discovering potentially shady operations is much greater. Also their potential for doing undeserved damage is great. In the context of this discussion, I believe special interest groups have the following responsibilities:

- \* To see that all issues are thoroughly aired, and to identify places where information is sketchy or suspicious.
- \* To use the power of accusation, with all its implications, sparingly, but when a case is developed, not to be bashful.
- \* To act only on facts and evidence, not on emotion or public opinion.

Government will have the final say in what type of facility is constructed and where it will be built. The existing systems of local, state, and federal government now control such actions under a wide variety of laws and regulations, and there is a clamor for additional legislation, at both the state and federal levels, to deal specifically with superports and energy facilities. At this time it is impossible to speculate on exactly what new laws are apt to be forthcoming, but it is probably safe to say that several new federal acts will be passed, and that many states will take action of some type.

The principal and most critical responsibility for decision making regarding DWP's lies at the state level. Before my local or federal colleagues jump from their seats with objections, let me point out that I said "principal responsibility" not "ultimate power." By this I mean that state government is generally in the best position - as the middleman - to assess the alternatives, pro and con, and make the decisions that best represent the collective interests of its citizens. Not infrequently, this decision by a state will involve a granting of additional responsibility to a local entity to enable that local entity to make its own decisions. The state is a good middleman because its representatives/officials are a little more buffered from local, special interest groups which may almost totally control or subdue a local government. At the same time the state's officials are much closer to the local folks than are the great thinkers from the banks of the Potomac.

In order to specifically examine the state's responsibilities let's first ask the leading question: "To whom does the state have a responsibility?" I believe there are four such target groups: citizens, local government, neighboring states, and the federal community.



The state's responsibility to its citizens, both private and corporate, can be stated in text-book rhetoric as giving each the freedom to do whatever he desires provided it doesn't interfere with others, and simultaneously providing protection against interference from others. While this is easy to say, it is virtually impossible to precisely define for hypothetical cases involving DWP's and refineries. A few general observations are:

- \* To regulate such large-scale developments so that a minimum of adverse environmental and socio-economic impact is caused.
- \* To implement procedures to insure that those who are inevitably adversely affected or displaced shall receive equitable compensation.

The state's responsibility to local governments relating to DWP's can be covered by three points:

- \* To provide adequate enabling legislation, ordinance-making powers, etc. to empower local government to take the steps it needs in order to regulate activities within its scope of jurisdiction.
- \* To make certain that all appropriate questions are raised and that all sides of key issues are thoroughly aired.
- \* Not to unduly meddle in local affairs.

A state's responsibility to its neighboring states begins with simply being a good neighbor, including:

- \* Keeping neighboring states informed as to what you are up to, and hope like hell they reciprocate.
- \* Attempting to resolve differences internally within the states rather than running to Washington and asking for a referee.

A state also has a responsibility to the federal community. The emphasis here is on community not government. There's a distinct difference, with the latter simply being an agent for the former. A state's responsibility here includes:

- \* Recognizing that it is one member of a fifty-member family, and realizing that each state must do part of the household chores if it is to share in the income.
- \* Being willing to accept the fact that if another member of the family does one's "dirty work" then at some time you will have to compensate that other member for his efforts and suffering.

The states do and should play a role in deciding the if, how, and where of DWP's and related facilities. In executing this responsibility the state must respect the rights of its local government units and, simultaneously, recognize that it itself has certain obligations to its sister states and the federal community as a whole.

In presenting these commandments and citing the participants and responsibilities, I hope I've not scared you away from the decisions. I realize the Northeast is overly sensitive, even prejudiced against DWP's and refineries. As I look at your beautiful coast I can see why. My feelings are equivocal. We could easily slip another refinery into Texas City and no one would know the difference. Not so with the New England coast.

Texas has a natural gift for producing your oil and gas. Nature has endowed us with the underground resources. However, processing it and drilling offshore are acquired traits. Anyone can play.

If you grew up in Houston, a refinery was as common a sight as a snowman to a New England winter. We in Texas don't want to be selfish any longer and keep all the refineries, pollution and political payoffs in the Southwest. We want to share some of the largesse. And while these commandments wouldn't make refineries into a religious experience, they can ease the way in accomplishing the tasks that lie before us.

## STATE APPROACH TO DECISION MAKING

Neil Rolde

It was in the late sixties that the first proposal for an oil refinery and oil port in Maine started a series of shock waves coursing throughout the state--shock waves that have not diminished in intensity with the passage of time, but, pretty much to the contrary, seem about ready to reach a crescendo.

The first focus of oil--big oil--on Maine was at an obscure down-east fishing center called Machiasport (and often mispronounced Makiasport by out-of-staters), whose primary claim on the attention of the American people until then had been its nearness to the site of the first naval battle of the American Revolution outside of Machias in the spring of 1775. The timing of the Machiasport oil proposal was such that it came at a crossroads in the environmental consciousness of the people of Maine, and for that matter, the entire country. Had Machiasport been proposed a few years earlier, perhaps even a number of months earlier, it might have been accepted as painlessly as was the Portland Pipe Line, which, for about 20 years now, has been bringing a vast volume of oil into Maine without anybody getting particularly excited.

But Machiasport came at a time when the threat that oil could pose had been washed into world consciousness through the Torrey Canyon disaster, followed by the Santa Barbara disaster, with the nightmare visions of oil-soaked birds, blackened beaches and exhausted mop-up crews that those events caused to be flashed upon television screens and front pages everywhere. Supertankers were creating superfears, and what had first attracted Maine authorities to the idea of creating a foreign trade zone oil refinery complex at Machiasport--namely, that Maine's potential in having deep water close to shore could be utilized to berth these monstrous vessels--suddenly was no longer the asset that some people had thought. Supertankers at Machiasport frightened a great many people, particularly the coastal residents, summer and winter, and a growing body of opposition formed against the proposal for a refinery and oil port that had been made by Occidental Oil.

*\*Mr. Rolde is a member of the Maine House of Representatives from York and serves on the Natural Resources Committee and the Special Committee on Public Lands. He received his B.A. Degree at Yale University and an M.S. at Columbia University Graduate School of Journalism. He has been active in local and state marine and conservation programs.*

But to any student of the events that transpired, it should be readily apparent that the opposition posed by environmentalists and lobstermen and summer-home owners was merely a small factor in the ultimate defeat of the Machiasport idea. As so often happens, it took big business to put a crimp in the plans of big business. In other words, powerful forces worked against a potential business rival. Just as the fact that there is no Dickey-Lincoln Hydroelectric Dam in northern Maine can be laid to the opposition of the private utilities of New England, not to a handful of environmentalists, so can the defeat of Machiasport be laid at the feet of the major oil companies. They blocked it, not the environmentalists, and they did it for business reasons. The original plan, proposed and supported by Dr. Armand Hammer, Chairman of the Occidental Oil Company, who is something of a maverick in his field, was conceived as an end run against the oil import quota program then in effect. Occidental had no oil importing rights. The major companies did. The trade zone idea was a subterfuge for foreign oil to be brought into the U. S. to be refined here and then distributed. The major oil companies, seeking to block Armand Hammer, went to work in Washington and saw to it that Maine never received permission to establish a foreign trade zone.

Machiasport was dead, but its ghost lingered on. Other oil companies showed an interest in the area. Even a major company, Atlantic Richfield, took options on some Washington country land and made some noises about being interested in a refinery. It was these factors, coupled with an abortive attempt to establish an aluminum smelter a few miles from Bar Harbor and Acadia National Park, that provided the impetus for the Maine Legislature to act in devising what has so often been referred to as "landmark legislation."

Basically, this legislation consisted of two separate bills. One, called the "Site Location of Development Act" or, more popularly, the "Site Selection Act," establishes guidelines by which an appointed board, the Board of Environmental Protection, examines all industrial and large scale commercial projects proposed for Maine, and also all residential developments of more than 20 acres. These projects are examined as to their potential impact upon the Maine environment. They are then either accepted, or accepted with conditions, or rejected entirely. The Site Selection Act is Maine's basic decision-making tool when it comes to dealing with the oil industry, and that is why I have taken some time in describing the events that led to the passage of this law. But I also mentioned another "landmark" bill, and I will touch on this now, for it deals with oil as well. This is our "Oil Conveyance Act." This law established a set of standards and regulations to govern the handling of oil in Maine, but its most important feature is a "Coastal Protection Fund," created by a charge of one-half cent a barrel on every barrel of oil brought into Maine, and this money to be used as an emergency fund for the state to assist in the clean-up of oil spills. After a challenge by the oil companies, the Supreme Court declared this law constitutional. There is now \$4,000,000, the maximum amount allowable, in this fund should Maine ever need it.

The passage of the "Site Selection Act" and the "Oil Conveyance Act" has been followed by a number of further proposals for oil facilities in Maine. It is instructive to see how these proposals were handled in order to understand the manner in which Maine, to date, has organized its decision-making process concerning oil.

Three applications have been made to the Board of Environmental Protection for oil facilities--a refinery at Searsport by Maine Clean Fuels, an oil terminal at Long Island in Casco Bay by the King Resources Company, and a refinery at Eastport by the Pittston Company.

The first two projects were heard by the Board in extensive hearings and rejected. The Maine Clean Fuels application, as I understand it, was continually being revised to deal with objections, such as one that was told to me about how it was discovered that the refinery planned for Sears Island was too big to fit on the island. There was simply not enough confidence that Maine Clean Fuels could meet proper standards, and the project was rejected. There may have been similar fears about King Resources, although the project was really turned down because of its adverse impact upon existing uses of the area. King Resources appealed, won its appeal, but shortly thereafter went bankrupt. The Pittston proposal, as everyone knows, has gone through interminable hearings, but a final decision has been suspended because it has been discovered that Pittston does not have title to all the land that it needs for its enterprise. Following the recent vote of the Sanford Town Meeting to rezone certain land in Sanford, there is every indication that the Gibbs Oil Company will now submit its formal application for a refinery it has long planned to build at an inland site in York County.

Here you have Maine's reaction to the challenge of big oil and the method by which we have made our decisions to date. The Board of Environmental Protection, in effect, has made these decisions for the state, acting in a statewide capacity. This Board is appointed by the Governor, with the advice and consent of the Executive Council. By statute it consists of 10 members, 2 knowledgeable in air pollution, 2 from the public, 2 from conservation, 2 from industry, and 2 representing municipalities. The Commissioner of the Department of Environmental Protection is an eleventh member, but can only vote to break ties.

Nothing in politics, of course, is immutable. These decisions that have already been made have caused unhappiness in certain quarters. The feeling has developed that the Board has perhaps been too environmentally oriented. During the last legislature, a move was made to amend the Site Selection Law so that economic impact would have to be considered in addition to environmental factors--in other words, trade-offs between development and protection. The legislature rejected a vaguely worded bill to this effect and is studying responsible ways to amend the Site Selection Act to include economic factors. A new development is a movement to add a member from organized labor to the Board of Environmental Protection, a member who, presumably, would be more industrially oriented.

Before these proposed changes coalesced into actual political realities, the state did endeavor to seek a governing policy in the question of oil. The Governor's Task Force on Energy, Heavy Industry and the Maine Coast struggled for a compromise on where to locate heavy industrial projects on the Maine coast. A compromise was reached. Heavy industry would be restricted to two locations on the Maine coast--the Machiasport area and Portland-South Portland--and only at the Portland-South Portland site would oil be allowed. When it came time to introduce legislation to this effect, the compromise fell apart, leaving the sponsor of the bill, me, in the middle without enough votes.

During this debate, however, we did deal with another aspect of decision-making in these matters--the role of the local community. My bill would have given the municipalities involved a veto over such massive projects. This had not been done in Maine before, where all decisions were and still are made at the state level. On the local level in Maine, there have been informal polls, like one privately financed plebiscite taken in the Machiasport area, or votes on zoning changes like the one recently at Sanford, but I know of no project, perhaps with the exception of the proposed aluminum smelter at Trenton, where a local vote has been decisive.

Finally, one other dimension of the problem of locating oil facilities has been brought home to us in Maine, at least to those of us in southern Maine who stood by as not very silent observers when Mr. Onassis came calling at the Isles of Shoals. We suddenly began to like the sound of the concept of "regional planning," and we felt keenly the need of a mechanism for a contiguous state to have a say about developments a few miles away on the other side of its border. The shock of the Onassis project has rippled its way into Maine's consciousness, and we will now be looking to broader authorities, either on a New England basis or a national basis, to deal with oil.

Whether we will reach that stage before there is some dramatic oil breakthrough in New England is problematical. With all this pressure--because, apparently, there is tremendous profit potential for the first person to secure approval of a refinery in New England--we are in a race against time. In Maine, we feel that we have at least created a bulwark of laws that will enable us to deal with oil on the best possible terms. I can only hope that our neighbors will provide themselves with equal or even better protection and, in so doing, will protect us all.

## REGIONAL APPROACH TO DECISION MAKING

Glenn Kumekawa

My role in today's discussion is to present the regional aspects of the issue of siting oil refineries and offshore port facilities. We have already discussed several propositions, and many of the premises surfaced yesterday and earlier today. However, I would like to reiterate them anyway:

- 1) At the present time, the New England region does not have any substantial refining capability. The fact that we have an absence of that capability may not in itself be critical, but what is critical is the cost of refined products as it affects the consumer and the region, and the impact on the economic base of the region. In the recent period of insufficient supply of crude oil, the region has been severely affected. Obviously, the relationship of supply and cost, and the source of that supply, is clear.
- 2) During the recent "energy crisis," the position taken by the Federal Energy Office, in reference to the adequate supply of fuel for the New England region, constantly pointed out the absence of refineries within the region and intimated that the Northeast wanted the benefit of adequate supply and reasonable cost without paying the price environmentally. On several occasions, the Federal Energy Office admonished the New England region and cited the region's concern for its environment as the reason for the lack of refining capability. The fact remains that private interest concerns, which deal more with the supply of crude oil and the impact of that supply because of the Arab export quota, are perhaps more compelling than any other concern.
- 3) The situation surrounding the potential for establishing refinery capability in New England is now completely changed. It seems to me that the increased cost for refinery products, generally on the domestic market and particularly in the Northeast region, is the first factor and is obviously central to this change. The second significant factor is the apparent availability of crude oil, not

*\*Mr. Kumekawa is Executive Assistant for Policy and Program Review, Office of the Governor, State of Rhode Island, and also Director of the Graduate Curriculum of Community Planning and Area Development at the University of Rhode Island. He received his B.A. Degree from Bates College and his M.A. from Brown University, and served as Director of City Planning for the City of Warwick, Rhode Island, until 1972.*

only from overseas, but from George's Bank on the continental shelf adjacent to New England. These, then, are the changes in the New England setting as we approach the issue of refineries within our region.

Propositions for a regional approach may be summarized as follows:

- 1) The commonality of the New England regional economic infra-structure stands beyond debate. For example, the New England regional economy is inextricably related to its transportation modes and systems. There is a common concern expressed by the six New England states with reference to transportation policy, but heretofore that policy has been enunciated at the federal level. This is an indication that the six states of the New England region cannot effectively deal with a regionalized system of transportation. Similarly, it is also clear that the New England Power Pool and its regionalized system of electricity distribution compelled the six states in the New England region to deal with this energy problem on a regional basis.
- 2) In the context of a regional energy distribution system, the New England states continue to deal with the issue of consumer rates, and as the states become involved in this issue, they will have to deal with the determination of the possible energy generating sources. It is in this context that the six New England Governors, jointly sitting as members of the New England Regional Commission, as well as a New England Governors' Conference, have in the past eighteen months concentrated their efforts in three major areas of concern most amenable and most directly related to the regional context. They are, of course, (a) the regional economic base, (b) the regional transportation modes and systems, and finally, (c) a regional energy policy.

In searching for a regional policy and in searching for a commonality that binds the six New England states in these three fields, the obvious point of departure is an analysis of the externalities which impact the New England region. To be concrete, these national policies affect the region in general, whether they be the export quotas or the adequate distribution of fuel to the New England region. Presently, a concerted effort to average the cost of fuel throughout the nation because of the inordinate cost of this fuel to the New England region has been launched. In the field of transportation, the region has addressed the problems of Amtrak and its demonstration project, curtailment of freight service through the Railroad Reorganization Act under what was the Penn Central, and an extension of air service to the northern tier communities of Maine, New Hampshire and Vermont. In terms of the economic base, efforts have been directed toward the attraction of foreign investment, national firms, regional competition, and the attraction of tourists into the region.

I suggest that this is the basis of the commonality upon which the six New England states have acted. The states are addressing forces and policies external to our region because of the realization that national policy and international economic dynamics do affect the region. Substantial progress has been made in addressing these issues. We have yet to address, or solve as a region, the internal competition among the six states as it may occur. The point is that the New England Regional Commission and the New England Governors' Conference provide the framework through which the six states can approach problems regionally; and in many instances, working in concert with the New England Caucus, composed of the Congressional representation of the six states, an institutional basis for a regional response to national issues is created. There is, then, that agreement and recognition of a commonality which binds the states as a region. At that level, we have indeed come a long way.

In reference to the refinery issue, the New England Regional Commission has commissioned a series of studies on the siting of energy production facilities in the six-state region. The analysis includes nuclear power plants, refineries, and deepwater ports which all impact the coastal zone. These studies will provide a regional framework for analysis which will hopefully be a guideline for individual state responses to specific proposals and provide the capability for regional input into the decision-making process. This will hopefully encourage an input at the state and local level, so that the problem definition will not be narrowed to the state government and the locality, but will enable some broader analysis of whether a refinery should be located in Durham, New Hampshire, or Portsmouth, Rhode Island. What is provided through the Regional Commission is an institutional capability of providing the regional context. Each of the New England states, however, retains the right to make its own decisions. We have not evolved sufficiently on a regional basis to construct a regional institutional mechanism where issues such as siting with the least environmental degradation can be resolved.

It is my personal view that as the reality of the commonality of the problem becomes more concrete, there will be the imperative of institution-building on a regional basis. I hope and believe that through a frank recognition of the regional requirements--total regional requirements for energy, for an economic base, for environmental protection--a system of regional public policy formulation capabilities, and finally a mechanism to implement public policy decisions on a regional scale, taking into account the priorities of state determination, can be established.

It is in this light that I believe that pending legislation now before the Congress, dealing with the President's Economic Adjustment Program as well as the simple extension of the Economic Development Administration and the Title V Commissions, may be critical for the governance of our society. That subject is perhaps a basis for another discussion. The implications of that discussion, however, surely impact the topics we have discussed today. National land use legislation now pending and coastal zone management legislation already enacted address the need for the states to analyze and evaluate land use decisions on a statewide and regional basis.

These legislative questions, together with decentralization of the federal government through the New Federalism, provide a unique opportunity to begin to talk about a new realignment of the governments of our society. The regional context will not provide the final decision--it can only help to provide a rational framework to assist in that decision. The ultimate decision resides with the states through their regulatory mechanisms and with the local communities. The decision process is a continuum, extending from the local basis all the way through to the federal basis. Yet the unresolved questions remain: where should public policy be formulated; on what kinds of frameworks should it be formulated; and, of course, the final key question, where will the implementing tool have a critical impact on the totality of the decision-making process?

## REGIONAL APPROACH TO DECISION MAKING

Norman J. Faramelli

I want to share some of the views of the New England Oil Coalition (NEOC) with regard to regional planning of oil facilities and citizens' participation in that process. They are both related to "Who makes the final decision?"

NEOC is a coalition of environmental and civic groups from New Hampshire, Maine, Massachusetts, and Rhode Island. We are concerned about the soaring energy demands, the failure of the U.S. (both personally and institutionally) to come to grips with energy conservation, and the environmental damages resulting from the exploitation of energy resources. Therefore, NEOC begins by asking three questions that have been considered throughout this conference:

1. Do we need refineries in New England? If so, how many? The answer to the first is not obvious, but depends upon the availability of feed stock and what facilities are being constructed elsewhere in the U.S. The cries for refinery self-sufficiency for New England (or all products consumed here should be refined here) seem to us to be a bad joke.
2. If refineries are built, what kind will they be? Will they include the latest in pollution control technologies? Will they meet EPA regulations, or even come in under those standards?
3. Where are the refineries to be located? Refinery siting is a crucial question to which NEOC answers: not in a coastal zone. For example, when I first came to Durham in January, I was convinced that Durham was not an appropriate site for an oil refinery. Today, as I looked out over the beautiful Great Bay, my convictions were intensified that Durham is an utterly stupid place to build a refinery. In fact, it is one of the worst possible sites imaginable.

*\*Mr. Faramelli is Co-Director of the Boston Industrial Mission and Chairman of the New England Oil Coalition. He has a wide background in the oil industry and is now dealing with the social, environmental and ethical problems related to industrial development. He has a Bachelor's Degree in Chemical Engineering from Bucknell University, a Doctorate in Religious Thought from Temple University, and was a visiting lecturer in social ethics at Andover-Newton Theological School from 1968-1971.*

NEOC is primarily concerned about a regional approach to our oil needs, and adequate citizens' participation in the planning process. Regional planning of energy facilities? Citizens' participation in the planning process? Both concepts--the regional approach and citizens' input--seem so nebulous. It has been likened to something vague and diffuse chasing something else that is vague and diffuse. Nevertheless, let me try to spell it out.

A) A Regional Plan. Whether or not we need a regional approach depends entirely upon whether or not we perceive the problems to be regional. According to NEOC the issues are at least regional, but also have national and international components. NEOC believes that the regional approach is essential, because piecemeal procedures are grossly inadequate. Presently, for example, there is hustling or "carpetbagging" of refinery facilities up and down the New England coast. The developer is looking for the most profitable deal, playing off state against state, town against town. Is that what we want?

The problems associated with the regional approach, however, have been aptly pointed out. Very simply, we have no regional government. With regard to our concerns, the best we now have is the energy study of the New England Regional Commission (NERCOM). We recognize, however, that NERCOM has only as much clout as the Governors collectively are willing to give it. Yet as the problems grow beyond the capability of state governments, the need for new regional mechanisms becomes increasingly obvious.

If the regional study is to be real, it must involve the key actors (including the energy firms) and not be done in a vacuum. Studies that do not include the key decision-making agents are destined for the filing cabinets. We all know the planner's tendency to shape designs in a manner that bears no relationship to reality. But there are a variety of views surrounding the development of oil facilities. Those competing interests should be represented in a public forum. And that leads me to my second concern: citizen participation.

B) Citizen Participation. Before we can have citizens' input we must have a well developed planning process into which citizens' views can be fed. Citizens cannot create the planning mechanism--they can only relate to it.

If the views of citizens are to be taken seriously, a well defined and funded citizens' participation component is needed as part of the study design. The most successful citizens' planning effort in which I have taken part was in Boston transportation--the Boston Transportation Planning Review (BTPR), a federally funded study that looked at the interstate proposals for the Boston region. In the BTPR 10 percent of the study funds were set aside for community liaison work. Technical assistance, for example, was supplied directly to the citizens' groups. Despite the problems associated with it (and there were many), it served as a model that can possibly be reproduced in other areas on other issues.

## FEDERAL APPROACH TO DECISION MAKING

Frank J. Kelly

Let me again emphasize that citizens' groups need something specific to relate to, so that their inputs can be incorporated into all the stages of the study. Traditionally, citizens are only given the opportunity to respond to final designs or alternatives in which they had no input. That is why citizens' groups are often tabbed as being negative. But why are citizens' groups so negative? They are often so negative because the options presented to them are so lousy. Protesting, therefore, is often the only means available for self-expression.

Some say that citizens' groups are only obstructionist, and thus serve only a negative purpose. I fully disagree. The current planning schemes via private developers and public agencies are actually creating obstacles. By excluding the wider public from the planning phase, a project opens itself up to a host of legal battles, litigation upon litigation, and protest on top of protest. Hence, some of the things that need to be done in our society are not being implemented because of inadequate planning. Our present planning procedures, not citizens' groups, are the real obstructionists. If citizens' groups are given something specific to relate to, they can perhaps play a positive and facilitative role.

Recently, I spoke to a person who is in the refinery building business. He said that the selection of poor sites for refineries is slowing down refinery construction throughout the U. S. The Durham episode, for instance, is a locus classicus of how not to go about planning the construction of a refinery. Ironically, dealing with the so-called "negative" or "obstructionist" citizens' groups may be the real way to overcome, or even avoid, some of the obstacles.

In summary, NEOC believes that citizens' input is essential. The pre-condition, of course, is that there is first a regional planning effort for oil facilities with citizens' participation as an integral part of the process. That effort can serve as a forum for diverse views to be heard. Citizens' input should be included at the beginning, not at the end, of the process. Citizens do not have the illusion that they are the decision makers, so that is not a problem. Also, citizens' groups such as NEOC realize that there are other viewpoints held by other citizens that need a public hearing. So the question of "who speaks for the average citizen?" becomes unnecessary. That is, a variety of citizens' inputs is needed.

"Who makes the final decision?" may be a complicated question. The input of citizens on the development of oil refineries, however, should be part of the answer.

The dust has begun to settle on the aftermath of the Arab-Israeli war, the oil production curtailments, and the Arab embargo on shipments to the United States, and hopefully as a result, we will continue to receive crude oil from the Middle East.

That is the good news. The bad news is that we will pay something like \$11 a barrel for this supply, laid down at U.S. coastal refineries. This compares with less than \$4 per barrel in October, 1973. We are still unlikely to get as much petroleum as we would like to have, so conservation, in all its aspects, will still be necessary. And even if we could be supplied unlimited amounts of crude, we still wouldn't be able to make the volume of products we need to support a demand level even reduced by conservation efforts. What has happened is that we are back to contending with the immediate problem we had before the Arab embargo--namely, the lack of sufficient refinery capacity and a need for discovery and development of domestic resources. For the purposes of this meeting, I will focus on the need for refineries and associated deepwater ports (DWP).

First let me explain what a DWP means in a federal sense. It is a pipeline from a water depth of about 120 feet to a shore-side tank farm. It is used to offload crude oil tankers which have a draft of 90-95 feet. As long as any pipeline within state waters conforms to the federal laws administered by the Coast Guard, the Corps of Engineers, the Environmental Protection Agency, and indirectly the Department of the Interior, the state has the final word as to whether it is laid and where it comes ashore. When these pipelines move out to sea into waters under federal jurisdiction, the state and federal government would in a sense become partners in approving license applications from state or local governments or private investors. Should such pipeline systems be licensed, they would be common carriers and thus be subject to applicable federal and state laws. That is what we mean by a deepwater port. A better name might well be a high sea oil port or a pipeline to sea.

*\*Mr. Kelly is Coordinator for Deepwater Port activity of the U. S. Department of the Interior and also coordinator for the Marine Resource Program, Outer Continental Shelf, for the Assistant Secretary, Land and Water Resources. He has had an extensive career with the Bureau of Mines, serving as a commodity specialist, a researcher on the inter-industry economics of developing productive capacity in these industries, and the effect these demands have on other sectors of the economy.*

The President has requested that Congress provide authority to extend existing laws, which now are used to permit construction within state waters, so that they apply beyond the territorial sea, and the Congress is considering a DWP bill at this time. I can discuss any details of this legislative effort with you later.

I think the best way to handle refineries and DWP is within the context of satisfying the needs which these facilities provide, so I will focus on that aspect.

In order to avoid a recurrence of the problems resulting from the embargo and to attack the economic impact of the skyrocketing price of fuel, the President ordered that a plan be developed so that we could establish new national priorities in the energy field. He chose to call the plan Project Independence. I suppose he could have called it a host of other names, but it seemed appropriate to call it Independence because that appeared to be the best term to describe the objective. The President also chose 1980 as a target date for an all-out effort. Unfortunately, the name Independence and year 1980 have received more attention than the complex series of objectives. To the degree we continue to argue whether or not the objectives can be reached by 1980, we will never move out of the starting gate. If this happens, monumental supply problems will face us in the 1980's.

This would be too bad, because the objective that Project Independence is designed to serve is to specify a date when we should have the capacity to be independent of the action of other governments which hold the key to the supply of a resource that is vital to a modern society--in this case, energy in the form of oil. By capacity to be independent, we did not mean that we would put our head in the sand and gopher ahead at any cost. What we meant was that, in general terms, we needed to sight in on our projected demand and what needed to be done to have the capacity to meet that demand. And finally, another objective was to focus public attention on the problem so as to get the public support for an agreed-upon approach toward a series of solutions.

The long lead times necessary to move from a 15-20 percent dependence on foreign supply for energy source materials to a capability for a near zero dependence is not unlike the situation facing a college professor planning his course or a farmer laying out a crop rotation plan. The principal ingredients are planning time, how that time is used and knowing what you want to do. Therefore, we established an ambitious set of goals which we hoped could be met by 1980. In general terms, these goals meant that we would have to step up the rate of growth in energy production to 4.7 percent per year and back down the rate of growth in demand from 3.6 percent to 2 percent. If this could be achieved, U. S. energy supply and demand could be in balance by 1980.

In terms of Project Independence, the principal element of the supply increases are an expansion of coal production from 600 to 900 million tons per year, expansion of crude oil production from 11 to 14 million barrels per day, a tenfold increase in the generation of nuclear power, and an

expansion of natural gas production from 23 to 27 trillion cubic feet per year. The principal conservation savings would have taken place in household and industrial use of energy and in transportation. This could be accomplished by conservation programs involving better insulation of buildings, energy labeling of appliances, increasing average gasoline mileage of automobiles up to 17 mpg by 1980, greater use of mass transit, an increase in industrial conservation, major recycling programs for aluminum, glass, and steel, and finally, production of energy from municipal trash and waste.

In a general sense, this is the overall direction of Project Independence which, stated simply, says if we as a nation want something badly enough we will find a way to get the job done.

Moving from the national energy scene, let's focus on the situation on the East coast. Of the 6 million barrels of oil a day consumed on the East coast, 1/4 of it is refined in the Middle Atlantic states from waterborne imported crude, 1/4 is direct import of refined products from abroad, and the remaining 1/2 is refined products from the Gulf Coast, where waterborne imports play a substantial part of the crude supply picture for Gulf refineries.

Putting this activity in terms of refining capacity, the East Coast has a demand habit of about 6 million barrels per day. By comparison, the East coast has a refinery capacity of only about 1 1/2 million barrels per day--a short fall of some 4 1/2 million barrels.

The next step in describing resource problems is at the regional level. Therefore, where does New England fit into the East coast picture? Strangely enough, New England, not unlike the Southeastern states, is dependent on the Middle Atlantic and Gulf Coast states and foreign refineries to supply the liquid energy products to keep its industry moving and its residential populace active and satisfied.

Given these facts, it is not unrealistic to characterize New England as a scale model of western Europe or Japan--a well-populated, highly industrialized, high consumption society lying at the end of a long supply line from which it gets most of its energy.

New England's inability to provide for itself its needed energy materials stands out when you consider the following facts. There is not a single oil or gas well or coal or uranium mine in all of New England, or a single refinery except for Mobil's Asphalt Plant in East Providence. The only native energy produced here comes from some 140 hydroelectric stations, which satisfy less than 2 percent of the total energy consumption.

You in New England are overwhelmingly dependent on oil--more so than any other part of the country. Oil supplies 85 percent of your total energy needs.

This is a fair characterization of the New England supply-demand picture at the present time, May, 1974. This picture has two main characters around



which your economy and personal way of life are built--the first figure being the Middle Atlantic and Gulf Coast states, and the second being those foreign nationals and governments which follow political and economic incentives in supplying you with such a basic raw material.

At the same time that you are increasing your dependence on the Middle Atlantic states, these states are embarking on a course which will not continue to support your demand. They are simply saying, "We have more than enough industrial development and activity." Thus your Middle Atlantic partners are taking a position that they no longer want to incur the larger environmental risks required to supply energy materials to other coastal states that are not willing to share a portion of that environmental risk.

In the Gulf Coast states the picture is slightly different. Some of these states have enacted controlling legislation which provides a means of handling increased economic development within environmental constraints, and, therefore, the Gulf Coast is willing to consider more economic activity. However, all of this Gulf Coast region is also saying that if it is willing to accept a greater environmental risk attendant with DWP and refineries which are used to supply other coastal states with petroleum, it should receive larger economic incentives because of its willingness to accept these greater environmental risks.

If any of you are of a mind to say, "Let's prohibit all New England refinery/DWP proposals and pay the higher price for Middle Atlantic and Gulf Coast product supply," let me provide another dimension. As a result of the Arab embargo, we are already aware of what those countries think oil should be used for. Clearly we hope to have a substantially different relationship with our friends in the Western Hemisphere. However, even if the political future of supply from the Western Hemisphere countries presents few problems, it would be naive to assume that there won't be substantially higher economic costs involved. And finally, we fully expect the Western Hemisphere contributions to our overall supply picture to continue to decline. Therefore, you in New England must consider cost as a limitation on your supply. An empty home oil tank because you don't have the money to pay for someone else's oil has the same effect on your comfort as if the Arabs stop selling you oil. You'll be cold, and your machines will be stopped either way.

Perhaps the best way of describing the New England dilemma is, "What if you don't have refining capacity?" In the first place, if the Congress does not provide the legislative authority for private or public capital to finance the construction of deepwater ports, we will have lost the incentives to recover the economics of deep-draft tanker delivery of oil. Nothing this nation can do will keep a lid on tanker size and draft, and, in fact, in other federal programs we are subsidizing tankers which can't sail into our ports. Therefore, if we don't make our harbors deeper, or, if we don't pass national legislation to authorize the application of proven technology of high seas tanker offloading systems, and if we continue our anti-refinery and Outer Continental Shelf development bias on the East

Coast, we are in reality providing all the incentives in the world for private investment to move up to other lands, foreign to our own, in order to build the refineries, which will pour more and more small tankers carrying substantially more toxic petroleum products into our already crowded ports.

By whatever process the New England region arrived at the conclusion to prevent refinery construction, it appears to us at the federal level that what you have said is that you want to maintain the status quo, but at the same time you expect more fuel from the Middle Atlantic and Gulf Coast states. I don't believe that is what is intended, but that is how it appears on the surface. With bumper stickers appearing in the Gulf Coast states saying, "Let the bastards freeze in the dark," you can't help but appreciate the attitudes building there.

To put the question bluntly, it seems to me that we, and "we" means federal, state and local officials, are going to have to develop new approaches to solving the basic problems of providing our citizens with the energy material needs balanced against our environmental desires. Environmental concerns tend to be at the forefront of our thoughts, as well they should be after so many years of neglect. But at the same time that we realize that for over half a century we have neglected to recognize how we have adversely affected our surroundings, let us not adopt for another half century an attitude on the environmental side which puts our heads in the sand to avoid the reality that man will require and demand certain materials in his pursuit of happiness and comfort. In short, we should not lose the ground the environmental movement has made by being adamant about how we offset or confine economic activity within environmental constraints. I would argue that the American voter, when faced with a gut choice between environment and material comforts, will tend to lean to the latter.

Therefore, the challenge to government at all levels, and to those public advocates of environmental protection at all costs at one pole, and to unrestrained economic growth advocates at the other is to seek that larger area called the middle ground, where both forces can find solace and comfort in that larger American value called compromise.

In closing, let me become a little philosophical. Not unlike the typewriter, which was the great woman emancipator, the National Environmental Policy Act of 1969 (NEPA) is one of the milestones in man's effort to sustain himself and yet still preserve much of his natural surroundings. This piece of legislation forced Federal Government decision making into a fish bowl and made us publicly evaluate what we wanted to do and examine the consequences of the proposed action. It is purely in retrospect that we at the federal level, both the Congress and Executive Branch, recognize the beautiful simplicity of NEPA when it is applied.

In a sense it was another cut at a form of Bill of Rights for all of us to say to the government, "Go slow and let us look at the implications of what you plan to do." While NEPA does all of this, it does not, nor was it designed to, take our society back a generation or so. It is not an Act which requires society to place environmental protection in supremacy over

all other values. It cannot, and it should not, be used as a means to stop the pendulum of the clock of time and human progress. In my view, this piece of legislation forces those who have responsibilities to all citizens to pause and consider a dimension we were not used to considering--our surroundings. I think we all are learning from this experience, both developer and environmentalist.

It is against this backdrop that we must consider the effect of proposals for construction of refining capacity.

Up to now, in the case of refineries and DWP, we have been reacting to industry proposals without a set of standards of our own. By this I do not infer that industry is bad and, therefore, anything it proposes is bad. That is not the real world. What I want to highlight are two things. First, on such nationally important issues as energy supply, the worst thing in the world to propose is that government get directly involved in the oil and gas business. That conclusion is based on the fact that government is not the kind of organization that can be used in producing oil and gas, certainly not in a free society. If government got directly involved in energy production, you have to recognize there would be no cost to our failure. If private capital failed, people would lose jobs and investments would be lost.

Therefore, the public, through its governmental process, should establish performance requirements for private capital to achieve, and if these objectives are not achieved, there are plenty of inducements to bring along more competent people. What I am driving at is that private capital should not be assumed to be all bad. And at the same time it should not be assumed that enacting laws putting government agencies in charge is the only way to go.

The second point is that what we need to do is develop at a regional level the objectives the public, through its elected representatives, wants to achieve; and then set the goals for private capital, and monitor the results. I think this is a pretty responsible way of bridging the gap between government and private capital in such an important public issue as energy.

I have indicated in a regional sense the New England performance record on consuming petroleum products. Nothing on the horizon indicates that you as a region are going back to burning wood and the horse and buggy or make a massive change in your consumption patterns. Therefore, while you continue to rely on traditional U.S. suppliers of petroleum products so you can maintain your rocky coasts and beaches, these suppliers are re-evaluating their positions. Clearly then, New England as a region has to reexamine its dilemma. When you consider New England's direct dependence on foreign refineries for energy products, the importance of reappraisal gains added significance. It is within the context of these thoughts that regional conferences such as yours take on national significance.

From the standpoint of the Department of the Interior, we want to hold out to such a conference as this an open-ended invitation to discuss the pros and cons of where we are regionally and where we would like to be. Therefore, I look forward to our discussions and any other invitations to address groups in the New England region. I have provided copies of Assistant Secretary Horton's testimony on deepwater ports<sup>1</sup> and Deputy Under Secretary Carter's remarks on potential Atlantic Outer Continental Shelf activity and its impact on Coastal States.<sup>2</sup> I hope that by providing this material to you before this conference it will stimulate further discussions.

---

<sup>1</sup> Testimony of Jack Horton, Assistant Secretary for Land and Water Resources, Department of the Interior, before the Special Joint Committee of the Senate Interior, Commerce, and Public Works Committee, July 23, 1973.

<sup>2</sup> Testimony of the Honorable Jared G. Carter, Deputy Under Secretary of the Interior, before the National Ocean Policy Study Group of the Senate Commerce Committee, Pursuant to S.Res. 22, April 23, 1974.

## SUMMARY COMMENTS

R. Frank Gregg

First, let me note that I have no intention of trying to summarize what has already been said. It may be productive, however, to talk about what we have heard and where we go from here.

Jack Devaney suggested that the reasons which most strongly impel us toward refineries--the prospects of lower prices and more secure supplies--are largely illusions; that the refinery builder will recoup the cost differential as profit unless the region organizes a way to capture some of the "excess" through one device or another. On the other hand, John Buckley argued that local refineries will yield price benefits for the region that may be critical to the overall vitality of the region's economy, suggesting that we not only need refineries but should actually be soliciting responsible entrepreneurs. The security of supply argument does not seem compelling, but I remain confused on price. Everybody can make up his own mind as to the presentations offered.

I want to volunteer here an observation about Senator Bulger's arguments for a regional mechanism to deal with a number of petroleum issues. While there is much that is attractive in the regional mechanism concept, it seems to me that in the short run, the pursuit of a mechanism for regulation of ownership or operation of facilities may be counter-productive in terms of our abilities to deal with pressing problems. It took about five or six years to get an interstate compact mechanism--River Basins Commission--set up for the Susquehanna and the Delaware. In the case of the Potomac, we spent six or seven years trying to get such a mechanism, in a relatively non-controversial area, and never did get it. And I just want to caution anyone who wants to create a New England Oil Compact for regulation, ownership, management, or operation of facilities, that he had better be prepared to spend the rest of his natural life on it, and he ought not to be more than forty.

Further, it seems to me that what we do need very badly regionally is a better information process, better sources of information than we presently have. And it seems to me that the New England Regional Commission is in a critical position here through its access to funds for professional analysis and dissemination and its association with the Governors. I see a conflict between the Governors' roles as generators of good information and analyses and formulators of broad regional policy on the one hand, and as potential directors of a strong regional authority on the other. The more we press the Governors to take hard and fast positions at the regional level, the more difficult it is for them to encourage exploration of the range of alternatives available to the region. The individual Governors were elected by the voters of their individual states. They don't want to be put into boxes in the interest of some abstract regional good. But if the

Governors' basic accountability to their own states is respected, then they can--in their own interest and the interest of the region as a whole--use the Regional Commission as a major source of good, hard, objective information for the region as a whole. It seems to me, therefore, that it's most productive in talking about regional arrangements at least over the next few months to press for good information on the range of choice available, as distinct from placing too many bets on new institutional arrangements which are going to make major decisions. We have mechanisms now which can make decisions. We can make that process work better with better information. Even that would be a reasonable accomplishment within the time period we are talking about, because some of these decisions are going to be made in the next few months or years.

Even in the future, as Glenn Kumekawa implied, regional agencies will always deal better with "externalities" to New England than with adjusting differences between the New England states. In that regard, the federal government is now considering legislation to establish new energy laws and institutions, including a strong role for the federal government in energy facility siting decisions and new forms of multi-state regional energy agencies--I believe joint federal-state energy agencies. The region would do well over the next few months to see that new federal institutions and processes make sense in New England's terms.

A second point: I don't think anyone except me agreed that the deepwater port issue, the refinery issue, and the Georges Bank issue are interconnected. I can't help but believe that. Obviously, the deepwater ports won't be built except to supply refineries, and it seems to me that the existence of refinery and deepwater port operations in New England is going to influence New England's attitude one way or another on the question of whether we want refining to take place in New England from Georges Bank. A New England which is in the business of receiving and refining and distributing large volumes of crude--a region which is already deeply involved with petroleum processing--is likely to take a much different attitude toward refining Georges Bank oil than a relatively virginal New England in terms of oil industry investments and jobs and revenue. I don't know how these dynamics would operate, but I think they are connected. I'm still interested in asking whether an optimized refining configuration, including port and refinery locations, would change if one were to start out with an assumption of Georges Bank.

A point we can all agree on is that the pressure is going to continue. Apparently there is no end of entrepreneurs who are going to be proposing port and refinery developments within the region. We will drive ourselves out of our minds trying to figure out which are authentic proposals representing substantial institutions and which are not. But it is also pertinent to note that while we are talking about these immediate things and while we are in the process of dealing with them, a decision on Georges Bank gets closer and closer. Presumably the report of the Supreme Court Master on the Maine-USA case will be out shortly. Should the Federal government win the case, you can be certain that the day after the Supreme Court decision comes down, the Department of the Interior is going to be in full cry on formal steps leading to lease sales, if not in 1975,

then surely not later than 1976. Next year or the year after is not unrealistic.

This suggests that the possibility of Georges Bank development, including probable location of any shoreward facilities for receiving and/or refining Georges Bank crude, should be a factor in considering current proposals for ports and refineries.

Coming back to the institutional question, is it practical to think that we are going to fashion new institutions to help the region deal with Georges Bank development issues? Aren't the basic decisions going to be made or severely prejudiced before we can change the institutions?

Finally, we might as well go ahead and speculate a little bit on what is most likely to happen in the next year or so, not what we would like to happen or what we would cause to happen if we had the resources and the authority--but what is most likely to take place. It seems to me we should assume that, barring unexpected changes, Georges Bank is going to be developed. That's point one. Second, we haven't heard anything yet that suggests that the Gibbs proposal in Sanford is not going to go. While I have absolutely no information to go on, my hunch is that the Department of Environmental Protection in Maine at this point doesn't see any particular reason why the Gibbs application should be denied. Massport has a very live proposal for a deepwater terminal near Boston. If approved, you can bet that one, quite possibly more, refineries will be built to process the incoming crude. There is real interest in some of the Massachusetts lower Merrimack cities. And couldn't a terminal off the northern Massachusetts coast service refineries in New Hampshire and possibly even southern Maine? In any event, I would guess that Massport will make a powerful effort in the General Court next year for authority to go ahead with a deepwater terminal.

If either or both the Sanford refinery and a Massport superport goes forward, what is going to happen to the other dandelion-like port and refinery proposals popping up all over the region? Would a 400,000 barrel a day refinery in Maine, and one or two served by Massport, take most of the steam out of the other interests in refinery development in New England? Or would there be more proposals for refinery development?

As I understood it yesterday, the reason people are interested in refineries in New England is that the first guy who comes in here is going to make a killing--a legitimate killing. I've been sort of assuming that if one or two come in they are going to skim off most of the cream and then the attractiveness of additional locations would be lessened. I see some heads shaking--that scenario may be inaccurate.

In any event, if any of these speculations is accurate, we will be dealing six months from now, a year from now, with some port proposals and some refinery proposals. Most speakers agree that, except for the Gibbs proposal which does not involve a superport, the port location issue is the critical one. Major oil handling ports for large vessels apparently won't be built unless there is access to a superport. We'll wrangle over these.

I suspect that two years from now Georges Bank may again dominate regional concerns.

If I were a lay person at this conference, I would be somewhat frustrated at the quantity of information that has been presented and the lack of some sort of continuing process for pursuing my own interests in this question. I thought that a number of people, by their questions to Glenn Kumekawa, in effect were saying to the New England Regional Commission, "Look, why don't you step out and assert some strong leadership here, and open up the process to widespread public participation, and if you'll do that we'll follow and that will give us an orderly process for sorting these things out within the region." I think that's what Frank Lee of Boston Edison and some of the environmental spokesmen were saying.

It seems to me that while you may not have heard what you wanted to hear in response to your questions about how public groups were going to relate to the New England Regional Commission's studies, I still think you should consider that as a potential vocal point for an information system for the region. If you wish, it is certainly not inappropriate for you to address yourselves to the Regional Commission or to the individual Governors and offer suggestions as to how you would like to see the program handled.

There are some other things happening within the region which provide a point for citizen participation, not directly in the governmental process, but which may make your participation more effective. There is a group called the Oil Coalition which Norm Faramelli referred to and in which he is involved. This is a private group; it is a volunteer group. It does have an environmental bias, but I gather that its bias is not against any kind of oil development. The Coalition may provide a way of involving people who tend to be on the environmental side of the spectrum. There was also a story in the press last week announcing the formation of something called the "New England Energy Policy Center," which I gathered is a fairly deliberate attempt to get a real balancing of interests--economic interests, development interests, conservation interests, environmental interests, and so on. Some fairly substantial institutions within the region are associated with the Center, including Cabot, Cabot, and Forbes, in Boston, but also involved in its creation were organizations like the Massachusetts Audubon Society and several other authentic environmental organizations. I construe this to be a constructive development. It may be that if an institution like an Energy Policy Center, which is really sensitive both to New England's development needs and to environmental needs, could be put together, it would serve as sort of a lightning rod for sorting out those kinds of issues within the region which the Governors don't feel that they are in a position to deal with through the Regional Commission.

I want to say one or two words about the River Basins Commission and what you can and can't expect from us. The Commission is a joint federal-state agency with governors' designees as state members. The Commission is inter-agency at the federal level--ten federal agencies belong--and it has a professional staff. As you know, we publish a newsletter which has attempted

CONFERENCE PARTICIPANTS

in a sporadic way to keep a few thousand people in the region posted on major physical development proposals. We've been publishing a "situation map" which shows the location of major development and preservation issues in the region and accompanying that with some very shorthand descriptions of the project proposals. We'll continue to do that, and we'll continue through our newsletter to try to provide somewhat more detailed evaluation on some of these things. The River Basins Commission is not going to undertake a regional energy facility siting study under its own authority, although we could do so from the standpoint of natural resource availability and environmental protection. The Governors have decided that they want to mount that kind of effort under their own auspices as members of the Regional Commission, and we yield to the Governors' preference. I hope it will be possible for the River Basins Commission to participate in natural resource aspects of appropriate NERCOM studies, but that is a decision that the Regional Commission will make.

I want to add one closing thought, and that is to repeat what I said yesterday--that I hope those who are interested in the set of issues that relate to oil, including Georges Bank, deepwater ports and refineries, can find ways to think simultaneously about the electric energy system. They are not quite as neatly isolated as the discussion here at times may have suggested. A system, a regional evaluation system or a state evaluation system, which is capable of looking at all these major energy-serving facilities, seems to me more likely to be productive than one that focuses on one part or another part.

The Governors are square on this, and the Regional Commission program is designed to look over both the petroleum and the electric energy facilities, and I hope that it will continue that way.

On behalf of the sponsoring organizations, I should acknowledge that many of you may have suggestions that you would like to offer for services that we at the regional level can provide. If it occurs to you that you would like to see some new form of information or other reasonable service from the New England Center for Continuing Education or the New England Marine Information Program or the River Basins Commission, please say so. In other words, we are in the public education business, all of us, and if you see other issues or mutations of this issue that we could productively deal with either individually or in concert, we would be glad to try to respond.

Connecticut

R. B. Barger  
Manager of Utilization  
Connecticut Natural Gas Corporation  
P. O. Box 1230  
Hartford CT 06101

George S. Geer  
Cooperative Extension Service  
UConn  
322 North Main Street  
Wallingford CT 06492

Robert C. Leuba  
Executive Assistant and Legal Counsel  
to Governor Thomas J. Meskill  
Executive Chambers  
State Capitol  
Hartford CT 06115

Maine

William R. Adams, Jr.  
Department of Environmental Protection  
State House  
Augusta ME 04330

Wayne C. Cobb  
Coastal Consultant  
Natural Resources Council of Maine  
20 Willow Street  
Augusta ME 04330

W. Bartlett Cram  
Consultant  
Bangor Hydro Electric  
33 State Street  
Bangor ME 04401

Harold E. Kimball  
Sea Grant Advisory Program  
Ira C. Darling Center  
University of Maine  
Walpole ME 04573

Neil Rolde  
State Representative  
Sewall's Hill  
York ME 03909

Ned Shenton  
Coastal Zone Management  
Newsletter  
West Southport ME 04576

Paul Sova  
Department of Environmental  
Protection  
State House  
Augusta ME 04330

Carl E. Veazie  
Director  
Public Affairs Research Center  
Bowdoin College  
Brunswick ME 04011

Henry E. Warren  
Department of Environmental  
Protection  
State House  
Augusta ME 04330

Massachusetts

Zeb D. Alford  
Manager of Fuel Supply  
New England Electric System  
20 Turnpike Road  
Westborough MA 01581

Arthur L. Barrett, Jr.  
Administrative Assistant  
The New England Council  
1032 Statler Office Building  
Boston MA 02116

Alexander N. Beichek  
Marine Research, Inc.  
East Wareham MA 02538

Robert C. Blumberg  
Director  
Department of Natural Resources  
Division of Mineral Resources  
100 Cambridge Street  
Boston MA 02202

John G. Buckley  
Vice President  
Northeast Petroleum Industries, Inc.  
100 Federal Street, 37M  
Boston MA 02110

Senator William M. Bulger  
Chairman, Special Legislative Commission  
on Marine Resources and Boundaries  
State House  
Boston MA 02133

Russell Davenport  
Coastal Zone Management Institute  
P. O. Box 221  
Sandwich MA 02563

John W. Devanney III  
Associate Professor for Marine Systems  
Department of Ocean Engineering  
Massachusetts Institute of Technology  
Massachusetts Avenue  
Cambridge MA 02139

A. Thomas Easley  
Executive Vice President  
The New England Council  
1032 Statler Office Building  
Boston MA 02116

Norman Faramelli  
Co-Director  
Boston Industrial Mission  
56 Boylston Street  
Cambridge MA 02138

James W. Feeney  
Sippicon Corporation  
Marion MA 02738

Barbara Fegan  
Box 545  
South Wellfleet MA 02663

Charles H. W. Foster  
Secretary  
Executive Office of Environ-  
mental Affairs  
18 Tremont Street  
Boston MA 02108

Bernard L. Gordon  
Associate Professor  
Earth Sciences  
Northeastern University  
360 Huntington Avenue  
Boston MA 02115

R. Frank Gregg  
Chairman  
New England River Basins  
Commission  
55 Court Street  
Boston MA 02108

George F. Heimerdinger  
NODC/EDS Liaison Officer  
P. O. Box 91  
Woods Hole MA 02543

Dean A. Horn  
Executive Officer  
Sea Grant Project Office  
Room 1-211  
Massachusetts Institute of  
Technology  
Cambridge MA 02139

W. Nicholas Kruse  
Petroleum Coordinator  
The Badger Company (Subsidiary  
of Raytheon Corporation)  
1 Broadway  
Cambridge MA 02142

J. Perry Lane  
Regional Extension Coordinator  
National Marine Fisheries  
Service  
P. O. Box 1246  
Gloucester MA 01930

Allan A. Larivee  
C. H. Sprague & Son Company  
125 High Street  
Boston MA 02110

Robert Lawrence  
Massachusetts Forest & Park Association  
1 Court Street  
Boston MA 02108

Barry R. Lawson  
Senior Resources Planner  
New England River Basins Commission  
55 Court Street  
Boston MA 02108

Frank M. Lee  
Environmental Planner  
Boston Edison Company  
800 Boylston Street  
Boston MA 02199

Jennifer Lewis  
Room 5-326  
Massachusetts Institute of Technology  
Cambridge MA 02139

Peter J. Metz  
Assistant Secretary  
Executive Office of Transportation  
and Construction  
18 Tremont Street, 12th Floor  
Boston MA 02108

William Nothdurft  
New England River Basins Commission  
55 Court Street  
Boston MA 02108

Colonel Charles J. Osterndorf  
Deputy Division Engineer  
Department of the Army  
New England Division  
424 Trapelo Road  
Waltham MA 02154

Morgan R. Rees  
Army Corps of Engineers  
424 Trapelo Road  
Waltham MA 02154

Paul F. Smith  
Staff Oceanographer  
Environmental Equipment Division  
E. G. & G., Inc.  
Woods Hole MA 02543

Wallace E. Stickney  
Director  
Environmental Impact Office  
EPA Regional Office  
Room 2303  
JFK Building  
Boston MA 02203

John R. Taft  
Manager  
Technical Consulting Service  
27 Moulton Road  
Duxbury MA 02332

Richard Tatlock  
Department of Natural Resources  
100 Cambridge Street  
Boston MA 02202

Irvin Waitsman  
New England River Basins  
Commission  
55 Court Street  
Boston MA 02108

Frank H. White  
Thompson Academy  
79 Milk Street, Room 407  
Boston MA 02109

Richard Williams  
Consultant  
Arthur D. Little, Inc.  
35 Acorn Park  
Cambridge MA 02140

#### New Hampshire

Charles Allen  
Department of Resources &  
Economic Development  
P. O. Box 856  
Concord NH 03301

Representative Barbara Bowler  
Silver Lake Road  
Box #85  
Lochmere NH 03252

Richard A. Carrier  
Environmental Engineers, Inc.  
3 Pleasant Street  
Concord NH 03301

John D. Davis  
Normandeau Associates, Inc.  
Nashua Road  
Bedford NH 03102

Harry P. Day  
Director  
New England Center for Continuing  
Education  
15 Garrison Avenue  
Durham NH 03824

Stephen Fan  
Chemical Engineering Department  
University of New Hampshire  
Durham NH 03824

Terrence P. Frost  
Chief Aquatic Biologist  
New Hampshire Water Supply and  
Pollution Control Commission  
Prescott Park  
105 Loudon Road  
Concord NH 03301

Representative Elizabeth A. Greene  
399 South Road  
Rye NH 03870

Caroline L. Gross  
Speaker's Office  
State House  
Concord NH 03301

Pam S. Hall  
Normandeau Associates, Inc.  
Nashua Road  
Bedford NH 03102

John F. Hallett  
Agent  
3 Pleasant Street  
Portsmouth NH 03801

William F. Henry  
Chairman  
Resources Development Center  
Wolff House  
University of New Hampshire  
Durham NH 03824

Theodore C. Loder  
Department of Earth Sciences  
James Hall  
University of New Hampshire  
Durham NH 03824

Bruce A. Miller  
Director  
Sea Grant Marine Advisory  
Service  
University of New Hampshire  
Durham NH 03824

John I. Nelson, Jr.  
Normandeau Associates, Inc.  
Nashua Road  
Bedford NH 03102

David C. Neville  
Assistant Planning Director  
Office of Comprehensive  
Planning  
State House Annex  
Concord NH 03301

Thomas T. Oliver  
U.S. Fish and Wildlife Service  
55 Pleasant Street  
Concord NH 03301

Wadsworth Owen  
Normandeau Associates, Inc.  
Nashua Road  
Bedford NH 03102

Nancy P. Sandberg  
Langley Road  
Durham NH 03824

Godfrey H. Savage  
Engineering Design and Analysis  
Laboratory  
101 Kingsbury Hall  
University of New Hampshire  
Durham NH 03824

Joan Schreiber  
Strafford Regional Planning  
Commission  
90 Washington Street  
Dover NH 03820

Thomas C. Shevenell  
Department of Earth Sciences  
James Hall  
University of New Hampshire  
Durham NH 03824

Alden Winn  
Chairman  
Board of Selectmen  
23 Faculty Road  
Durham NH 03824

Marian D. Woodruff  
51 Berkeley Street  
Nashua NH 03060

Rhode Island

Earl H. Conn  
31 Jupiter Street  
Narragansett RI 02882

Alvaro W. Freda  
RR 4, Box 802  
Narragansett RI 02882

Malcolm J. Grant  
Resource Analyst  
Coastal Resources Center  
Graduate School of Oceanography  
University of Rhode Island  
Kingston RI 02881

Walter J. Gray  
Director  
Marine Advisory Service  
University of Rhode Island  
Kingston RI 02881

Paul T. Hicks  
Rhode Island Petroleum Association  
150 Francis Street  
Providence RI 02903

Richard C. Hitchcock  
Hitchcock Marine Services  
6 Christine Drive  
Barrington RI 02806

Glenn Kumekawa  
Executive Assistant for Policy and  
Program Review  
Office of the Governor  
State of Rhode Island  
Providence RI 02803

William W. Miner  
Rhode Island Coastal Resources  
Management Council  
East Shore Road  
Jamestown RI 02835

Stephen B. Olsen  
Resources Analyst  
Coastal Resources Center  
Graduate School of Oceanography  
University of Rhode Island  
Kingston RI 02881

A. S. Westneat  
Raytheon 505  
Portsmouth RI 02871

W. Edward Wood  
Providence Journal  
75 Fountain Street  
Providence RI 02902

Other

Frank Basile  
U.S. Department of the Interior  
Bureau of Land Management  
90 Church Street, Room 1305  
New York NY 10007

J. R. Jackson, Jr.  
Manager  
Exploration Department  
Environmental Affairs  
EXXON Company, U.S.A.  
P. O. Box 2180  
Houston TX 77001

Joe C. Moseley II  
Executive Director  
Texas Coastal and Marine Council  
State of Texas  
P. O. Box 13407  
Austin TX 78711

Frank J. Kelly  
Coordinator, Deepwater Port  
U.S. Department of the Interior  
Office of Assistant Secretary  
Washington, D. C. 20240

A BIBLIOGRAPHIC POTPOURRI ON OIL;

Offshore Oil, Transportation, Refineries, Regulation, Economics,  
Pollution, Industrialization, Ports, Environment

Compiled by  
William A. Bivona

URI Marine Advisory Service

INTRODUCTION

This bibliography is provided as an addendum to the Proceedings of the Fourth New England Coastal Zone Management Conference, "Perspectives on Oil Refineries and Offshore Unloading Facilities," held at the New England Center for Continuing Education, University of New Hampshire, Durham, New Hampshire, May 13-14, 1974.

It was compiled by collating references from the following sources.

1. The Pittston file at the Maine State Dept. of Environmental Protection. Pittston Company is applying for permission to build a refinery and deepwater port at Eastport, Maine.
2. University of New Hampshire, Study Task Force on Siting Oil Refineries in Southeastern New Hampshire, Newsletters.
3. References contained in the bibliography in The Impacts of an Oil Refinery Located in Southeastern New Hampshire: A Preliminary Study. These references are on reserve at the Kingsbury Library, University of New Hampshire.
4. References contained in Potential Onshore Effects of Deepwater Oil Terminal-Related Industrial Development: Volume IV-Appendices. Many of these references are available from the publishers.
5. References contained in a bibliography prepared for a paper to be published by Thomas A. Grigalunas, Dept. of Resource Economics, University of Rhode Island.
6. References in the possession of Stephen S. T. Fan, Associate Professor and Chairman, Dept. of Chemical Engineering, University of New Hampshire.
7. References in the possession of Owen B. Durgin, Resources Development Center, University of New Hampshire.

8. References in the office of Alan Goodwin, Technical Services, Maine State Planning Office, Augusta, Maine.

9. References in the office of Alden Winn, University of New Hampshire, Kingsbury Hall.

10. References culled from the corporate bibliography of Roy F. Weston, Inc., West Chester, Pennsylvania.

The numbers in parentheses at the end of each citation in the bibliography refer to the numbered list of sources above.

This bibliography contains many references that are pertinent to the evaluation of proposed port-refinery complexes, but it is not complete and many other valuable references could have been added from other sources. Considering the breadth of this topic, this effort represents a modest attempt to assemble a reasonable reading list. The topical breakdown was dictated by the nature of the references assembled. Many references could have been placed in more than one category, but were included in only one for the sake of brevity.

The assistance of Owen Durgin, George Shaw, and William Henry, UNH Resources Development Center, and of Thomas A. Grigalunas, URI Dept. of Resource Economics, in supplying key bibliographies and evaluating and annotating references, is gratefully acknowledged.



GUIDE TO SECTIONS OF THE BIBLIOGRAPHY

Refineries . . . . .	121
Deepwater Ports . . . . .	124
Economic Effect Of Ports, Refineries, and Associated Industrial Developments . . . . .	127
Urbanization Resulting From Industrialization . . . . .	129
Offshore Oil . . . . .	130
Pipelines . . . . .	132
Oil Spills--Prevention And Control . . . . .	133
Oil Spills And Pollution . . . . .	136
Air Pollution And Noise Pollution . . . . .	138
What Is Pollution?--Legal Standards And Criteria . . . . .	139
Pollution Control Laws . . . . .	139
Policy Guides And Interpretation Of The Law . . . . .	140
The Environment--Now And The Future . . . . .	141
The Energy Crisis--Supply And Demand . . . . .	143
Public Comment . . . . .	144
General Bibliographies And Publications Lists . . . . .	145

REFINERIES

Bayside, Atlantic City Electric Company, Atlantic City, New Jersey, undated (est. July 1971). Describes a 4,500 acre industrial tract located in the township of Greenwich, Cumberland County, New Jersey. (4)\*

"Big Heartland Refinery Ready for '70's," by Leo R. Aalund, The Oil and Gas Journal, April 23, 1973, pp 45-60, Special report-Joliet. (7)

The Chemical Plant, by Ralph Landau, Reinhold, New York, New York, 1966. Chapter 6, "Plant location and site considerations," by Robert Merims. Describes the process of constructing a chemical plant from the process selection to commercial operation, from the manager's point of view. (2, 3)

"Complexity of Refinery Operation," by W.L. Nelson, The Oil and Gas Journal, September 3, 1973, p 51, Question on Technology. (3)

Environmental Aspects of Site Selection for a Petroleum Refinery, by F.L. Cross, J.R. Lawson, C.C. Miesse and W.D. Sitman, Roy F. Weston, Inc., West Chester, Pennsylvania, Industrial Wastes, July/August 1972. Also presented at the Annual Northeast Regional Anti-Pollution Conference (ANERAC), University of Rhode Island, Kingston, Rhode Island. (10)

In the Matter of Maine Clean Fuels, Inc., Site Location 29-0166-14190, Findings of Fact and Order, Environmental Improvement Commission, Augusta, Maine, July, 1971. Forty-four findings and conclusions under which permission to build a refinery was denied to Maine Clean Fuels, Inc., in Searsport, Maine. The findings provide a check-list of matters which need to be considered when reviewing the impact of a refinery. (2, 3)

Machias, A Core Refinery and Deep Draft Anchorage Project for Machias, Maine, by Kenneth M. Curtis, Governor of Maine, prepared for Governor Price Daniels, Director, Office of Emergency Planning, January 10, 1968. (4)

Marine Facilities Plan: Eastport Location, Frederic R. Harris, Inc., Great Neck, New York, March 1973, for Pittston Company. Detailed description of all the marine facilities associated with the Eastport refinery. (1, 2, 3)

Marine Facilities: Project Design and Construction Aspects - Eastport Location, Frederic R. Harris, Inc., Great Neck, New York, April, 1973, for Pittston Company. Includes a sketch of the marine construction phase. (1, 2, 3)

\*The numbers in parentheses at the end of each citation refer to the numbered list of sources in the introduction to the bibliography.

Meeting with Richmond Standard Oil of California, a Richmond refinery. Type-script draft. (7)

New Hampshire Legislature - National Legislative Conference, Fact Finding Conference on Oil Refineries and Offshore Terminals, Concord, New Hampshire, February 12-14, 1974. (3, 7)

"NORCO Refinery Wins Well-Deserved Conservation Award," The Oil and Gas Journal, pp 83-86, December 4, 1972. Describes projects to keep the refinery quiet, tight and attractive. (2, 3)

Potential Onshore Effects of Deepwater Oil Terminal-Related Industrial Development, Arthur D. Little, Inc., Cambridge, Massachusetts, September, 1973. Prepared for the Council on Environmental Quality, Washington, D.C. Available from the National Technical Information Service, Springfield, Virginia, as PB 224 018 through PB 224 021, in four volumes:

Volume I, Part 1, Executive Summary;

Volume II, Part 2, Mid-Atlantic region, and Part 3, Maine;

④ Volume III, Part 4, Gulf Coast Region;

Volume IV, Part 5, Appendices.

Examines the economic and environmental onshore effects, particularly those associated with refinery and petrochemical activity, stemming from deepwater oil terminals. Considers alternative potential locations along the East Coast (Maine and Mid-Atlantic locations) and Gulf Coast (Louisiana and Texas). In the Maine volume, contains employment in Washington County, Maine (location of Pittston's Eastport refinery), income, population, tax, land use, water use, BOD discharge, air pollution loads, and effects on the State of Maine. (2, 3, 5, 7)

A Preliminary Economic and Environmental Study of Alternative Methods of Supplying Petroleum Products to Eastern Massachusetts. Prepared by Arthur D. Little, Raytheon Company, and Frederic R. Harris, Inc., July, 1973, for the Mass. Port Authority, Boston, Massachusetts.

Volume I, Summary. Discusses the methodology, the economic, and the environmental results. The environmental summary includes a discussion of the use of the Dept. of the Interior's "Information Matrix for Environmental Impact Assessment." Most of the environmental impact revolves around oil spills in the Boston Harbor area. Otherwise the summary is very sketchy.

Volume II. A preliminary economic study of alternative methods of supplying petroleum products to eastern Massachusetts. Arthur D. Little, Cambridge, Massachusetts. Petroleum economics, i.e., demand factors, marine versus pipe line transportation costs, receiving terminal, implications for the Massachusetts economy. Refineries are not discussed in much detail. Construction and post-construction employment is discussed (pp 119ff), induced and indirect employment (pp 127ff) and employment multipliers are derived. Total earnings, payrolls, and taxes are included (pp 139-156).

Volume III. A preliminary environmental study of alternative methods of supplying petroleum products to eastern Massachusetts. Raytheon Company, Lexington, Massachusetts. Primarily oriented toward the effect of petroleum delivery on Boston Harbor marine organisms, given several delivery options.

Volume IV. Appendices, Frederic R. Harris, Inc. (2, 3, 5)

Preliminary Study for Proposed Refinery, Durham, New Hampshire, prepared for Olympic Refineries, Inc.

Volume I. Summary. Purvin & Gertz, Inc., Dallas, Texas.

Volume II. Land planning site design: Community Impact. Kling Planning, Philadelphia, Pennsylvania.

Volume III. Environmental Impact. Texas Instruments, Inc., Dallas, Texas.

Volume IV. Aquatic Impact. Normandeau Assoc., Inc., Manchester, New Hampshire.

Volume V. Historical Survey. Lion W. Anderson; "Pipeline Study." Gulf Interstate Engineering Co.; "Water Requirements and Treatment." Fluor Corp., Ltd.; "Noise and Illumination." Bolt, Beranek and Newman, Inc., Cambridge, Massachusetts. (9)

Present and Prospective Use of Water by Manufacturing Industries of New Jersey, N. J. Dept. of Conservation and Economic Development, Division of Water Policy and Supply. Water Resources Circular No. 11, June 14, 1963. (4)

Project Design and Construction Aspects, Eastport Location, Forster Wheeler Corporation, Livingston, New Jersey, February 1973, for Pittston Company. Includes a detailed discussion of the construction phase. (1, 2, 3, 7)

Proposal for New Hampshire Oil Refinery and Transshipment Terminal, Purvin & Gertz, Inc., Dallas, Texas, November, 1973. Good overview of proposed refinery. Reprinted in Public Occurrences, December 7, 1973. (2, 3)

Prospectus for a 250,000 Barrel per Day Refinery and Marine Terminal at Eastport, Maine, USA, Pittston Co., New York, New York, April, 1973. An overall discussion, but more complete than the Purvin & Gertz discussion of the Durham Point refinery. (1, 2, 3)

Refining Facilities Plan, Eastport Location, Foster Wheeler Corp., Livingston, New Jersey, December, 1972, for Pittston Co. Includes a discussion of the process scheme, support facilities, pollution control, safety and emergency operations, and operating requirements. (1, 2, 3, 6)

Solid Waste, Liquid Waste, Air Pollution and Noise Pollution Management Planning for Ports, by D.E. Bruderly and J.R. Piskura, Roy F. Weston, Inc., West Chester, Pennsylvania. (10)

Tanker Requirements and Costs for Three Alternative Transshipment and Refinery Locations in the Caribbean, Arthur D. Little, Inc., Cambridge, Massachusetts, April, 1972, report to Ashland Oil, Inc. (4)

## DEEPWATER PORTS

Atlantic Coast Deepwater Port Facilities Study, Eastport, Maine, to Hampton Roads, Virginia, U.S. Army Corps of Engineers, Philadelphia District, North Atlantic Division, June, 1973. (3 volumes)

### Interim Report

#### Socio-economic considerations

#### Economic analysis

This major study examines alternative means of developing facilities to handle large supertankers to meet projected petroleum demands for mid- and north-Atlantic coastal states. The study includes a comprehensive analysis of the economic, socio-economic, environmental, and institutional aspects of possible deepwater facilities for selected locations. (5)

- ④ "Deepwater Ports: Issue Mixes Supertankers, Land Policy," by Luther J. Carter, Science, Vol. 181, August 31, 1973, pp 825-828.  
A review with the theme, "The environmental as well as economic implications of deepwater terminals may be surprisingly favorable -- or, in the absence of proper policies, disastrously unfavorable." (2, 3)

- ⑤ Draft Environmental Impact Statement - Deepwater Ports, U.S. Dept. of the Interior, Office of the Assistant Secretary, Program Development and Budget, Washington, D.C., June, 1973.  
This was compiled to accompany legislation to authorize the Secretary of the Interior to regulate the construction and operation of deepwater port facilities. It is very general, especially in the biological impact area. Includes the following: types of deepwater facilities, ports (including tanker traffic and construction); potential port sites; U.S. petroleum situation; short discussion of six oil spills, probability of oil spills; legislation to mitigate effects of spills; and other energy sources than oil. (2, 3, 7)

Economic Considerations Regarding an Out-to-Sea Deepwater Terminal for Boston Harbor. Testimony of Thomas A. Grigalunas and Jack A. Donnan before the Commission on Marine Boundaries and Resources of the Massachusetts State Senate, Boston, Massachusetts, January 19, 1973. This paper reviews the economic issues associated with a study by Frederick Harris, Inc., proposing an out-to-sea terminal and refinery-petrochemical complex for Boston. (5)

- ⑥ The Economics of Deepwater Terminals, U.S. Dept of Commerce, Maritime Administration, Office of Ports and Intermodal Systems, Division of Ports, 1972. (7)

Feasibility Investigation, Massport Out-to-Sea Oil Terminal System - Interim and Supplemental Reports, Frederick R. Harris, Inc., Boston, Massachusetts, March, 1970. This study analyzes the economic and environmental aspects of an out-to-sea deepwater terminal in Boston Harbor. The study also discusses the location of a refinery-petrochemical complex for the metropolitan Boston area. (5)

Foreign Deepwater Port Development, a Selective Overview of Economics, Engineering and Environmental Factors, Arthur D. Little, Inc., Cambridge, Massachusetts. A report submitted to the U.S. Army Engineer Inst. for Water Resources. Available from National Technical Information Service, September, 1971. (4)

Industrial Development Opportunities for the Port of Munroe, Arthur D. Little, Inc., Cambridge, Massachusetts, December, 1972. Final report to Area Re-development Administration, U.S. Department of Commerce. (4)

Louisiana Superport Studies: Report No. 1, Preliminary Recommendations and Data Analysis, Louisiana State Univ., Center for Wetland Resources, August, 1972. Publication No. LSU-SG-72-03. (4)

- ⑦ Offshore Terminal System Concepts, Soros Associates, Inc., for the U.S. Dept. of Commerce, Maritime Administration, September, 1972.  
Volume I. Evaluation of requirements and capabilities for determination of the need for offshore terminals. A discussion of bulk cargoes, shipping patterns, present bulk cargo ports, together with estimates of needs for additional port facilities.  
Volume II. Connections between deep-draft terminals and existing facilities by utilization of feeder vessels, pipelines and/or shore facilities relocation. Includes candidate sites for offshore terminals (Isles of Shoals not included) and their physical and oceanographic environment. The costs and methods of shipping between bulk terminals and existing industrial concentrations throughout the country is also covered.  
Volume III. Formulation of advanced concepts for offshore terminals. Analyzes various concepts for developing offshore terminals, compares the costs of the more promising schemes, and then prepared conceptual designs for offshore terminals at five east coast sites (selected in Vol. II).  
Volume IV. Executive summary. Presents a summary almost exclusively in terms of charts, tables, maps, and drawings. (2, 3, 4)

Port and Harbor Development System: Phase 1, Design Guidelines Work Report, Architecture Research Center, College of Architecture and Environmental Design, Texas A & M University, College Station, Texas, August, 1971, Report No. TAMU-SG-71-216. (2, 3)

Port and Harbor Development System: Phase 2, Planning Summary, Architecture Research Center, College of Architecture and Environmental Design, Texas A & M University, College Station, Texas, October, 1972, Report No. TAMU-SG-72-209. (2, 3)

Port Growth Policies Abroad, by Bertrand deFrondeville, Water Spectrum, Winter 1971-2, Dept. of the Army, Corps of Engineers, Washington, D.C. (4)

The Port of Milford Haven, Milford Haven Conservancy Board, Milford Haven, England, 1973.  
Milford Haven, Wales, can now handle 285,000 DWT tankers. This booklet describes its growth over the past fifteen years. Berthing, storage, and refining facilities are discussed. (2, 3)

- The Port of New Orleans, Louisiana, Port Series No. 20, revised ed., U.S. Army Corps of Engineers and U.S. Dept. of Commerce, Maritime Administration, 1959. Available from U.S. Government Printing Office. (4)
- The Ports of Galveston and Texas City, Texas, Port Series No. 23, U.S. Army Corps of Engineers and U.S. Dept. of Commerce, Maritime Administration, 1960. Available from U.S. Government Printing Office. (4)
- The Ports of Galveston and Texas City, Texas, Part 2, Port Series No. 23, U.S. Army Corps of Engineers, 1969. Available from U.S. Government Printing Office. (4)
- Small Port Development Potentials in North Louisiana, Draft Report, Gulf South Research Institute, Baton Rouge, Louisiana, March, 1971. Prepared for Economic Development Administration, Washington, D.C. (4)
- Study of Atlantic Coast Deepwater Port Facilities, Eastport, Maine, to Hampton Roads, Virginia. Record of proceedings of initial public meeting held in City Council Chamber, City Hall, Portland, Maine, May 23, 1972, U.S. Army Corps of Engineers, Philadelphia District. (4)
- Study of Atlantic Coast Deepwater Port Facilities, Eastport, Maine, to Hampton Roads, Virginia. Record of proceedings of initial public meeting held at Bridgeton Senior High School, Bridgeton, New Jersey, May 31, 1972, U.S. Army Corps of Engineers, Philadelphia District. (4)
- Study of Deepwater Port Facilities for the Gulf Coast Between Brownsville, Texas, and Tampa, Florida. Remarks and testimony at public meeting held at Moody Civic Center, Galveston, Texas, April 24, 1972, U.S. Army Corps of Engineers, Galveston District. (4)
- Studies on the Future of Atlantic Ports, by Ernst Frankel, Massachusetts Inst. of Technology, Cambridge, Massachusetts, July 10, 1973, Report No. MITSG 72-18. This first of two studies reviews the past and present capabilities of the U.S. Atlantic coast ports and projects the extent to which the ports will successfully meet future requirements. Sub-titled: A review of the status and analysis of characteristics.
- A Superport for Louisiana, Louisiana Superport Task Force, New Orleans, Louisiana, June, 1972. (4)
- U.S. Deepwater Port Study, by Ralph L. Trisko, et al, Robert R. Nathan Assoc., Inc. Report to U.S. Army Corps of Engineers, Inst. for Water Resources, Washington, D.C., March 3, 1972. Available from the National Technical Information Service, Springfield, Virginia, as AD 750 090 thru AD 750 095.
- Volume I. Summary and conclusions. The summary is short and general.
- Volume II. Commodity studies and projections. Considers long-term markets, import and export, for petroleum, ores, coal, grains, and phosphate rock.
- Volume III. Physical coast and port characteristics and selected deep-water port alternatives. Describes the characteristics of individual U.S. ports and then discusses a number of possible deepwater ports for specific sites.

Volume IV. The environmental and ecological aspects of deepwater ports. Discusses general environmental problems and an analytical framework in which to treat them. Provides 10 to 35 discussions of environmental impacts in each of eight possible deepwater port areas in the United States.

Volume V. Transport and benefit-cost relationships. Discusses the ocean shipping of bulk (dry as well as oil) commodities. Supply, demand, institutional characteristics, and costs are all included. (2, 3, 4)

United States Seaports - Atlantic Coast, Port Series, Part 1, U.S. Dept. of Commerce, Maritime Administration, August, 1963. Available from U.S. Government Printing Office. (4)

United States Seaports - Gulf Coast, Port Series, Part 1, U.S. Dept. of Commerce, Maritime Administration, April, 1965. Available from U.S. Government Printing Office. (4)

#### ECONOMIC EFFECT OF PORTS, REFINERIES, AND ASSOCIATED INDUSTRIAL DEVELOPMENTS

An Atlantic World Port and Oil Refinery for New England, The New England Council for Economic Development, Boston, Massachusetts, October, 1968. This pamphlet presents a statement by the New England Council supporting a foreign trade zone at Portland, Maine, and an oil refinery at Machiasport, Maine. (5)

Community Economic Profiles and Industrial Location in Delaware, by Robert W. Cook, Economist, Division of Urban Affairs, University of Delaware, April, 1965. Vol. III, prepared for the Delaware State Planning Office. (4)

A Critical Analysis of Employment Projection Methods: A Test Case of New Jersey, by Daryl Hellman and Marcus Marityhau, Water Resources Research Inst., Rutgers University, May, 1970. Part II of a three part study on Urbanization and its Effect on Water Resources. (4)

The Delaware River Port -- An Evaluation of the Port's Economic Importance, Future Potential and Development Plans, by Hammer, Green, Siler Associates, W.B. Saunders and Company, Washington, D.C., 1966, for PA Planning Bd. & Dept. of Commerce. (4)

Economic Impact Analysis of Texas Marine Resources and Industries, by John Miloy and E. Anthony Copp, Industrial Economic Research Division, Texas A & M University, College Station, Texas, June, 1970. (4)

The Economic Impact of a Deepwater Terminal in Texas, by Daniel M. Bragg and James R. Bradley, Texas Engineering Experiment Station, Texas A & M University, College Station, Texas, November, 1972, TAMU-SG-72-213. (2, 3, 4)

- Economic Impact of Oil Refinery Location in New Hampshire, by George Gilmen and Charles Allen, Department of Resources and Economic Development, Concord, New Hampshire, December, 1973.  
This report is based upon the Massport Study, Volumes I and II, and was reprinted in Public Occurrences for January 11, 1974, and the Manchester Union Leader in seven parts, January 7-14, 1974. (2, 3, 7)
- The Economic Impact of United States Ocean Ports, U.S. Department of Commerce, Maritime Administration, U.S. Government Printing Office, Washington, D.C., 1967. (4)
- The Economies of Fifteen Metropolitan Areas -- Historical and Projected Employment, Output, Population and Personal Income, 1950, 1957, 1960, 1962, and 1975, Regional Economic Projections Series, Report No. 65 - III, National Planning Association, Center for Economic Projections, Washington, D.C., 1965. (4)
- Employment Opportunities in Maine Through Oil Refinery Development: A Position Paper, by Roderick Forsgren, et al, February 17, 1971. (4)
- Galveston County, Texas: An Economic Base Study, University of Houston Center for Research in Business and Economics, College of Business Administration, Houston, Texas. (4)
- Guide to Refinery Operating Costs, by Wilbur L. Nelson, (Process Costimating) 2nd ed., The Petroleum Publishing Company, 211 South Cheyenne, Tulsa, Oklahoma, 1970. (5)
- "Houston: A Texas Lesson for Boston: Financial, Political Power Slips into the Old Confederacy," Boston Sunday Globe, p 2-A, May 28, 1972. (4)
- How the Atlantic World Port at Machiasport, Maine, Will Serve the National Interest, by Kenneth M. Curtis, Governor of Maine, a proposal presented through the New England Regional Commission. (4)
- An Industry Study of the Chemical Processing Industry in Texas, Industrial Economics Research Division, Texas Engineering Experiment Station, Texas A & M University, College Station, Texas. (4)
- Investment, Production and Returns to Potential Petroleum Development on the Outer Continental Shelf, by Thomas A. Grigalunas, Department of Resource Economics, University of Rhode Island. Paper to be delivered at the annual meeting of the American Agricultural Economics Association, August 18-20, 1974, Texas A & M University, College Station, Texas.
- The Port of San Francisco --An In-Depth Study of Its Impact on the City, Its Economic Future, the Potential of its Northern Waterfront, Arthur D. Little, Inc., Cambridge, Massachusetts, September, 1966, for the San Francisco Port Authority. (4)
- A Potential Economic Opportunity -- Maine's Deep Water Harbors, by Joseph B. Coffey. Prepared for Maine Department of Economic Development, 1971. (4)
- Preliminary Report and Economic Survey of the Louisiana Intracoastal Seaway, by Waldemar S. Nelson & Co. Prepared for Louisiana Department of Public Works, March 1963. (4)
- "Published Refinery Costs Include Storage," by W. L. Nelson, (Questions on Technology), The Oil and Gas Journal, p 92. (7)
- The Relationship of Economic Development to Environmental Quality -- Hearings Before the Subcommittee on Air and Water Pollution of the Committee on Public Works, United States Senate, Ninety-First Congress, Second Session, September 8 and 9, 1970, Machiasport, Maine. Printed for the use of the Committee on Public Works, U.S. Government Printing Office, Washington, D.C., 1971. (3, 4)
- A Study of the Economic Implications of the Refinery Proposed for Tiverton, Rhode Island, by Paul Mintok, Department of Resource Economics, Univ. of Rhode Island, Kingston, Rhode Island, Occasional Paper 70-345, December 1970.  
This paper deals with an economic assessment of the implications of a 65,000 bbl/day oil refinery proposed for Tiverton, Rhode Island. The possible effects of the refinery on local employment, taxes, and the environment are discussed. (2, 3, 4, 5)
- Texas Marine Resources -- A Summary of Coastal Activities, by John Miloy and W. M. Blake, Texas A&M University, Sea Grant Publication No. 105, February 1970. (4)
- 1970 Waterside Plant Locations and Expansions -- A Study in Economic Growth, American Waterways Operations, Inc., Washington, D.C., April 1971. (4)
- 1971 Waterside Plant Locations and Expansions -- A Study in Economic Growth, American Waterways Operations, Inc., Washington, D.C., April 1972. (4)
- "What is the Value of Old Refineries," by W. L. Nelson, (Questions on Technology), The Oil and Gas Journal, May 28, 1973, pp 80-84. (7)

#### URBANIZATION RESULTING FROM INDUSTRIALIZATION

- A Comprehensive Development Plan, Eastport, Maine, Eastport City Planning Board, Eastport, Maine, December 1970. (4)
- Delaware Valley Impact Study, Master Plan, Report 14, Hunterdon County, New Jersey, Hunterdon County Planning Board, Flemington, New Jersey, August 1969. (4)
- The Impact of Large Installations on Nearby Areas, by Gerald Breese, et al, Bureau of Yards and Docks, Department of the Navy, U.S. Naval Civil Engineering Laboratory, Port Hueneme, California, 1965. (3)
- Land Use -- 1964 -- An Inventory Analysis of Land Use, Physical Environment, Growth Controls and Principal Utility Services for Cumberland County, New Jersey, Cumberland County Planning Board, Bridgeton, New Jersey, October 1965. (4)

Measure of a Region, Tri-State Transportation Commission (Connecticut, New Jersey, New York), New York City, May 1967. (4)

New Jersey Municipal Profiles, Intensity of Urbanization, Division of State and Regional Planning, New Jersey Department of Community Affairs, January 1972. (4)

New Jersey's Delaware Bay Shore, An Inventory of Land Use, Department of Conservation and Economic Development, March 1964. (4)

Regional Development Guide -- Technical Perspectives, Tri-State Transportation Commission (Connecticut, New Jersey, New York), November 1969. (4)

Regional Forecast 1985 -- The Future Size and Needs of the Tri-State Region, Tri-State Transportation Commission (Connecticut, New Jersey, New York), December 1967. (4)

Streets and Highways: A Regional Report, Tri-State Transportation Commission (Connecticut, New Jersey, New York), New York City, January 1968. (4)

Tri-State Transportation 1985 -- An Interim Plan, Tri-State Transportation Commission (Connecticut, New Jersey, New York), New York City, May 1966. (4)

#### OFFSHORE OIL

The Effect of Natural Phenomena on OCS Gas and Oil Development, for CEQ, 1973. Draft Report TC-367. (2)

Energy Under the Oceans: A Technology Assessment of Outer Continental Shelf Oil and Gas Operations, by Don E. Kash, et al, University of Oklahoma Press, Norman, Oklahoma, June 1973.

The excellent work presents a comprehensive review and examination of the technology, regulation, and policy issues associated with oil and gas operations on the Outer Continental Shelf. The subject areas considered include: the nature of technology assessment; the development and regulation of OCS petroleum resources; policy issues; and a comparison and recommendations. Part five of the study contains appendices dealing with environmental issues and reserves. (2, 3, 5)

Geological Framework and Petroleum Potential of the Atlantic Coastal Plain and Continental Shelf, by John C. Maher, U.S. Department of Interior, Geological Survey, U.S. Government Printing Office, Washington, D.C., 1971. Professional paper 659.

This report indicates and discusses the geological characteristics of the areas along the U.S. East Coast with the most promising petroleum potential. (5)

The Georges Bank Petroleum Study, Offshore Oil Task Group, M.I.T., Cambridge, Massachusetts, February 1973, MITSG 73-5.

Vol. I: Impact on New England. Real income of hypothetical regional petroleum developments.

Vol. II: Impact on New England. Environmental quality of hypothetical and regional petroleum developments.

Summary.

In this study the economic and environmental implications of a variety of simulated offshore and onshore petroleum developments are examined. The study includes a computerized model to compute real income in the New England area as the result of offshore development. A subroutine computes the likely configuration, cost, output, and effluents of a refinery. The model, however, is extrapolated from a 30,000 bbl/day refinery representing world (higher fuel oil to gasoline ratio), not U.S., practice. (2, 3, 5)

Hearings on Offshore Drilling in the Atlantic, The Council on Environmental Quality, 1973.

Copies of testimonies on offshore drilling in the Atlantic at several locations along the eastern seaboard. (2)

Key Issues in Offshore Oil, by John W. Devanney, III, Cambridge, Massachusetts, M.I.T., October 1973. Second Annual Sea Grant Lecture: World Energy and the Oceans.

In this presentation, Professor Devanney reviews a number of economic and environmental issues as they relate to offshore oil, particularly potential petroleum production from Georges Bank. (5)

Legal Problems Regarding the Extraction of Minerals (Including Oil and Gas) From the Continental Shelf, by Walter J. McNichols, Univ. of Miami, Miami, Florida, March 1971. (2, 3)

Motions of Jackup Drill Rigs in Heavy Seas, by C. H. Kim and F. Chou, Stevens Institute of Technology, Hoboken, New Jersey, March 1971. (2, 3)

North Sea Oil and Gas -- Implications for Future U.S. Development, CEQ, 1973. (2)

"The Northeast Faces Critical Decisions on Petroleum Development," by Thomas A. Grigalunas, Maritimes XVII, August 1973, pp 3-5.

The author summarizes recent developments in federal energy policy, particularly as they relate to coastal areas in the northeast U.S. Some general implications of potential offshore petroleum for coastal regions are discussed. (5)

"Off-Shore Oil: Its Impact," by Ian Menzies, Boston Globe, Boston, Massachusetts, November 19-24, 1973.

A series of five articles on the economic and social effects of the North Sea oil discoveries on Scotland. It is suggested that New England will shortly follow in Scotland's path and perhaps might learn from Scotland's experience. (2, 3)

Offshore Petroleum Development and New England, by Thomas A. Grigalunas.

Testimony before the Commission on Marine Boundaries and Resources of the Massachusetts State Senate, Boston, Massachusetts, June 1973. In this paper the author discusses briefly national energy policy and

its general implications for offshore and coastal areas. This paper also contains some review comments on the MIT offshore oil study. (5)

Oil and the Outer Coastal Shelf, The Georges Bank Case, by William R. Ahern, Jr., Ballinger Publishing Co., Cambridge, Massachusetts, 1973. This study examines some of the economic, environmental, and other issues associated with potential offshore production on Georges Bank from a public policy standpoint. (5)

"Regional Impacts of Potential Offshore Petroleum Development," by Thomas A. Grigalunas, Marine Technology Society, Eighth Annual Conference Proceedings, September 1972, pp 491-497. This early paper discusses some general economic aspects of offshore petroleum production and an approach to examining the regional impacts of marine petroleum exploitation. (5)

Report on the Prospect of a Deepwater Oil Port off the Coast of Cape May, Cape May County Planning Board, Cape May Court House, New Jersey, May 23, 1972. (4)

Tentative OCS Oil and Gas Report Outline, by Stephen J. Gage, CEQ, Washington, D.C., January 18, 1974. This is a copy of the tentative outline the CEQ staff has prepared to report on potential oil and gas development in the Atlantic and Gulf of Alaska OCS regions. (2, 3)

Testimony, by Jack Horton, Assistant Secretary for Land and Water Resources, Department of the Interior, before the Special Joint Committee of the Senate Interior, Commerce and Public Works Committees, July 23, 1973, Washington, D.C. A general testimony to introduce and motivate legislation necessary to authorize the construction of deepwater ports in international waters (beyond the three-mile limit). (2, 3)

Testimony, by Jack Horton before the House Interior and Insular Affairs Committee, Statistical Appendix on Deepwater Ports and Oil Tankers, Washington, D.C., July 26, 1973.

Wave-Exciting Forces and Moments on an Ocean Platform, by C. H. Kim and F. Chou, Stevens Institute of Technology, Hoboken, New Jersey, September 1971. (2, 3)

Wave Forces on a Submerged Object, by John E. Halkyard, Massachusetts Institute of Technology, Cambridge, Massachusetts, November 1971. (2, 3)

#### PIPELINES

"Cross-Country Pipeline Construction," by Frederick J. Seeger and John A. Havers, Transportation Engineering Journal, pp 603-614, November 1970. Covers the conventional method of constructing large diameter cross-country pipelines. (2, 3)

The Economics of Arctic Oil Transportation, by J. B. Lassiter, III and J. W. Devanney, III, Massachusetts Institute of Technology, Cambridge, Massachusetts, November 1970. (2, 3)

"Gas Line Response to Earthquakes," by John D. McNorgan, Transportation Engineering Journal, pp 821-984, November 1973. (2, 3)

"Offshore Pipeline Burial," by Sjoerd C. Haagsma, Transportation Engineering Journal, Technical Notes, pp 981-984, November 1973. (2, 3)

"Pipeline Design to Reduce Anchor and Fishing Board Damage," by Robert J. Brown, Transportation Engineering Journal, pp 199-210, May 1973. (2, 3)

"Pipeline Location: Bibliography Supplement," Transportation Engineering Journal, pp 363-366, May 1973. (2, 3)

"Pipeline Transportation in the 70's," by Marshall V. Bagwell, Transportation Engineering Journal, pp 5-15, February 1973. (2, 3)

"Practical Applications of Codes in Construction of Pipelines," by David R. Williams, Transportation Engineering Journal, pp 471-494, November 1970. (2, 3)

Regulation of Pipeline Design and Construction, Journal of the Pipeline Division, Proceedings of the American Society of Civil Engineers, Vol. 89, No. PLL, January 1963. (2, 3)

"Stingray's Proposed Offshore Systems, Phase I, Pipeline Economics," Oil and Gas Journal, August 13, 1973, pp 70-90. (7)

#### OIL SPILLS--PREVENTION AND CONTROL

An Analysis of the Kinetics of a 250,000 DWT Tanker Entering Eastport, Maine, Engineering Computer Optecnomics, Inc., submitted to Maine Department of Environmental Protection, December 1973. (7)

Anti-Oil Pollution Plan, Milford Haven Standing Conference on Anti-Oil Pollution, Milford Haven, England, September 1973. (2, 3)

A Conceptual Report on the Management of Bay and Estuarine Systems--Phase I, by the Division of Natural Resources and the Environment, University of Texas, Austin, Texas, for the Interagency Council of Natural Resources and the Environment, March 1972. (4)

The Cost of Clean Water, Petroleum Refining, U.S. Department of the Interior, Vol. III, No. 5, November 1967. (10)

"Disposal of Oily Wastes," by J. R. Lawson, Roy F. Weston, Inc., West Chester, Pennsylvania, Pollution Engineering, January/February 1970, p 25. (10)

1967 Domestic Refinery Effluent Profile, CAWC, American Petroleum Institute, September 1968. (10)

Effluent Quality Control at a Large Oil Refinery, by D. S. Diehl, R. T. Denbo, M. N. Bhatla and W. D. Sitman, Roy F. Weston, Inc., West Chester, Pennsylvania, Journal of the Water Pollution Control Federation Reprint. (10)

Emergency Plan, Milford Haven Conservancy Board, Milford Haven, England, April 1972. (2, 3)  
Milford Haven has a very effective oil spill prevention and clean-up program.

Energy, Oil and the State of Delaware, Delaware Bay Oil Transport Committee, January 15, 1973.  
Report to the Governor dealing with a proposal for safeguarding the Delaware Estuary and Coastline by safer transport of oil. (4)

Engineers' Approach to Oily and Metal-Containing Wastewater Problems, by Y. H. Lin and J. R. Lawson, Roy F. Weston, Inc., West Chester, Pennsylvania. (10)

An Evaluation of Waste Treatment Facility, RE the Pittston Company Eastport Refinery, by K. Lennart Rost, Maine Department of Environmental Protection, Augusta, Maine, April-May 1973. Compares Eastport with some other refineries in terms of water use. (2, 3)

"How Refiners Abate Pollution," NPRA Panel Discussion, Oil and Gas Journal, May 24, 1971, p 77. (10)

Incinerate Sludge and Caustic, by R. C. Mallat, J. F. Grutsch, and H. E. Simons, Hydrocarbon Processing 121, May 1970. (10)

Land Spreading: A Conserving and Non-Polluting Method of Disposing of Oily Wastes, by G. K. Datson, et al, presented at Fifth International Water Pollution Research Conference and Exhibition, San Francisco, California, July 26, 1970. (10)

Machias Bay -- Environmental Management, Arthur D. Little, Inc., Cambridge, Massachusetts, December 1969.  
Draft report for review and discussion to Atlantic World Port, Inc. (3, 7, 8)

Management of Bay and Estuarine Systems -- Phase One, by the Division of Natural Resources and the Environment, University of Texas, Austin, Texas, March 1972.  
A report prepared for and in cooperation with the Coastal Resources Management Program, Division of Planning and Coordination, Office of the Governor. (4)

Management of Industrial Solid Waste in Municipal Operations, by J. R. Lawson, Waste Age 5, March/April, 1971. (10)

Manual on Disposal of Refinery Wastes, Volume on Liquid Wastes, American Petroleum Institute, Washington, D.C., 1969.  
Provides examples of current practice in the removal of separable oil and reduction of water-soluble organics, ammonia, and hydrogen sulfide from refinery waste waters. (2, 3)

National Oil and Hazardous Materials Pollution Contingency Plan, Council on Environmental Quality, Federal Register, June 2, 1970.  
Supersedes "National Multiagency Oil and Hazardous Materials Contingency Plan." September 1965. (5)

National Oil and Hazardous Materials Pollution Contingency Plan, Council on Environmental Quality, Washington, D.C., August, 1971.  
Specific plan to provide a mechanism for coordinating the response to a spill including statutes, administrative authority, authorized actions, and territory considerations. (2, 3)

Nonbiological Treatment of Refinery Wastewater, by R. F. Peoples, P. Krishnan and R. N. Simonsen, Journal of the Water Pollution Control Federation reprint. (10)

Oil and Hazardous Materials Contingency Plan for Prevention, Containment and Cleanup for the State of Maine, Portland Harbor Pollution Abatement Committee, 40 Commercial Street, Portland, Maine, January 1970. (5)

Optimal Dimensions and Layouts of Approaches for Large Tankers, International Oil Tanker Commission, Working Group No. 2 Report, Permanent International Association of Navigation Congresses, January 1973.  
Subject: Optimal dimensions and layouts of approaches (channels and maneuvering areas) for large tankers, considering among other things: the influence of winds, currents and waves; and means offered by modern technology for the ease and the control of navigation. (2, 3)

Petrochemical Water Pollution Control -- A Discussion, by R. W. Weston, Roy F. Weston, Inc., West Chester, Pennsylvania. (10)

Prevention and Control of Oil Spills, American Petroleum Institute, 1801 K Street, N.W., Washington, D.C. 20006, March 1973. (2)

Prevention and Control of Oil Spills at Marine Facility at Eastport, Maine, Pittston Co., New York, New York, March 1973.  
Short discussions of loading procedures, including drawings and pictures of the oil spill containment system (booms). (1, 2, 3)

Proceedings of a Joint Conference on Prevention and Control of Oil Spills, American Petroleum Institute and Federal Water Pollution Control Administration, December 15-17, 1969, New York. (5)

Process Development, Design and Full-Scale Operational Experience at a Petrochemical Manufacturing Wastewater Treatment Plant, by B. G. Vania, M. N. Bhatla, A. F. Thompson and C. W. Brabston, Roy F. Weston, Inc., West Chester, Pennsylvania. (10)

Recommended Electronic Nav aids for Navigation and Berthing of VLCC Class Vessels at Eastport, Maine, ITT Decca Marine, Inc., New York, New York, April 1973, for Pittston Co.  
Discussion of the navigational aids that Decca intends to supply to help the berthing of vessels in Eastport. (1, 2, 3)

Report on International Control of Oil Pollution, Union Calendar No. 250, 90th Congress, First Session, September 11, 1967, HR 628. (5)



Residuals Management in Industry: A Case Study of Petroleum Refining, by Clifford S. Russell, published for the Resources for the Future, Inc., by the Johns Hopkins University Press, Baltimore and London, 1973. (5)

Separation and Treatment of Fats, Oils and Greases, by D. A. Baker and C. A. Vath, Roy F. Weston, Inc., West Chester, Pennsylvania. (10)

Sludge Disposal: A Growing Problem, by A. Rabb, Hydrocarbon Processing, 149 April 1965. (10)

Solid Wastes Industrial Profiles -- Petroleum Refining, by W. L. Lewis. Presented by National Industrial Solid Wastes Management Conference, University of Houston, March 25, 1970. (10)

Treatment and Control of Oily and Metal-Containing Wastewaters, by Y. H. Lin and J. R. Lawson, Roy F. Weston, Inc., West Chester, Pennsylvania. (10)

Use of Sand Filter-Activated Carbon System for Refinery Wastewater Treatment, by P. Krishnan, R. F. Peoples and R. N. Simonsen, Roy F. Weston, Inc., West Chester, Pennsylvania. (10)

Water Treatment Plant Design, ASCE, AWWA, CSSE, 213(1969). (10)

#### OIL SPILLS AND POLLUTION

An Analysis of Oil Outflows Due to Tanker Accidents, by V. F. Keith and J. H. Porricelli, Prevention, pp 3-14. (2, 3, 7)

Biological Effects of Oil Pollution -- Bibliography: A Collection of References Concerning the Effects of Oil on Biological Systems, by Donna R. Radcliffe and Thomas A. Murphy, Edison Water Quality Laboratory, Edison, New Jersey, October 1969, for the Federal Water Pollution Control Administration (FWPCA), WPC Research Series DAST-19, PB 188 206. (2)

Biological Effects of Oil Pollution -- Selected Bibliography II, by Royal J. Nadeau and Thomas H. Roush, Edison Water Quality Protection Agency, EPA-R2-72-055, PB 213-483. (2, 3)

Deterioration and Restoration of Coastal Wetlands, by S. M. Gagliano, H. J. Kwon, J. L. van Beek, Louisiana State University, Coastal Studies Inst., Center for Wetland Resources. Presented at Twelfth International Conference on Coastal Engineering, September 1970, Washington, D.C. (4)

The Effects of the San Francisco Oil Spill on Marine Life, by Gordon Chan, College of Marin, Kentfield, California, January 1972. (2, 3)

Environmental Conservation: The Oil and Gas Industries, National Petroleum Council, Committee on Environmental Conservation, June 1971. Vol. I - A Summary. (5)

Oil and the Environment: The Prospect, Shell Oil Company, Public Affairs, POB 2463, Houston, Texas, January 1973. (4)

Oil on Puget Sound, by Juris Vagners, University of Washington Press, Seattle, Washington, 1971.

This is a 600 page interdisciplinary study to define the oil spill problem on Puget Sound and to evaluate critically the current status of oil spill prevention and control. (2, 3)

Oil Pollution: A Report to the President, Dept. of the Interior and Dept. of Transportation, February 1968.

A report on pollution of the nation's waters by oil and other hazardous substances. (5)

The Oil Spill Problem: Report of the President's Panel on Oil Spills, Office of Science and Technology, Executive Office of the President, Washington, D.C. A 25 page overview of the problem with panel's summary and recommendations. (2, 3)

Oil Spillage: A Bibliography, Vols. I & II, Office of Water Resources Research, U. S. Dept. of the Interior, Washington, D.C., May 1973. (2, 3)

Petrochemical Wastes as a Water Pollution Problem in the Lower Mississippi River, by James J. Friloux, Lower Mississippi River Field Station, EPA, Baton Rouge, Louisiana, April 5, 1971. Submitted to Subcommittee on Air and Water Pollution, New Orleans, Louisiana. (4)

"The Problem of Oil Pollution of the Sea," by A. Nelson-Smith, Advances in Marine Biology, Vol. 8, pp 215-306, 1970.

A very good review article with an extensive bibliography. Discusses tanker operations, terminals, properties of oils, the effects of pollution on marine environment, on oiled birds and on tourists. The removal of oil by natural means, dispersal, and the problems of cleaning shores and the toxicity of solvents are also included. (2, 3)

San Francisco Oil Spill, Hearings before a special subcommittee of the Committee on Merchant Marine and Fisheries, House of Representatives, 92nd Congress, First Session, February 8-9, 1971, Serial No. 92-3. (5)

Set-Up of Oil on Water by Wind, Edmund B. Spencer and Robert M. Sorenson, Texas A&M University, College Station, Texas, August 1970, studied analytically and experimentally. (2, 3)

Student Projects on the Oxidation of Marine Bacteria of Aromatic Compounds Found in Oil, by Phillips W. Robbins, et al, Massachusetts Institute of Technology, Cambridge, Massachusetts, June 1971. (2, 3)

"Studies of the Simulation of Drifting Oil by Polyethylene Sheets," by Douglas Teeson, et al, Ocean Engineering, Vol. 2, pp 1-11, 1970. (2, 3)

A Study of the Cost Effectiveness of Remote Sensing Systems for Ocean Slick Detection and Classification, by Glen C. Gerhard, University of New Hampshire, Durham, New Hampshire, April 1972. Remote sensing from surveillance flights considered. (2, 3)

Tankers and the Ecology, by J. D. Porricelli, V. F. Keith, and R. L. Storch, Society of Naval Architects and Marine Engineers, Transactions. 79(1971): 169-221. (3)

Tankers and the U. S. Energy Situation -- An Economic and Environmental Analysis, by Joseph D. Porricelli and Virgil F. Keith. Presented at Intersociety Transportation Conference, Denver, Colorado, September 1973. This presentation covers the reasons that tankers are becoming larger. Economic forces are well illustrated. Terminal systems, spill statistics, and mechanical failure in tankers are all discussed. (2, 3)

#### AIR POLLUTION AND NOISE POLLUTION

Air Pollution and San Francisco Bay Area, Bay Area Air Pollution Control District, San Francisco, California, September 1972.

A popular but informative booklet which includes standards and data.

Air Pollution Technical Publications of the U. S. Environmental Protection Agency, Air pollution Technical Information Center, Research Triangle Park, North Carolina, July 1973.

Computer listing of titles. (2, 3)

Air Pollution Translations: A Bibliography with Abstracts, National Air Pollution Control Administration, Vols. I and II, 1969 and 1970. (3)

Air Quality Impacts of a Proposed New Refinery for St. Croix -- A Preliminary Assessment, by W. R. Niessen, Roy F. Weston, Inc., West Chester, Pennsylvania. (10)

Atmospheric Refinery Emissions Pattern, Eastport Location, Foster Wheeler Corp., Livingston, New Jersey, December 1972, for Pittston Company. (1, 2, 3, 6)

Baton Rouge Metropolitan Area -- Air Pollutant Emission Inventory, by Alan J. Hoffman, National Air Pollution Control Administration, Division of Air Quality and Emission Data, Durham, North Carolina, January 1970. (Available through National Technical Information Service.) (4)

"Gulf Canada Solves Critical Community Noise Problem," by S. K. Ray, Oil and Gas Journal, pp 149-157, November 13, 1972. Goal was a maximum of 50 dba; describes measures taken and costs. (2, 3)

Hydrocarbons and Air Pollution: An Annotated Bibliography, National Air Pollution Control Administration, 1970. (3)

Laws and Regulations Governing the Control of Air Pollution, New Hampshire Air Pollution Control Agency, Concord, New Hampshire, 1972. (2, 3)

Laws Establishing and Affecting the Bay Area Air Pollution Control District, Bay Area Air Pollution Control District, San Francisco, California, May 1973. (3)

Noise Specification for Process Plants, by P. Sutton. (10)

Odor and Air Pollution: A Bibliography with Abstracts, EPA Office of Air Programs, 1973. (3)

Procedure for Making a Refinery Sound Survey, by R. L. Prevost, NPRA Paper MC-69-59, 1969. (10)

Refinery Noise Levels, by D. A. Tyler, NPRA Paper MC-69-58, 1969. (10)

Specifications for Noise Control in Process Units, by F. W. Church, NPRA Paper MC-69-60, 1969. (10)

Sulfur Oxides and Other Sulfur Compounds: A Bibliography with Abstracts, by Anna Grossman Cooper, Public Health Service, Washington, D.C., 1965. PB 198 103. (2, 3)

#### WHAT IS POLLUTION?--LEGAL STANDARDS AND CRITERIA

Background Information for Proposed New Source Performance Standards, Volume I, U. S. Environmental Protection Agency, Office of Air and Water Programs, Research Triangle Park, North Carolina, June 1973. Asphalt and Concrete Plants, Petroleum Refineries, Storage Vessels, Secondary Lead Smelters and Refineries, Brass or Bronze Ingot Production Plants, Iron and Steel Plants, Sewage Treatment Plants. Among the several technical reports that make up this volume three are of interest: No. 7, "Petroleum Refineries, Fluid Catalytic Cracking Units"; No. 8, "Petroleum Refineries, Burning of Caseous Fuels"; No. 9, "Storage Vessels for Petroleum Liquids." Each gives a summary of proposed standards and their rationale.

"Petroleum Refining Point Source Category: Effluent Guidelines and Standards," EPA, Federal Register, May 9, 1974, Vol. 39, No. 91, Part II. (5)

"Petroleum Refining Point Source Category: Effluent Limitation Guidelines and New Source Standards," EPA, Federal Register, Vol. 38, No. 240, Part II, pp 34542-34558, December 14, 1973. Provides the effluent guidelines that must be met by 1977. (2, 3)

"Standards of Performance for New Stationary Sources," EPA, Federal Register, Vol. 38, No. III, Part II, pp 15406-15415, June 11, 1973. (3)

#### POLLUTION CONTROL LAWS

Bay Area Pollution Control District, Regulation 1, Regulation 2, Regulation 3, San Francisco, California, (March 1957, May 1960, January 1967). (3)

Electric Power Plant and Major Transmission Siting and Construction Procedure, State of New Hampshire, RSA, Chapter 162-F (effective June 25, 1971). (3)

Electric Power Plant, Oil Refinery, and Transmission Siting and Construction Procedure, State of New Hampshire, RSA, Chapter 162-F (supp) (effective September 4, 1973). (3)

Maine Environmental Improvement Commission, Revised Statutes of 1964 (as amended), Protection and Improvement of Waters, Augusta, Maine, September 1971. (4)

Maine Law Affecting Marine Resources -- Volume III -- Regulation of the Coast: Land and Water Uses. Partial report under a study carried out under the joint sponsorship of: The School of Law and the University of Maine and the National Science Foundation, Office of Sea Grant Programs, University of Maine, School of Law, Portland, Maine, 1970. (4)

New Hampshire Laws and Regulations Relating to Solid Waste Disposal, State of New Hampshire, Dept. of Health and Welfare, Div. of Public Health Services, Concord, New Hampshire, 1972. (3)

New Hampshire 1966 Laws Relating to Public Utilities and the Public Utilities Commission, N. H. Public Utilities Commission, Equity, Orford, New Hampshire, 1966. (3)

New Hampshire Water Resources Board -- New Hampshire Laws, 1965, New Hampshire Water Resources Board, Concord, New Hampshire, 1970. (3)

New Hampshire Laws Relating to the Water Supply and Pollution Control Commission, N. H. Water Supply and Pollution Control Commission, Concord, New Hampshire, October 1972. (3)

Rhode Island Oil Pollution Control Rules and Regulations, Rhode Island Dept. of Health, September 1957. (3)

#### POLICY GUIDES AND INTERPRETATION OF THE LAW

Development of Environmental Impact Statements for Marine Operations and Installation, by M. W. Hooper and F. L. Cross, Roy F. Weston, Inc., West Chester, Pennsylvania. (10)

Energy, Heavy Industry and the Maine Coast, Report of the Governor's Task Force on Energy, Heavy Industry and the Maine Coast, Office of the Governor, State House, Augusta, Maine, September 1972. (3, 4)

Energy Policy for the State of Maine: A Report to the Governor of Maine and the New England Regional Commission, by William D. Shipman and Carl E. Veazie, Public Affairs Research Center of Bowdoin College, Brunswick, Maine, June 1973. (3, 7)

Heavy Industry on the Maine Coast, by Carl E. Veazie, Public Affairs Research Center of Bowdoin College, Brunswick, Maine, May 1972. This report to the Governor's Task Force on Energy, Heavy Industry and the Maine Coast summarizes past and likely future location of heavy industry along the Maine coast. Policy alternatives for the coastal zone also are discussed. (5)

Machias Region Study, Phase I: Environmental Planning Criteria, prepared for Eastern Maine Development District, Bangor, Maine, by Anderson-Nichols and Company, Inc., Richard A. Gardiner and Associates, Inc., 1971. (4)

Primer on Environmental Impact Statements, by Ronald Barbaro and Frank L. Cross, Jr., Technomic Publishing Co., Inc., Westport, Connecticut, 1973. (10)

Procedures and Programs to Assist in the Environmental Impact Statement Process, by Jens C. Sorensen and Mitchele L. Moss, University of California, Berkeley, and University of Southern California, April 1973.

This paper provides a good discussion of the practical, political and philosophical problems that arise in the production of environmental impact statements. Impact identification procedures (the USGS matrix), impact prediction, and evaluation (probably the most glaring shortfall of impact statements) are all included. (2, 3)

Regulations for the Conduct of Permit of License Type Hearings, Revised Statutes (1964), Title 38; Chapter 3: Protection and Improvement of Waters; Article 6: Site Location of Development. Maine. (3)

#### THE ENVIRONMENT, NOW AND THE FUTURE

"Arco Anchorage," Marine Engineering/Log, August 1973, pp 19-22. Description of a 120,000 DWT tanker and on-board equipment. (2, 3)

Coastal and Offshore Environmental Inventory: Cape Hatteras to Nantucket Shoals, by Saul B. Salla, et al, Marine Experiment Station, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island, 1973. URI Marine Publication Series No. 2, \$10.00, available from URI Marine Advisory Service.

Coastal and Offshore Environmental Inventory: Cape Hatteras to Nantucket Shoals -- Complement Volume, by W. L. Halvorson, et al, Marine Experiment Station, Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island, 1974. URI Marine Publication Series No. 3, \$5.00, available from URI Marine Advisory Service.

Eastern Maine Harbors Physical Resources Report, by Robert G. Doyle, Director, Division of Science, Technology and Mineral Resources, Department of Economic Development, Augusta, Maine, October 1971. (4)

Environmental Aspects of a Supertanker Port on the Texas Gulf Coast: Evaluation of the Offshore Environmental Impact of a Deepwater Port off the Texas Coast, by Wesley P. James, et al, Texas A&M University. Performed for the Council on Environmental Quality, December 1972. (2, 3, 4)

Environmental Impact Statement -- Expansion of El Segundo Refinery Marine Terminal, Standard Oil Company of California, Western Operations, Inc. Standard Oil proposes a fourth marine terminal to handle 300,000 barrels per day in water of 65 feet depth, accommodating 50,000 to 120,000 DWT tankers. Terminal operational procedures are discussed. An extensive inventory of beaches and other environmental factors follows.

Construction and oil spill frequencies are covered. The physics of oil slicks, particular spills, and the biological effects are covered. (2, 3)

Environmental Study of Heated Effluent at Eastport, Maine, by Chung S. Ahn and J. Bruce Andrews, EG&G, Environmental Services, Waltham, Massachusetts, for Pittston Company, February 1973. (1, 2, 3)

Existing Environmental Quality in the Machias Bay Area. Personal communication from Environmental Impact Coordinator, U. S. EPA, Region I, to Arthur D. Little, Inc., September 27, 1972. (4)

Geophysical and Drogue Study/Current Profile Reports, EG&G International, Waltham, Massachusetts, for Pittston Company, December 1972. Primarily data on bottom topology and currents. (1, 2, 3)

Literature Review of the Marine Environment Data for Eastport, Maine, by Edward H. Shenton and Donald B. Horton, The Research Institute of the Gulf of Maine, Portland, Maine, June 1973, for the Pittston Company. Extensive review, includes species lists, meteorological data, water data, tide patterns. Two volumes. (1, 2, 3)

Maine Coastal Resources Renewal -- Aquaculture, Recreation, Energy, State Planning Office, Executive Department, Augusta, Maine, July 1971. (4)

Preliminary Analysis of the Ecological Aspects of Deep Port Creation and Supership Operation, Natural Resources Institute, University of Maryland, to U. S. Army Corps of Engineers, Institute for Water Resources, October 1971. (4)

Report of a Visit to Arco Refinery-Cherry Point near Bellingham, Washington, February 26, 1974, by Alden L. Winn, University of New Hampshire Oil Refinery Study Group, Durham, New Hampshire. (7)

Report on Preliminary Site Investigations for the Proposed Eastport Refinery, Eastport, Maine, Haley & Aldrich, Inc., Cambridge, Massachusetts, for Pittston Company, December 1972. Primarily an interpretation of the borings taken, including the logs. (1, 2, 3)

Underwater Observations and Biological Considerations Relevant to the Use of Eastport, Maine, as a Supertanker Port and Oil Refinery Complex, National Marine Water Quality Laboratory, Narragansett, Rhode Island, November 1972. Discusses particular areas in the Eastport region from a biological point of view. (2, 3)

#### THE ENERGY CRISIS--SUPPLY AND DEMAND

"Crude Lack Hampers U. S. Refining -- Capacity Buildup," by Leo Aalund, Oil and Gas Journal, pp 19-21, November 5, 1973. Lists 20 projected refinery projects in the 55,000-250,000 bbl/day range plus 30 expansion projects. (2, 3)

"Demand Outpaces Oil Output," Oil and Gas Journal, pp 22-23, November 19, 1973. 10 month supply-demand rundown. (3, 4)

Energy, Science, Vol. 184 No. 4134, April 19, 1974. (2, 3)

Energy Fact Sheets by States and Regions 1971, U. S. Department of the Interior, Washington, D.C., February 1973. Fact sheets give salient fuel and energy statistics for each state. (2, 3)

Estimated International Flow of Petroleum and Tanker Utilization, (1972-3), U. S. Department of the Interior, Office of Oil and Gas, Washington, D.C., May 1973. (2, 3)

Future Petroleum Provinces of the United States, National Petroleum Council, Washington, D.C., July 1970.

This report of the NPC attempts to identify possible future petroleum provinces of the U. S. The study is based primarily on geological assessments of the eleven regions of the U. S., including offshore areas. Estimates of potential recoverable reserves are made, although such estimates are necessarily very speculative in some cases. (5)

Membership and Statistical Directory, New England Gas Association, Boston, Massachusetts, 1971.

This directory summarizes valuable statistics on the organization of the New England gas industry. Detailed data are presented for gas companies, by state. In addition, useful information is summarized regarding trends in the number of customers and gas sales within the region. (5)

Mineral Industry Surveys, U. S. Department of the Interior, Bureau of Mines, Washington, D.C.

The Surveys are published monthly by DOI, and they contain basic data on the production and consumption of petroleum products. These publications are an essential reference for reasonably current data on petroleum developments. Most of the material in the Surveys is eventually published in the Minerals Yearbook. (5)

Minerals Yearbook, U. S. Department of the Interior, U. S. Government Printing Office, Washington, D.C.

This basic research document presents a wealth of data on the production and consumption of petroleum products, including natural gas. Published each year. (5)

National Gas Supply and Demand 1971-1990, U. S. Federal Power Commission, Bureau of Natural Gas, Washington, D.C., Staff Report No. 2, February 1972.

A valuable source report which examines trends in the demand and supply for natural gas for the U. S. Alternative sources of gas--synthetic

and LNG--are discussed. Although the major focus of the report is national, a great deal of useful information on a variety of natural gas issues is presented. Also, there is review of the "economics" of LNG and LNG facility applications by area. (5)

The Oil Issue, NERBC Regional Report, Vol. 5 No. 2, December 1973. (7)

"Ontario Structure of Production," by A. A. Kubursi and R. H. Frank, Ontario Economic Review, pp 1-37, Department of Treasury and Economics, Toronto, Ontario. (3)

Petroleum Development in New England, by John A. McGlenon, U. S. EPA p 16. (7)

Petroleum Facts and Figures 1971, American Petroleum Institute, Baltimore, Port City Press, Inc., 1971.

This volume presents a massive compilation of petroleum and petroleum-related statistics in five major areas: production, refining, transportation, marketing, and prices and taxation. This is an excellent and essential reference work for those interested in virtually any aspect of the petroleum industry. (5)

The Potential for Energy Conservation, A Staff Study, Office of Emergency Preparedness, U. S. Government Printing Office, Washington, D.C., 20402, October 1972, price \$3.00. (2)

U. S. Energy -- A Summary Review, Department of the Interior, U. S. Government Printing Office, Washington, D.C., January 1972. (4)

U. S. Energy Outlook: Oil and Gas Availability, National Petroleum Council, Committee on U. S. Energy Outlook, Oil and Gas Subcommittees, Oil and Gas Supply Task Groups, 1973. (5)

U. S. Petrochemicals, Technologies, Markets, Economics, by Arthur M. Brownstein, The Petroleum Publishing Co., Tulsa, Oklahoma, 1972. This book contains a discussion of the nature of the U. S. petrochemical industry, including economic factors such as trends in feedstock costs, policy issues affecting the industry, and the role of the industry in world trade. A useful reference for those studying this industry. (5)

#### PUBLIC COMMENT

Fragile Structures: A Story of Oil Refineries, National Security and the Coast of Maine, by Peter Bradford, Harpers Magazine Press (to be published Fall, 1974). (3)

Is Olympic's Proposal the Best Deal for New Hampshire? by Frederick G. Hochgraf, privately distributed, dittoed paper, Durham, New Hampshire, 1974. A discussion of offshore terminals in terms of oil spill frequencies. Published data used to predict oil spills for assumed New Hampshire cases. (2, 3)

"Lafourche Hopes Port Gets in 'Deep Water'," Louisiana Horizons, Vol. 5, No. 2, pp 2-7, Summer 1971. (4)

Let's Keep the Record Straight on Machiasport, by Armand Hammer, Occidental Petroleum Corporation, Los Angeles, California, 1969. (4)

Machiasport: Economics, The Environment, and Oil, by Dana Paul Murch, June 4, 1971. (4)

"Maine -- for the 70's Down East is Mecca to Millions," by John N. Cole, The Boston Sunday Globe, July 23, 1972, p B-25. (4)

A Maine Manifest, by Richard Barringer et al., The Allagash Group, Bath, Maine, 1972. (4)

Maine Pilgrimage, The Search for an American Way of Life, by Richard Saltonstall, Jr., Little, Brown \$10, 1974. (3)

"Oil and the Environment: The View from Maine," by John McDonald, Fortune, April 1971, pp 84-89. (4)

Oil and the Maine Coast -- Is it Worth It?, by Frank Graham, Jr., sponsored by the Natural Resources Council of Maine, Augusta, Maine, March 1970. (4)

Shoals Marine Lab Newsletter, article by John M. Kingsbury, Director of the Shoals Marine Lab of Cornell University. A discussion, from his point of view, of the Isles of Shoals and deepwater ports. (2)

"The Twilight of Eastport," by Robert Coleman, The Boston Sunday Globe, May 7, 1972. (4)

Where the Place Called Morning Lies, by Frank Graham, Jr., Viking Press, 1973. Commentary on Maine coastal environmental issues. (3)

#### GENERAL BIBLIOGRAPHIES AND PUBLICATIONS LISTS

Bibliography of R&D Research Reports, U. S. EPA, Office of Research and Development, Washington, D.C., July 1973. (2, 3)

Coastal Zone Bibliography: Citations to Documents on Planning, Resources Management and Impact Assessment, by Marie Demers and Jens Sorensen, University of California, La Jolla, California, August 1973. (2, 3)

Current Awareness Service, EPA Region I Library, U. S. EPA, Boston, Massachusetts, January 1974. (2, 3)

EPA Reports Bibliography, U. S. EPA, Washington, D.C., July 1973, EPA-LIB-73-01. (2, 3)

Publications List, U. S. EPA, Boston, Massachusetts, 1973. (2, 3)

