GOVERNOR'S ENERGY COUNCIL
Commonwealth of Pennsylvania

OUTER CONTINENTAL SHELF IMPACT STUDY

Supplement to Pennsylvania's Coastal Zone Management Plan

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OUTER CONTINENTAL SHELF IMPACT STUDY

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EXECUTIVE SUMMARY

I. Background

Domestic oil and gas is presently being produced at a steadily declining rate, and there is no indication this picture will change on the basis of known reserves. At the same time, the United States has become increasingly dependent on foreign imports, despite the possibility of another Arab oil embargo and the drastic price increases in foreign crude oil since 1974. These factors have combined to make the prospects of exploring for new domestic oil and gas reserves in the outer continental shelf areas of the United States, much more promising and desirable. The frontier OCS areas, including the Middle Atlantic Baltimore Canyon Trough seem to be of special interest to the energy companies in the search for additional domestic reserves.

This study focuses on the area known as the Baltimore Canyon Trough (BCT) located in the outer continental shelf off the coasts of New York, New Jersey, Delaware, Maryland, and Virginia. The lease sale for the BCT area took place on August 17, 1976, after the resolution of six year dispute with the Atlantic Coastal states which ended in the 1975 decision that the federal government has exclusive rights to all OCS resources beyond a 3 mile limit. The first BCT lease sale Number 40, will shortly be followed by two more Numbers 49, and 59 which will offer additional tracts for exploration and development. It is difficult to estimate the value of the Baltimore Canyon

Trough in terms of recoverable resources. There have been many attempts by the United States Geological Survey, the Congressional Office of Technology Assessment, the Bureau of Land Management, the Council on Environmental Quality, and the Associated Petroleum Institute among others to arrive at a reasonable estimate for use in resource recovery planning. These estimates range from USGS figures of 0.4 - 1.4 billion barrels (BBL.) of oil and 2.6 - 9.4 trillion cubic feet of natural gas to the 6.0 BBl. oil and 32.0 TCF of gas projected by API. The most reasonable estimate would probably fall somewhere inbetween. In that regard, the OTA assessment of 1.8 BBl. of oil in a medium find and 4.6 BBl. in a high find would seem to be a likely prospect. OTA has estimated recoverable resources of natural gas to be in the range of 5.3 TCF to 14.2 TCF. After careful review of all the estimates, the OTA assessment provided the most reasonable basis for the construction of the scenarios used in this study. More reliable reserve figures will not be available until the exploration phase commences; however, the interest in OCS Lease Sale No. 40 indicates the strong probability that there are extensive reserves to be found in the Baltimore Canyon area. In this lease sale 154 blocks were offered and bids were accepted on 93 blocks, representing over 500,000 acres in the outer continental shelf, off New Jersey and Delaware. Record sums of $1.1 billion were invested by the energy industry in

acquiring these blocks for development.

There have been many reasons for the delays encountered between the offering of the tracts for sale, the actual sale, and the commencement of exploratory drilling. In addition to the usual red tape caused by bureaucratic requirements, OCS Sale No. 40 was voided by District Judge Jack B. Weinstein of the Eastern District of New York shortly after the sale took place. The Court decided in the suit brought by Nassau and Suffolk Counties in New York, and various environmental groups, that the U.S. Department of the Interior had not met the requirements of the Environmental Policy Act in preparation of the Environmental Impact Statement for the Baltimore Canyon Trough.

The case was subsequently appealed by the Interior Department and the Weinstein decision was overturned in August of 1977. However, the plaintiffs have lodged another appeal, which will go to the U.S. Supreme Court. It will be now well into 1978 before the case finds a final resolution.

In the meantime, the Interior Department has decided against issuance of any drilling permits until the case is finished. The energy companies holding the leases have been submitting

their applications, and continuing their geological studies as far as possible without beginning exploratory wells. However, the delay has caused original drilling schedules to be cancelled, which, in some cases, has meant that drilling rigs committed to the BCT area have been reassigned elsewhere. As soon as the case is finally decided, and the permits issued, the companies appear to be ready to begin their operations. But the delays caused by the decision and events following the sale could lengthen many developmental time tables.

II. Purpose of the Study

Pennsylvania has an interest in the development of OCS resources even though it has no ocean coast. The situation is unique in that although the state will not experience the direct effects produced in the coastal states by offshore drilling operations, the Delaware River area and the Port of Philadelphia present a potential for increased economic activity and environmental problems as a result of OCS development. This study has attempted to assess the economic, social, political, and environmental impacts which may result in Pennsylvania's coastal zone area, because of drilling for oil and natural gas in the outer continental shelf of the Middle Atlantic.

These impacts can be very significant, especially if the resource discovery is produceable at a high rate of recovery. Economic impacts can result from the use of service facilities

for drilling operations. Increased refinery activity and the possible construction of petrochemical and gas processing plants in the highly industrialized Philadelphia area would also result in economic benefits for the Commonwealth. Secondary economic impacts may result from other area businesses and industries which will be needed to supply goods and services to OCS related concerns. Social and political climates may be affected by this increased economic activity, and policy decisions and legislation may be necessary to direct the programs needed to cope with the effects of OCS activity.

Environmentally, OCS activity could cause a deterioration of air and water quality if the system designed to transport the oil or gas were to break or malfunction. Increased economic activity could also result in environmental concerns over the emissions from refineries and new industries in the area. A careful consideration of the best methods of resource production, transportation, and utilization is necessary to avoid these environmental pitfalls.

The necessity of a study of this nature is obvious. It is designed to provide information to be used in the planning operations of state and local governmental bodies, in the policy decisions which may be necessary to facilitate OCS development, and to resolve the conflicts of environmental and economic concerns, involved in

OCS related activities. The specific goal of this program is to develop an informational base to be incorporated into an integrated Coastal Zone Management Plan, which would improve the state's capability to plan for and manage projected OCS impacts.

The study was conducted in support of and in conjunction with the Coastal Zone Management Program of the Pennsylvania Department of Environmental Resources in accordance with Section 305 of the Coastal Zone Management Act of 1972. The program was made possible by $67,000 grant from the National Oceanic and Atmospheric Administration of the United States Department of Commerce. Due to the nature of the program, a set of working relationships among federal, state, and regional agencies and energy company executives has developed to assure the full integration of this effort and to avoid duplication in any of the study areas.

The study area included the coastal areas of the Counties of Bucks, Delaware, and Philadelphia along the Delaware River. In coordination with Pennsylvania's Coastal Zone Management Program, the OCS project was able to make use of the extensive materials already collected and assimilated on that area by the Department of Environmental Resources. The OCS study also made use of the myriad reports already completed on the subject of outer continental shelf drilling and its possible

impacts both in the tentative area of the Middle and Northern Atlantic, and in the already established OCS production sites in other areas of he country, such as Texas and Louisiana and the Gulf of Mexico. A detailed bibliography is included to demonstrate the amount of material which was reviewed for this program.

III. Organization of the Study

The subject of the possible impacts of OCS drilling on southeastern Pennsylvania was approached in a very straight forward fashion. The nature of onshore impacts to be evaluated in the study focuses on two basic areas: (1) onshore activities and facilities located in the state's coastal zone as a direct result of OCS exploration and production, and (2) onshore activities and facilities induced as a secondary result of OCS activity. The study of these impact areas was undertaken on the basis of four major tasks.

1. Collection and assimilation of existing OCS data;
2. Evaluation of plans for OCS impacts;
3. Critical analysis of study data;
4. Compilation of study data and issuance of final report.

A more detailed explanation of these tasks is presented below.

- Collection and Assimilation of Existing OCS Data.
  During this phase of the program the Governor's Energy Council worked with the Coastal Zone Management staff

of the Department of Environmental Resources, the Delaware Valley Regional Planning Commission, officials of the major oil companies, and other federal, state and local agencies in gathering all relevant information. We also collected the existing studies on OCS development and assimilated this data into our informational base. In this way, the findings of previous studies were useful in providing background material, input data, and guidance for this study.

- Evaluation of Plans for OCS Impacts.

  Each of the energy companies, which acquired leases in OCS Sale No. 40, is required to file a "Notice of Support Activity" with the Governors of the coastal states, including Pennsylvania, to comply with Stipulation No. 7 of the leases. This notice must be prepared and submitted before any exploratory drilling can begin, and must contain all available information on current plans for onshore activities and facilities needed to support the exploration effort.

  In addition to the data contained in these Notices, interviews have been conducted with executives of the energy companies which will serve as operators on the OCS leased tracts. These interviews and the additional material which was collected from the companies have provided a thorough picture of the probable events in the exploratory drilling phase. The reliability of further planning,

however, will depend on actual OCS findings when drilling finally begins.

The evaluation of all this accumulated data then assisted in the formulation of the three scenarios on which this study was based. The selection of the scenarios was made on the basis of the most reasonable estimates of resource recovery in the Baltimore Canyon Trough. Thus, the scenarios are based on the OTA estimates of recoverable resources in the area of 4.6 billion barrels of oil and 14.2 trillion cubic feet of natural gas in the high find, and 1.8 Bbl. oil and 5.3 TCF natural gas in the medium find. The low find scenario will include an exploratory phase, but will not result in an economically producible discovery of oil or gas. It must be remembered that the selection of any resource estimate is only tentative, and that as OCS activities proceed, estimates may change and reliability of forecasting will improve.

- Critical Analysis of Study Data.

  The analysis of the study data on the basis of the three scenarios provides the actual impact assessment effort of the program. The analysis was conducted on the basis of economic, social, political, and environmental factors.

This phase of the study was conducted by two subcontractors, the University City Science Center and the Pennsylvania Environmental Council, both located in Philadelphia. The Science Center provided the technical expertise necessary for the economic and social analysis, and the Pennsylvania Environmental Council provided an expert environmental impact assessment.

This analysis has been designed to supplement Pennsylvania's Coastal Zone Management Program and to provide the information necessary to implement policy guidelines in dealing with the possibility of outer continental shelf resource development. The completed assessments are based on only preliminary resource estimates; thus, they are to some extent subjective. However, they are valuable in providing guidance on issues which need to be addressed by state and local governmental agents and by federal officials. Issues such as social service needs, employment training programs, pollution control, and revenue use are only a few of the areas which may need to be addressed. The possible opportunities and problems presented by OCS oil and gas production must be recognized and prepared for within the scope of a comprehensive Coastal Zone Management Program.

- Compilation of Study Data and Issuance of Final Report. This final report is the result of many months of

planning, collecting, evaluating, and analyzing to present a reliable set of scenarios and impact assessments. The conclusions reached and the assessments made by the study are included in the section immediately following. The data selected for use in this report is the most reliable and comprehensive available in regard to present resource estimates. The conclusions and analysis may change as further information becomes available. However, this examination of present data will reflect current estimates of the possible social, economic, and environmental impacts of OCS development on southeastern Pennsylvania.

IV. Conclusions

In the analysis of projected economic OCS impacts on Pennsylvania, several basic factors must be emphasized. First, it is clear that any OCS oil discovered would be used primarily to displace imported OPEC crude; therefore, very little, if any, refinery expansion is expected. If the expectations of the OCS crude oil quality prove true, this product would be "sweet" and thus easily substituted in area refineries.

Second, there seems to be a feeling by the major oil companies, that there is a greater probability of finding significant quantities of natural gas than of high crude oil discoveries. If they are correct, Pennsylvania may benefit from the production of 750,000 tons of petrochemical feedstocks per year. Pennsylvania,

and the entire northeastern interstate natural gas system will also benefit from increased interstate gas supplies, because any gas discovered in this area will be designated for the interstate market as it is located on government property.

Third, in the area of secondary impacts, Pennsylvania may experience increased economic activity in construction and ship building trades, and in supporting industries such as pipeline manufacture, and drilling platform construction. It has been estimated that a total of $161 million in wages for support facilities and $166 million for construction may be generated by the exploration and development of OCS reserves in the BCT area. Although much of the support activity will probably be located in the coastal states, Pennsylvania, with its heavy industrial background, also stands to gain in the area of increased industrial activity.

And finally, it is reasonable to project that product transportation will be by pipeline. Economically and environmentally, pipelines are the most logical choice, and this selection is reinforced by a stipulation in the leases expressing a preference for pipeline transportation. Pennsylvania stands to benefit from pipeline production, coating, and installation, and if the pipelines are laid to Philadelphia, direct impacts from first landed products may result.

Environmentally, the Philadelphia coastal zone area has already been disturbed by development. Therefore, additional industrialization and activity would not further harm the area, as long as development is controlled and certain natural ~~gas~~ and historic areas are protected The Delaware River area contains many historic sites, such as Governor Printz Park in Delaware County and Society Hill in Philadelphia, which must be preserved. There are also several natural sites in the area, perhaps the most important being Tinicum Marsh in Delaware County, which is one of the few remaining undeveloped space on the river. However, there are also many locations in the area which are already heavily industrialized, and additional activity from OCS operations would not significantly harm the present environmental scene.

The possible impacts of OCS development are already being planned for. The National Environmental Policy Act and Pennsylvania's own environmental laws will be applied to any OCS related activity which takes place in the coastal zone. Serious problems, such as a reduction in air and water quality, will hopefully be minimized by such measures as applying stringent emissions standards on any new facilities, using pipelines to bring oil and gas reserves ashore, and reducing tanker traffic on the Delaware River, thereby minimizing the possibility of oil spills and tanker accidents.

If, as has been indicated, OCS oil and gas volumes are used mainly to displace present levels of imported crude oil, there

will be little or no refinery expansion, and correspondingly few economic or environmental impacts. However, the uncertainty of reserve estimates must be taken into account, and planning based on the high find scenario is necessary. Any major refinery or petrochemical expansion will require strict adherence to environmental standards. If significant quantities of natural gas are discovered, careful siting of pipeline corridors must be considered. In fact "Pipeline Siting and Construction" legislation may be necessary. Secondary industrial activity must also be considered, and regional plans developed to minimize environmental impacts while maximizing economic opportunities.

The one universal comment, of all interviewed oil and gas company officials which hold leases in the Baltimore Canyon Trough, was that this area has been the most difficult to develop of any OCS frontier because of legal and bureaucratic problems. Also since it is an undeveloped area, there are many unknown variables due to a lack of prior experience. The questionable reliability of geologic estimates and the possibility of severe winter weather in the middle atlantic, both serve to make plans for production schedules tentative. However, most sources agree on a figure of approximately 8 years from the beginning of the exploratory drilling until actual production takes place. Production should increase until about year 14, then begin declining. In preparation, the state and local governmental agencies should begin to get ready for possible impacts by assessing the options available to facilitate an orderly and beneficial action program.

Exploration and development of the outer continental shelf presents the possibility of increased economic activity, social and political impacts, and the need for environmental standards for efficient development. Pennsylvania's Coastal Zone Management Plan can assist the state in implementing adequate standards to utilize the resources and deal with the impacts of OCS production. Many types of plans have been considered by Pennsylvania and other states to incorporate the interests of federal, state, and local governments, as well as private industries and citizens into the management program.

One plan which has been tried by other states, and found to be workable, is "shared authority." This program which would be implemented through legislation, would set up a coastal commission with primary responsibility for coastal zone matters. It would also provide for a system of certification of the rights and duties of federal, state, and local agencies, and would allow local authorities to present and carry out development plans consistent with the legislation. Shared authority, if handled properly, could limit duplication and assist coordinators of governmental agencies.

APPENDIX A

Study of Opportunities and Economic Impacts

OUTERCONTINENTAL SHELF DRILLING AND PRODUCTION: OPPORTUNITIES AND IMPACTS IN PENNSYLVANIA'S COASTAL ZONE

A REPORT

BY

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OCTOBER 11, 1977

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FOREWORD

This report describes the foreseeable economic opportunities which Pennsylvania can expect to occur as a result of exploration and potential development and production of crude oil and natural gas from the first lease sale in the Baltimore Canyon Trough (BCT). The work on which it is based has been carried out under Contracts 447074 and 353514 (ME-6426) with the Governor's Energy Council of Pennsylvania.

In addition to that analysis of resources and the effects of their development, this report offers:

- A year-by-year projection of exploration and production for two different levels of oil and gas resources.
- An overall economic impact assessment of Outer Continental Shelf (OCS) activity based upon analyses of published information and on detailed interviews with the ten oil companies that will operate drilling activities in all but two of the leased tracts of the BCT.
- A review of the litigation in the district court and later in the appeals court and its relation to OCS activities.
- An identification and analysis of legislative and administrative policies and actions needed if Pennsylvania is to incorporate OCS in an approvable Coastal Zone Management plan.

At this time I want to acknowledge, with grateful appreciation, the efforts of the following persons who provided many kinds of background information and took the time to discuss it with me:

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MURPHY OIL CORPORATION
SHELL OIL COMPANY
TENNECO OIL COMPANY
TEXACO, INC.

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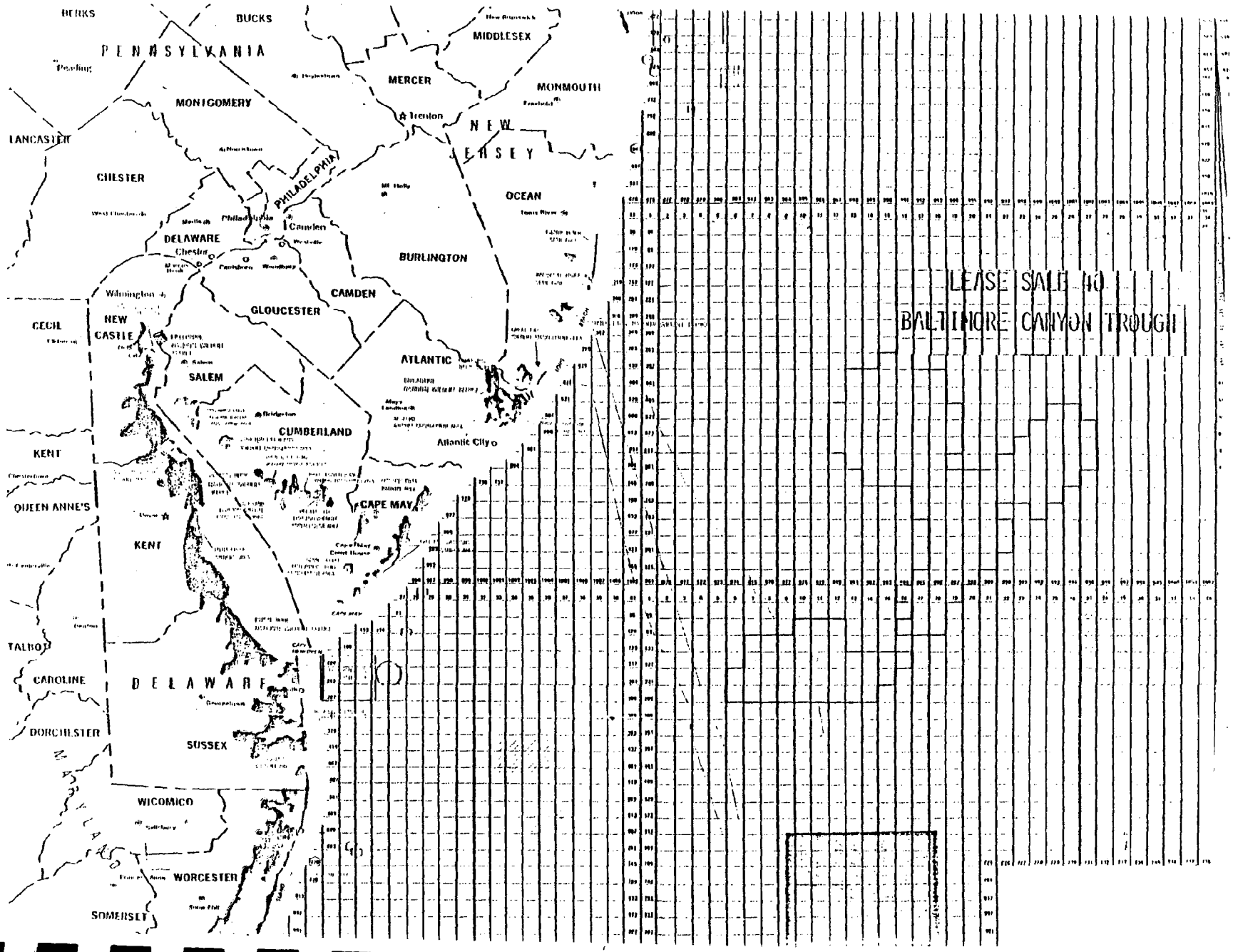
- For their cooperative oversight on this program, Cynthia L. McClain and Alec Wisch of the Governor's Energy Council.
- For his assistance with the interviews and his contributions to this report, Daniel H. Sims of University City Science Center.

Conclusions and inferences are the responsibility of the authors and should not be attributed to the Commonwealth of Pennsylvania, its officials, or their staff.

F. William Kirsch, Ph.D., Director
Center for Energy and Natural
Resource Management



Reproduced from Visual No. 1 for Mid Atlantic Region, Sale No. 40
Bureau of Land Management, U.S. Department of Interior.

SUMMARY

Exploration for oil and gas in the Outer Continental Shelf (OCS) offers an opportunity to augment declining domestic production of these valuable energy resources. However, activities associated with the exploration, development, and production of crude and natural gas produce onshore impacts that can be positive or negative — economically, socially, environmentally, and politically.

This report summarizes the economic impacts upon Pennsylvania that can be envisioned during the exploration, development, and production stages of the area known as Lease Sale 40, which forms part of the Baltimore Canyon Trough. Until August 25, 1977, all such activity beyond the sale itself had been prohibited by a U.S. district court order. The Court of Appeals for the Second Circuit lifted that ban on August 25 with a unanimous ruling of a three-judge panel.

All impacts identified and assessed in this report are, therefore, projected, not actual, because no exploratory drilling has yet occurred. Among the economic factors identified, the following deserve particular attention:

- New refinery construction is doubtful because so much of the crude throughput in the refineries is imported.
- At least 750,000 tons per year of petrochemical feedstocks have been projected from gas to be produced in association with crude. These are potential raw materials for new manufacturing without the burden of high transportation costs.
- Exploration, development, and production during a 14-year period could generate more than $161 million in wages and salaries for offshore support from service bases, supply boats, and helicopters. Volumes of supplies have also been estimated.
- Drilling platform construction could generate another $166 million in wages and salaries if suitable facilities are available at the right time.
- Less labor intensive but also considered in this report are pipeline coating, pipeline installation, and gas treatment plant construction and operation.

Separate chapters of this report are also devoted to a review of the court actions to date, to an analysis of oil companies' priorities and strategies (based upon personal interviews), to an account of future OCS sales in the revised schedule, and to a consideration of intergovernmental relations and actions — involving national, state, and local interests.

Not all the factors relevant to OCS activities could be addressed in this study, but a number of potentially large and vital impacts have been identified and assessed in the context of Pennsylvania's economy and its planning for coastal zone management.

The facts, analyses, and assessments in this report should be considered as constructive input to the process of developing an approvable Coastal Zone Management Plan for Pennsylvania.

CHAPTER ONE

OPERATORS' PRIORITIES AND STRATEGIES FOR EXPLORATION, DEVELOPMENT AND PRODUCTION

I. INTRODUCTION

The first sale of oil and gas leases off the east coast, OCS Sale No. 40, was held on August 17, 1976 and offered 154 blocks in the Baltimore Canyon Trough. Out of 101 tracts bid upon high bids were accepted on 93 blocks covering 529,466 acres (214,272 hectares) off the coasts of New Jersey and Delaware. These bids represent a total investment of more than $1.1 billion by the oil and gas industry.

Twelve groups or individual bidders participated successfully in Sale No. 40. All but one group of bidders has selected one of its number as the operator, and the blocks that each will operate are given in the table on the following page. Exxon, which is the sole owner and operator of thirty blocks, controls the largest area. It should be noted that although Chevron is listed as an operator, the Chevron group of bidders has not yet formally announced an operator.

Although Sale 40 was held in the middle of 1976, exploratory drilling has not yet begun. The reason for this delay is the litigation discussed in detail in Chapter Three, which caused all exploration and production activity in the Baltimore Canyon Trough to be enjoined. This case, now pending appeal, could delay an exploratory drilling in the BCT until 1978 if it goes to the Supreme Court. Shortly after the unanimous decision of the Second Circuit Court of Appeals reversing Judge Weinstein, however, Exxon Corporation announced its intention to begin exploratory drilling by December, 1977.

The exploration, development, and production of the oil and gas resources in the blocks leased in Sale No. 40 (and Sales 49 and 59) will produce onshore economic impacts within the coastal states in the Middle Atlantic area. The identification and quantitative assessment of these impacts are necessary for the development, by each state, of a Coastal Zone Management Plan that will effectively maximize gains and minimize the costs involved in OCS development. In order to assess these impacts accurately, insight into the priorities, strategies, scheduling and regulatory problems of the operators is necessary. In order to obtain this insight, detailed interviews were conducted with representatives of the major operators to provide a comprehensive review of each company's approach to a frontier production area and its anticipated onshore activity. These interviews were designed to reflect the importance which each operator attaches to the Baltimore Canyon Trough, the approximate operating schedules being projected, the probable types of equipment to be utilized, the kinds of onshore support that will probably be needed, the intended disposition of the oil and gas that could be discovered, and the underlying principles and strategies that will guide each operator's activities. This section will summarize the findings of these interviews.

II. FINDINGS

A. STRATEGIES

Ten of the twelve companies that will be operators on BCT tracts have been interviewed. The two remaining companies, Transco and Union, will operate only one tract each. During the course of these discussions, a broad consensus among the companies became evident on several points, each of which is discussed below.

TABLE I

OPERATORS OF TRACTS LEASED IN OCS SALE NO. 40

OPERATOR	TOTAL INVESTMENT* ($1000)	BLOCKS	
Chevron	$46,244.1	NJ 18-3:	412, 454, 455, 457, 497, 541, 543, 545, 585, 630, 900, 987
		NJ 18-6:	105
Conoco	$61,706.2	NJ 18-3:	502, 546, 590, 591, 633, 634 678, 718, 719
Exxon	$342,752.0	NJ 18-3:	456, 499, 500, 501, 596, 597, 599, 631, 640, 641, 643, 675, 683, 684, 685, 727, 728, 729, 816, 858, 901, 902, 944, 945, 988
		NJ 18-6:	019, 142, 143, 271, 276
Gulf	$33,511.6	NJ 18-3:	857
Houston Oil & Minerals	$8,144.6	NJ 18-3:	676, 720, 855
		NJ 18-6:	277
Mobil	$90,188.6	NJ 18-3:	544, 587, 588, 585, 985, 986
		NJ 18-6:	016, 017, 274
Murphy Oil	$3,048.9	NJ 18-3:	554, 674, 813, 899
		NJ 18-6:	018, 061, 062, 106
Shell	$83,503.6	NJ 18-3:	498, 542, 586, 589, 632, 677
		NJ 18-6:	184, 228, 229, 232, 272, 273
Tenneco	$32,069.7	NJ 18-3:	642
		NJ 18-6:	185, 187, 230
Texaco	$32,431.7	NJ 18-3:	598
		NJ 18-6:	275
Transco	$3,941.5	NJ 18-3:	942
Union	$16,355.0	NJ 18-6:	231

*Includes the total investment of each operator named, including both these tracts in which this company will be the operator and shares in other tracts in which other firms will be the operator. Excludes investment of non-operator shareholders in the blocks listed.

The first of these is the high priority that all companies place upon BCT exploration and production. The importance of frontier areas in general was cited by most companies; and the BCT was given an even higher priority than other frontier areas by some companies because of its promising geological and geophysical characteristics.

Another area in which there was a strong consensus is the nature of the anticipated BCT discoveries. Representatives of eight of the ten companies indicated that there is a higher probability of finding significant quantities of gas than of oil and that any crude discovered would likely be sweet and, therefore, compatible with existing refinery capacity in the New Jersey-Pennsylvania area. One company's representative, however, indicated that if some crude was not expected, the bids would not have been as high as they were (i.e., because of the greater per unit market value of crude as opposed to gas). Still another company's representative declined to make any prediction, citing the uncertainty surrounding such judgments. This individual specifically referred to the North Sea — an area that the industry expected to be primarily a gas producing region but which, in fact, is predominantly oil.

All companies indicated that any crude that is produced will be used to offset imports of OPEC crude by domestic refineries. Also, all BCT crude is expected to be refined in the northeast, either by refiners with a shareholding interest in a producing well or by other local refiners who are expected to work out exchange agreements with BCT producers that do not have existing refinery capacity in the northeast. The existing refinery capacity in the area that is relevant to this study consists of:

		Operable Capacity (Barrels per Day)		
Company	Refinery Location	Total	Operating	Shutdown
Getty	Delaware City (Del.)	140,000	140,000	-
Mobil	Paulsboro (N.J.)	98,000	98,000	-
Texaco	Westville (N.J.)	88,000	88,000	-
Sun Oil	Marcus Hook (Pa.)	165,000	165,000	-
British Petroleum	Marcus Hook (Pa.)	161,000	161,000	-
Gulf	Philadelphia (Pa.)	204,200	160,200	44,000
Arco	Philadelphia (Pa.)	185,000	185,000	-

Because BCT production will be used to offset OPEC imports, however, no increases in local refinery capacity are expected as a direct result of Lease Sale 40.

All crude produced in the BCT is expected to be landed by pipeline, as indicated by Stipulation No. 4 of the lease sale. Although most of the individuals interviewed did not expect both New Jersey and Delaware (the most logical choices for pipeline landfall sites) to erect barriers to the use of pipelines, the feasibility of landing pipelines as far north as Boston and/or as far south as Baltimore was mentioned by several persons.

According to the information obtained in these interviews, eight of these ten companies plan to establish their onshore supply base at Davisville, R.I. In addition, bases for rig personnel and communications will be established in Atlantic City. The two most frequently expressed reasons for establishing onshore bases at Davisville were (1) that area's ability to support exploratory activity in the North Atlantic (i.e., OCS Sale No. 42) and (2) the efforts of the state's governor to promote that site.

The two companies that have not committed themselves to a Davisville site have also not made any firm commitments to any other area. It remains possible, therefore, that all operators may locate their onshore supply base at Davisville during exploration. One company, which plans to contract out for all exploration activity, however, indicated considerable doubt that any firm that they might contract with would choose to locate its supply base at Davisville.

All but one company indicated that they expect to use a semi-submersible rig. The remaining company expects to use a jack-up rig. The possibility of a shortage of semi-submersible rigs if all companies start to drill at the same time was mentioned by one company's representative. If this happens, some drill ships may have to be substituted for semi-submersibles.

All companies agreed that BCT operations have been the most difficult to get started in their entire experience with exploration in frontier regions. While the litigation was cited as the main factor, numerous kinds of problems encountered with the government's regulatory agencies were also cited. In addition to the usual delays caused by the need to obtain the various permits and certificates required for OCS exploratory drilling, gaps in communication among the various regional offices and between national offices and the respective regional offices were said to have resulted in confusion and inconsistencies in regulatory practices. The lack of experience of government agencies' regional personnel in the Middle Atlantic region with the petroleum industry in general and with OCS operations in particular was also cited as a major problem. It should be noted, however, that the operators expect the knowledge obtained by these persons as a result of Sale 40 will expedite future Middle Atlantic and North Atlantic sales.

B. ANTICIPATED ONSHORE IMPACTS IN PENNSYLVANIA

Because of the problems and decisions discussed above, measurable impacts upon Pennsylvania will probably not be significant until development and production begin — at least five years after the first exploratory well is drilled. Once production does begin, the most significant impacts upon Pennsylvania are expected to result from:

- Displacement of Imported OPEC Crude with BCT Crude - On the basis of geophysical and geological evidence, crude from the BCT will probably be sweet and, therefore, compatible with the existing refining capabilities in the New Jersey-Pennsylvania corridor. The ultimate economic significance of this factor will depend strongly upon the pricing policies adopted for BCT production.

- Construction and/or Expansion of Petrochemical Plants - The increase in the availability of petroleum feedstocks from gas plant operations may create an opportunity for an expansion of existing petrochemical manufacturing facilities in the Delaware Valley. Pennsylvania will be in a strong position to benefit from this expansion because of unutilized industrially zoned land in its coastal zone and because of the resources of technological expertise and skilled labor in its resident population.

- Increased Supply of Natural Gas - All companies contacted believe that there is a high probability of finding gas in the BCT — possibly higher than that for oil. Since the production will occur on federal lands, all gas discovered will be dedicated to the interstate market. Significant gas discoveries could, therefore, tend to offset the shortage of natural gas throughout the northeast.

- Ship maintenance - Local shipyards are expected to undergo an increase in ship maintenance activity. In addition, if there are sufficient finds to justify construction of drilling platforms in the Mid-Atlantic area, this labor-intensive activity could contribute to the economic development of Pennsylvania and the Delaware Valley, at least for a few years.

CHAPTER TWO

OFFSHORE RESOURCES AND ONSHORE OPPORTUNITIES AND IMPACTS

I. RESOURCE ESTIMATES AND OFFSHORE OPERATIONS

A. PRELIMINARY CONSIDERATIONS

Until enough exploratory wells have been drilled in the Baltimore Canyon Trough, all estimates of recoverable resources in this area will continue to be unverifiable. However, resource sizes affect their rate of development and, to a large degree, the magnitude and pervasiveness of onshore impacts.

Therefore, it is vital to express at the beginning the assumptions made about resource sizes and the rates at which they will be explored, developed, and produced. If resource estimates are too high, then projected production rates and onshore impacts will be too large. Similarly, if production rates are estimated too low, the number of projected wells increases dramatically and the number of projected drilling units becomes inflated.

For the Baltimore Canyon Trough, resource estimates have varied over wide ranges, such as:

Crude = 0.4 to 6.0 billion bbl.
Gas = 2.6 to 32.0 trillion cubic feet.

For the purposes of this study, the estimates generated by the Office of Technology Assessment have been selected because they seem to represent a reasonable position that is neither too high nor too low. Therefore, the high resource estimate for this study has been placed at 4.6 billion barrels of crude and 14.2 trillion cubic feet of total gas.

The safest estimate of low recoverable resources is zero, and the onshore impacts will be only those occuring during the exploration stage.

The resource estimates used in this study can be considered as bracketing a range of probable values but not as precisely defining boundary conditions. Because of the contingent nature of schedules, opportunities, and impacts, they ought to be reassessed when the size of crude and gas reserves is known with better certainty after exploratory drilling is underway.

B. SPECIFIC ASSUMPTIONS

Specific assumptions made about the scope, intensity, and scheduling of OCS-related activities are presented here:

1. Recoverable Reserves:

   a.) 4.6 billion bbl crude oil.
   b.) 14.2 trillion cubic feet gas.

2. Exploration

a.) Two wells will be drilled/leased tract.
b.) About half (50%) of these wells will be developed.
c.) But no development platforms are to be in place during the first 3 years of exploration.
d.) One rig drills 4 wells/year.

3. Development

a.) One platform is to be used per developing tract.
b.) Two rigs will operate from each platform.
c.) Each rig will drill 4 wells/year.
d.) Over a 3-year period, 24 development wells will be drilled from each platform.
e.) Development platforms will not be installed until the 4th year after the start of exploration.
f.) Platforms will not be in development operation before the fifth year after exploration begins.
g.) No production will be taken from a given platform while development drilling is going on.

4. Production

a.) About 80% of the development wells drilled will become commercially productive.
b.) The equivalent of 33 platforms will produce crude and associated gas.
c.) Another 13 platforms will produce non-associated gas.

5. Production Rates

a.) Crude will be produced at 500 bbl/day from a maximum of 627 wells.
b.) Associated gas will be produced at 500 MCF/day from a maximum of 627 wells.
c.) An estimated 2556 MCF/day of non-associated gas will be produced from a maximum of 256 wells.

C. SCHEDULE OF OCS ACTIVITIES

The Baltimore Canyon Trough is a frontier area insofar as exploration activity is concerned. There is no prior experience to rely upon, and there is a wide spread in opinions about the time that will be needed for exploration and, if positive finds occur, for development and production. Operators will probably encounter fewer difficulties in the Mid-Atlantic with weather and rough seas than they did in the North Sea. But they will also be likely to find the weather and the currents more challenging than in the early days of Gulf Coast exploration.

Though the operators interviewed during this study have high expectations for the Baltimore Canyon Trough, they also recall the Destin Dome, which was a disappointing experience. These operators are, therefore, not willing to discuss schedules in terms of specific years for particular activities. Nevertheless, to address the needs of this study, it has been necessary to make estimates about which activities will occur in particular years and the level at which they will take place.

The estimated timing and scale of operations of exploration, development, and production are summarized in Table II. This information indicates that:

- Exploration will be carried out by 46 rigs that drill a total of 188 exploratory wells on 93 tracts (or blocks) during the years 1-5 after the start of exploration.

- A total of 46 platforms will be needed to develop the finds made during exploration. These platforms will be installed between years 4 and 9 after exploration begins, but a maximum of 35 such platforms will be engaged in development operation at one time between years 5 and 11 following the start of exploration.

- The number of rigs in development operation at one time will be twice the number of platforms engaged in this type of operation during the same years 5 through 11.

- A total of 1104 development wells will be drilled during these years, but development drilling will reach a peak of 280 wells during year 9 after the start of exploration.

- Production will begin during year 8 from those platforms upon which development drilling has been completed.

- By the end of year 14 since exploration began, a total of 883 wells will be in production.

To the extent that the actual schedule departs from this one, it could become necessary to re-evaluate the effects and impacts in the future. Nevertheless, this schedule is consistent with the assumptions stated and the recoverable reserves of crude and gas that were estimated.

II. GAS PROCESSING PLANTS AND PRODUCTS

In the preceding chapter, the designated offshore operators were said to agree that crude production will probably displace imported crude in existing refineries and not lead to a new refinery. On the other hand, gas production is a very different matter, one that deserves separate consideration for the potential which it offers for economic development.

TABLE II

ESTIMATED EXPLORATION, DEVELOPMENT, AND

PRODUCTION OF OIL AND GAS IN THE

*BALTIMORE CANYON TROUGH (HFS)**

Years After Start of Exploration	Exploratory Rigs in Operation (Per Year)	Exploratory Wells Drilled (Per Year)	Development Platforms Installed (Per Year)	Development Platforms in Operation (Cumulative)	Development Rigs in Operation (Cumulative)	Development Wells Drilled (Per Year)	New Production Wells (Per Year)
1	7	28					
2	8	32					
3	9	36					
4	10	44	5				
5	12	48	6	5	10	40	
6			10	11	22	88	
7			12	21	42	168	
8			13	28	56	224	32
9				35	70	280	70
10				25	50	200	134
11				13	26	104	179
12							224
13							160
14							84

**High Find Scenario*

Gas produced offshore will be very probably treated on the platforms to knock out the more readily condensable materials, such as pentanes and higher boiling hydrocarbons. Then the gas will be transported to processing plants, which are likely to be onshore. There, hydrocarbons other than methane will be separated, condensed or compressed, and sold separately. One of the chief stipulations will be that the main gas product will have some minimum heating value in the 1010-50 BTU/CF range and therefore be acceptable in quality to interstate gas pipelines. (Other processes - such as drying and desulfurization - will also take place at the gas plant.)

If the maximum gas production rates estimated in this study are realized, onshore gas processing capacity will be required for a total of about 968 MMCF/day, resulting from 314 MMCF/day of associated and 654 MMCF/day of non-associated production. Because of the size of this production and the time-phasing involved, at least two gas plants could reasonably be expected. However, modern gas processing plants are not labor-intensive, and two such plants are unlikely to produce large economic affects in terms of employment and earnings.

Potentially far more significant for Pennsylvania and the region is the economic impact of the C_2-C_4 (e.g., ethane, propane, butane) products separated from the pipeline gas production at the gas processing plant. These products are potential feed stocks for petrochemical plants, LPG plants, and other industrial operations.

To appreciate the magnitude of this potential and to emphasize only those aspects which are best known the amounts of C_2, C_3, and C_4 hydrocarbons that could be expected from gas produced in association with crude were calculated. These are the results:

Assumed Gas Composition

Component	Mole %
C_1	86.7
C_2	6.6
C_3	4.0
C_4	2.7

(Nitrogen and CO_2 were excluded.)

Assumed Production: 313.5 MMCF/day

Products	1000 Tons/Year
C_2	289
C_3	252
C_4	217

These numbers indicate that over 758,000 tons/year of C_2, C_3, and C_4 products (and potential feed stocks) could be available in the Delaware Valley at prices not burdened with high transportation charges -- such as those for moving Gulf Coast feed stocks to the east.

Additional C_2, C_3, and C_4 products could be expected from an estimated 654 MMCF/day of non-associated gas production. The estimate made here does not include this non-associated production.

Although it would be premature at this time to analyze the process and product utilization that could be made of these large quantities of valuable feed stocks, it is appropriate to speculate in general upon the economic stimulus which they could provide to the Delaware Valley.

Oil company representatives interviewed during this study stated repeatedly that the availability of industrial sites and the existing economic and political climate will be decisive factors in deciding where to transport C_2-C_4 feed stocks and how to process and sell them. Pennsylvania's coastal zone on the Delaware River includes extensive industrial sites and a pool of human resources skilled in handling, processing, and marketing petroleum and chemicals. Philadelphia and Delaware Counties have the largest industrially zoned areas bordering on the Delaware River, and the other three nearest Pennsylvania counties - Montgomery, Chester, and Bucks -- share a strong potential for participation through employment of their human resources and utilization of their industrial sites directly or by ripple effects from primary industrial operations in the other counties.

The potential availability of several hundred thousand tons per year of feed stocks should, at the very least, be the genesis of a comprehensive and thorough analysis and assessment of the economic, environmental, social, and political factors which must be considered and evaluated if Pennsylvania is to maximize the benefits and minimize the adverse effects which could be achieved by a reasonable consensus of views.

Pennsylvania and the rest of the Delaware Valley should prepare a series of relevant options, assess their advantages and disadvantages, and be ready to implement those actions which offer widespread benefits.

III. SERVICE BASE SUPPORT OF OFFSHORE ACTIVITY

A. EMPLOYMENT, WAGES, AND SALARIES

Service bases are an essential link between offshore activity and onshore support, which provides essentials such as food, drilling materials, fuel, and water. Although most of the operators from Lease Sale 40 expect to use Davisville, Rhode Island, as their initial service base, development and production will preferably be serviced from a site closer to the offshore activity.

At the time of this report, no exploration has yet taken place, and a detailed, site-specific analysis could become a meaningless exercise. However, the level of activity associated with service bases is not expected to be trivial, and for that reason an effort has been made to estimate roughly the activity generated by service bases and its potential impact in the Delaware Valley, especially in Pennsylvania.

For the purposes of this analysis, estimates have been made of the total service base employment and the attendant payroll for exploration, development and production. These estimates were based on the equipment and activity schedules projected and described earlier in this chapter.

Assumed employment levels were: 5 per exploration rig; 9 per development platform; 3 per producing platform. Corrections were applied for economies of scale in estimating employment, because the utilization of people is not strictly additive as the intensity of activity increases. Yearly totals of service base employment and wages and salaries are in the following tabulation:

Year After Exploration Begins	Type of Offshore Activity	Service Base Employment (number)	Wages and Salaries ($1000)
1	Exploration	28	476
2		32	544
3		36	612
4		40	680
5		44	748
5	Development	36	612
6		80	1360
7		153	2601
8		205	3485
9		256	4352
10		183	3111
11		95	1615
8	Production	5	85
9		15	255
10		31	527
11		55	935
12		85	1445
13		105	1785
14		112	1904

Activity	Total Service Base Wages and Salaries (Years 1-14) $1000
Exploration	3,060
Development	17,136
Production	6,936
	27,132

At least three observations can be made from these data:

- Development calls for the most service base support at the highest cost: over $17 million in wages and salaries during years 5-11 after explorations begins.

- Almost 89% of the service base wages and salaries paid during the first 14 years' time are expected to occur during development and production, which could be supported by service bases in the Mid-Atlantic area.

- Projections were carried out only through 14 years, because they become highly conjectural after very long times and because the projected schedule of Sale 40 development suggests that the number of producing wells will have begun to diminish by that time.

B. MATERIALS PROJECTED TO SUPPORT OFFSHORE ACTIVITIES

Most of the need for materials to support offshore activity will occur during the exploration and development stages. Estimates in Table III indicate the quantities needed of drilling mud, cement, steel tubulars, diesel fuel, and fresh water during exploration (years 1-5) and development (years 5-11). These numbers are consistent with the previously discussed totals of 188 exploratory wells and 1104 development wells resulting from Lease Sale 40.

Putting prices on these numbers and making more precise economic impact assessments would be largely conjectural exercises at this time. It is far more relevant now to identify the amounts of materials that could be needed and thereby provide a quantitative basis for more detailed economic impact assessments when the overall schedule and scale of operations is better known.

To place service base support in perspective, it is interesting to look at development at its peak (year 9). Offshore activity will require during that year an estimated: 147,000 tons of drilling mud; 80,000 tons of cement; 134,000 tons of steel tubulars; almost 1,000,000 bbl. of diesel fuel; and 272,000,000 gallons of fresh water.

IV. SUPPLY BOATS IN OFFSHORE ACTIVITY

Supply boats will transport materials needed for exploration, development, and production. On the assumption of 11 employed per supply boat, 2 boats per rig for exploration, 3 boats per platform for development, and 2 per platform for production, these are the estimates calculated (with allowances for economies of scale):

Year After Exploration Begins	Type of Offshore Activity	Supply Boat Employment (number)	Wages and Salaries ($1000)
1	Exploration	132	2244
2		143	2431
3		154	2618
4		176	2992
5		209	3553
5	Development	132	2244
6		264	4488
7		495	8415
8		682	11594
9		869	14773
10		605	10285
11		319	5423
8	Production	33	561
9		110	1870
10		220	3740
11		396	6732
12		605	10285
13		748	12716
14		803	13651

Activity	Total Supply Boat Wages and Salaries (Years 1-14) $1000
Exploration	13,838
Development	57,222
Production	49,555
	120,615

TABLE III

ANNUAL DRILLING MATERIAL REQUIREMENTS

BALTIMORE CANYON TROUGH

EXPLORATION AND DEVELOPMENT*

EXPLORATION

Years After Start of Exploration	1	2	3	4	5	TOTAL
Number of Exploration Wells	28	32	36	44	48	188
Mud (1,000 Tons)	18.0	20.5	23.1	28.2	30.8	120.6
Cement (1,000 Tons)	8.82	10.08	11.34	13.86	15.12	59.22
Steel Tubulars (1,000 Tons)	12.74	14.56	16.38	20.02	21.84	85.54
Diesel Fuel (1,000 Bbl)	92.90	106.18	119.45	145.99	159.26	623.78
Fresh Water (MM Gal)	33.32	38.08	42.84	52.36	57.12	223.72

DEVELOPMENT

Years After Start of Exploration	5	6	7	8	9	10	11	TOTAL
Number of Development Wells	40	88	168	224	280	200	104	1104
Mud (1,000 Tons)	21.0	46.2	88.2	117.6	147.0	105.0	54.6	579.6
Cement (1,000 Tons)	11.44	25.17	48.05	64.06	80.08	57.20	29.74	315.74
Steel Tubulars (1,000 Tons)	19.08	41.98	80.14	106.85	133.56	95.40	49.61	526.61
Diesel Fuel (1,000 Bbl)	142.80	314.16	599.76	799.68	999.60	714.00	371.28	3941.28
Fresh Water (MM Gal)	38.80	85.36	162.96	217.28	271.60	194.00	100.88	1070.88

*High Find Scenario

Obviously, supply boat operation is more labor intensive than service base support, and about 89% of the wages and salaries is generated during development and production. This pattern is consistent with the large amount of supplies that must be moved to the drilling sites and the drill cuttings that must be hauled away.

V. HELICOPTERS IN OFFSHORE ACTIVITY

All indications are for helicopters other than crew boats to transport people between shore and drilling site. Although this activity is the least costly of the three, it is still responsible for almost $1 million per year of wages and salaries, estimated according to the following schedule (on the assumption of 1 helicopter per 2 rigs during exploration and 1 per platform during development and production, and on an assumed crew of 3 for each helicopter).

Year After Exploration Begins	Type of Offshore Activity	Helicopter Employment (number)	Wages and Salaries ($1000)
1	Exploration	18	306
2		21	357
3		21	357
4		24	408
5		27	459
5	Development	12	204
6		27	459
7		51	867
8		63	1071
9		75	1275
10		15	969
11		33	561
8	Production	6	102
9		15	255
10		33	561
11		54	918
12		75	1275
13		93	1581
14		99	1683

Activity	Total Helicopter Wages and Salaries (Years 1-14) $1000
Exploration	1,887
Development	5,406
Production	6,375
	13,668

Because the helicopter requirement was kept at one per platform, production represents the most labor intensive phase of helicopter usage and the most expensive in wages and salaries. This distribution is consistent with the fact that more platforms are engaged in production than in development at any single time.

The aggregate payroll - in 1976 dollars - for service bases, crew boats, and helicopters is over $161 million. On the average, that represents about $11.5 million per year for each of the 14 years considered.

VI. PLATFORM CONSTRUCTION AND INSTALLATION

Even if positive finds are made as a result of Lease Sale 40, the first platforms wuld probably be built outside the Mid-Atlantic region.

Nevertheless, platform construction is a labor-intensive activity, and it is reasonable to speculate what it could mean in Pennsylvania and neighboring states.

If the first 11 platforms are constructed elsewhere and the additional 35 are built in the Mid-Atlantic area, this construction could lead to the following numbers of jobs over a 3-year period:

Number of Platforms Constructed	People	Wages and Salaries $1000
10	2500	47,500
12	3000	57,000
13	3250	61,750
		$166,250

In other words, platform construction could generate $166,250,000 in wages and salaries over a three-year period, employing an average of about 3,000 people per year.

Platform installation is more difficult to estimate, but it could employ about 200 people, onshore and offshore, and produce $3.5 to $4 million in wages and salaries.

No attempt has been made in this study to examine activities such as well workover and marine terminal construction and operation. These activities are not especially labor intensive, and their evaluation can only be justified in a more detailed assessment of OCS activity.

VII. PRODUCT PIPELINES

Pipelines are the only form of transportation given serious consideration during this study. For environmental and economic reasons, pipelines are preferred to transport crude from offshore areas, and pipelines have even stronger supporting reasons to transport gas production from offshore production sites.

In addition, Stipulation No. 4 of the lease terms and stipulations for Lease Sale 40 expresses the preference for pipelines in these words:

> "If feasible pipeline rights of way can be determined and obtained and, if laying such pipelines is technically and economically feasible, no crude oil production will be transported by surface vessel from offshore production sites to adjacent onshore facilities except in cases of emergency. Determinations as to emergency conditions and the technical and economic feasibility of pipeline laying will be made by the Supervisor."

This stipulation goes on to reserve to the lessor the right to require pipelines to be laid in certain designated areas and corridors.

Before production can begin, pipelines must be coated (to prevent corrosion) and installed. Gathering lines of smaller size must also be put in place. Economic estimates made during this study have focused on the employment required and the wages and salaries paid during pipeline installation and coating. Land requirements, including wharf space, and other components of capital investment have not been estimated.

There are two reasons for this approach to projecting economic impacts of pipelines. At this time, Pennsylvania's primary interests and concerns will be best served by an approach that is comprehensive in scope rather than exhaustive in detail. It is important for Pennsylvania to be able to identify and evaluate those activities which eventually are likely to produce effects upon jobs and earnings in the region. The second of these reasons involves timing. Pipelines are not important for exploration and development *per se*. Production is far more remote in time, and estimates of capital investments made now may either: 1) never be made unless discoveries are positive and sizable, or 2) be out of proportion with actual requirements at a time that is closer by several years to the time at which they could be made in a practical sense.

This same line of reasoning has been applied to onshore terminals, which will depend in size and purpose on the magnitude and destination of crude oil and gas production. Although OCS crude could reasonably be expected to displace imported crude from refineries in the Delaware Valley and OCS gas could be expected to feed into interstate pipelines, these prospects depend strongly upon the policies and actions of neighboring states. There are too few certainties at this time to make economic estimates of terminals that could generate much confidence in them. Also, terminal operations are not labor-intensive and, therefore, have minor significance in estimating jobs and earnings.

Another study of these factors excluded should, however, be made when a more detailed consideration would be more appropriate for Pennsylvania and its neighboring states.

Specific considerations of pipeline installation and coating are reported in succeeding paragraphs.

A. PIPELINE INSTALLATION

If discoveries and development lead to commercial scale production, pipelines will probably be the preferred transportation mode, rather than tankers. This expectation is based primarily upon the technical factors involved, but information obtained from the offshore operators (Lease Sale 40) is consistent with this observation (as described elsewhere in this report).

For strategic and technological reasons, pipelines are likely to be shared among the operators of Lease Sale 40. One 14-inch line can transport 100,000 bbl/day of crude, and one 20-inch line can handle 300,000 MCF/day or more of natural gas. Building smaller lines would seem to be counterproductive and needlessly expensive. Ultimately, two crude lines and two gas lines could be needed on the following basis:

Crude Oil	Natural Gas
1 x 14-in. line: 100,000 + bbl/day	1 x 20-in. line: 315 MMCF/day
1 x 22-in. line: 200,000 + bbl/day	1 x 30-in. line: 650 MMCF/day

These are estimated to be adequate to transport maximum production levels projected from Lease Sale 40 with:

627 producing wells for crude and associated gas;
256 producing wells for non-associated gas.

If these pipelines are each 180 miles in length, they could be sufficiently long to transport production to Philadelphia from the approximate center of the area known as Official Protraction Diagram NJ18-3 via any route chosen. This length will also allow an entire pipeline to be laid at the normal rate of about 1 mile/day within a single season of 6 to 7 months' duration.

Installing these lengths of pipeline is expensive. The two crude lines are estimated to have an installation cost of about $333 million, and the two gas lines, about $423 million more.

Employment resulting directly from each pipeline's installation is likely to be about 200 offshore for a period of about six months; total wages and salaries are estimated at $2.2 to $2.5 million for each. Onshore employment can be placed at about 24 for each pipeline at a wage and salary total of $400,000/year. On this basis, all four projected pipelines would generate an aggregate of no more than $11.5 million during a four-year period. Wages and salaries are obviously not a large factor in total installation costs.

According to the production schedule generated during this study, pipeline installation is more likely to occur from 8 to 12 years after the lease sale.

All dollars used in this study have the economic value of 1976 dollars unless otherwise indicated. No attempt has usually been made to project inflation rates because of the inherent uncertainty in that task over a 14-year time span. However, expenditures that are 8 and more years off will undoubtedly be larger than those stated here, and that probability deserves consideration in any analysis of economic impacts derived from OCS exploration, development, and production.

In sum, this analysis reveals that total pipeline installation costs for transporting commercial production from Lease Sale 40 - if commercial production becomes a reality - will probably be more than $750 million, of which no more than $11 to $12 million will be for wages and salaries.

B. PIPELINE COATING

Before pipelines are installed, the pipe is coated with materials to protect it against corrosion by the marine environment in which it will be placed. After being dried, cleaned by shot blasting, and coated with a primer, the pipeline is typically coated with hot mastic. The chief ingredients of mastic are asphalt, mineral aggregates, and glass fibers. Other coatings, such as plastic, may also be applied instead of hot mastic. If the pipe is to be stored out of doors before installation, a whitewash coating is often applied on top of the mastic.

Concrete coating is also added before installation to eliminate buoyancy and give it stability during service. Varying in thickness according to pipe size, the concrete coating is strengthened by wire mesh. After curing for about a month, the concrete coated pipe is ready to be loaded on cargo barges and delivered to a lay barge.

Specific sites, preferably located on the shore nearest to offshore activity, must obviously be chosen for a full assessment of impacts. No attempt has been made to identify such sites in this study, but it is reasonable to assume that at least one such location will be needed to support production from Lease Sale 40, if there is production. Pipe can be coated at an average rate of 1.5 miles/day, and this rate would be more than adequate if the pipeline installation rate is 1 mile/day.

Employment at a single pipe coating yard could be about 200, and the total wages and salaries generated at this site could be about $3.6 million for each year of operation.

For the four pipelines (14-, 20-, 22-, and 30-inch) estimated to be required to transport projected maximum crude and gas production from Lease Sale 40, the aggregate costs of coating could be about $35 million. Obviously, this amount is only a small fraction of the $750 million estimated for installation costs of the same four pipelines.

Although pipeline coating is an important component of offshore production, its overall economic impacts are not expected to be large, pervasive, or permanent in relation to Lease Sale 40. If other lease sales lead to production of oil and gas, pipeline coating and installation could generate localized economic impacts of more significance than those to be derived from a single lease sale's production.

CHAPTER THREE

LITIGATION OVER LEASE SALES --- THE ISSUES AND THE STATUS

I. INTRODUCTION

Litigation has been an important factor in the recent history of leasing and exploring the Baltimore Canyon Trough. At the very least, litigation requires time. Courts and attorneys need time for the allegations of the plaintiffs and the arguments of the defendants to be heard and then for decisions to be reached, appeals to be filed and heard, and decisions confirmed or reversed. In addition, substantive issues can be raised and decided by the courts in a way that can influence future decisions to permit exploration and drilling in the Outercontinental Shelf (OCS) and that can affect pending applications for permits to explore, develop, produce, and transport offshore production of oil and gas.

In two separate legal actions, orders of the U.S. District Court for the Eastern District of New York have been vacated and its decisions reversed by the U.S. Court of Appeals for the Second Circuit. The importance of these actions should not be underestimated, because the initial result of each was to enjoin all leasing and exploring. While the injunctions were in effect, neither of these activities could take place, and only after the decisions of the district court had been reversed by the appelate court could leasing and exploration begin.

Although the full details of these suits are not relevant for this study of the economic impacts of oil and gas production in the Baltimore Canyon Trough, the issues raised are significant for an understanding of the entire process from the lease sale through possible production. This chapter of the report presents the background of the litigation, defines the issues, and summarizes the decisions of the courts.

II. BACKGROUND

The Secretary of the Interior announced on June 30, 1976, his decision to proceed with Lease Sale 40 on August 17, 1976. Two years of hearings, environmental assessments, and selection of areas to be offered for leasing had preceded this decision. Shortly afterward, the National Resources Defense Council, the State of New York, and several local governments on Long Island brought suit to enjoin the proposed sale. This suit was then consolidated with an earlier action brought by the Counties of Nassau and Suffolk before Judge Weinstein of the U.S. District Court for the Eastern District of New York. The specific allegation was that the Environmental Impact Statement (EIS) developed by the Department of the Interior's Bureau of Land Management (BLM) did not properly comply with the National Environmental Policy Act (NEPA).

After hearings, Judge Weinstein granted a preliminary injunction against the lease sale on August 13, 1976. Three days later the U.S. Court of Appeals for the Second Circuit stayed enforcement of the preliminary injunction on the basis of its finding that the lease sale itself would not do irreparable harm before the suit was resolved. Justice Thurgood Marshall refused to vacate this stay of enforcement and noted that the sale could be voided if NEPA violations were proven. On October 14, 1976, the appeals court formally reversed the preliminary injunction for the same reasons.

One of the issues raised during the district court's trial centers around the question of whether other tracts in the Baltimore Canyon Trough should have been offered at Sale No. 40. To appreciate the breadth of pre-leasing preparations, it could be helpful to examine briefly how tracts are selected for leasing. Interior's Bureau of Land Management (BLM) had designated the Baltimore Canyon Trough as the area for consideration on the basis of reports on its potential mineral resources from thirteen government agencies. Out of a total of 1151 tracts covering about 6.5 million acres, BLM then asked oil and gas companies to nominate those tracts which they might be willing to lease and explore. Industry nominated 557 such tracts. BLM also asked state and local governments to identify those tracts that should not be leased for reasons such as particular environmental threats or shipping hazards which these tracts presented. After review of these responses and consultation with the U.S. Geological Survey, BLM selected only 154 tracts to be offered for bidding and leasing. As a result of Sale No. 40, the Secretary of the Interior accepted bids on 93 tracts out of the 101 on which bids were actually submitted. Clearly, substituting tracts involves more than administrative orders.

Early in 1977 the suit came to trial before Judge Weinstein. The next section defines the issues and describes the specific findings and the decision of the district court, and the section after that presents the findings and the decision of the appeals court.

III. THE ISSUES DEFINED

The record of the trial covers 4043 pages and includes the testimony of 32 witnesses who were heard. In addition, the court received and reviewed 273 documents related to the trial. The essential issue to be decided by the trial was the plaintiffs' allegation that the sale and the subsequent stages leading to production and transportation of oil and gas had violated NEPA and should be prohibited until compliance with NEPA was assured. However, for the record, it should be noted that the plaintiffs alleged violations of 19 separate acts of Congress, Executive Order No. 11912, and numerous documents applicable to the preparation of environmental statements.

In his written opinion, Judge Weinstein summarized his findings by focusing on the actions of the Secretary of the Interior. The judge concluded that the Secretary had:

- Ignored the effects of powers allocated to local governments by NEPA.
- Failed to consider the environmental impact of specific pipeline routes and their relation to particular tracts offered for leasing.
- Overstated peak oil and gas production and understated its cost, including the cost of pipeline construction, thereby producing a defective cost/benefit analysis.
- Failed to consider alternatives for the Baltimore Canyon Trough such as excluding the industry's preferred tracts or including less desirable tracts in the sale offer.
- Failed to consider separate leasing for OCS exploration and production.

Finally, the judge wrote that it was unnecessary for him to find that the Secretary had not acted in good faith, even though "there was substantial evidence that the Secretary's decision was not based upon a good faith consideration of relevant NEPA documents."

In the course of stating his decision, the judge also rejected any evaluation of adverse economic factors as being sufficient to "warrant denial of NEPA relief." In other words, an injunction against OCS activity is to be decided on the merits of the case and not on the basis of negative economic consequences growing out of decisions to prohibit or delay OCS leasing and eventual production.

Only by enjoining all activities resulting from Lease Sale 40, the judge concluded, could he be assured of adequate compliance with NEPA. By so doing he could also prevent further unjustifiable commitment of investment capital without proper judicial review and the possible buildup of momentum that would carry OCS activities forward until they would be unstoppable.

To relieve any doubts about the focus of his attention, the judge commented: "There is no showing of illegal acts by the oil companies. The fact that they must suffer because of the Secretary's failures was considered by the court. The public rights and equities are paramount and must prevail."

To understand the magnitude and complexity of this case and the issues which it has raised, a few additional comments could be useful. The judge held that, because hypothetical product pipeline routes could be examined in the course of economic feasibility calculations by oil companies, the Secretary should have compelled oil companies to identify specific pipeline routes so that site-specific environmental aspects could be assessed at the time of sale. The Secretary's failure to explore specific pipeline routes and onshore landfalls with local governments compounded the problem, moving it from bad to worse, according to Judge Weinstein's decision.

Furthermore, the judge reasoned, the oil companies were overstating the advantages and incentives of OCS activity in the Baltimore Canyon Trough by submitting economic data that were different from those in which the judge placed credence. The judge also concluded that Interior's EIS had failed to consider specific alternative tracts and the appropriate pipeline routes that would have been less hazardous to the environment. Also, he decided, the government had failed to consider separating OCS exploration from production, thereby also preventing adequate governmental oversight and possible intervention in the processes of developing OCS resources.

For the reasons stated, Judge Weinstein concluded that the Secretary of the Interior had violated NEPA. He enjoined the parties concerned from further activity growing out of Lease Sale 40 and declared the leases null and void. But he stayed his order until appeals were completed.

IV. THE APPEAL HEARD AND DECIDED

At the time of this report, an appeal from the district court's decision has been heard and decided by the U.S. Court of Appeals for the Second Circuit. Whether further legal actions, including a possible appeal to the U.S. Supreme Court, will be taken is not yet known. This section will present the findings of the appellate court and summarize the conclusions reached on each of the issues raised in the district court's written opinion.

The findings of the appeals court will be presented in the context of each point of the district court's decision.

First is the "claim that the EIS failed to consider effects of state and local regulations on the mode of transportation to be used and to project 'likely' pipeline routes and landfalls."

The appeals court noted that all onshore development associated with OCS activity is subject to approval and regulation by state and local government through land use controls. "However," the appeals court remarked, "the district court brushed these references aside as too vague and abstract."

In judging the adequacy of the EIS with respect to the lease sale and exploration, the appeals court reflected on a previous decision, in which it had stated that an EIS "is required to furnish only such information as appears to be reasonably necessary under the circumstances for evaluation of the project rather than to be so all-encompassing in scope that the task of preparing it would be either fruitless or well nigh impossible."

To require more of the current EIS would, in the view of the appeals court, be a meaningless exercise. The appeals court's decision states this view in these words:

> "It is still not known which companies will find oil, nor is it known whether any oil found will be of a type that existing refineries can process. Thus it is not possible at this point to specify probable pipeline destinations. To require the EIS to specify such routes at this stage would be equal to demanding that the Department specify the probable route of a highway that may never be built from points as yet unknown to other points as yet unknown over terrain as yet uncharted in conformity with state plans as yet undrafted. While speculation in an EIS is not precluded, the agency is not obliged to engage in endless hypothesizing as to remote possibilities. There comes a point when the chain of 'ifs' gets too long and too tenuous to be of any practical use. That point was reached here."

In sum, the appeals court decided that the Secretary did not need information on specific pipeline routes to approve the sale and exploration. But the appeals court went on to observe that the Secretary will prepare a Development Plan EIS on the basis of development plans submitted by lessees of each tract where oil and gas are discovered. The Secretary is expected to assess the environmental consequences of pipeline routes before production and transportation begin. Approved state CZM plans are anticipated to give the Secretary the benefit of federal-state programs developed under the Coastal Zone Management Act.

Moreover, the appeals court observed that under current regulations of the Department of the Interior, lessees of OCS tracts must furnish detailed information on their development plans to affected coastal states "at least six months in advance of the contemplated date for commencement of operations."

Second is "the cost-benefit analysis of the Sale 40 project."

The heart of the matter here is the district court's finding that a defective cost-benefit analysis had been accepted by the Secretary and in fact resulted in "an inadequate balancing of economic benefits against environmental costs." In disagreeing with this finding, the appeals court offered the following comments:

- "Although professing not to make a 'substantive review of the administrative decision,' the district judge found the Secretary's balance of economic benefits against environmental costs to 'be arbitrary and capricious and in violation of NEPA.' We disagree."

- "In our view, the Department of Interior made an adequate compilation of relevant information, analyzed it reasonably, and did not ignore pertinent data. The district court, on the other hand, by substituting its judgment and its approval of the evidence for that of the Department, exceeded the proper scope of judicial review."

- "The district court does not sit as a superagency empowered to substitute its scientific expertise or testimony presented to it de novo for the evidence received and considered by the agency which prepared the EIS."

However, the appeals court rejected the defendants' claim that the failure of the plaintiffs to introduce additional information from their own economist for incorporation into the EIS precluded the right of the district court to consider this additional information per se. But the appeals court then went on to observe that this additional testimony "consists primarily of opinions and estimates rather than hard facts." By crediting this testimony over that of the Department of Interior, the district court had found that the Department's cost-benefit analysis was not prepared in good faith, and the appeals court decided that this finding "was thus clearly erroneous."

Third is the "alternative of separating exploration of tracts from leasing for oil and gas production."

According to the district court's decision, the EIS "effectively ignored" the possibility of separating exploration from development, and a brief discussion of exploration before leasing was "mere window dressing."

On the other hand, the appeals court observed that:

- The Programmatic Environmental Impact Statement (January 1974) had discussed possibilities of separate exploration and production.
- The EIS had taken up the subject under the heading of "Alternatives."
- The Department of Interior had prepared two position papers on the subject which had led, in August, 1975, to the Secretary's decision to "require a pause between exploration and development in order to provide coastal states with resulting data for use in considering development plans submitted by OCS lessees for approval."

Consequently, the appeals court decided that the district court had "nonetheless brushed the data aside as too brief." In these terms, the appeals court added that: "This was clear error. Here again the district court appears to have misconceived its role and allowed its concept of the substantive merits of the issues to dominate its limited reviewing role, which is permissible."

Fourth is "the possibility of leasing tracts other than those selected for Lease Sale 40."

Section II of this chapter described the selection process which the Department of Interior applied to the whole area, part of which ultimately became Lease Sale 40. Out of 1151 tracts originally considered, bids were offered on only 101 and accepted on only 93.

The district court's opinion stated that the EIS was inadequate because the tract selection process had not examined "the potential environmental effect of offering, and accepting bids on tracts other than those actually proposed and leased." This line of reasoning rests on the premise that a tract not offered for sale by the Department or not bid by the oil companies could "improve the revenue from lease sale, decrease pipeline lengths and reduce environmental impacts if tracts contiguous to potentially acceptable pipeline landfalls were utilized."

In pursuing this line of reasoning, the district court ignored the procedure followed by the Department of Interior and the experience of many years that shows pipelines located to be near production, not the other way around. The appeals court remarked that: "In our view this procedure was reasonable and gave proper consideration to alternatives of the type suggested by the district court." Later, the appeals court added: "The district court's criticism in this regard appears to be unrealistic ..."

As the appeals court correctly perceived, bids are offered on the basis of geologic information and the potential for oil and gas which that information implies. Unless a tract has some potential for production, nobody wants to bid on it. Lease Sale 40 produced bids on only 101 tracts out of 154 offered for sale.

The appeals court concluded "that there was a 'non-existent' interest in leasing tracts of the type suggested sua sponte by the district court because there was an insufficient "indication of the existence of hydrocarbons in those tracts."

Fifth is "the claims of lack of good faith on the part of the Secretary of Interior."

The appeals court addressed this issue with the knowledge that the district court's decision was based on grounds other than bad faith. Then the appeals court stated:

> "... we nevertheless feel compelled to advert to this unfortunate discussion, not only because of the possibility that the court might otherwise be inclined to resurrect it but because of the needless damage it inflicts on government servants."

In developing its analysis of this issue, the appeals court referred to the district court's "about-face on this issue" as "not its only change made without any new evidentiary support."

The appeals court was apparently disturbed over the introduction of this issue into the trial and described its findings as a failure "to find such proof."

Conclusion

In stating its conclusion, the appeals court focused on two main points, which are quoted here from the court's decision:

- "The district court appears to have allowed its views regarding the substance of the Secretary's proposal to becloud its understanding of its reviewing function and its analysis of the Sale 40 EIS for adequacy, leading to the court's unfortunate characterization of the Secretary's motives, its substitution of testimony received by it for that considered by the Secretary and its adoption sua sponte of grounds for inadequacy that were not suggested by the parties."

- "We are satisfied that the Department of Interior, which will have continuous control over the venture, will deal with them* thoroughly in the Development Plan EIS before approving any plans for transportation of such oil as may be discovered in the Sale 40 area and after the Department has the essential information regarding the location, quantity and quality of any discovered oil, an ocean bottom survey, and the Coastal Zone Management Act programs that will have been enacted."

  *Questions of environmental impact related to transportation of production.

Finally, the appeals court stated:

> "The decision of the district court is reversed, the injunction is vacated and the cases are remanded with direction to dismiss the consolidated complaints."

CHAPTER FOUR

OVERVIEW OF REGULATORY PROCEDURES - SCHEDULES OF FUTURE OCS SALES (REVISED)

I. REGULATORY PROCEDURES AND SALE 40 HISTORY

Prior to the actual sale of any group of OCS leases, a carefully prescribed sequence of regulatory procedures must be followed. This chapter will review those procedures beginning with the Call for Nominations and Comments, with special emphasis upon the sequence of events that occurred in OCS Sale 40.

The Call for Nominations and Comments is the first formal mechanism through which the federal government obtains public input into decisions involving OCS lease sales. The Call for Nominations and Comments on OCS Sale 40 was issued on March 26, 1975 and requested public input on 6.5 million acres of OCS land (1,137 tracts) off the coasts of New Jersey, Delaware, Maryland and Virginia. Twenty petroleum companies responded to this call, nominating a total of 557 tracts (3.2 million acres). Comments were also received from several commercial and environmental groups expressing concern over the ecological and environmental consequences of exploratory drilling in general or upon specific tracts in the sale area.

An assessment of the nominated tracts, considering both geological attractiveness and environmental risks, and a preliminary determination of the tracts to be leased is the next step in the regulatory process. Of the 557 tracts nominated in OCS Sale 40, the selection of 154 to be leased (off the coast of New Jersey and Delaware) was announced on August 20, 1975.

On the basis of the tracts selected for leasing, a site-specific Draft Environmental Impact Statement (DEIS) is prepared. The DEIS is then made available for public review and open hearings are held. The DEIS for OCS Sale 40 was made available on December 10, 1975 and public hearings were held during January, 1976. Based on the DEIS and the input received during the public hearings, a Final Environmental Impact Statement (FEIS) is prepared and a final determination of the tracts to be leased is made. The FEIS for Sale 40 was published on May 25, 1976 and the decision to proceed with the sale (which led to the litigation discussed in Chapter 3) was announced on June 30, 1976. On August 17, 1976, 154 tracts were offered in Lease Sale 40. Actual bids were received on 101 tracts; and high bids on 93 tracts exceeding $1.1 billion were accepted.

II. CURRENT LEASE SALE SCHEDULE

The most recent schedule for OCS lease sales was announced by Secretary of the Interior Cecil D. Andrus on August 23, 1977. This schedule, which is reproduced on the following page, shows that two OCS lease sales in addition to Sale 40 are scheduled for the Middle Atlantic region through 1981. The initial step (nominations of tracts) has been completed in the first of these, Sale 49; and the sale itself is now scheduled for February, 1979. The actions required for the second of these sales (No. 59) will not begin until the Call for Nominations is issued in September, 1979.

PROPOSED OCS PLANNING SCHEDULE

August 1977

SALE AREA	1977					1978												1979												1980												1981											
	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
CI Cook Inlet		N	S																																																		
42 N. Atlantic	F		P		N	S																																															
43 South Atlantic-Georgia Embayment			F		P		N	S																																													
45 Gulf of Mexico				F		P		N	S																																												
65 Eastern Gulf of Mexico						E		H			F	P		N	S																																						
51 Gulf of Mexico							E		H			F		P		N	S																																				
49 Mid-Atlantic		T						E		H			F			P		N	S																																		
48 Southern California													E		H			F		P		N	S																														
58 Gulf of Mexico			C		D		T							E		H			F		P		N	S																													
54 South Atlantic-Blake Plateau		C				D			T									E		H			F		P		N	S																									
Federal/State Beaufort (near shore)			C		D				T											E		H			F			N	S																								
55 Gulf of Alaska										C		D			T										E		H			F		P		N	S																		
62 Gulf of Mexico														C		D			T								E		H			F		P		N	S																
46 Kodiak																													E		H			F		P		N	S														
52 North Atlantic																C		D			T								E		H				F		P		N	S													
53 Central and Northern California				C							D			T																			E		H			F		P		N	S											
60 Cook Inlet																	C		D			T									E				H				F		P		N	S									
56 South Atlantic-Georgia Embayment																				C		D			T										E		H			F		P		N	S								
59 Mid-Atlantic																										C		D			T								E		H			F		P		N	S			
66 Gulf of Mexico																												C		D			T							E		H			F		P		N	S		
57 Bering-Norton																					C							D			T									E		H					F		P		N	S

C - Call for Nominations
D - Nominations Due
T - Announcement of Tracts
E - Draft Environmental Statement
S - Sale
H - Public Hearing
F - Final Environmental Statement
P - Proposed Notice of Sale
N - Notice of Sale

Sales are contingent upon a reasonable assumption that technology will be available for exploration and development. A decision whether to hold any of the lease sales listed will not be made until completion of all necessary studies of the environmental impact and the holding of public hearings as a result of the environmental, technical, and economic studies employed in the decision making process, a decision may, in fact, be made not to hold any sale on the schedule

The Department of the Interior

COMPARISON OF LESSEES (OCS SALE #40)
AND NOMINATORS (OCS SALE #49)

Companies	OCS 40	OCS 49	40 and 49
Allied Chemical			X
Ameranda Hess Corp.	X		
American Petrofina Exp. Co.	X		
Aminoil Resources, Inc.	X		
Anadarko Prod. Co.	X		
Atlantic Richfield			X
Canadian Superior Oil (U.S.) Ltd.	X		
Chevron Oil Co.			X
Cities Service Co.	X		
Columbia Gas Dev. Corp.		X	
Continental Oil Co.			X
Diamond Shamrock Corp.	X		
Energy Development Corp.	X		
Exxon Corporation			X
Freeport Minerals Co.	X		
General Amer. Oil Co. of Texas	X		
Getty Oil Co.	X		
Gulf Oil Corp.			X
Hamilton Bros. Oil Co.	X		
Houston Oil & Minerals Corp.			X
Houston Production Co.***	X		
ICI Delaware Inc.	X		
Kerr-McGee Corp.	X		
Louisiana Land & Exp. Co.			X
Marathon Oil***			X
Mobil Oil Corp.	X		
Mobil Exp. & Prod. Serv.			X
Murphy Oil Corp.			X
Ocean Prod. Co.	X		
Pan Canadian Petroleum Co.	X		
Phillips Petroleum		X	
Santa Fe Minerals Co. - U.S.	X		
Shell Oil Co.			X
Skelly Oil Co.	X		
Sun Oil Co. (Delaware)	X		
Sunmark Exp. Co.		X	
Superior Oil Co.	X		
Tenneco Oil Co.			X
Texaco, Inc.	X		
Transco Exp. Co.	X		
Union Oil of Calif.			X
U.S. Steel Corp.	X		
Weeks Natural Resources, Inc.	X		
Total Companies (43)	26	3	14

*** Through Assignment on OCS Sale #40.

It is likely that many of the companies that participated in Lease Sale 40 will also take part in Lease Sales 49 and 59. A comparison of the successful bidders in Lease Sale 40 and those companies which participated in the nomination of tracts for Sale 49, for example, is shown on page 34 . These data show that a total of 43 companies were either successful bidders in Sale 40 or nominated tracts for Sale 49. Of these, 40 companies were successful bidders in Sale 40; and 14 of these 40 companies also nominated tracts in Sale 49. Only 3 of the 17 companies that nominated tracts in the Sale 49 area either did not bid or were unsuccessful bidders in OCS Sale 40. Finally, 26 of the successful bidders in OCS Sale 40 did not nominate tracts in the Sale 49 area.

Any assessment of the anticipated onshore impacts of Sales 49 and 59 was not within the scope of this study. Their existence and probable significance in terms of increasing the importance of OCS oil and gas production to the economy of the Middle Atlantic region should be noted, however. In addition, the continuing strong interest of the petroleum industry in Middle Atlantic OCS areas illustrates their expressed confidence in the geological promise of the area and their belief that the knowledge obtained as a result of Lease Sale 40 will greatly reduce the regulatory barriers and public apprehension that was evident in that sale.

CHAPTER FIVE

INTERGOVERNMENTAL RELATIONS AND ACTIONS

I. INTRODUCTION

Coastal Zone Management (CZM) offers states an opportunity to design and implement plans that can assure the development and utilization of their coastal zones in a manner that reflects concern and protection for national, state, and local interests. Outer Continental Shelf (OCS) exploration for and production of petroleum and natural gas represent a particular intrusion upon a state's coastal zone and an opportunity for the state to manage this intrusion to achieve maximum benefits and minimum adverse impacts. These benefits and impacts can be economic, social, environmental, and political. This section of the report offers some considerations which, if taken into account, can be a framework for the process by which a state seeks to provide for orderly and effective development and utilization of its coastal resources while safeguarding all relevant interests involved.

First and foremost is the need to create a means for a state to implement its CZM plan under adequate authority to satisfy federal standards, local government interests, and the desire of individual citizens to participate in CZM planning and management. Experience in states other than Pennsylvania indicates that the concept of shared authority can be developed to meet this need and satisfy all interests, at least to some degree.

In simple terms, shared authority is provided by legislation which gives a state coastal commission the primary responsibility for implementing provisions of the coastal zone legislation but which also recognizes that local land use plans and regulations can reflect statewide coastal concerns and preserve a degree of local autonomy. Although the coastal commission has the authority to plan and manage the coastal zone in accord with the policies of the legislation and the requirements of federal agencies, local governments have the explicit right and duty to submit plans and ordinances for certification as part of their coastal plan if this plan is consistent with the legislation. Once certified, the local government's plan becomes operational. However, the coastal commission also has the authority to review the certification periodically and retain control over certain limited CZM areas for policy reasons or for the need of particular management and technical requirements at a local level that exceed the capabilities of local authorities. For example, a limited area with a severe erosion problem might call for technical resources that a local government could not command. The state coastal commission would be expected to address this problem with a broad spectrum of technical resources, but the state body must have the authority to apply these resources effectively.

By careful design, shared authority can reduce redundant efforts by different levels of government, enhance coordination among them, and alleviate administrative burdens on each of them.

II. SHARED AUTHORITY

A. MECHANISMS

The most direct mechanism for implementing shared authority involves the certification of local authorities by the state coastal commission according to policies and provisions of its enabling legislation. When a local authority desires certification, the local governing body applies for certification according to certain protocols and under certain guidelines already developed by the state coastal commission in conjunction with official local representatives. The application will state the justification for the certification and will enumerate the specific provisions of a local management plan and reflect their consistency with overall policies and objectives of a statewide program. Within a specified time period, the state commission is to review the application and render a decision on specific provisions of the local plan as well as on its entirety.

In the preparation and presentation of its application, a local authority is to address certain specific factors of the coastal zone, such as:

- Regulation of the location and design of structures within its jurisdiction by building codes.
- Regulation of land development practices.
- Zoning regulations and permit procedures.
- Development plans and their implementation.
- Environmental control and monitoring.
- Special regulatory provisions, as needed.

The state commission, in its review, is to judge both the adequacy of scope and the quality of enforcement that are expressed in the local authority's plan. Adequacy does not imply overly complex and cumbersome regulatory practices and permit procedures, but rather a scope which is only as large as needed and an implementation which is workable.

In the development of its CZM plan the local authority is expected to build upon its general plan, providing amendments and addenda to insure its adequacy and its consistency with the statewide plan. This development is expected to cover such factors as land use designations, resource protection, and environmental considerations. A practical test for local authorities to apply in developing their plans is to ask whether the end product will enable them to issue permits for a specific development with the assurance that it is in conformity with their certified local coastal program.

B. INCENTIVES

Coastal zone management programs are intrinsically necessary if a state is to fulfill its obligation to protect the public trust. The concept of shared authority extends this obligation of safeguarding the public trust to certified local units of government. Implementing this authority creates the need for funds to carry out the management plans. This need is the basis for federal support of approved coastal zone managment plans.

By analogy, states have an obligation to support local management plans with the necessary financial and technical assistance. This assistance can be a substantial benefit to certified local governments as they enter into the regulatory, planning, and management activities specified in their coastal management plans. Without this assistance, local governments would be asked to burden their budgets and possibly be forced to seek relief with taxes. With this assistance, they can be assured that their coastal plans can be carried out in a manner consistent with the objectives.

For example, the state's financial assistance to local governments could include the development of new ordinances and planning capabilities, including contractual help from consultants and the hiring of persons able to prepare the application for certification and the implementation design of its coastal management plan. Technical assistance provided by the state could cover an assessment of land and water uses within the local government's jurisdiction, the acquisition and review of information on natural resources and potential environmental and economic impacts, and the identification and analysis of technical input to the formulation of policies and local ordinances.

In sum, a local government with a certified coastal zone management plan will be able to protect its interests according to local preferences and needs and will also be able to have the financial and technical assistance required to carry out its plan so that it is consistent with the policies and provisions of the state's coastal zone management plan.

III. POWERS AND DUTIES

This entire chapter focuses on intergovernmental actions in a generic manner that attempts to raise topics for consideration, to outline the major factors to be addressed, and to propose a framework for implementation. In no sense is this information to be misinterpreted as an attempt to lay out in detail all of the provisions of legislation that could be required. Neither is it an attempt to define in detail the powers and duties which are appropriate for the coastal management plans of a state or a local government. However, in order to lend substance to the considerations provided, this section will attempt to describe some of the powers and duties appropriate to state and local management bodies under the principle of share authority.

A. STATE COASTAL COMMISSION

The state commission is expected to have the ultimate responsibility for design and implementation of the coastal management plan. Unless and until local governments' coastal mangement plans are certified, the state commission is expected to perform all duties and exercise authority under the enabling legislation. In general, the state coastal commission is expected to exercise these powers unless they are specifically delegated to another state body. If another unit of state government has primary responsibility for a specific activity then the coastal commission can be expected to participate only as an interested party and can neither exercise control nor certify local governments to exercise control.

For example, matters of power plant siting may be under regulation of another state commission, according to prior legislation. In this case, the state coastal commission cannot issue permits for construction of power plants at specific sites. However, to the degree that power plant sitings have impacts upon the coastal zone, the coastal commission can and ought to intervene as an interested party in the process of power plant siting and seek adjudication of disputes by judicial review, if necessary.

The following list is a non-definitive and non-exhaustive enumeration of the evident powers of a state coastal commission:

1. Granting permits for developments and installations in the coastal zone, unless this power has been delegated to a local government under certification procedures.

2. Granting certification to local governments upon satisfactory legislation.

3. Defining the coastal zone within the context of the enabling legislation.

4. Identifying geographic areas of particular concern and possibly excluding them from the jurisdiction of local governments.

5. Adopting rules, regulations, procedures, and schedules for coastal zone management.

6. Assuring opportunities for public participation in all decisions of the commission.

7. Establishing budgets within the limits of legislative authorization and appropriation.

8. Preparing and issuing reports on the coastal zone management program.

9. Coordinating and cooperating with other units of state government and, when necessary, intervening in their regulatory procedures and hearings in a manner consistent with the responsibilities of the commission in the coastal zone.

10. Coordinating and cooperating with the federal government to assure consistency of federal actions with coastal zone management policies and practices.

11. Monitoring the activities of certified local management plans and considering whether to continue or possibly revoke their certification for coastal zone management.

12. Seeking, when necessary, judicial review and resolution of conflicts among interested parties in matters of coastal zone management.

13. Specifying actions of local governments which can be appealed upon suitable petition and delineating the grounds for allowing appeals.

14. Assuring the exclusion of certain actions from regulatory purview, whether these exclusions are of a statutory, judicial, or categorical nature. (For example, certain residential improvements, certain repair or maintenance activities, certain utility connections, and certain other developments lacking the potential for coastal zone impacts could be excluded by legislation, judicial decision, or by their very nature of their purpose and function.)

15. Granting exemptions from its rules and regulations when overriding interests are involved - for example, in a national or regional energy emergency or in the fulfillment of national goals that are consistent with existing legislation and judicial decisions.

B. LOCAL GOVERNMENTS

Once a local government has certification of its coastal management plan, it can administer its coastal zone with the confidence that its management decisions and actions will be controlling as long as they adhere to the certified plan.

Several advantages accrue to local government when its plan is certified - for example, shorter response times and lower administrative costs for its applicants, protection of the interests that are peculiar to its specific jurisdiction, and the ability to be accessible and accountable to its constituents. Much duplication of effort can also be avoided, because a local management plan is built around its existing policies and plans for land and resource utilization.

Among the specific powers it will be able to exercise are the enforcement of its plans for land use and development, zoning ordinances, uniformity of mapping requirements, and other implementing actions such as those affecting the kinds, locations, and diversities of land use. Not to be overlooked is the local government's ability to control access to its land and, when desirable, assure public access to those areas where public access ought to exist.

Furthermore, the local government will be able to allow or disallow those activities which occur within its jurisdiction but which have more than local interest. In these cases, local governments may elect to seek agreements with other interested local governments having certified management plans in the knowledge that their agreements can be binding as long as they conform to the policies and provisions of their certified plans.

One limitation likely to be placed upon local governments concerns the approval of federal agencies' activities affecting the coastal zone within local jurisdictions. For example, the Department of the Interior may want to grant permits and licenses for rights of way on public lands; the Environmental Protection Agency may decide to issue permits and licenses under the Federal Water Pollution Control Act of 1972 and its amendments; the Federal Power Commission may issue certifications for interstate gas pipelines. In these and other instances affecting the coastal zone, the state coastal commission will probably want to reserve to itself the right to issue permits in order to unify the regulatory process in the state and assure overall federal consistency with the state's plan as approved by the Secretary of Commerce.

Among other federal departments and agencies considered likely to be issuing permits with impacts upon the coastal zone area the Corps of Engineers, the Nuclear Regulatory Commission, the Coast Guard, and possibly the Federal Aviation Administration.

In all considerations of proposed federal actions affecting the coastal zone, the state coastal commission ought to provide systematic and regular opportunities for participation in the decision-making by local governments and by the public, including hearings. This participation is to be the norm and not an exception.

The state coastal commission may elect to call for a memorandum of understanding from the federal agency rather than issue a formal permit. This device avoids some potentially difficult technicalities, including possible constitutional questions.

If a federal agency disagrees with the decision of the state coastal commission or refuses to enter into a memorandum of understanding about the permits which it issues, then the state coastal commission has the option of seeking a resolution of the problem by the Secretary of Commerce or requesting judicial review and approval for its decisions and requirements.

With this exception, local governments having certified management plans can expect to enjoy the same authority over their coastal zones that the state coastal commission has over areas which it maintains under its control, such as geographic areas of particular concern.

IV. APPEALS AND JUDICIAL REVIEW

The decisions of local governments will not always satisfy applicants for permits within their jurisdiction. The state coastal commission can function as an appellate body if the issue at hand falls into certain categories and has sufficient grounds for appeal. These categories and grounds for appeal are preferably stated in the enabling legislation or are decided by the state coastal commission under a clear legislative mandate to do so.

For example, if the local governments's decision involves an application for use of wetlands or is alleged to be substantially at odds with the local management plan in a sensitive area, an appeal would be heard if there is also sufficient grounds to support it. Among the factors which could provide sufficient grounds are allegations that a development fails to provide adequate public access, that it alters natural landforms, or that it fails to comply with requirements for shoreline erosion or geologic protection.

A state coastal commission that offers an appeal mechanism can often act with more speed than a court and with informed technical insight on the action before it.

Nevertheless, it is essential to recognize that it is the basic right of aggrieved persons to obtain judicial review of a decision by a local or a state commission. The enabling legislation ought to acknowledge this right clearly and unequivocally. Some definition should also be stated about who can be an aggrieved person, but it is customary to accept as an aggrieved person anyone who has, in person or in writing, sought and been denied commission approval for a proposed action within the coastal zone.

By providing for review of local decisions by the state coastal commission and, when desired, for judicial review of all decisions, the legislation can offer all interested parties the protection and the opportunity for prompt review of appeals at the administrative level and for ultimate review in the courts.

CHAPTER SIX

ECONOMIC DEVELOPMENT OPPORTUNITIES AND COASTAL ZONE MANAGEMENT POLICIES

I. COMPARISON OF RESOURCE ESTIMATES AND LEVELS OF ACTIVITY

A. RESOURCE ESTIMATES

Estimated ranges of oil and gas resources in a frontier area like the Baltimore Canyon Trough cannot be evaluated until exploration is well underway. Nevertheless, resource estimates are essential if there is to be any OCS planning, because the size and type of resource are the primary determinants of all direct, indirect, and induced activity from exploration and potential production in the Outer Continental Shelf.

Chapter Two of this study presented data on the principal activities resulting from a high and a low estimate of resource size. The high estimate was taken to be: 4.6 billion bbl. of crude oil and 14.2 trillion cubic feet of gas (the same as the high estimates in the OTA study). The low resource estimate was taken to be zero, which would lead only to exploration but not to development or production.

As an estimate of the intermediate level of resources, it is reasonable at this time to use the OTA mean values: 1.8 billion bbl. of crude oil and 5.3 trillion cubic feet of gas. To adopt a particular estimate as firm before any exploration has occurred is to give more credence to the estimates than their authors do. However, these numbers, together with reasonable oil and gas production rates, are a basis for calculating the magnitude of all associated activities, if not their precise levels and schedules. Appendix II presents a year-by-year projected schedule of OCS activities accompanying an intermediate level of resources.

In summary, the high and intermediate estimates of resources can be expected to lead to the following levels of direct activity:

Total Resources	4.6 billion bbl. crude 4.6 trillion CF gas (associated) 9.6 trillion CF gas (non-associated)	1.8 billion bbl. crude 1.8 trillion CF gas (associated) 3.5 trillion CF gas (non-associated)
Exploration	188 wells from 46 rigs over 5 years	92 wells from 23 rigs over 5 years
Development	1104 wells from 46 platforms over 7 years	552 wells from 23 platforms over 8 years
Production	313,500 bbl./day and 314 MMCF/day; 33 platforms Plus 654 MMCF/day; 13 platforms	152,000 bbl./day and 152 MMCF/day; 16 platforms Plus 296 MMCF/day; 7 platforms

The low estimate of zero resources can be inferred from these data by examining the levels of exploration activity alone. They show 92 to 188 wells drilled over a 5-year time frame but allow for no platform construction or any other effect of resource development and production.

All of this discussion is based solely upon Lease Sale No. 40 and does not include resource estimates or activity levels that could follow other scheduled sales: No. 49 in February, 1979, and No. 59 in July, 1981.

In view of the uncertainties involved, levels of activity will be examined in detail at this time only for the high resource estimate.

B. EXPLORATION ACTIVITY

Table II revealed a rapid rise from 7 to 12 exploratory rigs in operation at one time during the first to fifth years after exploration begins. If early results indicate favorable crude and gas discoveries, developmental drilling could begin as soon as year 4 after the start of exploration.

Interviews with 10 operators of tracts from Lease Sale 40 revealed that Davisville, Rhode Island, will be the initial site of onshore support, except for helicopters, which will be based at Atlantic City. The two major economic impacts from exploration will come from the materials supply operation and from the supply boats and helicopters.

According to Table III, at the peak of exploration, the following estimated annual levels of supplies will be required:

Drilling Mud: 30,800 tons	Steel Tubulars: 21,840 tons
Cement: 15,120 tons	Diesel Fuel: 159,260 bbl.
Fresh Water: 57 million gallons	

During the same year, the following impacts could be expected: a service base employment of 44 with aggregate annual personal earnings of $748,000; a supply boat employment of 209 with earnings of about $3.6 million; and a helicopter employment of 27 with earnings of $459,000.

For this peak year of exploratory activity, these directly attributable jobs add up to 280, and related personal earnings have a total value of $4.76 million (1976 dollars). Little if any of these impacts are likely to be found in Pennsylvania. In fact, the first five years of OCS activity in the Baltimore Canyon Trough cannot be expected to have large economic impacts in Pennsylvania unless the rates of offshore activity are accelerated beyond the schedule stated in Table II.

If, however, exploration leads to development and production, then Pennsylvania can anticipate sizable future economic impacts, which will be described in the next sections of this chapter.

C. DEVELOPMENT ACTIVITY

Development is the most labor intensive stage of OCS activities. For example, in the peak year of the estimated schedule in Chapter Two (year 9 after exploration begins), employment of 1125 persons with wages and salaries of $20.4 million can be envisioned at onshore service bases, on supply boats, and for helicopter services. Estimated supply requirements for this year include over 133,000 tons of steel tubulars and almost 1 million barrels of diesel fuel. (A year-by-year delineation of these requirements is given in Chapter Two.)

In addition, by year 9 there could be a need to construct locally about 24 of the 35 development platforms then in operation. Whether all of these will be built in Pennsylvania cannot be decided now, but their number indicates the potential for construction. As a rough guide, about 2000 people could be needed to build these platforms during each year of a 3-year period if the platfrom construction facilities are available.

All together, it is reasonable to expect as many as 35 platforms to be built in the Middle Atlantic region, providing 8750 person-years of employment and over $166 million in wages and salaries during a period of at least 3 years. By contrast, platform installation is not expected to produce more than 200 jobs and an aggregate of $3.5 to 4 million in wages and salaries.

For all 7 years of development activity, the aggregate of wages and salaries is estimated to be about $80 million for onshore service bases, supply boats, and helicopter services. It is not difficult to anticipate Pennsylvania's receiving positive economic benefits from these activities and from platform construction if a hospitable industrial environment is created and maintained.

D. PRODUCTION ACTIVITY

According to the schedule projected in Table II, production begins in year 8 if exploration and development justify the start. In terms of onshore support and helicopters, production calls for fewer jobs than development. For example, the peak year of those examined in detail (year 14) is projected to offer only 211 onshore support and helicopter jobs with accompanying annual wages and salaries of about $3.6 million. Supply boats needed to support this production are more labor intensive, leading to an estimated year 14 employment of 803 at wages and salaries of $13.7 million.

In the aggregate, during years 8 to 14, production is estimated to lead to $62.9 million in wages and salaries, of which 79% is paid for supply boats.

No formal estimate was made of drilling-type materials required for production, but it will be only a small fraction of the requirements for development. However, installation of four pipelines to transport maximum offshore production was estimated in Chapter Two to cost over $750 million, exclusive of product gathering lines. Labor costs for laying these four pipelines are considered comparatively small, because they add up to less than $2.5 million for each line. For the distances involved in the Baltimore Canyon Trough, one pipeline can be laid within a six month time frame and should produce about 200 of offshore jobs and about 24 onshore.

In the aggregate, only about $11 to $12 million of the over $750 million cost goes for wages and salaries.

Pipeline coating could generate about an equal number of jobs and an equal amount of income during the same period, but the total cost of coating four pipelines may be only $35 million, which is small in comparison with the $750 million pipeline installation cost.

Chapter Two of this report also described the tonnages of petrochemical feed stocks which could be available in Pennsylvania with lower transportation charges than they would carry from the Gulf Coast. Their principal economic impacts will come in the form of petrochemical manufacturing plants and the product formulation industries which these plants tend to spawn. A whole range of end uses can be envisioned from pharmaceuticals to fertilizers, and a variety of petrochemical products could be made into the raw materials of other industries, such as household appliances, toys, textiles, and motor vehicle components. A qualitative assessment of these opportunities will be made in Section II. of this chapter.

II. ASSESSMENT OF ECONOMIC DEVELOPMENT OPPORTUNITIES

A. EXPLORATION, DEVELOPMENT, AND PRODUCTION OF RESOURCES

The foregoing section of this chapter summarized the identification and description of onshore economic impacts possibly resulting from development and production of resources in Lease Sale No. 40 in the Baltimore Canyon Trough. Before any exploration has occurred, it is impossible to be more precise or certain about what will follow or when. Nevertheless, it is essential for Pennsylvania to assess in a qualitative way the economic development opportunities which could arise and to identify the policies and actions which could be necessary for the Commonwealth to derive significant benefits while minimizing undesirable effects.

This and the next section of Chapter Six offer a qualitative assessment intended to fill those needs at this time.

Although exploration activity is not expected to produce much of an effect in Pennsylvania, development and production are expected to do so. In particular, the supply of drilling materials during development will probably call for nearby bases and businesses to meet the demand at a satisfactory rate. In addition to capital and materials, this activity will require people and land. New Jersey and Delaware will undoubtedly be involved, unless these states ban onshore support sites as a matter of public policy. A detailed analysis of all these requirements is beyond the scope of this study. But in consideration of this activity's magnitude, it is not too soon for public officials, businessmen, and private citizens to recognize the importance of this activity and to set in motion the conditional processes that will be needed to manage it successfully.

In terms of jobs, wages, and salaries created to support offshore activities, the development stage has the larges potential for impacts. For example, development alone accounts for almost half the projected $161.4 million in wages and salaries to be paid for service base support, supply boats, and helicopters during the first 14 years of OCS operations with a high level of resource recovery (Chapter Two).

Similarly, platform construction could become an intensive activity for at least three years' time as a result of Lease Sale 40. At least two other lease sales are now scheduled through 1981, and a high rate of crude and gas discovery could prolong the period for platform construction. As a result of Lease Sale 40 alone, construction of 35 platforms is estimated to generate 8750 person-years of employment and over $166 million in wages and salaries.

B. OIL AND GAS PROCESSING

Petrochemical plants are still another opportunity described in Chapter Two. From an estimate of processing only the natural gas to be produced in association with crude, more than 758,000 tons per year of petrochemical feed stocks could become available at onshore gas plants. Qualitatively, this volume of raw materials represents a large resource for innumerable types of processes and products. It is not too soon for Pennsylvania to consider specific process routes for converting them to useful products that could become starting points for new industries in the Delaware Valley. This kind of consideration is beyond the scope of this study, but it should have a high priority in the future development of Pennsylvania's Coastal Zone Management plan.

The express intention of OCS operators to displace imported crude from existing refineries with production from the Baltimore Canyon Trough represents an opportunity for refiners in the Philadelphia region to achieve a stable source of supply at a known price level. Although not yet easily quantifiable, this factor can be a stimulant for the economic health of the refineries located in the Philadelphia region and of the widespread markets which they serve.

C. OVERALL ASSESSMENT

Pennsylvania should begin now to address the questions raised by this qualitative assessment of economic development opportunities and to incorporate them into Pennsylvania's Coastal Zone Management plan. Quantitative estimates of the capital, land, equipment, workforce, and the total infrastructure requirements are beyond the scope of this study. When exploration begins - and there are now indications that it will - these estimates will take on an urgency that they have not yet had. Efforts will then be needed to involve all sectors - government, business, and private citizens - in a constructive manner that will respect but also transcend state boundaries. Cooperation among national, state, and local governments and the private sectors will be called for within a framework designed to incorporate their inputs, allow for interaction and improvement, and strengthen their capacity to maximize desirable impacts and minimize undesirable impacts within their respective jurisdictions and areas of influence.

An outline of the framework called for is presented in Figure 1 in terms of the inputs, processes, and outputs related to OCS activity. In addition to the previously named types of factors that are considered to be beyond the scope of this study, Figure 1 shows two others: education and training requirements and revenues. The subject of education and training is known in principle and can be examined in the light of experience in other states adjacent to offshore exploration, development, and production of crude and natural gas. The subject of revenues is another matter, because none of the Baltimore Canyon Trough is within a state's jurisdiction, and traditional mineral severance taxes will not apply. Other sources of state revenue will exist, over and above personal income taxes, but there is a definite need now for Pennsylvania to develop land and tax policies relative to OCS activities that will encourage economic development and, at the same time, produce revenues for state government.

Pennsylvania's Coastal Zone Management plan cannot afford merely to take casual cognizance of these needs and opportunities. Rather, Pennsylvania can and should begin now, within a framework such as that in Figure 1, to take the actions that are required to capitalize upon the economic development opportunities that are identified and assessed in this report.

III. IDENTIFICATION OF POLICY ISSUES

Coastal Zone Management offers a framework and a process for a state to maximize benefits and to minimize losses from the growth and development of its coastal zone. Some components of a state's management program are obvious and generate the attention and consideration which they deserve — sizes of resources, estimates of exploratory and developmental activity, and their direct and indirect onshore impacts. Other components — such as the identification of policies required at different levels of government — may fail to get the same kind of attention and consideration. This section of Chapter Six is intended to prevent that kind of failure.

One of the objectives of this report is to identify policy issues which must be addressed by state government if a Coastal Zone Management plan is to be operational and effective. It is not the intent of this report to develop the necessary policies but rather to identify and articulate policy issues which are the responsibilities and the prerogative of state government and which ought to be the concern of all government levels which interact with each other in a coastal zone context.

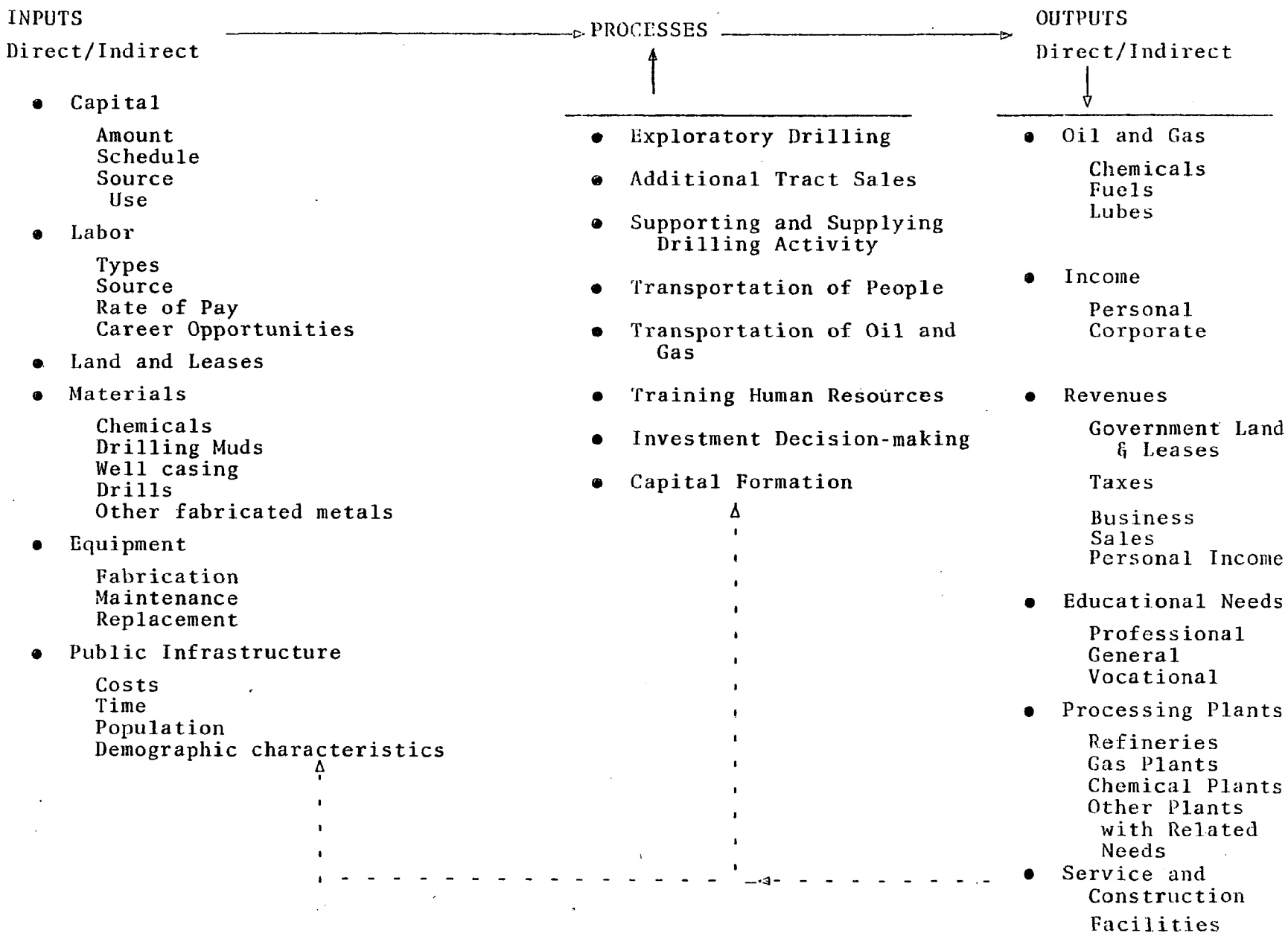
These policy issues can be generically placed within one of three categories, named for the area of state government's interaction and focus: national, state, and local or regional.

First, the nation. Legislation exists to enable a state to develop and implement a Coastal Zone Management (CZM) plan. Among the national issues toward which a coastal state ought to develop policies are the following:

- Whether the state in fact intends to develop a CZM plan, obtain approval from the National Oceanic and Atmospheric Administration (NOAA), and then carry out the plan with federal assistance of a technical and financial nature.
- Whether the state intends to permit CZM developments in the national interest (e.g., energy facility siting, location of industries that support national economic goals, establishment of energy transportation carriers like pipelines) even though the benefits of these developments may extend beyond a state's boundaries.
- Whether the state intends to support actively the enforcement of environmental standards or merely to rely upon federal oversight functions.
- Whether the state intends to insist upon the consistency of future federal actions in the coastal zone with the state's approved CZM plan.
- Whether the state intends to enact the legislation that may be needed to implement its CZM policies that have primarily national implications.

Figure 1

Framework for Assessing Economic Impact of OCS Activity



Second, the state. These are the chief issues to be considered by a CZM state for policy development:

- The designation or creation of a specific agency or entity to manage the coastal zone and, if necessary, the commitment to enact legislation to enable this agency to carry out its responsibilities.

- The protection, preservation, and utilization of the land and other natural resources in the state's coastal zone as a matter of public trust.

- The protection, preservation, and utilization of the existing recreational, cultural, and historical facilities within the coastal zone and the creation of a comprehensive approach to the development of similar resources in a consistent manner.

- The protection and preservation of private rights and the equitable resolution of conflicts between private and public rights in the coastal zone.

- The desirability of enhancing opportunities for economic growth and development in a manner compatible with other interests and to a degree that will widely benefit the economy of the coastal zone and, ultimately, of the entire state (e.g., in special tax provisions, interest rates, and offers of land).

- The need to protect the environment of the coastal zone and the establishment of mechanisms to achieve the degree of protection desired.

- The analysis and official acknowledgment of which state agencies have responsibility and authority for certain types of regulation in the coastal zone (e.g., for environmental protection, power plant siting, sewer placement and construction).

- The provision for local autonomy in managing the coastal zone combined with the state's retention of the right to approve or disapprove local CZM plans.

- The recognition that the state may find it necessary to retain direct control over specifically sensitive parts of the coastal zone or geographic areas of particular concern.

- The overall responsibility of the state for coordination among federal agencies and among local governments in managing the coastal zone.

- The creation of capabilities for assuring due process in resolving disputes among conflicting interests and, when necessary, for judicial review of official decisions.

Third, the local area. Local governments can expect to address the following particular issues with appropriate policy decisions.

- The interactions to be maintained with respect to national, state, and other local governments.
- The desirability of developing a state-certified management plan for the coastal zone in a specific local jurisdiction.
- The relative priorities to be given to land use, environmental protection, and economic development.
- The local ordinances needed to implement policy decisions and assure consistent actions.

Summary

The focus of this section is upon identifying policy issues, not upon deciding which policies to adopt. These issues are raised in a very pragmatic spirit, because the experience of several states has shown that national, state, and local governments find it essential to consider at least the issues named, irrespective of whether they adopt a policy for or against any one of them. Even if the decision is not to adopt a policy on a particular issue, that of itself is a policy decision that is preferably made in advance and not after the fact.

This enumeration and discussion of policy issues do not preclude the possible need for other policy matters to be considered and decided in the future. When important policy matters are identified and decided in advance, many problems cease to be troublesome. And then CZM can become an opportunity for Pennsylvania to gain much and surrender very little.

APPENDIX I

ASSUMPTIONS AND SCHEDULES

FOR

INTERMEDIATE RESOURCE LEVEL

Baltimore Canyon Trough

Lease Sale No. 40

A. ASSUMPTIONS

Specific assumptions made about the scope, intensity, and timing of OCS-related activities for an intermediate level of resources are summarized here:

1. Recoverable reserves:

   a.) 1.8 billion bbl. crude oil.
   b.) 5.3 trillion cubic feet gas.

2. Exploration

   a.) Two wells will be drilled/leased tract.
   b.) About 25% of these wells will be developed.
   c.) But no development platforms are to be in place during the first 3 years of exploration.
   d.) One rig drills 4 wells/year.

3. Development

   a.) One platform is to be used per developing tract.
   b.) Two rigs will operate from each platform.
   c.) Each rig will drill 4 wells/year.
   d.) Over a 3-year period, 24 development wells will be drilled from each platform.
   e.) Development platforms will not be installed until the year 4 after the start of exploration.
   f.) Platforms will not be in development operation until year 5 after exploration begins.
   g.) No production will be taken from a given platform while development drilling is going on.

4. Production

   a.) About 80% of the development wells drilled will become commercially productive.
   b.) The equivalent of 16 platforms will produce crude and associated gas.
   c.) Another 7 platforms will produce non-associated gas.

5. Production Rates

   a.) Crude will be produced at 500 bbl /day from a maximum of 304 wells.
   b.) Associated gas will be produced at 500 MCF/day from a maximum of 304 wells.
   c.) An estimated 2141 MCF/day of non-associated gas will be produced from a maximum of 138 wells.

ESTIMATED EXPLORATION, DEVELOPMENT AND

PRODUCTION OF OIL AND GAS IN THE

*BALTIMORE CANYON TROUGH (IFS)**

Years After Start of Exploration	Exploratory Rigs in Operation (Per Year)	Exploratory Wells Drilled (Per Year)	Development Platforms Installed (Per Year)	Development Platforms in Operation (Cumulative)	Development Rigs in Operation (Cumulative)	Development Wells Drilled (Per Year)	New Production Wells (Per Year)
1	2	8					
2	4	16					
3	4	16					
4	6	24	2				
5	7	28	3	2	4	16	
6			3	5	10	40	
7			5	8	16	64	
8			5	11	22	88	13
9			5	13	26	104	32
10				15	30	120	51
11				10	20	80	71
12				5	10	40	83
13							96
14							64
15							32

**Intermediate Find Scenario*

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A P P E N D I X B

Areas of Environmental Concern for Site Specific Development

A SURVEY

of the

ENVIRONMENTAL IMPACTS

of

OFFSHORE OIL DEVELOPMENT

on the

PENNSYLVANIA COASTAL ZONE

Prepared for

the

Governor's Energy Council

Harrisburg

by

Pennsylvania Environmental Council, Inc.

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CHAPTER 1

EXECUTIVE SUMMARY AND PLANNING CONSIDERATIONS AND RECOMMENDATIONS

Specific environmental impacts of Outer Continental Shelf (OCS) oil development on the Pennsylvania coastal zone are almost impossible to identify at the present time because of the inconclusive reports of the quantity of oil and gas that will be found there. Until the industry knows what is there and in what quantities it will not be able to ascertain what support facilities are needed. Nevertheless, knowing the general types of facilities that are required, the character of the region, and the environmental laws that apply to industries within the region, it is possible to identify certain areas of environmental concern. These are areas which will exist irrespective of whether the present amount, a moderate increase or a large quantity of oil, is realized.

Pennsylvania's coastal zone is intensely developed. The natural environment is so disturbed that it would not be possible (even if it were desirable) to restore the area to its natural productivity. A committment to heavy industry, intensive residential and commercial development, and transportation networks has been made already. The die is cast. There are, however, certain open areas of ecological importance, just as there are other sites of historical and cultural value. Since there are so few of them left in Pennsylvania's coastal zone, they should not be used as the location of offshore oil support

facilities. Among the most important ones are the HISTORICAL sites: Governor Printz Park (Delaware County), Society Hill (Philadelphia), Southwark (Philadelphia), Fort Mifflin (Philadelphia), Penn Treaty Park (Philadelphia), Andalusia (Bucks County), Bristol town (Bucks County), the Red Lion Inn (Bucks County), the Delaware Canal (Bucks County and Pennsbury (Bucks County)). Some, but not all, of these sites are in public ownership.

The significant natural areas include the Tinicum Marsh, Delaware County, which Congress has authorized the Department of the Interior to acquire as a National Environmental Center, Little Tinicum Island, Biles Island, the "Warner Lakes" and the mouth of the Pennypack Creek. Development pressures will be strong in all the areas except the Tinicum Marsh. Development in these areas will have the greatest environmental impact by virtue of the fact that there are so few open spaces adjacent to the river.

There are sites which are suitable for industrial development without an undue negative environmental impact. These include the Chester Tidewater Terminal (Delaware County), Baldwin Industrial Park (Delaware County), and the following sites in Philadelphia: the Fort Mifflin Reservation (excluding the fort and adjacent historical buildings), areas adjacent to the Schuylkill River, Walt Whitman Bridge Area, Washington Avenue area, Callowhill Urban Renewal area, Cottman Avenue area, and Frankford Arsenal. Bucks County areas include: Neshaminy Industrial Park and a limited number of smaller tracts along the Delaware River. The sites in Delaware and Philadelphia Counties are, on the whole, less environmentally sensitive than are those in Delaware County. Before facilities are constructed anywhere in the region, detailed environmental impact statements should be done.

Each onshore facility located in the Pennsylvania coastal zone will have some environmental impacts. Pennsylvania may want to encourage the location of

some facilities here, and not others, in order to minimize negative impacts. Chapter 3 considers the impact of specific facilities and outlines the environmental issue which their construction will have to address.

There will be regional environmental impacts of offshore oil development some of which are desirable and some of which are not. The most serious potential environmental impacts from offshore oil facilities are the reduction in air and water quality. If tankers are used to bring the oil ashore there is always the danger of spills. A serious effort to deepen the channel to fifty feet would have far more serious implications, however, for not only would it pollute the Raritan and Magothy Aquifer which provides southern New Jersey with its water supply, but it would also negatively impact coastal marshes along the Bay. On the other hand, new facilities may find it easier to meet air and water quality standards, thereby reducing rather than increasing these pollutants. As Chapter 4 shows, the cumulative impact of the facilities may have a synergistic effect. A detailed environmental impact statement, which explores this potentiality, is essential.

Pennsylvania's environmental laws, rules and regulations are closely correlated with those that Congress has enacted. They will apply to any development that occurs in the coastal zone. Administered by the Department of Environmental Resources (DER), these laws will govern air and water quality control, solid waste disposal, local responsibilities, governing planning, and construction of water obstructions. They are summarized in Chapter 5.

The National Environmental Policy Act will apply to the Pennsylvania Coastal Zone, because any development that occurs here will be an adjunct of the Department of Interior's leasing of the tracts on the Outer Continental Shelf. A number of federal agencies may prepare environmental impact statements, but

which one conducts the studies, and at what time in the development of support facilities in Pennsylvania will depend upon when the agencies interact with private enterprise. When a statement is prepared it will have to address the cumulative impact of coastal zone development, and not just the impact of a single facility or action.

The key issue concerning the onshore impacts generated by the development of the Baltimore Canyon Trough oil and gas revolves around where and how to develop the needed support facilities. The answer to these questions will determine the environmental impact of the facilities.[84] To enable this region to cope with the impacts, some of the considerations require legislative action, while others need additional research.

First, it is generally believed that the offshore finds will be "sweet" crude and therefore compatible with the existing refinery capacity along the Delaware River.[49] If so, the oil industry would probably substitute the new crude for the OPEC oil which they presently import from the Middle East by tanker. This action would enhance the present environment of the coastal zone by reducing tanker traffic in the river and by maintaining the status of the existing refinery capacity in the region, so long as a pipeline is used to deliver the oil to the refineries.

There would be a reduction in tanker traffic because the lease sale stipulates the use of pipelines to bring the oil and gas finds onto land. A pipeline reduces the human error factor in oil spills since there are fewer people handling the product. Chronic oil spills are associated with the loading and unloading of oil onto and off ships. Pipelines eliminate this potential source of pollution. Once laid properly, they have minimal environmental impact.

The reduction in the number of tankers will also improve ship safety in the Dealware River shipping canal. Tankers have the poorest record for the number of groundings, rammings, and collisions of all vessels in the River. Therefore,

reducing this type of traffic would improve overall river safety for other vessels. (100)

If there is no expansion of existing refinery capacity, there will be no change in the impacts on existing air and water quality unless additional pollution control equipment is required. Depending upon the quantity of oil that is found, the existing refineries may expand, perhaps doubling their present capacity. This expansion would have to comply with the federal air and water pollution regulations requiring the use of the best available practicable control technology. Nonetheless, major expansion will incrementally increase this region's existing air and water quality problems unless one of the older facilities is shut down or other industrial facilities that are now polluting close. Closing an older facility to enable the construction of a new one would create a net improvement in the environment per barrel of oil produced since the new facilities must conform with stricter pollution control standards. To minimize negative environmental impacts, there must be strict enforcement of existing federal and Pennsylvania air and water pollution laws.

If the high scenario identified in the Kirsch Report is a good estimate, there will be approximately 758,000 tons per year of petrochemical feedstocks (ethane, propane and butane) available in this region. This would encourage expansion of the area's petrochemical industry. Although economic development is desirable, this expansion could be detrimental to the environment. Lack of careful and strict environmental siting and design could turn the Delaware River into another Houston Ship Canal, an environmental wasteland, highly impacted by water discharges of petrochemical industries. The Delaware supports too many other natural and manmade resources to make this a desirable impact irrespective of what economic advantages are realized.

Proper planning will help minimize the negative impacts of onshore support facility development. Money is needed for planning in the coastal zone townships.

This would enable their Planning Commissions to update existing comprehensive plans and land use regulations. This would also enable the townships to hire and train staff to review energy impacts and development permits.

Coastal townships should adopt "energy impact zoning." By doing this, local governments could identify those areas where they want OCS-related development. Identification of these sites would encourage industry to locate in areas having the least number of environmental constraints. It would help minimize the effects from the beginning.

The Kirsch Report (49) identifies the expansion of natural gas supplies as a third onshore impact in this region. Since natural gas is a "clean" fuel, this would be a great benefit for the region. However, associated with this expansion of natural gas supplies, four new pipelines (two for natural gas and two for crude) will need to be constructed. Pipeline construction is highly disruptive, although once completed the pipeline is fairly unobtrusive. Careful siting which avoids natural and historic areas is necessary as well as construction standards which minimize erosion, and combine rights-of-way wherever possible. We recommend, therefore, that the Pennsylvania Assembly consider "Pipeline Siting and Construction" legislation which provides uniform guidelines, minimizing the negative impacts of pipelines. Most of the pipeline impact will probably be felt in New Jersey rather than Pennsylvania.

The fourth impact which the Kirsch Report (49) identifies is the creation of ship maintenance industries. These small, auxillary industries create the most environmental impacts (7,37) and are hardest to identify because each has a slight impact, yet they also provide the greatest economic opportunities for local industries to expand. Because their cumulative impact is so great it is important that a strong regional planning and development program be established to help industries minimize potential adverse effects.

There are a variety of techniques which minimize such effects. Consistent enforcement of environmental protection laws is important. While they may not cover all the impacts which these industries will generate, their stringent enforcement will do much to reduce them. Another way to minimize negative impacts is to require environmental bonding. The money held in escrow is available for cleanup, if necessary. The funds can also be used to convert the land to other uses once the "boom" of OCS development passes.

Tax incentives or low interest loans to encourage these auxiliary industries to use the best pollution control technology available are needed. Local governments often give industries property tax rebates in order to encourage location in their area, but they should explore the feasibility of giving them for pollution control rebates also. The Commonwealth can use this same technique on corporate income taxes to encourage use of the best available pollution control technology.

Finally, other states, notably Maryland, have found need for improved communication between local governments, state agencies, and the oil industry. This is appropriate in the Delaware River Coastal Zone as well. The many federal, state and regional agencies (listed in Table II), the oil industry, and citizen organizations may need to discuss what will or may happen. The Delaware Valley Regional Planning Commission (DVRPC) is the most realistic agency to expand its responsibilities to serve as a clearinghouse/notification/coordinating agency for coastal zone energy related matters in this region. DVRPC is the logical choice, since its member counties include the nine-county Philadelphia metropolitan region. Since DVRPC was one of the subcontractors for the coastal zone management plan, they have considerable expertise in this field which should be capitalized upon.

The development of the Baltimore Canyon oil and gas seems especially attractive to the Delaware River Coastal Zone because it contains the potential for

economic expansion for this region. This development is compatible with southeastern Pennsylvania's environmental goals if the recommendations contained in this report are implemented.

CHAPTER 2

CRITICAL AREAS WITHIN PENNSYLVANIA'S COASTAL ZONE

There are specific sites within the fifty-two mile Pennsylvania coastal zone which have historical, natural, or recreational value, just as there are locations that lend themselves particularly well to additional industrial development. While the data is not site specific, it is possible to summarize the existing characteristics of some of the more important areas within the coastal zone in order to either encourage the protection of an area, or encourage its industrial utilization. The purpose of this chapter is to identify and describe these areas briefly.

Heavy industry has long taken advantage of the Delaware River as a transportation corridor. Philadelphia has historically been one of the largest ports in the nation. There are, therefore, very few undeveloped areas along the river. The same characteristics that make the zone desirable for future development have created a great many historical and cultural resources in the area. They compete with the industrial development for breathing room. Natural areas are limited, making what there are more valuable than they might otherwise be in a less congested area. By identifying the historical, cultural and natural resources of the zone, we can more easily direct development away from them, thus minimizing the negative impact of any coastal zone development which occurs.

A. HISTORICAL SITES

Delaware County. The Pennsylvania Historic and Museum Commission operates

the Governor Printz Park, which is located at the lower end of Wanamaker Avenue, Essington, Tinicum Township. Named after the seventeenth century Swedish governor, the park marks the site of the earliest Swedish settlement. Archeological excavations in 1937 produced a number of seventeenth century artifacts.(98)

Another historic area along the coastal zone in Delaware County is Finland. It is located on Concord Avenue, east of Monument, Chester. This is the location of the first Finnish settlement in America. The land from Marcus Hook to the Chester River was granted to Captain Hans Ammundson Besk by Queen Christina in 1653, and he and his settlers moved to the area soon thereafter.(30)

Philadelphia County. Society Hill was the oldest residential and banking section of Philadelphia. It was an elegant residential neighborhood, until about 1890. As commercial activity increased in the nineteenth and twentieth centuries, industrial buildings replaced the residences on the waterfront.

Still, there are over 600 historic houses in Society Hill, many of which have been restored.(99) The Powel House, on Third Street, and the Hill-Physick-Keith House, on Fourth Street are examples of the outstanding architectural value of Society Hill. The Powel House is an elegant colonial home, which Charles Stedman built in 1765. Philadelphia's first post-Revolutionary War mayor, Samuel Powel, later bought it. The house is considered one of the most outstanding examples of eighteenth century American architecture. The Hill-Physick-Keith House was built in 1786 for the wine merchant, Henry Hill. It was later the residence of a prominent physician and surgeon, Dr. Phillip Syng Physick.(30,31)

The commercial role of Society Hill faded after World War I. The industrial buildings fell into obsolescence and decay. The idea for renewal of the historical section began in 1920. No action was taken until January, 1948, when the City Planning Commission certified the area for redevelopment. In August, 1957,

renewal of Society Hill speeded up when City Council approved the Redevelopment Authority's request for Federal planning assistance. The rebirth of the area incorporated historic renovation with the introduction of new apartments, shops, and parking areas. The Society Hill renaissance is considered to be "one of the foremost renewal projects ever undertaken in an area of historic importance."(30)

Southwark is another historic area in Philadelphia. It is bounded by South Street, Front Street, Washington Avenue and Third Street.(30) Before William Penn's arrival, the Swedes had established a colony in this section. Unfortunately, many of the historic structures were destroyed to construct the Delaware Expressway. However, on Monroe Street, Kenilworth Street, and Workman Place, there are still many historic homes.

Two notable landmarks in Southwark are the Gloria Dei (Old Swedes Church) Church, and the Shot Tower. Old Swedes Church, located on Swanson Street, is the oldest church in the city, dating back to 1677. The Shot Tower, located at Second Street and Washington Avenue, was built in 1808, for the purpose of producing rifle shot, and is one of the few shot towers of that period still standing.(30,31)

Captain John Montressor laid out Fort Mifflin (located near Philadelphia's International Airport) in 1771. It was completed in 1777 and served as Philadelphia's line of defense from a water attack during the Revolutionary War. In 1798, Major Pierre L'Enfant, planner of Washington, D.C., prepared plans for remodeling the fort. In 1904, the fort was partially dismantled, and in 1930, it was partially restored according to Major L'Enfant's plans.(30,73,98)

The history of Cannon Ball Farm, an early farmhouse within the coastal zone, is linked with that of Fort Mifflin. The farmhouse has been moved to a site near Fort Mifflin. Believed to be a late seventeenth century structure,

it was damaged during the battle for Fort Mifflin in 1777, thus receiving its name. It is owned by the City of Philadelphia Water Department.(30)

Another historical site in the coastal area of Philadelphia is Penn Treaty Park. It is a 1.8 acre park surrounded by highly developed industrial area at Linder Street in northeast Philadelphia. The Penn Treaty Park honors William Penn's treaty with the Indians. Fairmount Park Commission operates the park. It is the sole public access point to the river between Penn's Landing and Pleasant Hill Park.(73)

Bucks County. Andalusia, once the site of a Neshaminy Indian village, is located in Bensalem Township in Bucks County. The early house, dating from 1794, was enlarged in 1832. It is a magnificent example of Greek Revival architecture continuously occupied by the Biddle family.(98)

Bristol, an historic port town, was settled in 1697. Revolutionary and post-Revolutionary structures line Radcliff Street, on the waterfront. One finds the Grundy House, the Delaware House, the Farmer's Bank, and the Keystone Hotel. The Easton to Bristol Canal, which was completed in 1834, was an important factor in the town's prosperity, and portions of it are extant today.(73)

The Grundy House is now a privately owned museum. This Victorian structure was once the residence of United States Senator Joseph R. Grundy, who was a manufacturer and outstanding benefactor of the community. The original Delaware House was built in 1705, and rebuilt in the 1760's. Before the Revolution, the house was licensed as a hotel by Thomas Brock. It was reputed to be the best hotel between Philadelphia and New York. Many prominent people lodged there, including General John Cadwalder, General de Marquis de Lafayette, Joseph Bonaparte, and John Fitch.(30) The Farmer's Bank, which was organized in 1814, was the county's first bank. The central portion of the structure was built in 1818, as the home of James Craig. The Keystone Hotel, which was once known as the

Closson House, has been operating as a hotel for over one hundred years.(30)

Also in Bucks County, one finds the Mount Pleasant House, which is located on the Delaware River northeast of Cornwells Heights. Benjamin Franklin's son-in-law, Richard Bache. owned this house. It is thought that the first lightning rod was used here.(30)

The Red Lion Inn, southwest of Andalusia, is another historic structure within the coastal zone. The brick and stone building was erected in 1730. On their way to Yorktown, Washington's troops camped near here. Delegates to the First Continental Congress also stayed at the Inn.(28)

The ten miles of the Delaware Canal, which stretches from Morrisville to Bristol, is of historical importance as a reminder of the economic role canals played in the industrial expansion of the state and nation. The Pennsylvania Department of Environmental Resources maintains the canal as a public park. Because it is a narrow strip of land between private property and the Delaware River, access to the canal is sometimes difficult.(73)

Pennsbury, William Penn's "beloved manor," was built in 1683. Although destroyed, archeologists from the Pennsylvania Historical and Museum Commission recovered artifacts from the original dwelling in 1934. In 1938-40, the state reconstructed the manor.(98)

These are among the most outstanding historical sites located in the Pennsylvania coastal zone along the Delaware River. Any coastal zone development should seek to minimize negative impacts on these outstanding examples of our architectural and historical heritage.

B. SITES OF NATURAL VALUE

The Delaware Valley Regional Planning Commission conducted an inventory of natural features of the coastal zone, and in the 1976 publication, Four Environmentally Signifiant Areas, identified four of the most critical areas. They are: (1) Tinicum Marsh, (2) Little Tinicum Island, (3) Biles Island, and

the area alternately referred to as (4) "Warner Lakes--" Manor Lake, Van Sciver Lake, or Money Island.

The reason for the designation of these four areas as such is:

> The Delaware Estuary Coastal Zone in Pennsylvania is characterized by intensive development. Undeveloped areas are scarce, and the few large natural areas which remain merit special attention... Those areas which exhibited concentrations of woodlands, wetlands, steep slopes, wildlife habitat and scenic quality were designated as "areas of significant natural value" deserving further study. (29)

Little Tinicum Island - Tinicum Township. The island is situated on the Delaware River across from Tinicum Township in Delaware County, southwest of the Philadelphia International Airport. It measures 11,400 feet in length, and its width ranges from 140-840 feet. Currently, the island is of environmental significance, as its vegetation sustains numerous waterfowl, land birds and some mammals. (29)

The island exists because the current of the Delaware River slows just north of the island. When the water slows, it deposits sediment, and lacks the velocity to erode the island. (29)

At the water's edge, marsh vegetation flourishes. Marsh vegetation consists of common reeds, pickerelweed, loosestrife, and spatterdock near the waterline, while bulrushes and narrow-leaved cattails grow in the water. (29)

The vegetation changes as one proceeds to higher ground. Inland, the shrub layer occupying open areas consists mostly of elderberry, alder, and honeysuckle. The canopy overhead is red maple, ash, sycamore, and black willow, none of which is very mature. As wildlife habitat, the island is a refuge for some 237 species of migratory and native landbirds, shorebirds, and waterfowl. Located on the Atlantic Flyway, it is a convenient stopping point for migratory birds. There are relatively few mammals on Little Tinicum Island. (29)

Tinicum Marsh. Tinicum Marsh was once part of 13,000 acres of tidal marshland in the coastal zone along the Delaware River. Today these 500 acres are

almost all that remain of Pennsylvania's coastal marshes.[29] The area

> ... is bounded on the south by Interstate Route 95 and Pennsylvania Route 291, on the west by Darby Creek, on the north by high ground (the Piedmont) and developed areas, and on the east by Eastwick Redevelopment Area. A 145 acre portion of the Tinicum National Environmental Center, originally a wildlife preserve, consists of diked freshwater impoundments for waterfowl and was given by the City of Philadelphia to the U.S. Department of the Interior...in 1974. (29)

Only recently have people understood the value of marshlands. Wetlands serve as highly productive breeding grounds for aquatic and terrestrial life, and improve the water quality serving as settling ponds -- trapping suspended sediments, recycling nutrients contained in the sediments to the plants and aquatic organisms living in the marsh, and reoxygenating the water. It also stores water during floods.

The marsh ecosystem is highly sensitive to changes. The vegetation and micro-organisms are adapted to a unique and severe environment. The marsh floods twice daily with the tides; it is baked during dry periods, and it freezes in the winter. The biotic community will not tolerate diking and filling, and less obviously is sensitive to changes in water quality from pollutants which affect the quality of the nutrient cycle.

The Federal government is quite anxious to preserve the Tinicum Marsh and adjacent open space to establish the Tinicum National Environmental Center. Congress has just appropriated funds to begin land acquisition, thus recognizing the unique attributes of the area, as well as the need to protect some natural wildlife habitat in urban areas. Local support for the project is equally strong.

Biles Island. Biles Island is located near Falls Township, Bucks County, and is separated from the mainland by Biles Creek, which connects with the river at both ends of the island. Biles Island is about 800 feet wide at its narrowest point at the northern end, and is about 4,000 feet near the center of the island. Once densely forested, the U.S. Army Corps of Engineers has cleared nearly half of the island's 600 acres to make a site for dredge spoil disposal. One of the

two disposal sites was filled in 1975, and the Corps expects to begin using the other soon.[29]

The U.S. Steel Corporation, whose Fairless Works is located across Biles Creek, owns the island. Were the works to expand, this location appears to be a natural site for expansion.[29]

Vegetation on the island ranges "...from sparse grassland on filled areas to nearly impenetrable forest."[29] New growth is beginning on the spoils piles, but is very sparce. In the abandoned fields at the southern end of the island, young sycamores and red ash grow in a dense shrub layer of spicebush, jewelweed, and sumac. All these species are associated with wet, poorly drained soil.

The more mature areas of vegetation consist of more diverse, mixed deciduous species -- linden, maple, sycamore, birch, walnut and elm. In the upland areas, which have better-drained soil, sassafras and gray birch grow. Like the two previous sites, Biles Island has several freshwater tidal marshes around its perimeter. They contain spatterdock and smartweed.

The diversity which characterizes the vegetation on the island also characterizes the wildlife community. While no inventory has been made of the species, many are believed to inhabit the island.

Manor and Van Sciver Lakes. The lakes are located a few miles southwest of Biles Island, on the west shore of the Delaware River, near Levittown. The lakes are man-made -- the result of extensive quarrying of old riverbed gravels. They total approximately 2,250 acres and are surrounded by 4,000 acres of land, all of which the Warner Company owns. The company employees use the lakes for boating, fishing and camping.

Money Island is part of the lake complex. It is more a peninsula than an island, and owes its existence to the artificial lakes adjacent to it. Money Island contains 6,000 acres, and lies southwest of Manor Lake. Money Island is similar to Biles and Little Tinicum Islands. Dense shrub underlies a rim

of willow, sycamore, and cottonwood around the perimeter. Inland are dredge spoil disposal sites. Although they are about twenty years old, the early successional vegetation consists of short grasses and herbs. In addition to the species already mentioned, the periphery of the island supports black cherry, sassafras, black locust, and black oak. Scrub vegetation, consisting of greenbriar, honeysuckle, sumac and arrowwood, grows on parts of the fill area.(29)

As on the other islands, the vegetation communities are not evenly distributed, but vary with the drainage characteristics and degree of soil disturbance. Upland and lowland species, commonly found elsewhere in the region, follow the same locational patterns on the islands and around the lakes. Sycamore, willows, silver maples, and river birch occupy the poorly drained areas, while red maples, and in one case, Virginia pine, grow in the upland areas.(29) Freshwater marshes, common to the other sites, are less common here, but do exist in a few places. Spatterdock again dominates the marsh vegetation.

Water quality in the lakes is relatively good. Though swimming is absent from the list of recreational activities, this is due to a lack of facilities and supervision, rather than to water quality. In Manor and Van Sciver Lakes, most of the water which fills them is groundwater with some (seven feet) augmentation pumping from the Delaware River. To the degree that the Delaware River water is a supplementary source for the lakes, the quality of the river water has a great degree of influence over the overall water quality in the lakes.(29)

Water quality is a function of the degree to which lakes are subject to sedimentation from suspended particles in the river water, erosion from the surrounding countryside or algal blooms resulting from eutrophication. None of these problems is present in either lake, in spite of the radically different treatment the Warner Company gives them. Van Sciver Lake is continually

dredged, but Manor Lake has not been dredged for fifteen years. As the DVRPC report states:

> Manor Lake appears to be in a more delicate state of ecological balance than Van Sciver Lake. The nutrient level is high so that additional amounts could upset the balance between the nutrients and organisms, and trigger an algae bloom. This problem arises not only because Manor Lake is the older of the two lakes and has accumulated nutrients over time, but because of the proximity of agricultural uses, which typically contribute nutrient rich run-off. (29)

The report goes on to say that the quality of the water being pumped from the Delaware to augment the level of the lakes could cause eutrophication if water quality deteriorates.

Pennypack Creek. The Pennsylvania Coastal Zone Management Program describes Pennypack Creek, located at the northern stretch of Philadelphia's shore, as "one of the most valuable natural resources found in the entire study." (73) The Fairmount Park Commission operates Pennypack Park, which protects most of the river corridor. The area surrounding the creek consists of woodlands, wetlands, and wildlife habitat. There is relatively undisturbed wetland where the Creek joins the Delaware River. This is a unique natural area, simply because there are so few similar tracts within Pennsylvania's coastal zone. The area is subject to development pressures and should be protected.

C. RECREATIONAL SITES

The high percentage of industrial, commercial, and transportation facilities along the Delaware riverfront limits recreational opportunities. Yet, the river corridor is a desirable place for recreation, since "many forms of recreation are signficantly enhanced by proximity to water." (73) Major problems are that waterfront access is limited, the shoreline is poorly maintained, and pollution forbids water-based recreation.

Delaware County. A majority of the riverfront in Delaware County is in private ownership. The public access areas are: McClure Park in Marcus Hook, the Governor Printz Park in Tinicum, and private marinas in Tinicum, Chester,

and Marcus Hook. The Delaware County River Corridor Study suggests that increased recreational development would not conflict with riverfront industries since the majority of them are not river-dependent.(27) A problem might arise, however, from competition between recreational and commercial water traffic.

On the Pennsylvania side of the Commodore Barry Bridge in Chester, the Delaware River Port Authority owns four acres of waterfront which are zoned for industrial development. The city could use the area as a recreational site instead.(73)

The mouth of the Chester Creek in Chester could be a useful recreational site. It would provide access to the river, within easy walking distance of Chester City with its dense concentrations of population.(73)

At the end of Market Street in Marcus Hook there is the 1.2 acre municipal McClure Park. Its salient feature is a river view.(73)

Governor Printz Park, at the end of Wanamaker Avenue in Essington, Tinicum Township, is a five acre public park, which the Pennsylvania Historic and Museum Commission operates. Not only is it special for historical and archeological reasons, but it also has a good vista of the river.

There are, in addition to the above sites, eleven private marinas and a seaplane base in Tinicum Township. This Delaware River waterfront could be an important resource for water-related recreation if the depth of the channel were maintained.(73)

Philadelphia County. The City of Philadelphia is developing a 42-acre strip of Center City, along the Schuylkill River from South Street to the Art Museum as part of the Fairmount Park System. It expects to complete it in 1980. The park will have athletic facilities, a playground, bicycle and foot paths and passive recreation facilities.(73)

The Penn's Landing project, which is a joint undertaking by the Commonwealth of Pennsylvania and the City of Philadelphia, incorporates commercial and rec-

reational activity along the Delaware River in the Society Hill area.(73)

Bucks County. At the end of State Road and Station Road, Bensalem, Bucks County has just developed an eight-acre, multi-purpose park. In addition to providing direct access to the river, it has boat-landing, picknicking and fishing facilities. It serves the lower Bucks County -- northeast Philadelphia area, whose residents would not be able to enjoy the river otherwise.(73)

Another recreational site in Bensalem Township is close to Flushing, between Newportville Road and Creek Road. It includes 30 acres of floodplain on the Neshaminy Creek. The County is converting it to public open space for passive recreation and hiking.(73)

The Pennsylvania Department of Environmental Resources has developed the Neshaminy State Park at the juncture of Neshaminy Creek and the Delaware River. The 220-acre mutlti-purpose park is on both sides of the Creek and provides much needed recreational facilities for the area.(73)

The Pennsylvania Canal, from Morrisville to Bristol offers a lovely walkway for hikers, fishermen, and others in lower Bucks County. The Department of Environmental Resources, which maintains it, may connect it with the Theodore Roosevelt Park, a canal-oriented park which parallels the Delaware north of Morrisville.(73)

Finally, 30 acres of heavily wooded land, at the base of Lauderback Road was recently donated to Falls Township for open space. The Township is constructing picknicking, fishing, and boating facilities.(73)

D. INDUSTRIAL DEVELOPMENT SITES

Delaware County. The Chester Tidewater Terminal, in Chester City, is a prime area for water-related development. This 70-acre independent cargo terminal is underutilized. Although it is now used as a storage area for bulk cargo, it was once considered as the location of a containerized marine terminal.

Rail spurs and utilities are already on the site. Good highways are located nearby.(73)

To the east of the Chester Terminal, Philadelphia Electric Company owns twenty-five acres of land. It is not available for short-term development, though, because the utility is using it as a solid waste diposal site.(73)

Perhaps the best site for new industrial activity in Delaware County is the Chester Waterfront in Chester. The City of Chester proposes to overhaul at least fifty acres from Ridley Creek to Flower Street and from the Delaware River to the Conrail right-of-way. The result will eventually be an industrial park, composed of major utilities and industries, plus commercial activities. The area is now in a state of disrepair. Route 291 is being improved for this area. Utilities and a large unemployed work force are also located in this area.(73)

In Eddystone Borough, the Baldwin Industrial Park is an ideal spot for development. Inland from the river, it is close enough to complement river-based activities. These 24 acres once housed the Baldwin-Lima-Hamilton Corporation. The Industrial Park Development Company owns almost all of the site. Only one of the buildings is used now. The rest are unoccupied. Conrail and Route 291 (Industrial Highway) pass through the property.(73)

In Eddystone Borough, two large Delaware County firms, Sun Shipbuilding and Dry Dock Company and Philadelphia Electric Company own one mile of waterfront.(73) Sun Ship constructs large commercial vessels, engages in repair and conversion of ocean-going vessels, and fabricates heavy industrial items there. It also has a shipyard in Chester complete with floating dry docks, derricks, heavy lift cranes, wet docks, and pier facilities. Sun Ship is seeking to expand its operation particularly along the Eddystone waterfront. Sun Ship would almost certainly become involved in platform construction or ship maintenance for the offshore oil industry, as its Executive Vice President, Robert

Galloway, explained that, "Our resources, skills, and plant and equipment are ideally suited for all facets of such offshore work."

There are also some other privately owned, developed parcels of land, including one thousand feet of riverfront south of Crum Creek, that are available for industrial expansion.(73) This portion of Delaware County has good railroads, plus Interstate 291. Since these properties have already been developed, the environmental impact of using them for offshore oil support facilities would be minimal.

There are two large parcels of vacant, easily developed land in Tinicum Township, other than Tinicum Marsh. One parcel of approximately two hundred acres is slated for airport-oriented development. It is opposite Little Tinicum Island, and is owned by Westinghouse Corporation. Potential uses here are limited due to the noise the adjacent Philadelphia International Airport generates. The site is currently used for minor cargo handling. Railways and highways, particularly Route 291, are accessible, but the back channel of the Delaware River is very shallow and could be a limiting factor for river-oriented growth.(73)

The other parcel, of approximately 150 acres, is filled marsh. This second site is located between Cargo City, of the Airport, and the industrial sites of Tinicum. It is privately owned by Tinicum Real Estate Holding Company. It is also suitable for airport-related uses, including future extension of the runway.(73)

The Fort Mifflin Reservation, Penrose Avenue area, will provide a prime development opportunity for Philadelphia. They are two separate, major parcels of land at the junction of the Schuylkill and Delaware Rivers. The Army Corps of Engineers uses one 420-acre parcel as a dredge spoil disposal site.(73) The Corps maintains that there is no other practical site for this activity in the city. Since it takes a number of years for spoil to stabilize, this land will not be available for development for 25 to 30 years.

The City owns the second parcel of 113 acres, referred to as the "golf tract." It is currently used for the storage of the Philadelphia Water Department's Southwest Sewage Treatment Plant's sludge.[73] If an alternative place is found for the sludge, this land could be used more productively.

On the opposite bank of the Schuylkill River, the Philadelphia Industrial Development Commission owns some land. It plans to develop this as an industrial park. It is a good location since it is close to downtown Philadelphia, has access to I-95, Route 291, and interstate freight railroads, and is located at the mouth of the Schuylkill River. One major obstacle is that there is no good river access to the Penrose Avenue area.[73]

In Eastwick, there is a site of approximately 350 acres near the Schuylkill River. Site preparation has already been done there. It has very good potential for petrochemical plants.

The Walt Whitman Bridge area, located south and west of the Packer Avenue Marine Terminal, is immediately available for reuse. There are around 350 acres in this area. Marginal wharf, and vacant inland industrial property are part of this area. There are really three sections to the site: the railyards, Delaware Avenue, and the Pier 98 Annex. Most of the Conrail yards are vacant and scheduled for abandonment or sale. Delaware Avenue, from Catherine Street to Oregon Avenue, is going to be improved and has the potential for heavy industry. The Pier 98 Annex, owned by the Philadelphia Port Commission, is vacant and available for reuse.[73] Its twenty-four acres are earmarked as a foreign or free trade zone, which means that certain activities could occur without the imposition of import duties. This area may not be a good site for ship maintenance industries because of its relatively small size. Other parts of the Walt Whitman Bridge area are suitable, however, and hope to attract these industries to them. There is adequate rail and truck transportation to the area, and while there are a few active public

finger piers nearby, much of the area is abandoned or underutilized. The property has the potential to be a service area for ship maintenance industries. Already severely disturbed, it has little ecological significance.

North of the Walt Whitman Bridge area there are various parcels of marginally used land and piers around Washington Avenue.(73) There are two active industries, Kerr McGee and National Sugar, in the area. They use piers and storage space along the waterfront. The northern portion of this area adjoins Queens Village, a residential complex. This area would not be suited for heavy industrial or ship maintenance activities because of the residential area.

Abutting the Callowhill Urban Renewal Area, north of the Benjamin Franklin Bridge, is the largest industrial reuse project in Philadelphia. There are some vacant, underutilized and active piers along the Delaware River waterfront in the area from Penns Landing to Shackamaxon Street. Reuse proposals have been made for isolated parcels, but other parcels are still available.(73)

One of the greatest development areas in the Philadelphia waterfront area would be created if Conrail decided to abandon its railyard in Port Richmond and the Chessie System did not not acquire it. This major railyard is now used to ship grains and general cargo. The Philadelphia Industrial Development Commission also owns a 150 acre site.(73) It has been proposed as a possible location for a containerized cargo terminal. A great deal of new construction would be necessary to enable the piers to handle containerized cargo, however.

The northernmost point of intensive commerical port- and shipping-related activity in Philadelphia, the Cottman Avenue area, has several small industrial parcels of land now available for reuse. Immediately north of this waterfront property are the major city intake point and the mouth of the

Pennypack Creek (described under natural areas). The Philadelphia Industrial Development Commission is considering buying the least developed parcels. There is adequate rail and highway access (notably I-95) to the area.[73]

Since its military purposes are being phased out, the Federally-owned Frankford Arsenal is available for public or private reuse. It encompasses 110 acres and is densely developed with buildings that are in good condition. At one time, 22,000 people were employed here. The site is desirable because it is surrounded by a strong residential community, a number of major industries, and an extensive utility system. However, the preferable use of this site would be for educational, non-profit activities.

Bucks County. Neshaminy Industrial Park, located at Street and State Roads, Bensalem, is the only site that is immediately available for development in Bucks County. This park includes around 75 acres of flat waterfront, that are close to several large, established industrial plants and warehousing activities. The potential exists for water transport, in addition to Conrail, and interstate highways. The area is also well served by utilities.[73] The one possible problem that may be encountered in this area, as with other areas in the Bucks County coastal zone, is flooding.

Much of the land that could be used for industrial development in the Bucks County coastal zone is of substantial natural value, and should be protected against unnecessary industrial intrusions. If development is planned for these areas, considerable site preparation may be necessary. Large companies, such as U.S. Steel and Rohm & Haas own industrial sites in this county. These lands are often planned for other types of development. This would preclude their use for offshore oil support facilities.

Rohm & Haas owns a portion of Bristol Township's waterfront which extends for approximately three quarters of a mile north and south of the Burlington-Bristol Bridge. These flat wetlands currently act as a buffer zone, despite

their strategic location on the Delaware River and to existing industry. At another Rohm & Haas site at Otter Creek oil storage facilities were proposed. The plan was withdrawn because of potential adverse environmental effects on the river. Nonetheless, this site is zoned for industrial use.[73] Conrail, Bristol Pike, I-95, and Route 413 pass through this area.

In Falls Township, there are close to 2000 acres of industrially zoned land between Van Sciver Lake and the Fairless Works of the U.S. Steel Corporation. There are many owners, but the Warner Company, a cement and real estate firm, is the principal one. U.S. Steel also has some land for sale in its Falls Indusrial Park.[73] All of this land is suitable for productive, multi-purpose use, and could be utilized for offshore oil and gas development. The transportation network serving this area is extensive, including access to Conrail, Bristol Pike, Bordentown Road, and shipping on the Delaware River. Development of tracts within existing industrial parks would reduce the environmental impact on the limited existing open areas.

U.S. Steel Corporation owns the land between its Fairless Works and the Delaware River.[73] This area has been degraded so parts of it could be used for a water-related, industrial site. Parts of it are sensitive, natural areas, and should not be developed if other sites are available.

In Bristol Township, near the intersection of Linton Avenue and River Road, a tract of 108 acres of flat land is available. Rohm & Haas owns it.[73] The area has natural and scenic value and serves as a buffer against intense industrial activity on the Delaware River. Yet, it is zoned and planned for industrial uses that would be compatible with the surrounding residential, commercial, and industrial developments. It is situated on Bristol Pike. The conflict between its use as a buffer and being developed must be resolved. If developed, every effort should be made to keep as much of it open space as possible.

Another area, between Van Sciver Lake and the Pennsylvania Canal, in Falls Township, has potentially conflicting uses. The wooded and agricultural parcels are traversed by Martins Creek. Its location is conducive to industrial development, though, since it is adjacent to Conrail, Route 13, and commercial and mining activities. This flat area's proposed land-use and zoning suggest industrial development.(73)

Money Island is a large, available area in Tullytown Borough and Falls Township. Only 200 of its 600 acres are really suited for large-scale industrial development; this acreage is located on the southern part of the island. This area is used for dredge spoils and low-intensity agriculture. The major disadvantage here is that costly improvements would have to be made, such as the installation of sewer, utility, road and rail extensions into the area.(73) Although most of the 600 acres are planned and zoned for industrial use, the northern part, the frontage of Manor Lake, and the areas along the Delaware River are of prime natural and recreational value when compared with other open areas within the coastal zone.

Warner Company owns a narrow parcel of wooded land with rich soils in Falls Township, located along Ford Mill Road. It is on an existing rail spur and is planned and zoned for industrial uses.(73)

Also, in Falls Township, there is a large undeveloped area, called Biles Island which U.S. Steel owns.(73) Some of the wetlands of the island are of significant natural value. There is a conflict because the site is zoned for industrial development and railroads and highways are accessible. Since the Delaware River is 25 feet deep, some shipping is possible. This is an environmentally sensitive area which should be avoided if possible.

SUMMATION

The sites that are available for development in Philadelphia and Delaware

TABLE 1

SITES WHICH CAN BEST SUPPORT OCS-RELATED ONSHORE DEVELOPMENT WITH MINIMAL ENVIRONMENTAL DEGRADATION

SITE	COUNTY	SPECIAL FEATURES	LAND	ACREAGE	POSSIBLE FACILITIES	SHOULD BE NEAR
Walt Whitman Bridge Area (Packer Avenue Terminal)	Philadelphia	marginal wharf (1978) heavy lift crane 40-foot channel	flat inland waterfront	350	*repair and maintenance *marine terminal permanent shorebase partial processing gas processing petrochemical pipecoating	terminal tank farm refinery, terminal, pipeline pipeline refinery shorebase
Chester Tidewater Terminal/ plus site on east side	Delaware	independent cargo terminal on Delaware River	flat waterfront	50/25	*marine terminal base - pipeline and platform installation permanent shorebase gas processing	tank farm pipeline, pipecoating pipeline
Between Delaware River and Fairless Works	Bucks	belongs to U.S. Steel	flat waterfront	100-300	repair and maintenance pipeline station pipecoating	terminal shorebase
Baldwin Industrial Park	Delaware	near riverfront	flat inland	60 (only 20 may be free)	partial processing gas processing	refinery, terminal, pipeline pipeline
Neshaminy Industrial Park	Bucks	floodprone close to warehousing	flat waterfront	75	partial shorebase partial processing gas processing pipeline	refinery, terminal, pipeline pipeline

*indicates the most likely facilities to locate

Counties are less environmentally sensitive, on the whole, than are those in Bucks County. Whenever possible, any offshore oil-related development should be encouraged in those areas. This is particularly true of sites which were once used for commercial or industrial development, but have been abandoned. Initial analyses show that if they are rehabilitated the overall environmental impact will be positive rather than negative.

Before facilities are constructed, site specific environmental impact analyses should be done, irrespective of whether they are required under the National Environmental Policy Act or not. Such a review will further minimize negative environmental impacts, while accommodating the development that is necessary to improve the economy of the Greater Philadelphia region in order to pay for the preservation of the unique natural areas which merit protection.

CHAPTER 3

POTENTIAL ENVIRONMENTAL IMPACTS OF ONSHORE FACILITIES

Pennsylvania's coastal zone is already heavily urbanized. Nevertheless, the construction of additional onshore facilities to support offshore oil development will have environmental impacts. Some of these may be good. Modernization of existing refineries would enable the oil industry to utilize the most modern pollution control techniques. On the other hand, some impacts may be less desirable. If the oil comes ashore in tankers, the increased river traffic could lead to spills, which would harm aquatic and marsh biotic communities.

In the preceeding chapter we discussed the broad environmental impacts that offshore oil development could have on the Pennsylvania coastal zone. Equally important is the impact different types of facilities could have, for Pennsylvania may want to encourage one and discourage another facility in order to minimize negative environmental impacts. This chapter, therefore, describes the kinds of facilities that are apt to locate in the Pennsylvania coastal zone

and the broad environmental implications of each. The facilities include shore-based support facilities for exploration and drilling, as well as those that refine crude oil.

SHOREBASES

Different people define shorebases differently. The term can be used in general or to describe particular operations. In this report, temporary service bases, permanent service bases, bases supporting pipeline and platform installation, and repair and maintenance yards are defined as shorebases.

Temporary Service Bases. The temporary service base serves as a transfer point between the mainland and offshore operations. Materials and workers are taken from here to the rigs in boats or helicopters.

Commercial fishing ports often make an ideal location for temporary service bases. To be used as one, a harbor must have a 15 to 20 foot channel and be open throughout the year. Most bases are located on five to ten acres of land and have a minimum of 200 feet of wharf.(39)

The temporary service bases are located as close to operations as possible, so it is doubtful that any will be located within the Pennsylvania coastal zone. Should they be, however, they would have minimal environmental impact, for there is an abundance of abandoned land available along the Delaware River.

Permanent Service Bases. Permanent service bases serve essentially the same function as temporary ones, but they are larger and more intensively developed. They need 50 to 75 acres of land and a minimum of 600 feet of wharf on an all-weather harbor in order to serve rigs. They are erected during the development phase of offshore oil development when oil has been discovered in quantity and the size and intensity of support services that are needed increases drastically.(39)

Most of the land at the permanent service base is used for warehousing and open storage. A small area is used for offices and communications operations.

The base must have adequate land transportation facilities. Good road and rail access to the site is essential. Since helicopters are used to transport oil rig crews to and from offshore platforms, perform oil spill control and pipeline patrol tasks, and transport emergency parts to the rigs,(39) the site must be in an area that permits them to operate.

Environmental impacts of the permanent base tend to be long-term in nature. Open storage can lead to water pollution if not done properly. Increased traffic in congested shipping lanes could increase the probability of accidents. The waste that is brought to land from the rigs must be disposed of in an environmentally sound manner. If supplies are brought to the base via truck, exhaust may increase the air pollutants in the area to undesirable levels. From an environmental viewpoint it is far better, therefore, to service these bases by rail rather than road.

The environmental impacts of permanent bases are no greater than those of heavy industries that are located within the Pennsylvania coastal zone. So long as care is taken to adhere to existing environmental regulations and locate the facilities in already developed areas, their impact would be minimal. In those instances where the facilities replace derelict warehouses and wharves, their environmental impact would probably be positive, rather than negative. Before these facilities are constructed, however, an environmental impact statement should be prepared to assess the specific impacts of that facility.

Bases Supporting Pipeline and Platform Installation. The companies that support or install pipelines and platforms usually set up their own service bases. They need waterfront, warehouse space, and service and maintenance facilities for their vessels and barges. Normally these are short-term facilities which require from five to seven acres for each set of vessels that is laying a pipeline. The pipe is not stored at the site, but is transferred from the

pipecoating plant directly to the installation site. This reduces the storage area that is needed.[39]

A good transportation system is critical to the smooth operation of the base. It must have adequate rail or highway access as well as access to the water.[39]

The environmental impact of the pipeline and platform installation base is similar to that of the temporary and permanent supply bases. In the Pennsylvania coastal zone there are a sufficient number of non-critical environmental sites which could house these facilities, so long as environmental regulations are met.

Repair and Maintenance Yards. Next to payroll and initial capital investment, the oil industry spends more money on repair and maintenance than on any other phase of its exploration and production operations. Many existing industries can capitalize on this fact simply by augmenting and adjusting their existing facilities to meet the industry's needs. Not only does it require the normal equipment maintenance facilities, but also people who are trained in seamanship and diving.[39]

There are many industries which are able to provide the necessary support facilities in the Delaware Valley. Because of the variety of services involved, and the dearth of companies that could provide them, it is impossible to assess what the environmental impact in Pennsylvania would be. Given the number of industries in the region that are not now operating at capacity, however, it is probable that the development of a service industry geared to supporting the offshore oil development would have little primary environmental impact in the region.

Summary. The determination of the environmental impact of a shorebase in the Pennsylvania coastal zone will depend upon the preparation of an environmental impact statement for the facility. Table 1, however, summarizes the general types

TABLE I

POTENTIAL TYPES AND SOURCES OF POLLUTANTS
FROM SHOREBASES FOR OIL EXPLORATION AND PRODUCTION

Category of Pollutant	Type	Amount	Source
AIR POLLUTION	Hydrocarbons	varies	Fuel storage tanks Transfer operations Combustion Spills or breakage
	Kerosene	.005-1 lb/day/ 1000 gal handled	Storage tanks
		.25 lb/day/ 1000 gal handled	Transfer operations
		.32 lb/day/ 1000 gal load	Boat transit
	NO_x SO_x	varies	Service vessels Cranes Trucks
	Dust	varies	Mud and chemical storage and transfer
NOISE POLLUTION	BASIS	Amount	Source
	24-hour	Up to 85 dB	Equipment operation
WATER POLLUTION	Component	Amount	Source
	Hydrocarbons	varies	Bilge and ballast water from boat discharge Accidental and chronic fuel spills
	Heavy metals	varies	Bilge and ballast water from boat discharge
	Muds	varies	Runoff from work and storage area
SOLID WASTES	Component	Amount	Source
	Misc. refuse	Up to 6 tons daily per source	Drilling operations
	Oil-contaminated waste	250-500,000 lbs/day	Offshore rigs

of pollution that could occur, and that must be handled in an environmentally satisfactory manner by any shorebase facilities that locate here. Existing literature and conditions in the region suggest that the technology to control negative impacts is available if shorebase facilities locate in some of the redevelopment areas of the Pennsylvania coastal zone.

MARINE TERMINALS

Marine terminals are needed at the landfall of waterborne shipments of crude oil. The oil companies operate many of them for their own use. The terminal usually includes berths, crude oil loading and unloading equipment, storage tanks, ballast water treatment facilities, and other general harbor facilities. Land for the terminal should be flat, out of the flood plain and be capable of bearing heavy loads.(39)

When crude oil comes ashore via pipeline, it can be transferred at the marine terminal to tankers for delivery to the refinery. Before it is shipped, ballast treatment and processing facilities remove the brine from the crude, separate the crude into its components, and process gas, if enough liquifiable petroleum gases are contained in the crude oil. This is one type of terminal.(39)

A second type of terminal is to receive crude from tankers for delivery by overland piplelines to nearby refineries. Tankers unloading at these terminals pump the crude oil to a surge tank farm where it is stored temporarily. This allows for faster unloading than could occur if the tanker is unloaded directly into the pipeline.(39)

The Flotta Terminal, in Scotland, is a good example of a transfer terminal. One hundred of its 340 acres are used intensively, mainly for storage. There are five 250,000-barrel tanks, one 500,000-barrel ballast tank, two 100,000-barrel liquid petroleum gas tanks, and a gas processing plant. In addition, thirty-two acres are used for crude oil storage, while ten acres are used by the deballasting tanks.(39)

The terminal and tank farm should be at one site to: 1) avoid duplicating office and safety equipment, 2) simplify loading and unloading of tankers, 3) lower land requirements, 4) reduce overland pipeline needs, and 5) transport large materials to the tank farm by the sea.[39]

TABLE II

POTENTIAL TYPES AND SOURCES OF POLLUTANTS FROM MARINE TERMINAL

Category of Pollutant	Type	Amount	Source
AIR POLLUTION	Hydrocarbons		Storage tanks Transfer operations Combustion Spills or leakage
	Exhaust (NO_x) (SO_x)		Boats Sumps Compressors
NOISE POLLUTION	Basis	Amount	Source
	Operator's position	92-100 dB	Compressor
	6 feet	90 dB	Boiler
WATER POLLUTION	Component	Amount	Source
	BOD		Bilge, ballast & runoff water
	COD		Bilge, ballast & runoff water
	Tanker suspended solids		Bilge, ballast & runoff water
	Grease		Bilge, ballast & runoff water
	Oil		Bilge, ballast & runoff water and spills

The environmental impact of a marine terminal is greater than that of a shorebase because it requires more land. A large terminal can easily require 60 acres and a terminal farm 15 to 20 acres. If partial processing facilities are part of the terminal complex, an additional 15 acres per 100,000 barrels capacity are needed. This land should be flat, well-drained, out of the flood plain and capable of bearing great weight.(39) Finding such an area in the Pennsylvania coastal zone, that is not committed to another use, will be difficult indeed. Many of the natural areas that are relatively undisturbed are within the flood plain or are poorly drained. Aside from the difficulties of site preparation, the loss of these few areas would be a critical environmental impact in an area that has already destroyed almost all of its natural coastal areas.

Air pollution from marine terminals would include the escape of hydrocarbons from storage tanks, transfer operations, combustion, and spills and exhaust from boats, sumps and compressors. Specific pollutants would include particulates, sulfur dioxide, carbon monoxide and nitrogen oxides. Because of existing air pollution levels in the Greater Philadelphia area, air pollution could be a constraint should a marine terminal be constructed within the region.

Bilge, ballast and runoff water may contain a number of pollutants. In addition to suspended solids, grease and oil, there may be heavy metals, phenols, and other foreign substances.(39) If discharged into the receiving waters they can have an adverse effect on the aquatic communities. Stringent state and federal regulations would minimize their environmental impact.

PARTIAL PROCESSING FACILITY

Partial processing facilities remove impurities from the crude well stream. The liquid components from the crude oil are processed to remove free and e-

mulsified water, dissolved solids, and suspended solids.[39]

The decision on where to construct a partial processing facility would be made upon confirmation of discoveries. If the finds are too far offshore, arrangements will be made to partially process the well stream on the platform.[39]

If possible, the industry plans to use existing onshore facilities. If it must build a partial processing plant, it would locate it near a pipeline landfall, marine terminal, and refinery to minimize the overland pipeline. The land requirements for a partial processing plant range from 11 to 15 acres per 100,000 barrels per day capacity.[39]

TABLE III

PERCENTAGE OF LAND
DEVOTED TO DIFFERENT USES
AT A PARTIAL PROCESSING PLANT

Use	Percentage of 15 acres	Acreage
Oil Treatment	11.4%	1.71
Oil Storage	21.9%	3.28
Gas Treatment	42.1%	6.31
Water Treatment	8.8%	1.32
Liquid Petroleum Gas Storage	7.0%	1.05
LACT Unit	8.76%	1.31

If partial processing is done offshore, wastes could be re-injected into the well. Even if these facilities are onshore, processing wastes must be disposed of.[39]

The processing operation generates hydrogen sulfide gas, nitrogen oxides, and sulfur oxides from the crude oil heaters and incinerators. If there are leaks during processing, more nitrogen oxides and hydrocarbons will be released. These are controllable if the crude is handled properly.

Wastewater from a partial processing facility may contain oil/water emulsions, dissolved oil, suspended and dissolved solids, heavy metals and dissolved salts. It must be treated before it is released. Solid wastes from the treatment process are a potential environmental problem, but can be dealt

TABLE IV

POTENTIAL TYPES AND SOURCES OF POLLUTANTS
FROM PARTIAL PROCESSING PLANT (80,000 Barrels per day)

Category of Pollutant	Partial Processing	Component	Amount	Source
AIR POLLUTION	(80,000 bpd)	Hydrogen Sulfide	.88 tons/year 4 tons/year 1 lb/day	(8)Crude oil heater Incinerator Leakage
	(80,000 bpd) (3,400 mi/day)	Nitrogen oxides	6.6 tons/year .022 tons/day 152 lbs/day	Processing leaks Automobiles Combustion
	(3,400 mi/day)	Carbon monoxide	.094 tons/day	Automobiles
	(80,000 bpd) (3,400 mi/day)	Hydrocarbons	.2 tons/year .013 tons/day 32 lbs/day	Processing leaks Automobiles Leakage
	(80,000 bpd) (80,000 bpd)	Sulfur oxides	27.7 tons/year .7 tons/year 4.8 lbs/day	(8) Crude oil heater Incinerator Combustion

NOISE POLLUTION	Basis	Amount	Source
		80-90 dB	Pumps
		81-96 dB	Flare stacks
		81-96 dB	Treating vessels

WATER POLLUTION	Component	Amount	Source
	Oil/water emulsion		Wastewater
	Suspended and dissolved solids and heavy metals	High concentration	Wastewater
	Dissolved salts	5,000 ppm	Wastewater
	Oil	200-300 ppm	Wastewater

SOLID WASTES	Component	Amount	Source
	Non-hazardous combustible materials		
	Hazardous and sedimented materials		Crude oil production Storage
	Sludge, scums and froth		Treatment of crude or brine

with satisfactorily.

REFINERIES

A refinery is where crude oil is processed. It is composed of a series of units designed to produce petroleum products by physically or chemically altering all or part of the crude oil stream.[39] The following summary outlines the complex processes that occur at the refinery.

A refinery is highly automated. Crude oil arrives by pipeline or tankers, and is stored until it is processed. First, it is distilled into its gross hydrocarbon components. These groups are chemically altered to more desired, refined groups through alkyation, polymerization, catalytic reforming, and catalytic and thermal cracking. Sulfides and mercaptan are removed. Finally, the base stocks are mixed to increase the number of products. These are returned to storage tanks to await transfer to markets.[39]

Refineries can be located inland or on the coast, but if they are inland they have to have pipeline access to the coastal terminal. The Grangemouth Refinery in Scotland, for example, is located 130 miles from the pipeline landfall. Crude oil can be transferred to a refinery more quickly, however, if the marine terminal and refinery are located in closer proximity to one another. Irrespective of whether it is located inland or on the coast, the refinery should be close to its major markets, the urban areas.[7] Locating them in already heavily industrialized areas may be difficult, if not impossible, because of ambient air quality standards. Siting is complicated further since there is no firm relationship between facility size and complexity and the amount of land needed. However, the New England River Basin Commission estimates that a 250,000 barrel per day refinery needs 1000-1500 acres of flat (maximum slope 5%) industrially zoned land.[39] The Council on Environmental Quality agrees with this estimate.[23] Half of this land is needed for buildings, storage and processing units, and the rest

is a buffer zone or for transportation systems.[39]

Refineries are the largest source of pollution among the onshore oil processing facilities.[74] Table V estimates the amounts of pollutants that a 250,000 barrel per day refinery is apt to produce. According to a study prepared for the U.S. Environmental Protection Agency by Stephen Sobotka and Company, if sulfur compounds in refinery fuel are removed, tanks containing gasoline or volatile crude oil are equipped with floating roofs, large catalytic cracking units are equipped with electric precipitators and carbon monoxide boilers, and refinery wastewater is skimmed, neutralized, settled and subjected to biological treatment, refineries can control pollutants adequately and economically.[22] These control costs would increase the price of oil approximately eight cents per barrel. The addition of these controls will encourage the construction of larger and new refineries because of economies of scale.[22]

The refineries in Pennsylvania's coastal zone are now meeting emission standards of the Pennsylvania Department of Environmental Resources in most instances, although they are having some difficulties with particulate control and sulfur oxide emissions.[75] New refineries would probably find it easier to meet standards because of the inclusion of treatment facilities in the initial plant design.

Refineries require a great deal of water for normal operation. Wastewater treatment is essential for the large amounts of effluent that they produce. The particularly critical water pollutants that are emitted are floating and dissolved oil, phosphates, BOD and ammonia complexes.[25,39,56] All can be removed from wastewaters with existing technologies.

The land area and air and water emissions from a refinery mean that it

TABLE V

POTENTIAL TYPES AND SOURCES OF POLLUTANTS FROM REFINERIES (250,000 bpd)

Category of Pollutant	Component	Amount	Source
AIR POLLUTION	Particulates	17,220-20,820 lbs/day	(in general) Processing
	Sulfur dioxide	83,950-97,420 lbs/day	Cracking and choking units Machinery
	Carbon monoxide	5,640-5,750 lbs/day	Leaks from valves, seals and floating roof tanks
	Nitrogen oxides	35,145-42,082 lbs/day	Mobile sources
	Hydrocarbons	90,130-91,870 lbs/day	

NOISE POLLUTION	Basis	Amount	Source
	Operator's position	98 dB	Compressor
	Operator's position	97 dB	Furnace
	Operator's position	79-100 dB	Blowers
	Operator's position	79 dB	Air fan cooler
	6 feet away	90 dB	Boiler
	Operator's position	80 dB	Cracking unit

(CONTINUED)

TABLE V (CONTINUED)

POTENTIAL TYPES AND SOURCES OF POLLUTANTS FROM REFINERIES (250,000 bpd)

WATER POLLUTION	Component	Amount	Source
	Floating and dissolved oil	1-1,000 ppm	Wastewater
	Dissolved solids	0-5,000 ppm	Wastewater
	Suspended solids	250-27,500 lbs/day	After primary treatment
	Dissolved organic	0-1000 ppm	Wastewater
	Cyanide	0-20 ppm	Wastewater
	Chromate	0-60 ppm	Wastewater
	Phosphate	0-50 ppm	Wastewater
	Sulfides	0-100 ppm	Wastewater
	Caustics and acids	2-11 pH	Wastewater
	BOD	15 ppm	Wastewater
	COD	80 ppm	Wastewater
	Phenols	50-11,000 lbs/day	After primary treatment
	Ammonia complex	1250-7000 lbs/day	After primary treatment

will have a major environmental impact wherever it is located. The impact of another facility in the Pennsylvania coastal zone will depend on whether or not existing facilities are phased out at the time it is brought into operation, or used in addition to existing refining capacity. If the former occurs, the refinery could have a positive environmental impact, because modern technology can solve some environmental problems that it is uneconomic to correct in an older plant. However, if a new facility is built and the old one retained, pollution levels could become a problem. The region would have to cope with the emissions from the older plant as well as the new one. No accurate determination of environmental impact is possible, however, without more information about the quantities of oil that could be expected from the outer continental shelf.

GAS PROCESSING PLANTS

The gas processing plant is an installation designed to liquify and recover ethane, propane, butane and pentane. A facility may include treatment, recovery, and fractionating equipment to separate the liquid hydrocarbon stream into its various components. Plant capacity can vary between two million and two billion cubic feet per day.[39]

The size, expected production rate of the find, liquid hydrocarbon content and composition in the gas, sulfur content of the gas, the markets for liquid hydrocarbons and the location of the partial processing facility are taken into consideration in siting a gas processing plant. The producer decides where to put it because he has the rights to the liquifiable hydrocarbons in the gas stream.[39]

The site only requires processing equipment, storage facilities, and compression facilities.[72] Plant production can vary from two million to two billion cubic feet of gas per day.

Estimates vary on how much land is needed for this facility, with figures ranging from 25-100 acres. Most of the land is used for a safety zone around the facilities. It should be located within three to five miles of the onshore pipeline landfall, but does not require waterfront because the processing is not water-intensive. The land on which the gas processing plant is sited should be flat and well-drained. It should lie between the pipeline landfall and where the pipeline joins commercial gas transmission lines.(39,68,72,79)

Gas processing is a heavy industrial operation. Air emissions include hydrogen sulfide, sulfur oxides, and hydrocarbons. They should be minimized through stringent anti-pollution measures.(34,79)

Wastewater used for cooling and in the boiler will contain some potentially harmful pollutants. Although phosphate concentrations pose the greatest threat, the amounts of sulfuric acid, chromium, zinc, chlorine, bases, sulfates, and dissolved hydrocarbons should be carefully monitored. Some scale and sludge is also produced.(39,79)

PETROCHEMICAL PLANTS

Certain groups of hydrocarbons are called "petrochemicals." Petrochemical operations refer to the production of second generation petrochemicals, such as alcohols, ketones, cumenes, and styrene, or the production of first generation petrochemicals and isomerization products, such as BTX, olefins, and cylcohexanes, when 15% of the refined production was first generation.(39)

"Feedstock" is a comprehensive term for all those products that are "fed" into the petrochemical plant. Most feedstock comes directly from refineries, so petrochemical plants and refineries are often near each other. Part of the great demand for petrochemicals is the growing use of plastics. Both ethylene and acetylene are the preferred raw materials for vinyl chloride and vinyl acetate. New markets for these chemicals are on the rise.(32)

An average petrochemical plant (one billion pounds of olefins per year) releases 383 tons of particulates and 2,625 tons of hydrocarbons annually. Wastewater from these plants is heated slightly more than the intake water and represents a potential thermal pollution problem, especially in this region, where water temperatures are close to the permissible degree.[48,74] The wide variety of potential petrochemical plants that could be located in the region if offshore oil is shipped to Philadelphia makes it impossible to evaluate their environmental impact in a paper of this scope.

PIPELINES

Pipelines can transport oil or gas. Barges and tankers can also transport oil from offshore sites. Gas, on the other hand, is most always transferred by pipeline. If a pipeline is not used to transport natural gas, special tankers and offshore liquefaction operations would be necessary. These are rarely economical or practical. In all probability if oil or gas is discovered in quantity in the Baltimore Trough, pipeline would be used instead of a tanker to bring it ashore. In the United States, approximately 98% of all offshore production is brought in by pipelines.[39] From an environmental, as well as economic viewpoint, this is advantageous.

There is another difference between oil and gas transport. Oil is easy to transport both offshore and on land. It does not have to be refined, treated, or stored next to the pipeline landing point onshore. Often, the oil is brought in to the marine terminal and temporarily stored, until it is loaded on barges and tankers for further transport. Natural gas must be processed soon after it comes ashore. The odor ordinarily associated with natural gas is injected into it usually at the landfall, because without the odor, a dangerous leak could not be detected in time.[7]

Marine pipeline systems consist of a pressure source, gathering lines, pipe-

line, boosting stations, and a landfall.[39] The LOOP system, in Louisiana, is a good example of a marine pipeline. Two parallel, 1,200-foot segments of pipe, 16-24 inches in diameter, run from the tankers to the tanker terminal. An 8,000-foot long, 56-inch outer diameter pipeline runs from the single point mooring (SPM) to the offshore platform. Then, three parallel pipelines around 22 miles long and 48 inches around the outside are connected between the pumping, offshore platform and onshore booster station. There is another section of pipeline between the booster station and a storage terminal. The last segment connects with the main pipeline onshore. Altogether, it is 54 miles long between the two 42-inch diameter pipelines.[92] Once installed the environmental impact of the pipeline is minimal.

On land, pipelines require a right-of-way fo 50-100 feet, even though the width of the land disturbed in the burial is only 50-60 feet. Once the pipeline is in place, about 25 feet to either side must be kept clear of trees and shrubs, although crops may be grown over the pipeline right-of-way. These rights-of-way are best aligned with existing transportation or other pipeline and utility rights-of-way, especially in urban areas where it is difficult to obtain the land.[14,39]

Once ashore, the oil can be piped to a tanker terminal or to the refinery. If the line must go further inshore, a booster station is needed. Booster stations are established according to the length, diameter, characteristics of the contents of the pipe, and the bottom characteristics offshore.[39]

Before a pipeline is laid, the earth must be cleared. The pipe segments used are large, with diameters of twelve to thirty-six inches. The pipe sections are placed along the ground in a line, in a process called "stringing." The sections are bent to fit the land's contours. Ditches are then dug. Before being put in the ground, the sections are welded together. After the pipeline is buried, the ditch is backfilled and the area restored.[92]

If the oil and gas from the continental shelf comes ahore by pipeline there will probably be a substantial decrease in oil tanker traffic to the Port of Philadelphia. Still, there is a potential for oil pollution in the Delaware River as a result of discharges from loading facilities, freighters, tankers, pipelines and any other product transfer operation. Oil pollution leakage from a pipeline is a chronic problem, especially with old lines that are corroding. However, a catastrophic accident involving a pipeline would be more serious than one involving a tanker. Environmentally, the advantage of tankers is that they do not have the shattering construction impact on an area as pipelines do. However, over the long-term, pipelines have less of an impact.[23,39,43,97]

The major environmental impact pipelines have is this: their construction can have severe short-term impacts. Table VI indicates some of these. The clearing and grubbing of the right-of-way can destroy wildlife habitat, increase runoff, cause erosion and sedimentation, and increase turbidity in nearby streams. By minimizing the area that is disturbed during construction, scheduling work so that it occurs during the fall and winter, and controlling runoff from the construction site, these impacts can be minimized.

In the Pennsylvania coastal zone, the pipeline will come ashore practically at the refinery, so negative impact here will be minimal. The major impact will occur in New Jersey, since that is the state that lines must traverse.

PIPECOATING PLANTS

The pipecoating industry is a necessary adjunct to pipeline construction and installation. If "bare," or dark, steel pipe is laid, it would quickly corrode. Therefore, a protective coating of primer and mastic are put on the piping. Since there is a flotation problem with offshore pipes, three inches of cement are added to these pipes. Fiberglass paper is wrapped around the outside of all

TABLE VI

EFFECTS OF PIPELINE CONSTRUCTION ACTIVITIES

Construction activity / Physical and chemical effects	Loss of natural cover	Loss of topsoil	Faster runoff	Lowered water table	Increased erosion	Violent fluctuation in stream flow	Violent fluctuation in water levels	Increased downstream flooding	Increased sediment loads in streams	Increased turbidity	Loss of wildlife habitat
Clearing and grubbing	x								x	x	
Ditch excavation	x	x	x	x	x	x	x	x	x	x	x
Pipe laying									x	x	
Backfill									x	x	
Drainage ditch and canal lining											x
Appurtenances and special construction	x		x						x	x	
Disposition of materials	x	x	x						x	x	

"x" signifies a potential negative environmental impact

Source: Impacts of Construction Activities in Wetlands of the United States, E.P.A.

these layers.[39,92]

A pipecoating plant needs around 100 acres of land. If it is a portable, temporary plant, it will only occupy 30 acres. In both instances, 95% of the land is used for outdoor storage.[39,92]

Ideally, pipecoating plants should be located on the waterfront, near the oil company's service base or the pipelaying firm's base of operation. To further facilitate the delivery of pipe joints, the plant should also be near adequate waterways and rail service. Adequate highways are needed too, because trucks replenish the cement supply daily.[39]

Pipecoating yards involve a surprising number of pollutants. Sources include ovens, boilers, vehicles, cranes, solvent, hydrated lime, and leaks. Particulates, oxides, hydrochlorine, oil and toxic gases are the major air emissions. The noise at a pipecoating yard is quite high.[19,39]

Water pollution is caused by runoff and water used in processing and cooling, finding their way into nearby waters. Some pollutants are hydrocarbons, hydrated lime, steel shot and heavy metals. Solid waste, including some contaminated debris, is also generated.[19,39]

PLATFORMS

Steel platform fabrication yards are large, waterfront facilities. Although the smallest possible facility could be 50 acres, the average size is somewhere between 200 and 1000 acres.[14,39,68] These yards need to be close to the water, marginal wharves, and an open waterway or dredged channel. In order that the completed platform components can be easily moved out to offshore sites, a minimum of five hundred feet of unobstructed shoreline and a channel fifteen to thirty feet deep and two to three hundred feet wide is required. For example, three platforms, each two hundred feet long at the base, would need at least eight hundred feet of marginal wharf. The land must be able to withstand heavy burdens. Raw ma-

TABLE VII

POTENTIAL TYPES AND SOURCES
OF POLLUTANTS FROM
PIPECOATING YARDS

Category of Pollutant	Component	Amount	Source
AIR POLLUTION	Particulates		General
	Nitrogen oxides		Ovens
	Sulfur oxides		Boilers
	Carbon monoxide		Cranes and trucks
	Hydrocarbons		Solvent
	Oil and toxic gases		
	Odor	Strong	Leaks
	Dust		Hydrated lime
Noise Pollution	**Basis**	**Amount**	**Source**
	24-hour	90-100 dB	Shot blasters
	24-hour	90-100 dB	Compressors
	24-hour	90-100 dB	Boilers
Water Pollution	**Component**	**Amount**	**Source**
	Hydrocarbons		Runoff, cooling and process water
	Hydrated lime	High pH	Runoff, cooling and process water
	Steel shot		Runoff
	Heavy metals		Runoff, cooling and process water
SOLID WASTES	**Component**	**Amount**	**Source**
	Packaging		
	Concrete		
	Metal scraps		
	Contaminated debris		

terials are received and completed platform components are sent out at the dock. There should also be railroad and highway service, since trucks must deliver fuel, supplies, heavy machinery, miscellaneous supplies, and spare parts daily. There would also be three hundred railcars coming to the yard each year.[14,39]

Buildings, warehouses, workshops, maintenance yards, and administrative offices fill much of the acreage at the fabrication site. About half is allocated to fabrication, while the rest is devoted to support and storage facilities. There are many separate processes that combine to finally produce platforms, including an open area for jacket fabrication, a building for deck assemblage, a fabrication shop for plates and pipes for the jacket and deck, a shop for sand-blasting and painting, a pipe mill for manufacturing tubulars of varying diameters and wall thicknesses, and a rack for welding tubular lengths.[39]

Concrete Platform Fabrication Yards. Concrete platform fabrication yards are similar to steel fabrication yards. The major difference is the construction process. A concrete platform base is built in drydock. Therefore, the concrete platform fabrication yards must be large, waterfront facilities with deep, dredged drydock basins, set off by coffer dams. They use a great deal of sand, gravel, and aggregate.[39,58]

Sandblasting, paint, and vehicles are the common sources of air pollutants from platform fabrication yards. Particulates, hydrocarbons, organics, carbon monoxide, sulfides, and nitrogen oxides are all emitted. Heavy metals, particulates, anti-fouling chemicals, and petroleum products are found in the wastewater.[19,39] The main consideration in siting platform fabrication yards would probably be the large amount of land required, not the resultant pollution. Table VIII summarizes the environmental problems associated with the fabrication yards.

SUMMARY

The environmental impact of specific support facilities and refining capacity

TABLE VIII

POTENTIAL TYPES AND SOURCES
OF POLLUTANTS FROM
STEEL PLATFORM FABRICATION YARD

Category of Pollutant	Component	Amount	Source
AIR POLLUTION	Sand and metal dust		Sand blasting
	Hydrocarbons and organics		Paint evaporation Vehicles
	Carbon monoxide		Vehicles
	Sulfides		Vehicles
	Nitrogen oxides		Vehicles
NOISE POLLUTION	Basis	Amount	Source
	24-hour	80-100 dB	Uncontrolled
	24-hour	76-116 dB	Outdoor
WATER POLLUTION	Component	Amount	Source
	Heavy metals		Runoff, cooling and process water
	Particulates		Runoff, cooling and process water
	Anti-fouling chemicals		Runoff, wastewater
	Petroleum products		Runoff
SOLID WASTES	Component	Amount	Source
	Packaging		
	Metal scraps		
	Contaminated debris		

TABLE IX

POTENTIAL TYPES AND SOURCES
OF POLLUTANTS FROM
CONCRETE PLATFORM FABRICATION YARD

Category of Pollutant	Component	Amount	Source
AIR POLLUTION	Sand and metal dust		Sand blasting
	Dust		Cement silos Concrete mixers
	Hydrocarbons and organics		Paint evaporation Vehicles
	Carbon monxide		Vehicles
	Sulfur oxides		Vehicles
	Nitrogen oxides		Vehicles
NOISE POLLUTION	Basis	Amount	Source
	24-hour	80-100 dB	Uncontrolled
	24-hour	76-116 dB	Outdoor
WATER POLLUTION	Component	Amount	Source
	Heavy metals		Runoff, cooling and process water
	Particulates		Runoff, cooling and process water
	Anti-foul chemicals		Wastewater, runoff
	Petroleum products		Runoff
SOLID WASTES	Component	Amount	Source
	Packaging		
	Metal scraps		
	Contaminated debris		

will depend in large measure on the number of operations that locate in the Delaware Valley. A few individual facilities could probably be accommodated with minimal impact. In some cases the construction of the facilities might actually improve environmental quality. The most critical consideration from an environmental viewpoint is the cumulative impact of the location of different facilities here. This is discussed in the next chapter.

CHAPTER 4

REGIONAL ENVIRONMENTAL IMPACTS OF OFFSHORE OIL DEVELOPMENT

The preceding chapter discussed some of the types of facilities that industries could locate in the Pennsylvania coastal zone in order to support offshore oil development. Each facility would have a particular, often minimal, environmental impact on the region. A single facility may have a very slight impact. The cumulative effect of ten similar facilities could cause some major environmental problems of particular importance to the region and the lower portion of the Delaware estuary.

Although is lacks the majesty of the Hudson, the power of the Mississippi, or the turbulence of the Colorado, the Delaware River quietly dominates the region it serves. The topography of the river and its tributaries has changed considerably over the years. Many creeks that once entered the river no longer exist. The Pennsylvania tidal marshes, with the exception of Tinicum and some small pockets along the river in Bucks County have gone. Many southern New Jersey marshes have disappeared as well. Where wetlands remain, communities have zoned them for industrial or commercial development. The industries and port facilities from Wilmington north to Philadelphia form a Chinese wall pro-

viding little public access to the river.[96]

Several specific wetland areas in the region should be preserved: Tinicum Marsh, the mouth of Pennypack Creek, and the flood-prone areas in Bucks County. (See Chapter 2) These wetlands are environmentally sensitive and are important because of their value to man, their role in the coastal ecosystem, and their intrinsic, natural value. They serve the following functions: 1) hydrologic. They absorb water and store it to minimize erosion and flood water damage; 2) hydraulic-hydrographic. They form a natural buffer zone, absorbing storm tide and wave shock; 3) sediment control. The wetlands act as a settling and filtering basin to restrain the direct deposition of raw materials into adjacent waters; 4) anti-pollution. They metabolize materials that would otherwise degrade the environment; 5) food producer. Nutrient production in a coastal marsh can be as much as seven times greater than the protein yield per acre of a Kansas wheat field. 6) breeding, nesting, feeding and nursery grounds for fish and wildlife. Two-thirds of all fish and shellfish caught have lived in wetlands during some stage of their lives 7) thermal exchange. They mitigate temperature extremes.[45] Wetlands are especially susceptible to oil damage, so activities related to oil and gas development should be staged away from these areas.[38] Flood-prone areas also serve a valuable purpose in the coastal zone; development on these lands only invites greater loss during a flood.[31]

The destruction of these wetlands will have negative environmental impacts on the River corridor which are summarized in Table I . However, because of the intensive modification of the coastal area in Pennsylvania and the small open area left, the magnitude of the physical impacts looms larger than in a coastal area where manmade changes have not occurred already. In the less disturbed marshes the destruction of the coastal wetlands would decrease commercial fish populations, increase flooding and stream sedimentation, all of which could

TABLE I

THE PRIMARY PHYSICAL AND CHEMICAL EFFECTS OF CONSTRUCTION ACTIVITIES ON THE PENNSYLVANIA COASTAL ZONE

Physical and chemical effects \ Construction activity	Preconstruction activities	Impervious surfacing & earthwork	Drainage ditching	Building construction	Open air industrial plant construction	Drainage structures	Tunnel construction		Dredging & spoil placement: Gen. & immed. effects	Channelization effects	Riparian effects	Bay & estuarine effects	Marshland effects
Loss of riparian habitat	x	x	x	x	x	x	x		x		x		x
Loss of wetland habitat	x	x	x	x	x	x	x		x	x	x	x	x
Removal of vegetative cover	x	x	x	x	x	x							
Removal of topsoil		x	x	x	x	x							
Reduction of habitat diversity		x							x	x			
Drastic fluctuation in water levels & flow rate		x	x	x									
Increased surface runoff	x	x	x	x	x	x							
Increased peak flows		x											
Elimination of floodplain													
Increased hazard of flooding	x	x	x	x							x		
Increased soil erosion	x	x	x	x	x	x					x		x
Reduced minimal flows		x											
Creation of spoil banks											x		
Increased bank erosion											x		
General increase in flow rate										x			
Loss of groundwater		x									x		
Lowered water table		x	x							x	x		x
Modification of internal circulation patterns									x			x	
Increased downstream flooding		x	x							x			
Pollution of groundwater		x				x			x				

Adapted from: Rezneat M. Darnell, Impacts of Construction Activities in Wetlands of the United States, U.S. Environmental Protection Agency.

(CONTINUED)

TABLE I (CONTINUED)

THE PRIMARY PHYSICAL AND CHEMICAL EFFECTS OF CONSTRUCTION ACTIVITIES ON THE PENNSYLVANIA COASTAL ZONE

Physical and chemical effects \ Construction activity	Preconstruction activities	Impervious surfacing & earthwork	Drainage ditching	Building construction	Open air industrial plant constr'n.	Drainage structures	Tunnel construction		Dredging & spoil placement				
									Gen. & immed. effects	Channelization effects	Riparian effects	Bay & estuarine effects	Marshland effects
Increase in stream gradient						x				x			
Increase in bottom scouring		x	x			x							
Creation of canals in swamps and marshes									x	x	x		x
Increase in turbidity	x	x	x	x	x	x	x		x	x		x	
Increase in sedimentation	x	x	x	x	x	x	x		x	x		x	x
Altered bottom topography		x							x	x		x	
Reduction in light penetration		x							x	x			
Elevation of temperature		x							x				
Modification of natural chemical composition		x	x	x	x	x						x	x
Increased oxygen demand		x	x	x	x	x			x	x		x	x
Addition of chemical pollutants		x	x	x	x	x			x			x	
Build-up of bottom-associated pollutants		x	x	x	x	x					x	x	
Reduction of freshwater input												x	x
Increase in salinity											x	x	x

Adapted from: Rezneat M. Darnell, Impacts of Construction Activities in Wetlands of the United States, U.S. Environmental Protection Agency.

have a negative economic as well as environmental impact. Nevertheless, the open coastal areas in Pennsylvania remain significant, particularly as stopping places for migratory waterfowl using the Atlantic Flyway. Their destruction would create a negative impact on the region, out of proportion to their size because they are the last remaining estuarine wetlands in eastern Pennsylvania.

Offshore oil development takes place in three overlapping phases; exploration (one to five years), development (one to seven years) and production (indefinite). Each requires different land based support facilities and would have a different overall impact. Exploration, which is a sophisticated marine operation, requires little land based support.(7) Development requires more support facilities, and the third stage, production, requires intensive land support to refine crude oil and natural gas. The complex activities associated with each phase frequently overlap.(92)

Malcolm and Pamela Baldwin, in their book Onshore Planning for Offshore Oil, Lessons from Scotland, discuss some of the more critical impacts. Since onshore development of the Atlantic coast appears somewhat similar to that of Scotland, we can learn from the experiences there. The Baldwins wrote:

> The major environmental concerns about oil in Scotland center on circumstances that occur long before there is any oil to spill or to refine. They include: the selection of sites for the construction of offshore production platforms, the selection of landfill locations for pipelines, the development of harbors to accomodate the many service and supply vessels needed to support offshore operations, and the ripple effects that can emanate from oil development and engulf the whole economy and social structure of Scotland. (7)

The major difference between the Pennsylvania coastal zone and Scotland, however, is that here we already have intensive industrial development and a skilled workforce. The economic, social, and environmental shock will not be as great.

Nevertheless, regional impacts will have to be taken into consideration. The greatest refining concentration in the mid-Atlantic region is the Upper Delaware Bay.(39) Some two-thirds of this concentration is within Philadelphia. It is

generally accepted that the crude petroleum from the Baltimore Trough will be piped to these refinery complexes along the Delaware River rather than refined along the coast.(57) The existing geological and geophysical evidence suggests that the oil will be sweet crude, a type that is refinable with existing refinery equipment.(49)

To some extent, the new domestic petroleum will displace imported petroleum. Onshore environmental impacts will be the same as they are now. If the capacities of the existing refineries in the region expand, environmental impacts will increase. Most current studies feel that doubling existing capacity would enable the Philadelphia region to handle all the crude from mid-Atlantic tracts. This means that either new refineries will be built, or the old ones expanded.

There is also a high probability that a gas processing plant will be located in the region. In a report to the mid-Atlantic governors, Resource Planning Associates, Inc. state that there will probably be between two and seven processing plants in the mid-Atlantic region. Pennsylvania's coastal zone offers several good potential locations for these heavy industrial facilities, including the Walt Whitman Bridge area, the Chester Tidewater terminal, Baldwin Industrial Park and Neshaminy Industrial Park. The specific environmental impacts are discussed in Chapter IV.

Some new petrochemical production will follow OCS development. As the discussion in Chapter II indicates, these facilities can have a great environmental impact. The Pennsylvania side of the Delaware River contains almost no good waterfront sites for a new petrochemical complex. Such a facility would require about 300 acres and would put a burden on ambient air and water quality conditions in the region.

The oil companies have said that they will probably bring the OCS oil ashore by pipeline. Not only are pipeline landfalls potentially major sources of oil

pollution, but the development construction of the pipeline can have major impacts as well. Auxillary services, such as pipecoating yards would increase the environmental impact. Nevertheless, when compared with the potential impact of tanker spills, the pipelines appear to afford the most environmentally sensitive transportation mode.

From a regional viewpoint, the most serious potential environmental impacts from offshore oil support facilities located in the Pennsylvania coastal zone are reduction in air quality and the further pollution of existing ground or surface waters. If the industries are required to meet existing air and water quality standards, and the law is firmly enforced, these effects can be minimized. One water quality problem however, depends not upon enforcement of the law, but on government policy.

The natural depth of the Delaware River channel at Philadelphia in the late nineteenth century was 17 feet. The U.S. Army Corps of Engineers is responsible for keeping the channel, which is now at a depth of 40 feet, open for navigation. It has considered deepening the channel to fifty feet to permit larger vessels to enter the Port of Philadelphia, but such a mammoth operation poses many environmental problems, among which are:

(1) The Raritan and Magothy formations, important aquifers for southern New Jersey, lie close to the bottom of the present channel. Deepening it may induce aquifer recharge from the polluted Delaware.

(2) The Delaware's shallow watercourse would increase the probability of siltation and increase channel maintenance.

(3) Deepening the channel would affect existing flow patterns and alter ecology of the River.

(4) One hundred ninety million cubic yards of fill would have to be placed somewhere. If placed on the tidal marshes it would produce a profound effect on the Delaware's biological productivity.(8)

Channel deepening would make it possible for the larger tankers to enter the Port of Philadelphia. They would bring with them the increased probability

of accidental spills and other accidents. The size of the larger vessels increases the negative impact of the accident when it occurs. While care can and will be taken to avert such possibilities, negative impacts must be fully assessed as part of a feasibility study of channel deepening. Before the deepening can occur, however, the U.S. Army Corps of Engineers must prepare a detailed environmental impact statement and hold public hearings on the project.

While there may be little possibility of deepening the main channel at this time, dredging, filling and channelization constitute activities which may have deleterious effects on the region. The President's Council on Environmental Quality supports this view:

> Digging channels for service ships and barges, building docks and other structures at the waterfront, and to a lesser extent, laying pipeline cause another kind of environmental disruption. Instead of poisoning marine creatures, these activities tend to bury them, choke them, or cut off the light which is essential to their whole food chain. Most important, dredging and filling change drainage patterns of estuaries and wetlands and can lead to erosion or salt water intrusion. (38)

The cutting and digging of dredging breaks through the thin, oxidized layer of submerged soil and exposes a deep, unoxidized layer, which is high in C.O.D. and B.O.D. Hydrogen sulfide, methane, organic acids, ketones, heavy metals, and pesticides are then released.

Dredging inherently increases water turbidity and sedimentation. Turbidity can be visualized as the varying "cloudy condition" of water. The increase associated with dredging has sub-lethal to lethal impacts.

Clearly adequate transportation of all kinds is essential to offshore oil and gas development. Onshore support facilities need good rail and highway service to move supplies promptly. Equipment, supplies and personnnel must be able to shuttle from the shore base to the drilling site rapidly, so airports or helioports are needed, as well as an all-year around harbor. Industry

utilization of this complex transportation network creates secondary environmental impacts on ambient air quality depending upon the number of facilities and the type of equipment that they use.

The mid-Atlantic region has a highly developed transportation network. Interstate highways traverse the Pennsylvania coastal zone and stretch outward in all directions. Already in place, they obviate any need to construct new highways to enable the more rapid movement of supplies needed for industry. The potential negative impact of building these support facilities does not exist.

Railroads are also located within close proximity to the coastal area. One of the cheapest ways to transport bulky goods over long distances, they are also one of the most satisfactory ways environmentally, as well. Conrail, Amtrak, and the Chessie system all service the Philadelphia region. Like the highway system, the rail network is essentially in place. It's utilization to support the offshore oil development would have a minimal environmental impact.

Air pollution is often described as having a synergistic impact, i.e., the total effect of the interaction of different pollutants exceeds the sum of the effects of each substance. This is particularly true of an already developed region which has difficulty meeting present primary standards. Nitrogen dioxide and hydrocarbons combine in the presence of sunlight to produce peroxacetyl nitrate (PAN) and ozone, more toxic than the nitrogen dioxide and the hydrocarbons.

In the Pennsylvania coastal zone, hydrocarbon emissions now exceed air quality standards. Philadelphia faces an ozone problem during the summer. Some of the effects include watery eyes, exacerbation of respiratory diseases, and damage to plants.[70]

Sulfur oxides also tend to accumulate in a heavily industrialized area like the Pennsylvania coastal zone. When released into the air, SO_2 can combine to form sulfuric acid. Sulfuric acid, injurious to human health, corrodes metals,

and constitutes a major pollutant. The increased release of sulfur oxides into the atmosphere in the air basin could intensify already serious air pollution control problems in the region. The extent to which they become critical depends upon the amount of development that occurs.

The Federal Water Pollution Control Act (P.L. 92-500) requires industries to meet quite stringent water quality criteria by 1983. The Delaware River's water quality has improved over the last five years, although current standards are not being met. The technology to control water pollutants from support facilities is available. Its use is important.

The support facilities for offshore drilling use a great deal of electricity. If a large support complex develops in the Pennsylvania coastal zone, then additional electrical generating power is needed in the region. This will have an impact, not in the zone itself, but on other areas of Pennsylvania.

Environmental improvement requires large amounts of capital best generated by a healthy economy. The Pennsylvania coastal zone possesses serious economic problems. An industry which faces lay offs and possible bankruptcy cannot install the pollution equipment that is needed. Consequently, if offshore oil development increased the economic activity of the region, and the industries involved install and maintain adequate pollution control equipment, the long-range effect of offshore oil development on the region can be quite positive from an environmental viewpoint. To insure this, proper planning and development must take place. Environmental considerations must be brought into the decision-making process early and continue to be considered throughout the life of the offshore oil facility.

CHAPTER 5

A SYNOPSIS OF PENNSYLVANIA'S ENVIRONMENTAL LAWS THAT RELATE TO THE DEVELOPMENT OF THE COASTAL ZONE

The Federal Coastal Zone Management Act of 1972(P.L. 92-583) advocates "wise use of the land and water resources of the coastal zone giving full consideration to ecological, cultural, historic and aesthetic values as well as to needs for economic development" (Section 303 (b)). This means that Pennsylvania must balance the imminent necessity for onshore facilities relating to the drilling of the Atlantic Ocean's outer continental shelf (OCS) and the protection of the environment.

There are basically two types of direct onshore impacts due to OCS operations: (1) construction and services for offshore operations (this includes platform fabrication, docking and service areas for support vessels, pipelines, and supply depots); and (2) industrialization (refineries, petrochemical and gas processing plants and oil storage facilities). This development affects both the environment and the socio-economic structure of the communities involved.

Initially, an immediate need for a large number of construction workers will accompany the development of OCS oil and gas. The migration of so many people will increase the demand for more facilities and services, i.e. hospitals, schools,

housing, transportation, police, firemen, sewage treatment plants and public utilities, unless there are already a surplus in the region. After several years, onshore activity will abate, causing a substantial diminution in the labor demand. Thereafter, routine operation and maintenance of equipment will require only a small number of employees. The impact of such an influx of people on a community will greatly depend upon its financial and planning capabilities. A community must be prepared to handle efficiently the demand for growth. Specific environmental concerns include an increase in air and water pollution, solid waste management, and the dredging and/or filling of wetlands. As shown in Chapter Two, however, Pennsylvania's coastal zone is already extensively developed, limiting the number of potential locations for support facilities.

Pennsylvania's environmental laws, rules and regulations are closely correlated with those which Congress has enacted. They are compatible to those which adjacent states have adopted, although in certain instances one state's regulation may be stricter than another's. The possible exception is Delaware, where a very strong coastal zone management act curtails extensive development on undeveloped land within the coastal zone. No such law exists in either Pennsylvania or New Jersey.

The purpose of this summary of the Pennsylvania environmental laws which will impact coastal zone development scenarios is to provide the reader with a thumbnail sketch of what laws may apply. It is not meant to provide him with a detailed analysis of the laws which he can then use as the basis for submitting the necessary applications to the appropriate agencies. For this information, he must turn to the complete laws, rules and regulations.

I AIR QUALITY CONTROL

1. Pennsylvania Air Pollution Control Act

(Act of January 8, 1960, P.L. (1956) 2119; As amended January 24, 1966

P.L. (1965) 1520; July 23, 1970, P.L. 606, No. 201; October 26, 1972
P.L. 989, No. 245; House Bill 2406, Session of 1976, December 2, 1976.)

This act gives Pennsylvania one of the most progressive air pollution control laws in the nation. The act specifies the powers and procedures of the Department of Environmental Resources (DER), the Environmental Quality Board, and the Environmental Hearing Board with regard to air quality control. DER has the power and duty to:

(1) inspect any air contamination source to determine the compliance or non-compliance of the rules the Environmental Quality Board adopts;
(2) sample emissions;
(3) maintain records;
(4) receive and investigate complaints;
(5) require source owners to install air contamination monitoring equipment;
(6) institute prosecutions under the Act (Section 4).

The Environmental Quality Board shall adopt regulations for point source controls. Section 6.2 of the Act provides for emergency hearings within 24 hour notice.

Section 6.1, which creates an air contaminant source point system, requires plan approval and a DER permit before stationary sources or control equipment can be constructed, assembled, installed or modified. The permittee must make an annual report to the Department regarding the operation and maintenance of the source. Section 6.1 (d) requires the Environmental Quality Board to promulgate standards which DER must use to explain when it refuses to grant a permit.

Penalties for violation of the Act for summary offenses and misdemeanors are $1000 and 30 days maximum imprisonment for the first offense, and $5000 and one year for continuing violations. Section 9 provides for the jailing of corporate officials. The civil penalties are $10,000 and $2,500 per day until the pollutant problem is brought within the law.

This act provides broad authority in Pennsylvania for regulating air quality within all areas of the state including the coastal zone. This control is necesary in order for Pennsylvania to comply with the Federal Air Pollution Control

Act, (42 U.S.C. 1857) 1970.

All stationary sources (e.g. refineries, oil storage facilities) must comply with the requirements of the Pennsylvania Air Pollution Control Act whether the structure already exists or is currently in the planning stages. Therefore, all support facilities or petroleum refining operations would also have to adhere to the provisions of the Act.

2. Uniform Interstate Air Pollution Agreements Act

(Act of February 14, 1972, P.L. 64)

This act authorizes the Department of Environmental Resources (DER) to make administrative agreements to coordinate air pollution control efforts with authorities of other states when they are affected by regional air masses. These agreements may include provisions for developing and reviewing plans, for coordinated administration of air pollution control programs, consultation concerning problems relating to the maintenance and improvements of air quality and their implementation, and similar matters.

This act can play an important role with regard to potential air pollution due to increased development of the coastal zone. The Delaware River flows through New Jersey and Delaware, as well as Pennsylvania. Scientific studies show that New Jersey's ambient air quality is a direct function of the amount and type of emissions Pennsylvanians place in the air.

3. Pennsylvania Vehicle Code

(Act 81 of June 17, 1976; As amended July 1, 1977, House Bill No. 1817)

This act regulates all aspects of motor vehicle operation, including ownership, licensing, enforcement and pollution control. Sections 4523, 4531, and 4532 are the most pertinent to our discussion. They set standards for exhaust and noise (S4523), emission (S4531) and smoke (S4532) control. Every motor vehicle operating on a highway must comply with them. The Department of Transportation

promulgates specific exhaust, noise and smoke control regulations under the terms of the Code. The Federal Clean Air Act (77 Stat. 392, 42 U.S.C. S1837) sets emission control standards, also.

Increased development along the coastal zone, due to OCS drilling, could cause an increase in the use of trucks for product distribution. All such motor vehicles will have to comply with the provisions of the above code.

II. WATER QUALITY CONTROL

The Federal Water Pollution Control Act of 1965 amended in 1972 (33 USC 1251 et seq (1972) regulates pollution of navigable waters, assists the construction of publicly owned waste treatment works, and allows EPA to develop programs to eliminate pollution of navigable waters by 1985. It allows Federal enforcement of point source discharge permits, but the states have primary responsibility for enforcement. Pennsylvania's Department of Environmental Resources (DER) has the main responsibility for the state's water resources. Some of the extensive legislation that guides the Department is summarized below.

1. Clean Streams Law of Pennsylvania

(Act of June 22, 1973, P.L. 1987; As amended through 1970 P.L. 653, Act No. 222)

The Clean Streams Law states that the "discharge of sewage and industrial wastes is not a natural use" of Pennsylvania's waters, is against public policy and is a public nuisance (Section 3). Its objective is to "reclaim and restore" Pennsylvania's polluted streams.

Under the Clean Streams Law, DER has the power to:

(1) formulate and/or repeal rules necessary to carry out the act;
(2) establish policies for effective water quality control and develop and implement comprehensive public water supply, waste management and other water quality plans;
(3) review Pennsylvania's water resource projects;
(4) operate Pennsylvania's water quality control program;
(5) issue, modify, revoke or suspend permits; and,
(6) issue orders necessary to implement the provisions of the act (Section 5).

The permit system set up by the Clean Streams Act predates the Federal one, and

is not restricted to navigable waters. The Clean Streams Act prohibits the discharge of any pollutant into the waters of Pennsylvania without a permit from DER. DER may order a landowner or occupier to correct a condition which results in such pollution, or allow DER access to the land to correct the situation.

No person or municipality may discharge sewage into water unless the discharge is allowed by DER's rules and regulations or a DER permit. In order to prevent sewage pollution, DER may require a municipality to (1) file reports showing whether existing sewer systems and treatment facilities are inadequate; and (2) build a sewer system or treatment facility. DER approval is needed for all plans to build a new sewerage system or improve an old one.

Industrial wastes and mine discharges into streams must be authorized by DER rules and regulations. Any discharge of industrial or mine wastes without a permit or contrary to the rules and regulations is a public nuisance, and punishable under the law.

Coastal zone management must meet Pennsylvania's Clean Streams Law's standards. Equally important, however, any facility within the coastal zone must also adhere to the provisions of the Federal Water Pollution Control Act (P.L. 92-500) and its National Pollutant Discharge Elimination Systems requirements.

2. Pennsylvania Sewage Facilities Act

(Act 537 of January 24, 1966; As amended July 22, 1974)

This act provides for the planning and regulation of individual and community sewage disposal systems. Under this act, DER has the following duties:

(1) to order municipalities to submit official plans and revisions for DER approval and implementation if they are consistent with the rules and regulations promulgated under the act;
(2) to review local agency performance;
(3) to administer grants to municipalities to assist them in preparing official plans and for carrying out related studies; and
(4) to reimburse local agencies which comply with the provision of this act in a manner deemed satisfactory by the Secretary of the Department of Environmental Resources. The reimbursement will equal one-half of the cost of expenses incurred. (Section 10).

The construction or installation of individual or community sewage systems is prohibited without first obtaining a permit from the local municipality (Section 7). Permits are issued when the proposed project is shown to be in compliance with the Sewage Facilities Act and approved comprehensive plans. DER has the power to review the performance of the local agencies in the administration of the permit process.

The Environmental Quality Board adopts the rules and regulations to implement this act. These rules and regulations establish standards for the construction, installation, alteration, maintenance, and operation of the individual and community sewage systems and of sewage treatment plants in such systems. Penalties for violations of this act range from $100 to $300.

This act would control the increase of sewage generated by industry and population growth which could accompany offshore oil support facilities development in the coastal zone. Municipalities with funding problems relating to the planning and constructing of sewage treatment plants could receive financial assistance from DER as provided by this act.

3. The Land and Water Conservation and Reclamation Act

(Act 443 of January 19, 1967, P.L. 996, As amended June 30, 1976, P.L. 474)
This act authorizes DER to award grants for the construction of municipal sewage treatment plants. A priority system is set up for the distribution of the grants.

This act, along with the Pennsylvania Sewage Facilities Act, could enable municipalities to better handle an increase in sewage from further development of the coastal zone.

4. The Pennsylvania "Scenic Rivers Act"

(Act 283 of December 8, 1972)
The purpose of Act 283 is to assure Pennsylvanians and their decendants "the opportunity to refresh their spirits with the aesthetic and recreational qualities of unspoiled streams."

This act gives to DER the authority to administer a system of scenic rivers statewide. DER will submit proposals for designating these rivers to the Governor and General Assembly, based on its own studies and public hearings. Once the legislature approves DER designations, DER can acquire scenic easements, by condemnation under the "Eminent Domain Code of 1969" if necessary, or whatever easements are "reasonably necessary to give the public access to the river." Heads of other state agencies must cooperate with DER in all studies and acquisition proceedings.

DER may also grant easements or rights-of-way on or through parts of the Scenic Rivers System provided such easements are consistent with the provisions of this act. The Scenic Rivers Act would not apply unless DER designates the Delaware River or its tributaries as wild, scenic or recreational rivers.

5. Water Obstruction Act

(Act 555 of June 25, 1913)

This act makes it unlawful to construct any dam or other water obstruction, or to change or diminish the course, current or cross section of any stream or body of water without DER's approval. Exceptions to this restriction are dams in private streams less than three feet high, 50 feet wide, and built to create a pool for fishing purposes. However, DER does not have the authority over the tidal waters of the Delaware River and its navigable tributaries. The Navigation Commission for the Delaware River controls most of this area except for the city of Philadelphia which rules itself and its water through the Philadelphia Home Rule Charter.

6. Delaware River Construction Regulations (13 Pa. Code Ch. 203)

The Navigation Commission for the Delaware River and its Navigable Tributaries requires permits for any type of construction in the tidal portions of the Delaware River and its navigable tributaries (i.e. the Schuylkill River

below Fairmount Dam and Chester, Crum, Darby, Neshaminy, Pennypack and Ridley Creeks). It requires permits for wharves, piers, docks, bulkheads, slips, basins, bridges, submerged pipes, conduits, tunnels, fill, dredging, and all other harbor structures.

The Commission does not require any assessment of environmental impact or proof of compliance with environmental laws as part of the permit application. It does require:

(1) proof of ownership (including proof of eminent domain power to acquire the property of construction);
(2) plan showing location, dimensions, current/tide direction, among other requirements; and
(3) construction plans certified by a registered engineer or architect which proves the proposed structure's safety, and in the case of dredging or dumping, its exact location, depth, amount of material removed, and disposal site.

The Commission would not grant a permit until it has held a public hearing on the application. The permit does not replace other permits required by other agencies.

III. LAND RESOURCES MANAGEMENT

A. Land Use

1. Pennsylvania Municipalities Planning Code

(Act 247 of 1968; As amended by Act 93 of 1972, Act 194 of 1974 and Act 272 of 1974)

The Planning Code establishes the basic authority for the exercise of municipal land use controls in Pennsylvania. It authorizes municipalities and counties to regulate all kinds of development including planned residential development and subdivisions. Zoning ordinances may regulate:

(1) land and water uses;
(2) size and location, construction, alteration and use of all structures;
(3) areas of land and water to be occupied or left unoccupied by structures and uses; and
(4) density of population and intensity of use.

They are to be designed to prevent overcrowding of land, blight, traffic congestion and loss of health, life, or property from fire, flood panic or other dangers.

This act authorizes the establishment of local planning commissions and planning departments. They shall produce a comprehensive plan for the municipality or county. The plan shall include a statement of objectives, a transportation plan, a public facilities plan and an official map. When a municipality adopts an official map, it must consider the effects of its plan on neighboring communities and must send certified copies of the map and its adopting ordinances to all municipal governments within the county.

The Commonwealth of Pennsylvania, generally through DER, has retained certain powers to control land use as it affects air and water quality. (Pennsylvania Sewage Facilities Act). However, the Pennsylvania Municipalities Planning Code delegates to the municipalities the authority to regulate the use of land. Each coastal municipality must consider in its comprehensive plan whether or not it wishes to accomodate onshore facilities (if they don't already exist).

2. Open Space Lands Act

(Act of January 19, 1968, P.L. (1967) 992)

This act broadens the existing methods by which Pennsylvania can preserve or acquire land for open space uses. The Commonwealth, through DER or the Department of Agriculture, may preserve or acquire the land only with the permission of the county where the land is situated. The Commonwealth could also acquire land and existing improvements located in impoverished urban areas.

The Site Development Act could have major environmental impact. In a positive sense, it could support the construction of facilities which have minimal environmental impact.

IV. OTHER LEGISLATION

1. Delaware River Basin Compact

(Act of July 7, 1961, P.L. 518)

This compact provides that the part of the Delaware River Basin lying within Pennsylvania is part of an interstate region for intergovernmental cooperation

among Delaware, New York, New Jersey, and Pennsylvania. Therefore, Pennsylvania must consult with its neighbors before taking a major action concerning the Delaware River Basin.

The Compact created the Delaware River Basin Commission as the interstate agency responsible for developing the Basin's water resources. The Commission is responsible for developing a Basin comprehensive plan. It can carry out waste treatment, water distribution and diversion, flood control, watershed management, pollution control and ground water recharging projects. It has the power to zone the Basin's floodplains and requires permits for all water withdrawals and diversions. The Commission is responsible for providing recreation facilities, developing hydroelectric power and fisheries, controlling saltwater movement, and improving navigation. It may adopt regulations to carry out these duties.

The Commonwealth can acquire land or an interest in it for several purposes including:

(1) to protect and preserve water resources, watersheds, forests and land being used to produce timber crops;
(2) to protect existing or planned parks, forests, wildlife preserves, nature reserves and other recreation or conservation sites by controlling adjacent lands;
(3) to protect natural and scenic resources, including soils, beaches, streams, floodplains, or marshes, and;
(4) to limit the use of real property to achieve open space.

This act could play an important role with regards to coastal zone management. Pennsylvania can acquire open space along the Delaware in order to preserve it from industrial development, but only if the county so desires. A county might prefer to encourage industrialization so as to expand its tax base and create jobs, rather than maintain open space along its coastal fringe.

B. Solid Waste Management

1. Pennsylvania Solid Waste Management Act

(Act 241 of July 31, 1968; As amended January 12, 1970, P.L. (1969) 456; December 30, 1974, P.L. 1035, No. 337)

The purpose of the Solid Waste Management Act is to:

(1) establish a cooperative state and local program for all phases of solid waste management;
(2) utilize private enterprise to accomplish an effective solid waste management program; and
(3) require permits for the operation of processing and disposal systems.

This act prohibits dumping solid wastes in the Commonwealth without a permit, constructing or operating a disposal system without the approval of DER, burning solid wastes in violation of the Air Pollution Control Act, or storing or transporting solid wastes in a way which constitutes a public nuisance. The definition of solid wastes includes sludge and dredge spoils which are disposed on the land.

In administering this act, DER may adopt rules and regulations to enforce it, provide technical assistance to communities, initiate research, establish policies and develop a statewide solid waste management program.

2. Solid Waste Resource Recovery Development Act

(Act of July 20, 1974, P.L. 572, No. 198)

The purpose of this act is to provide financial assistance to municipalities and development agencies in the planning and development of resource recovery and solid waste disposal/processing program.

DER disburses moneys from the fund and may exercise all power necessary to effectively carry out the purpose of this act, including:

(1) making loans or grants upon proper application to developing agencies;
(2) inspecting the books of the recipients of the loans or grants;
(3) issuing enforcement orders to said recipients; and
(4) prosecuting under the provisions of this act (Section 4)

3. Site Development Act

(Act of May 6, 1968, P.L. 117, No. 61)

This act empowers the Commonwealth to give grants to municipalities, industrial development agencies, or state agencies for the construction, rehabilitation, alteration, expansion, or improvement of certain site development facilities. The facilities include:

(1) water facilities, e.g. pumping stations;
(2) sewage collection lines;
(3) channel realignment; and
(4) access roads.

CHAPTER 6

NEPA PROVISIONS

There are certain areas of environmental concern which coastal zone development proposals must consider under the terms of the National Environmental Policy Act of 1969 (Public Law 91-190, January 1, 1970 (42USC 4321-4327)) familiarly known as NEPA.

These areas are spelled out in the Act, in the Council on Environmental Quality's (CEQ's) Environmental Impact Statement Guidelines, and in the body of law that has evolved from judicial decisions since 1970. Of the legal cases perhaps the most important from the viewpoint of utilizing Pennsylvania's coastal zone is County of Suffolk v. Secretary of the Interior (U.S. ED NY Final Memorandum Order, Docket Nos. 75 C 208; 76 C 1229). In this case, the judge determined that in leasing the rights to off shore oil the Department of Interior's environmental impact statement had to consider the impact of the leases on land development.

NEPA's purpose is to "declare a national policy which will encourage the productive and enjoyable harmony between man and his environment; to

promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; ..." In more practical terms, the Act seeks to minimize the negative environmental impacts of federal decisions whenever possible. Consequently, it requires federal agencies to prepare an environmental impact statement (EIS) on "major federal actions significantly affecting the quality of the environment..." (Sec. 102) The statement must: 1) consider the environmental impact of the proposed action; 2) identify avoidable environmental impacts; 3) suggest alternatives; 4) consider the relationship between long and short term impacts; and 5) review irreversible or irretrievable commitments of resources as a result of the proposed action. (Sec. 102) The statement must be circulated to other federal agencies, to state and local governments and to the public for comment.

The President's Council on Environmental Quality has the responsibility for administering the Act. In 1973 it adopted Guidelines which federal agencies must use to prepare environmental impact statements. Among the most important sections of the Guidelines are those that define the actions that NEPA covers (1500.5), identify major actions significantly affecting the environment (1500.6) and describe the contents of environmental impact statements (1500.8). It is necessary to understand each of these sections of the Guidelines in order to ascertain the areas of concern that development in the coastal zone must consider under NEPA.

NEPA applies to all federal agencies' actions. The Guidelines describe three specific types of actions where EIS's are needed. They are: (1) recommendations for legislation that the agency will administer; (2) new and continuing agency programs and activities which are supported

with federal assistance or undertaken by the agency or that involve a "...federal lease, permit, license certificate or other entitlement for use; and (3) the writing or modification of rules, regulations, procedures and policy. The responsible or head agency is the one that administers the legislation, program, permit, lease or regulation. The Table attached to this report, entitled "Federal and State and Regional Agencies Involved in NEPA Review Process of Delaware River Coastal Zone" lists many of the federal agencies which must prepare EIS's if they undertake projects within the Pennsylvania coastal zone.

It also presents several state and regional agencies with projects affecting the coastal zone. Pennsylvania, however, lacks a requirement for a state environmental impact statement. Although these agencies are active in the coastal zone, there is no statutory authority necessitating that they prepare a State environmental impact statement. Consequently, these state and regional agencies can only become involved through review of a federally prepared EIS.

The federal agencies involved in EIS preparation have interpreted the statutory clause that EIS's must be prepared for "major federal actions significantly affecting the quality of the human environment" differently. A large body of case law has developed as a result. In the guidelines CEQ makes it plain that major refers to the cumulative impact of a project and to local projects" ...if there is potential that the environment may be significantly affected." 40 C.F.R. 1500.6 Anticipating that the agencies might have difficulty ascertaining what is a major action, CEQ elaborated on the point as follows:

> In considering what constitutes major action significantly affecting the environment, agencies should bear in mind that the effect of many federal decisions about a project or complex of projects can be individually limited but cumulatively considerable. This can occur when one or more agencies over a period of years puts into a project individually minor but collectively

> major resources, when one decision involving a limited amount of money is a precedent for action; in much larger cases or represents a decision in principle about a future major course of action, or when several Government agencies individually make decisions about partial aspects of a major action. In all such cases, an environmental statement should be prepared if it is reasonable to anticipate a cumulatively significant impact on the environment from Federal action. (40 CFR 1500.6

Private enterprise will initiate much of the onshore development supporting OCS development. Consequently, federal agencies will not be directly involved. However, transporting the fuel ashore is going to involve the U. S. Corps of Engineers which will have to grant permits either to lay pipelines in or across the Delaware River, or to make the necessary shore or channel changes to permit tankers to discharge their cargoes. EPA must grant discharge permits for air and water discharges. As a result, there will be a cumulative impact which the different federal agencies will have to address. These impacts will be of sufficient magnitude to merit the preparation of an Environmental Impact Statement.

What must the EIS contain? Each agency prepares its own guidelines, within the broad framework that CEQ has outlined. In Section 1500.8, the CEQ Guidelines describe what points an EIS must cover. First, the statement must include a description of the proposed action and the environment it will effect. This descriptive material must contain a sufficiently detailed summary of the technical information to permit an adequate assessment of the potential environmental impact of the project. It must also discuss the cumulative impact of the proposed action and other federal activities in the area.

A second criterion for each EIS is that it must analyze the "relationship of the proposed action to land use plans, policies, and controls for the affected area." It must explain how the project will conform or conflict with federal, state and local land use plans and controls.

Where conflicts exist, the EIS must explain the degree to which the agency has sought to minimize these conflicts.

Next, an environmental impact statement must explain the probable impact of the proposed action on the environment. To do this, it must assess the positive and negative impacts of the project and the secondary or indirect impacts, as well as those which have direct consequences for the environment. In so far as the Pennsylvania coastal zone is concerned, the analysis of these secondary impacts will be the crucial area of environmental concern in the development of offshore oil.

Alternatives to the proposed action must be discussed also. Their environmental impacts must be evaluated, as well as those of the proposed project. The EIS must consider also the costs, risks and overall impact of any alternative course of action, irrespective of whether or not the agency will have anything to do with the use of the alternative method.

The fifth requirement is that the EIS review unavoidable adverse environmental effects, as well as how the adverse impacts identified in the second requirement can be mitigated. The adverse impacts can include, but are not limited to "water or air pollution, undesirable land use patterns, damage to life systems, urban congestion, threats to health..." This requirement will permit the reviewers to have a clearer concept of the project's impact before they permit it to continue.

Tradeoffs between the short term environmental disruption and long-term advantages, or conversely short-term gains and long-term losses must be discussed in the EIS too. A seventh consideration is the irreversible or irretrievable committment of resources, cultural as well as natural. Some of the resources which would have to be considered in the Pennsylvania coastal zone are described in Chapter 2.

Finally, the EIS should indicate what other aspects of federal policy will offset the adverse environmental impacts. For example, an EIS concerning offshore oil support facilities in the Pennsylvania coastal zone would have to assess the need for additional domestic energy resources in relation to the increased air and water pollution, destruction of remaining wetlands, possible pollution of the Raritan-Magothy Aquifer and similar negative environmental impacts.

NEPA is definitely applicable to offshore oil development. Whether or not it will apply to the onshore impacts that will occur in the Pennsylvania coastal zone depends in large measure on the cumulative impact of the activities that occur here. The information on the quantity of oil that the Baltimore Trough will produce is so limited, that the industries are not sure where the oil will be brought ashore. Consequently, federal agencies cannot plan what actions they will take and whether or not these will require an EIS. Once drilling begins and there is reliable information about the quantity of oil and where it will be brought ashore, it will be possible to determine whether or not a statement is required, and which agency shall prepare it.

The federal agencies that are most apt to have to prepare an environmental impact statement covering the impacts of the onshore support facilities are the Corps of Engineers, because of dredging and channelization permits; Environmental Protection Agency, with its responsibilities under the Federal Water Pollution Control Act (P.L. 92-500) and the Air Pollution Control Act (P. L. 91-604); the Department of Commerce with its responsibilities for the coastal zone, and perhaps Interior as an adjunct to its responsibilities concerning the leasing of offshore oil tracts.

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The Governor's Energy Council was established by Executive Order of Governor Shapp in February 1974. The purpose of the Council is to strengthen the capacity of the Commonwealth to respond to the complex problems related to energy. The Council is the principal authority within the Commonwealth for all aspects of energy policies and programs. It has the authority to exercise control and coordination necessary to insure the proper management of energy use, conservation, and production throughout the Commonwealth.

In addition to the Council itself, an Advisory Committee to the Council has been formed. Members of the Advisory Committee represent the many industries, organizations, citizen groups and the public in their concern with energy production, management and use.

One of the primary functions of the Council is to develop a Commonwealth Energy Policy. A Commonwealth Policy on Coal Revitalization and a Commonwealth Policy on Energy Conservation have been prepared and are currently in the implementation stage. Special projects and the day by day response to energy problems are also the responsibility of the Council.

The Council maintains liaison with the Congress and the Pennsylvania Legislature in energy matters and also with the various Federal agencies and with sister organizations in other states.

MILTON J. SHAPP
Governor

LT. GOVERNOR ERNEST P. KLINE
Chairman

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