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OCS OIL & GAS

AN ASSESSMENT OF THE DEPARTMENT OF THE INTERIOR ENVIRONMENTAL STUDIES PROGRAM

A report to the
Department of the Interior,
Bureau of Land Management
from the
Committee to Evaluate
Outer Continental Shelf
Environmental Studies

Environmental Studies Board
Commission on Natural Resources
National Research Council

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Preface

The study culminating in this report was undertaken at the request of the Bureau of Land Management, U.S. Department of the Interior. The Environmental Studies Board was assigned responsibility for assessing the Bureau's Environmental Studies Program on the outer continental shelf (OCS) and it appointed the Committee to Evaluate Outer Continental Shelf Environmental Studies in the fall of 1976. The intention of the study was to examine critically the concepts, procedure, and results of the Program in order to provide an evaluation and recommendations that the Department of the Interior could use as a basis for Program improvement.

The technical information provided by the Program contractors to date provides little opportunity for an evaluation of its scientific content. As a result, the Committee has focused on the needs, concept, and procedures of the Program and the actual or potential use of the results. While the Program is still young, we feel that our analysis has provided a firm basis for recommending improvements, some of which will require substantial changes if the Program is to be effective and the national interests well served.

During the course of this assessment, some of the Committee's recommendations have been anticipated. For example, the Department of the Interior proposed rule changes in the *Federal Register* on July 12, 1977 for environmental studies that recognize the need for nearshore studies, for consideration of involvement by the affected states, and timely completion of studies for decisions. This evidence of a willingness

Findings and Recommendations

GENERAL

The Department of the Interior initiated the Environmental Studies Program for the Development of Offshore Oil and Gas Resources in 1973 in response to pressure from public interest groups, states, and other federal agencies, in connection with the leasing of an OCS area off Mississippi-Alabama-Florida (MAFLA). The purpose of the Program is to provide environmental data to support decisions by the Department of the Interior for leasing of outer continental shelf (OCS) tracts for oil and gas exploration and development. It is the Committee's finding that the Program has not been based on an adequate assessment and identification of the scientific research that is required to answer environmental concerns for oil and gas operations.

The Program does not now effectively contribute to leasing decisions or to the accrual of sound scientific information adequate for OCS management, both offshore and onshore. While the Bureau of Land Management (BLM), which administers the Program, does not define it as a research program as such, a scientifically sound activity is nevertheless required. Our concern for the scientific content of the program, as distinguished from its utility to BLM, is that we could find very little evidence of explicit hypotheses or statements of scientific purpose for which the data were intended (see also Appendix A). Thus gathering of the data prescribed through formal bid instructions (Chapter 4) often leads to descriptive data for unknown purpose. We do

not wish to imply that we judge all work of this BLM program unscientific. However, the general lack of a scientific construct and specific hypotheses combined with uncertain relevance for Departmental decisions greatly erode the potential value of the program. Therefore, we urge BLM to execute a problem analysis (Chapter 2) to identify the information required to develop a program design (Chapter 3) suitable to obtain this information. Without a sound scientific design focused on the relevant issues, the present Program will continue to produce inconclusive descriptions.

The basis for opposition to development in new areas has been fear of oil pollution and other adverse onshore and nearshore impacts. Serious federal/state jurisdictional problems are involved in decision making to meet these concerns. To achieve both scientific credibility and usefulness to government officials, the scope, design, execution, implementation, and procedures for continuing evaluation of the Program require substantial change.

- *Our general recommendation is that the current Program should be extensively revised to contribute to OCS environmental management goals. The program should: (a) reallocate funds for greater emphasis on study of onshore and nearshore impacts; (b) formulate a program based on an adequate problem analysis and relevance to policy decisions; (c) change research management and procurement practices to assure scientifically sound and useful results; and (d) adjust responsibilities for environmental studies within the Department of the Interior to facilitate effective use of Program results.*

Specific actions to achieve this substantial revision of the Program are suggested in the recommendations for Program design, implementation, and use that follow.

PROGRAM DESIGN

SCOPE

The present focus on offshore data collection to the near exclusion of nearshore and onshore issues is a significant deficiency. This defect may be caused in part by the artifical boundary created by state jurisdiction being set at three nautical miles offshore, and by the partitioning of functions among several federal agencies. The present offshore emphasis of the Environmental Studies Program is not responsive to state and local government concerns for OCS oil and gas development (see

Chapter 2). Legal cases (see Appendix C) seeking to constrain OCS oil and gas development have been concerned primarily with onshore and nearshore environmental impacts. These actions have been the primary reason for postponement of OCS leasings. Thus, the present Program design is not adequately coupled either to technological or to policy problems.

- *Appropriate studies should be conducted on all impacts associated with OCS operations, including physical, biological, and social concerns, and should cover those affecting the critical onshore and nearshore areas. Such an expanded scope will require closer collaboration with agencies concerned with coastal management.*

NEED FOR PROBLEM ANALYSIS

The existing problem analysis, as presented in BLM's response to the OCS Environmental Studies Advisory Committee (OCSESAC) "Resolution of 1976 Concerning Program Rationale" (see Appendixes A and B), insufficiently specifies the scientific and technical problems, information needs, and leasing and policy requirements. As now constituted, the Program is inadequate (see Chapters 2 and 3). OCSESAC, a group comprising representatives of the states, federal agencies, public interest groups, and the scientific community, organized by DOI in 1974, has made similar criticisms of BLM's response to the OCSESAC resolution.

A clear identification is needed of (1) the impacts of OCS activity, (2) the actions to control those impacts, and (3) the problems for whose resolution scientific data is to be collected and synthesized.

- *A comprehensive analysis of the potential impacts (physical, biological, and social) of oil and gas operations (exploration, development, and production) should be completed for all areas (onshore, nearshore, and offshore) that could be affected. This analysis should emphasize all government actions (not just DOI's leasing function) related to management of OCS oil and gas.*

PROGRAM DESIGN

The Environmental Studies Program of BLM has not been useful for making leasing decisions and is not fully responsive to public information needs because of both inadequate administration and poor program design. Owing to a lack of clearly defined problems, funds in

each geographic area are spread over a variety of projects with too little discrimination as to priorities.

In the absence of a clear Program strategy, there is no adequate basis for allocating BLM resources. Rather than spreading the funds geographically and among oceanographic disciplines, a better approach would be to identify critical information needs and concentrate work on a limited number of tasks relevant to leasing decisions. A Program strategy should be based on a problem analysis leading to a detailed design that will guide resource allocation and priorities.

- *The Program should consist of separate strategies targeted respectively on pre-leasing and pre-development management decisions. DOI should identify and separate all decision points (not just leasing) for input from environmental studies (see Chapter 2). On this basis the appropriate predictive parameters and information requirements for management decisions can be defined as determinants of the Program design.*

IMPROVED USE OF SCIENTIFIC METHOD

The current Program consists mainly of "baseline" or "benchmark" studies (see Glossary) that will not produce adequate insights into the environmental effects of OCS activities (see Chapter 3). Even if the results of such studies are scientifically accurate, the information gathered will be of little use in management decisions.

Such descriptive baseline and benchmark studies suffer from limitations imposed by natural variability. Even with intensive sampling, chemical and physical changes identified with petroleum operations cannot be related causally to observed changes in living communities. A more effective approach than costly baseline or benchmark studies and monitoring over 10-15 years would be to hypothesize and define the possible causes of change in the OCS and onshore areas, and to conduct tests of the validity of the assumptions underlying the hypotheses (see Chapter 3). For example, a more useful approach would be the design of specific cause-effect experiments which establish the vulnerability of key species or communities.

- *The current long-term benchmark studies program of BLM should be terminated, and the needs of federal and state officials in meeting NEPA requirements for prediction should be the primary focus. A new format should be designed, based on stating and testing hypotheses, that would produce work more relevant to the management of specific environmental effects of OCS activity.*

PROGRAM ELEMENTS

The information needs are best considered in two categories: (1) pre-leasing and (2) pre-development. Reconnaissance and survey studies are being conducted, but there is no adequate evidence that they are being synthesized in a form useful for management decisions related to environmental protection, except for a few minor leasing tract deletions. Pre-development information needs are not adequately met (a) because study reports must be delivered before there is any assurance that exploitable hydrocarbons are present in a specific area, (b) because information needs include social impacts but the Program is largely aimed at environmental science, (c) because of complex jurisdictional problems, and (d) because the Program is inadequately designed (see Chapter 3).

- *BLM should continue pre-leasing, short-term reconnaissance studies.*
- *Concerted effort by scientifically trained personnel is required to synthesize the data from reconnaissance studies and put it in a form useful to decision makers.*
- *Appropriate interpretation of the social impacts of OCS oil and gas development on nearshore and onshore areas should be initiated using existing data.*
- *For OCS development and production, more studies of the specific effects of low-level chronic inputs on aquatic communities should be undertaken by experienced scientists.*
- *DOI should support immediate and continued studies of major spills whenever they occur on the U.S. outer continental shelf.*

PROGRAM IMPLEMENTATION

ORGANIZATION OF THE ENVIRONMENTAL STUDIES PROGRAM WITHIN BLM

Initiation, coordination, and contract administration of the environmental studies each occurs in different parts of BLM. Regional offices are responsible for initiation, the Environmental Studies Branch for coordination, and the Administrative Services Branch for contract administration. Coordination between the sectors is inadequate.

An integrated management structure is required not only for smooth and efficient administration of the program, but also to assure synthesis and delivery of interpreted information in a timely and effective manner. While we recognize the prerogative of any agency to organize and

implement its assigned programs, the limitations of the current program implementation so effected the science undertaken, that we offer the following recommendations for improvement.

- *For effective implementation of the Program, DOI should devise and promulgate a unified management structure that reports at a level appropriate to assure use of the results.*

PROGRAM AND STAFF RESPONSIBILITY

Major constraints on effective implementation of the Program are (1) the small number of BLM staff assigned to the Program, (2) the paucity of professional experience relevant to assigned staff responsibilities, (3) limited or ineffective authority of the Program staff over supporting personnel, and (4) the weakness of support rendered by senior management of DOI (see Chapter 4). Approximately nine people have responsibility for the expenditure of $50 million appropriated for the Environmental Studies Program. The inadequate authority assigned to this Program and its dependence upon other units of DOI indicates a low priority in DOI.

The Program needs more authority to work effectively with other DOI units, and greater support from senior management in DOI.

- *Both the Department of the Interior and the Office of Management and Budget should recognize the limitations of staff resources and provide positions in number and grade level commensurate with the responsibilities. An improved grade level is necessary to attract highly qualified professionals. An adequate field staff in the frontier regions should be assigned directly to the Environmental Studies Program.*

PROGRAM PROCUREMENT

The Requests for Proposals (RFPs) used by BLM to implement the Program are generally prepared at regional offices and are inflexible and excessively detailed in their requirements. The Committee has been told that some universities and oceanographic institutions have apparently discouraged their staff from participating because of the poor and rigid procurement process.

Since the uncertainties are numerous, and scientific knowledge of the OCS is not yet advanced, a less rigid and prescriptive procurement approach would be more suitable for recruiting capable scientists and conducting competent scientific research. Alternative mechanisms are

required for effective procurement of proposals from appropriate sources, particularly for the longer-term studies (see Chapter 4).

- *BLM should issue RFPs or Program advertisements designed to elicit proposals that will respond to identified information needs. Such needs should be based on the problem analysis and on questions relevant to policy established by the program design. The needs should be defined, RFPs and advertisements prepared, and proposals selected with the assistance of external panels of knowledgeable professionals and potential users of the results. Awards should be based on technical merit of approach and staffing, interpretation with respect to policy decisions, and on financial competitiveness.*

CONTRACT MANAGEMENT

Current contracts are unduly restrictive and require unnecessary routine submission of raw data. Monitoring is performed by contract managers with limited experience who take inflexible positions on contract requirements. Reports, particularly synthesis reports, are consistently behind schedule (see Chapter 4).

Management of the contracts is unsatisfactory, has encouraged inefficient procedures, and has discouraged participation of many competent professionals. More professional and flexible contract management is required.

- *BLM contract managers should have authority to carry out flexible programs that allow for changes from contract specification when appropriate. Reporting requirements should be tailored to the provision of completed information timely to decisions.*

IMPLEMENTATION OF NEARSHORE AND ONSHORE PROGRAMS

Study of nearshore and onshore environmental impacts has been carried forward in a casual and ad hoc manner, on the stated assumption that these areas need not be studied by BLM at this stage in outer continental shelf development. Neither goals nor methodology for studying such impacts, or for integrating relevant information into the federal/state decision-making process, have been developed. A considerable body of information already exists on nearshore and onshore environmental impacts (such as effects of oil spills and pipeline construction), and could be gathered and synthesized in connection with these studies.

• *The program should immediately be expanded to include systematic study of onshore and nearshore impacts of OCS exploration, development, and production. To this end, appropriate BLM goals should be identified and an effective methodology developed for gathering and synthesizing existing information and for carrying out selected studies to obtain needed new information.*

PROGRAM UTILITY

INPUT OF INFORMATION FOR OCS DECISIONS

The present organizational structure at the Department of the Interior, as it relates to OCS decisions, often involves almost every Assistant Secretary in DOI in OCS leasing decisions. The structure makes it difficult for Program results to contribute to decision making (see Chapter 4).

It is unlikely, under the current department structure, that environmental information can be assured of reaching relevant decision points within DOI. Under present legislation and departmental procedures, leasing decisions involve many DOI officials. It is therefore desirable to make sure that relevant information from the Program is readily available to all the parties concerned.

• *The environmental studies activity should have more visibility and importance within DOI, and the route to the decision makers should be more direct than its present path through many departmental units. The appropriate reporting of this Program should be reviewed in the context of reorganization of the government for more effective energy programs.*

STATE INFORMATION NEEDS

States suffer major onshore and nearshore impacts of OCS development, but have little access to the decision-making process in the Department of the Interior. Because of state and local siting and environmental control legislation, the states will play a major role in the development and production phases of OCS oil and gas activity. The Federal Coastal Zone Management Act and Amendments, while providing some financial support to state planning through the Department of Commerce, do not provide for any direct involvement of the states in DOI information gathering.

Substantial jurisdictional problems exist between the states and the federal government. Since state siting and environmental laws will play a

vital role in the development and production phases of OCS oil and gas activity, states should be involved from the outset and should have a direct input into the BLM Environmental Studies Program.

- *State involvement (as opposed to provision of information to the states) must be a component of all OCS Environmental Program decisions made by DOI before, during, and after leasing.*

TIMELINESS AND UTILITY OF PUBLIC REPORTS

None of the first-year synthesis reports has been made available to the public in advance of leasing. This may be due, in part, to the newness of the Program. Only a few reports are now published and publicly available. Indeed, there is little evidence of how the Program findings have been used or will be used internally by DOI.

For the Program results to be fully used, the synthesis reports should be as widely available as possible in time for use by all parts of DOI as well as interested parties before major decisions are made.

- *The annual synthesized results of the Environmental Studies Program should be incorporated in the appropriate sequence of decision documents (Environmental Impact Statements, Program Decision Option Documents). To effect this, and to satisfy the needs of the interested parties, the synthesis reports appropriate to the specific EIS should be publicly available at the time the Departmental Environmental Impact Statement is issued.*

ASSURANCE OF SCIENTIFIC QUALITY

The current Program has provided scientific results of limited use either for management decisions or for better scientific understanding of the OCS environment. The Environmental Studies Program would greatly benefit from expert advice wisely implemented. OCSESAC's identifications of scientific inadequacies and recommendations for improvement have generally been valid. They have also generally been ignored.

- *DOI should reassess the procedures for reviewing the scientific quality of Program design, implementation, and use. DOI should provide internal follow-up to assure deliberate response to such expert advice.*

1 Introduction

BACKGROUND

The potential petroleum resource on the outer continental shelf is in the front rank of candidates for exploitation to help meet the nation's energy needs. Development of the resource, in common with development of most sources of energy, will be accompanied by environmental and social impacts; precautions to protect the environment must therefore attend government leasing of OCS areas.

The Santa Barbara oil spill and the Arab oil boycott highlight the conflicting demands that must be reconciled in developing the resource while at the same time protecting the environment. The policy debate over the relative emphasis that these demands should receive is broad, and reflects not only differences in values, but also great uncertainty about facts. For the OCS, this is particularly relevant because in frontier areas factual uncertainty ranges from whether oil and gas exists to what will be the physical, biological, and social impacts of oil and gas operations.

To carry out its responsibility to "provide for proper protection of the environment during the development of federal energy resources" (U.S. Congress, Senate 1975:1020), the Department of the Interior needs to inform its decision making with data that reduce as far as possible the uncertainties associated with environmental impacts. In 1973, DOI instituted the OCS Environmental Studies Program to perform this function.

The impetus for the present study was concern over how well the Environmental Studies Program is accomplishing its purpose. This chapter provides a perspective for the Committee's evaluation of the Program with a brief outline of the OCS issue in its energy context, of the funding and stated purpose of the Program, and of the Committee's procedure and approach.

THE NATIONAL ENERGY ISSUE: THE POTENTIAL RESOURCE

Offshore oil currently contributes 1.3 million barrels per day to U.S. oil production, about 16 percent of total daily production, according to recent industry estimates (American Petroleum Institute 1977). The magnitude of activity associated with development of outer continental oil and gas is illustrated in Table 1.1.

Forecasting resources in frontier areas is an activity fraught with uncertainty. Presence of producible hydrocarbons can only be confirmed by drilling. Even after initial exploratory drilling and reclassification of a lease to producible shut-in status, the range of estimates of the economic reserves in the reservoir may vary widely. History is replete with examples, such as the Destin anticline off Florida, of promising structures that turn out to be dry. There are also many instances of properties being abandoned by one company and subsequently being proved and developed by another.

As technology has improved and prices have risen, it has become feasible to search for hydrocarbons in previously inaccessible areas. These areas, mainly offshore, are not only new in terms of accessibility, but many present new challenges because they are in geological environments about which little is known and in which experience is limited, such as in Alaska. The resource potential of these areas remains to be determined.

PURPOSE AND FUNDING OF THE ENVIRONMENTAL STUDIES PROGRAM

The avowed purpose of the Bureau of Land Management's OCS Environmental Studies Program, as described at appropriations hearings for FY 1975, is "to provide a better data base to plan an accelerated leasing program in harmony with the environment" (U.S. Congress, Senate 1974:233). Further testimony of DOI witnesses during three years of hearings (U.S. Congress, Senate 1974, 1975, 1976) somewhat expands

TABLE 1.1 Some Selected Statistics of OCS Activity

To be successful, environmental studies must consider all potential impacts from OCS development. Table 1.1 shows some parameters relevant to the scale of physical activity that has been associated with past OCS leasing.

	Gulf of Mexico	California	Oregon-Washington	Total
1954 through 1974				
Tracts offered	4,919	240	196	5,355
Tracts leased	2,153	129	101	2,383
Acres leased	9,623,149	678,121	580,853	10,882,123
No. of wells drilled	12,389	314	12	12,715
Oil and condensate production (1,000s of barrels)	3,487,021	126,346	–	3,613,367
Gas produced (billion cubic feet)	24,109	57	–	24,166
Bonuses (millions)	$14,156.6	$636.7	$34.5	$14,827.8
Royalties (millions)	$3,109.3	$71.6	–	$3,180.9
Production value–all products (millions)	$18,829.4	$429.5	–	$19,258.9
Calendar Year 1974				
Acres leased	1,762,158	–	–	1,762,158
Active leases (12-31-74)	1,514	68	–	1,582
Productive leases (12-31-74)	712	19	–	731
No. of fixed platforms (12-31-74)	2,054	5	–	2,059
Oil and condensate production (1,000s of barrels)	343,817	16,777	–	360,594
Gas produced (billion cubic feet)	3,509.2	5.5	–	3,514.7
Bonuses (millions)	$5,022.9	–	–	$5,022.9
Royalties (millions)	$542.6	$13.0	–	$555.6

OCS wells (Gulf of Mexico and Santa Barbara Channel as of September 1975)
- **Range of depth–5,000 to 20,000 feet**
- **Greatest depth of well drilled–20,000 feet**
- **Greatest depth of water (exploratory well)–1,780 feet**
- **Greatest depth of water for producing well–373 feet**
- **Greatest distance from land for producing well–109 miles**
- **Greatest distance from land for well drilled–138 miles**
- **Average number per platform–5 to 50**

Miscellaneous
- **Greatest distance of platform from shore–125 miles**
- **No. of operating companies–72**
- **Average number of bids per tract leased–4**
- **Miles of pipeline on OCS–6,800**

SOURCE: U.S. DOI (1976a)

that definition, but explanations of Program rationale continue to be expressed in very general terms throughout.

Testimony defending the Program during the FY 1976 hearings speaks of:

"baseline studies under which key biological, chemical, geological, and physical data is gathered at sampling stations in proposed leasing areas . . . to guide leasing decisions and to be in a position to measure changes in the environment, if any, from the so called 'baseline' once oil and gas operations are underway" (U.S. Congress, Senate 1975).

Examples given of the type of study planned include:

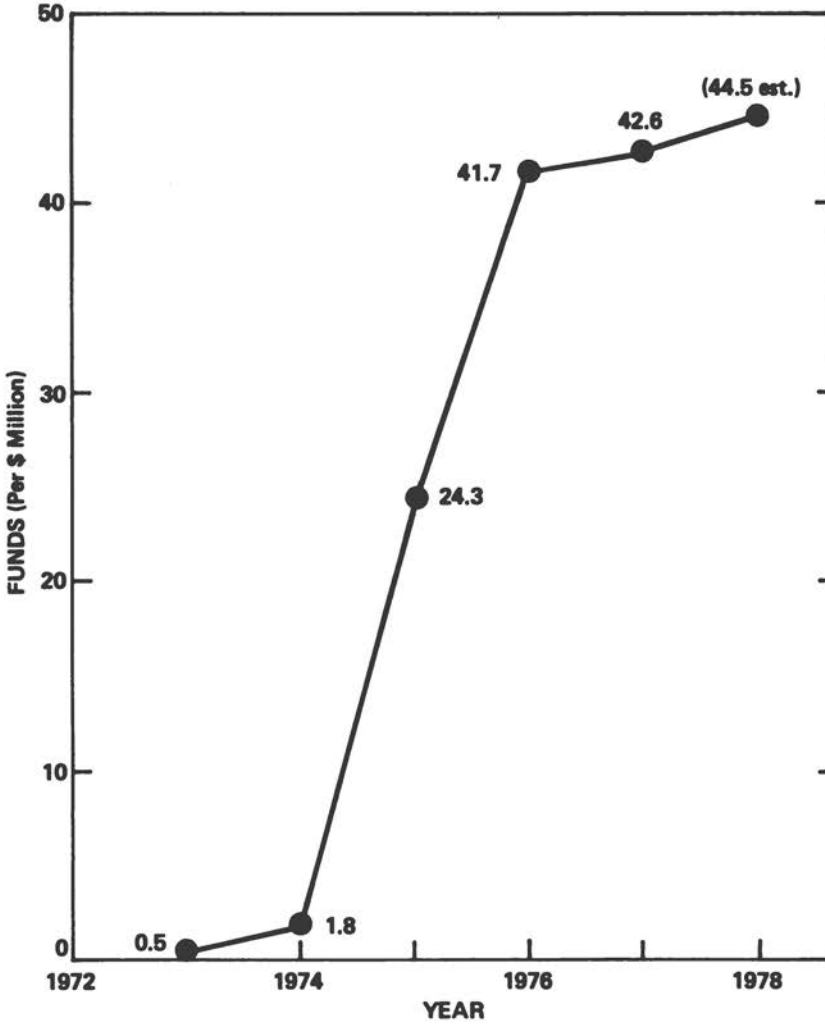
"analyzing oil spills to ascertain their spread or distribution patterns, studying hydrocarbon toxicity, studying unique ocean environments such as coral reefs . . . some analysis of socio-economic effects of development on industry, recreation, and the like" (U.S. Congress, Senate 1975:1023).

The same generality pervades testimony of DOI witnesses at the hearings for FY 1977. A brief interchange on the value of baseline and monitoring approaches for the studies (U.S. Congress, Senate 1976:1366) yields the most specific information to be garnered from three years of hearings. Thus, although it was made clear that reduction in BLM funding would curtail the BLM Studies Program, the conceptual basis for the Program, on which a defense against such curtailment would depend, was not made clear.

A program of studies with direct applications for decision making clearly requires an adequate definition of objectives. The need for explicit, specific goals becomes more vital as the Program expands. Figure 1.1 depicts the increase in Program funding from $1.2 million in FY 1973 to nearly $60 million for FY 1978. As well as illustrating rapid and spectacular expansion for the Program in general, the figure shows that a substantial Program has now been in existence for nearly three years. (Significant funding was obtained first for FY 1975.)

The Program's advisory committee (OSCESAC) has already initiated the process of reassessment. OCSESAC's 1976 Resolution Concerning Program Rationale (reproduced in Appendix A) requested from BLM a detailed exposition of Program goals and of how current and planned activities are designed to attain them. BLM's response (much of which is reproduced in Appendix B), is the fullest available statement of Program objectives, design, and implementation.

The starting point for this Committee's own contribution to the reassessment process has been an examination of current Program



SOURCE: Letter provided to the Committee by BLM, August 1977.

FIGURE 1.1 BLM-OCS Environmental Studies Program Budget.

This graph shows the growth in total BLM program funds from approximately $0.5 million in 1973 to $42.6 million in 1977. An additional $12 million was expended during the FY 1976 transition quarter. The rapid increase in funds has been due to the expansion of the Program into many new geographic areas. The amounts reported here are not necessarily consistent with the FY 1975-1976 total reported in the BLM response to OCSESAC, November 1976. The total expenditures FY 1973 through FY 1977 appear to be $122.9 million.

rationale, as expressed in the BLM response to OCSESAC and as manifested in the output of the Program so far.

COMMITTEE CHARGE AND APPROACH TO EVALUATION OF ENVIRONMENTAL STUDIES

The Committee was charged by the Department of the Interior to evaluate the scientific, management, and institutional issues that relate to environmental studies in support of OCS oil and gas development projects, in order to assess the Program's effectiveness in providing the information BLM needs to meet its responsibilities. The evaluation should also be relevant to the concerns of other federal agencies, state and local governments, and the private sector.

The ensuing report is based on the Committee's review of numerous Program documents, Requests for Proposals (RFPs), contracts, and contract reports; discussion of the Program with the staff of the Department of the Interior; study of academic publications; staff interviews of officials and scientists involved in many phases of the Program; and personal knowledge of the Program by Committee members. After several meetings to interview knowedgeable officials and review the Program, the Committee's effort culminated in a week-long workshop in which the present report was written.

The following chapter reviews the issues and problems the Committee considers relevant to the Program, and defines the relationship of the studies to the technological and policy components of OCS oil and gas operations. On the basis of this analysis and of the clear objectives for the Program that emerge from it, Chapter 3 discusses the adequacy of current Program design, in terms of consistency of approach, relevance to management of minerals on the OCS, and scientific questions, and suggests new approaches and methods for improving design. Chapter 4, on implementation of the Program and use of results, describes current contracting procedures and problems related to them, the merits and deficiencies of the reports that have resulted from the contracts, and how the Program's results are currently used. Participation of technical and scientific manpower is considered, as well as the scientific validity and utility of the information produced. The chapter concludes with recommendations on how the Program might be improved, both in the execution of its studies and the adequacy and timeliness with which it integrates the results into DOI's decision making. Findings and conclusions discussed in each chapter are listed, for the reader's convenience, in the Executive Summary.

The project scope includes assessment of onshore, nearshore, and

offshore environmental impacts of OCS oil and gas development. The report does not judge individual leasing actions, but examines the quality and use of environmental information used to make such decisions. The aim of the analysis is to determine strengths and weaknesses, and to suggest changes that might better relate the OCS Environmental Studies Program to national objectives.

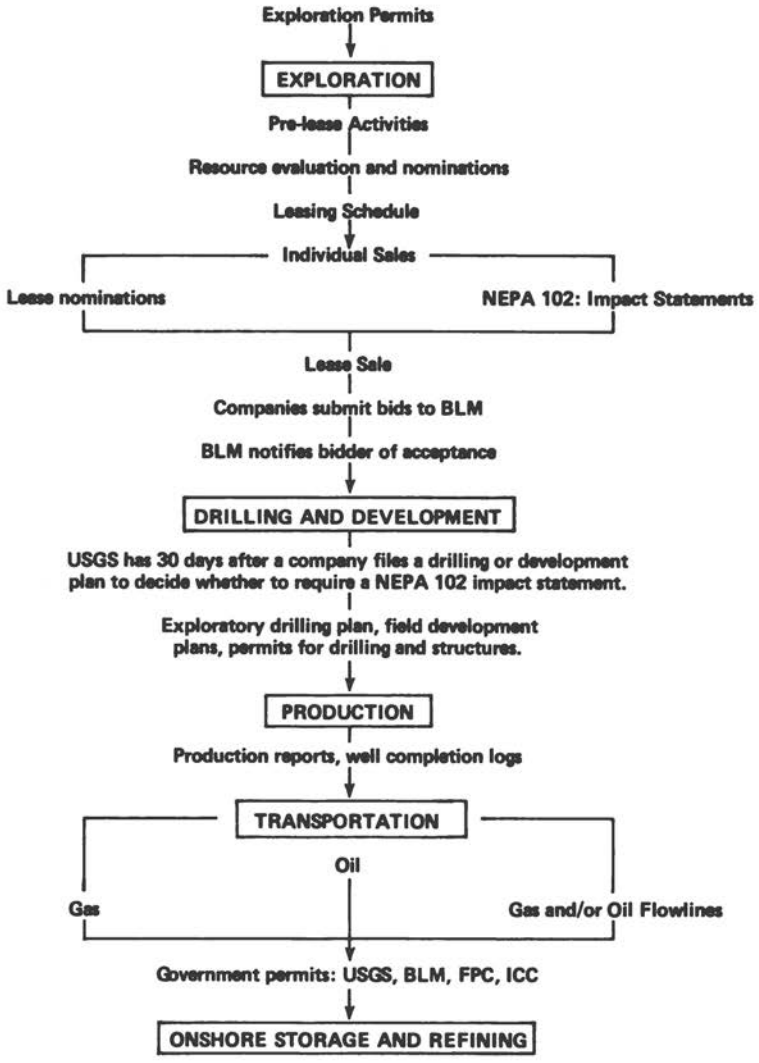
2 Problem Analysis

INTRODUCTION

An environmental studies program designed to help the Department of the Interior make environmentally sound decisions must be based on a comprehensive problem analysis. The problem analysis should consider the basic technology, its potential impacts on the environment, and the use of that information in policy decisions. Understanding the mechanics of the technology and their interactions with policy elements is fundamental to design of expedient environmental studies (see Figure 2.1). Pending amendments to the Outer Continental Shelf Lands Act could alter the controls on the technology which are indicated in Figure 2.1.

While the technology system shapes the studies, the policy system must use their results to make informed decisions. Therefore, a problem analysis should consider the policymakers involved and the tools they may use to manage technology's effects on the environment.

Chapter 2 presents the technology and policy aspects of this three-step system. The intermediate step, program design for environmental studies, is presented in Chapter 3. That design is the critical link between technology's effects and management decisions. Its goal is to develop an environmental information-gathering system on technology's impacts



SOURCE: Figure extensively redrawn from Kash et al. (1973).

FIGURE 2.1 Government control of technological activities related to OCS development.

Figure 2.1 presents an overview of some of the technological activities (shown in capitals) that can produce environmental impacts. Some of the government controls (lower case) that may be exerted on the technology are also shown. The Technology System and Policy System sections of Chapter 2 provide more detailed information about the mechanics of OCS oil development and the various controls exerted on it.

that is amenable to actions that may be taken by the existing policy system. The major components in the problem analysis are identified and discussed here, but the level of detail in describing these components and their interactions could be greatly expanded by the Department of the Interior. The framework offered by Chapter 2 should be used to construct a more detailed problem analysis, but should not be considered complete in itself. The chapter concludes that the problem demands increased attention to the onshore and nearshore environments.

THE TECHNOLOGICAL SYSTEM

INTRODUCTION

Industry's careful use of technology is essential for adequate protection of the environment. Practices used to locate and exploit outer continental shelf oil and gas must respond to the severe conditions that confront industry in the frontier areas of the Atlantic and Alaskan shelves.

This section discusses the major physical, biological, and social impacts that technology may cause during exploration for outer continental shelf oil and gas, and subsequent development and production. It considers the three environments, onshore, nearshore, and offshore, that may be affected. For detailed descriptions of the technological components, see Arthur D. Little, Inc. (1973), Baldwin and Baldwin (1975), Council on Environmental Quality (1974), Kash et al. (1973), University of Oklahoma (1975), Woods Hole Oceanographic Institution (1976), New England River Basins Commission (1976), and Canoy et al. (1976).

Through a description of some of the major technological elements and their possible impacts on the environment, this section offers a basis for a more complete problem analysis that policymakers must use to design an environmental studies program whose results will contribute to efficient management of outer continental shelf resources.

EXPLORATION

Exploration for subterranean geologic formations that may contain oil or gas calls for both reconnaissance and detailed seismic surveys made from

elaborately instrumented vessels. These operations have little environmental impact on any of the three areas. The ships are usually self-contained, far-ranging laboratories that need only available harbors for provisions and repairs. It is after exploration, once a promising structure is located and leased, that the operation becomes more complicated.

Onshore

The support from land bases required once exploratory drilling begins entails very little onshore development. The major onshore requirement is for supply bases where rigs and service vessels can receive drilling equipment, pipe, chemicals, and provisions. Only minimal social impact results. Each drilling rig may employ 50-75 people; half on board the rig itself and half in support jobs, either on shore or on support vessels.

Nearshore

Supply vessel traffic, between the support base and the drilling rig, may cause minimal impacts on the nearshore environment.

Offshore

Active reconnaissance techniques (e.g., seismic surveying, bottom sampling, and coring) may interfere with fishing fleets and general navigation, and have small, localized impacts on the environment. Once exploratory drilling has begun there is some possibility of a blowout, with loss of crude oil at the test drilling site, but this is a rare event.

DEVELOPMENT

The key word during development is "construction." Each of the three environments is involved. Support facilities are built onshore; pipelines run from land to the platforms that are installed offshore. Onshore development to accommodate the increased labor force may result in a development "boom."

Onshore

Virtually every facility (refineries, storage, dockage) necessary to support the offshore industry is under construction during the development

phase. Since construction is labor-intensive, local communities must cope with increased demands for housing and services such as schools, hospitals, and entertainment. Land prices increase with demand.

Planners for OCS activity must consider political, socioeconomic, and physical factors while balancing the site-specific requirements of industry with different policy objectives of state and local governments. Because of local opposition, facilities often create siting problems. While some coastal communities welcome the oil industry and the jobs it brings, others fear the inevitable change in their natural environments and quality of life. Planners must beware of overbuilding during the development "boom," and attempt to create a diversified economic base that will continue to provide jobs when construction is completed.

Nearshore

The nearshore environment is most often affected by the transportation of oil and gas from offshore production facilities to onshore treatment and processing plants. Chronic pollution by boat traffic and associated activities will affect port facilities, coastal harbors, and possibly wetlands. Economic factors, meteorological and oceanographic conditions, the distance from shore, and the ultimate destination determine whether pipelines or tankers should be used. Despite their expense, pipelines are more economical and safer in areas that suffer harsh weather conditions. Storms and high seas cause delays in tanker loading operations.

Offshore

Development drilling is usually considered to be less hazardous than exploratory drilling because the knowledge of subsurface conditions is greater. However, there is still the possibility of blowout, or spills of crude oil, or drilling mud. There is competition for space with fishing interests. Although the actual space occupied by drilling rigs and platforms is small, the competition for space may be substantial in some types of fisheries. Although some areas would be totally lost to fishing by emplacement of platforms and feeder pipelines, a larger area would be lost to bottom fishing such as trawling, lobster fishing, and long lining. Pipelines, even if trenched, present hazards to gear. Bottom debris tends to accumulate, fouling and damaging gear. Some areas may be lost to fishing if pipe laying and debris accumulations are not stringently controlled.

PRODUCTION

When a well is completed and connected, it is ready for production. Until the find proves to be commercially valuable, tankers, rather than pipelines, provide transportation. The use of pipelines is favored in fields with a high production rate.

Onshore

Tanker use requires an onshore tank farm for crude oil storage. The amount of land needed for the tank farm depends on the size of the field and arrangement for transfer of production to a refinery. Pipelines by themselves have only a moderate impact on the environment. The magnitude of impact depends upon the contingent facilities. Natural gas requires immediate treatment for safety reasons; coastal facilities should therefore accompany gas pipelines. Since oil does not need immediate refinement, refineries and tank farms do not have to be situated at the pipeline landing point.

During production, most construction activity terminates and the number of jobs adjust to a lower but steadier level. An oil refinery may require a work force of 2000 when it is being built, but only 300 for operation. The decline in jobs is normally most apparent in platform building and pipeline laying. Care must be taken to provide for the social and economic impacts that can occur during the transition from development to production phases, for example, with respect to employment. Specific planning should be done to determine alternate uses for sites (for instance, platform construction sites could be transformed into marinas, or if the community is large enough, sewage treatment plants.)

Nearshore

The primary impact of production operation on the nearshore environment is from transportation of oil and gas. Tankers may collide or run aground. Pipelines, in water depths of up to 200 feet, must be buried. Care must be taken to select pipeline routes that will receive the least disturbance from the prevailing tidal, wave, and earthquake forces.

Nearshore impacts are a more serious problem than those that may occur offshore at the oil field. Spills are less readily diluted nearshore, because of the smaller water volume. If the hydrocarbons are taken up by sediments on the bottom or in coastal wetlands, as is likely, slow

return of petroleum to the water greatly prolongs the effects on the biota. Concentrations of petroleum pollution have harmful effects that vary with the type of crude oil or petroleum product as well as with the populations exposed to it.

Offshore

When water is produced at the platform, it is usually separated offshore, carefully de-oiled, and then discarded to the ocean. Produced sand may also be dumped offshore after it is carefully cleaned of oil according to OCS operating regulations. Suitable containment and cleanup devices are required to be readily available at all offshore production sites in case of an accident. The floating boom is the most frequently used equipment to prevent oil on the ocean from reaching shore. Although additional cleanup by oil skimmers, absorbants, or dispersants have been provided, these are only partially effective. In the production phase, there will be chronic losses of hydrocarbons from separators, often at the rate of several barrels of hydrocarbons per day. Since many of the discharged hydrocarbons may be toxic, their cumulative impact on the biota may equal that of a single large spill.

THE OCS POLICY SYSTEM

INTRODUCTION

The current OCS Policy System includes the Department of the Interior and other federal agencies (e.g., Departments of Commerce, Transportation), state and local governments, industry, and environmental interest groups. The disparity of interests represents a major change from the early stages of outer continental shelf activities when policy and administration were controlled exclusively by the petroleum industry and the federal government. Although cooperation between government and industry provided up-to-date information for policymakers, and ensured that regulations would be realistic and enforceable, it effectively closed the system to nonfederal, nonindustry interests. Recently, however, state and local governments and environmental groups have challenged the closed system through court action.

This section outlines the legal-institutional framework, and identifies the categories of participants who must use the information provided by environmental studies to regulate technology's impacts on the onshore, nearshore, and offshore environments.

FEDERAL DEPARTMENT AND AGENCIES

Department of the Interior

The Outer Continental Shelf Lands Act (OCSLA) of 1953 (43 USC 1331-1343, 1970) designated the U.S. Department of the Interior as lead agency to carry out the Act's provisions for mineral leasing and development on the outer continental shelf. Within the Department, the Bureau of Land Management (BLM) and the U.S. Geological Survey (USGS) have been assigned the majority of activities necessary for timely resource development, safety, environmental protection, and resource conservation. Each lease action involves many units and nearly every Assistant Secretary in the Department: the Secretary and Under Secretary; the Solicitor; and the Assistant Secretaries for Program Development and Budget; Land and Water Resources; Energy and Minerals; Fish, Wildlife, and Parks; the Bureau of Land Management; the U.S. Geological Survey; the Office of Mineral Policy Development; and the U.S. Fish and Wildlife Service. Ultimately, coordination of these units and their activities rests with the Office of OCS Coordination in the Office of the Secretary of the Interior.

Other Federal Agencies

A number of other federal agencies are involved in the administration of the outer continental shelf. The U.S. Army Corps of Engineers has jurisdiction over obstructions, fills, and dredging. Construction and the dumping of dredge spoil require a Corps permit. The Corps may deny permits on the basis of navigational concerns as well as environmental and ecological factors.

The U.S. Coast Guard promulgates and enforces regulations on lights and other warning devices, safety equipment, and other matters relating to safety of life and property. The Coast Guard is also responsible for the formulation and implementation of the National Oil and Hazardous Materials Contingency Plan as well as local pollution contingency plans.

The U.S. Environmental Protection Agency (EPA) is generally responsible for pollution control and waste disposal. The Administrator issues permits for the dumping of any material, other than dredge spoil (e.g., refinery effluent, platform wastes, and drilling muds), into the waters of the territorial sea, the contiguous zone, or the high seas.

The President's Council on Environmental Quality (CEQ) played a major role in focusing attention on environmentally safe outer continental shelf regulations through its 1974 study. That report

concluded that leasing on the Atlantic and Alaskan shelves could be conducted with strict controls and stipulations. Currently, CEQ focuses continued attention on the outer continental shelf through its annual reports.

The National Oceanic and Atmospheric Administration (NOAA) houses the Office of Coastal Zone Management. The Coastal Zone Management Act of 1972 (16 USC 1451-1464, Supp. III, 1973) stipulates that the coastal management program of any state must be approved by the Secretary of Commerce. The Secretary administers this legislative mandate through NOAA.

RELEVANT LEGISLATION

Decisions concerning development of outer continental shelf oil and gas reserves are made within a wide and constantly changing framework of legal requirements (see Appendix C for a description of this framework). If at times BLM actions appear confused and disjointed, some responsibility has to be ascribed to the lack of consistent and clear legal guidance, which continues in spite of the passage of the Federal Land Policy and Management Act (90 Stat. 2734, PL 94-579), generally known as the BLM Organic Act in 1976.

The principal directives for BLM's OCS leasing programs are found in the Outer Continental Shelf Lands Act of 1953, (43 USC 1331-1343, 1970), which authorizes DOI to manage and lease the mineral resources of the OCS. Leases must be awarded on the basis of competitive bids of either of two types: (1) a cash bonus with a fixed royalty, or (2) a royalty with a fixed bonus. The Secretary has assigned responsibility for leasing to BLM. The OCSLA also authorizes the DOI, through USGS, to control the operation and production of offshore oil rigs. Environmental provisions of the Act include authorization to the Secretary of the Interior to set regulations to prevent waste and conserve natural resources; pursuant to this authority, DOI has issued regulations requiring BLM to evaluate potential impacts of OCS development on the environment. The Act has recently been amended to provide additional safeguards for the environment.

Two points concerning the OCSLA and its implementation by DOI are of particular significance for the Environmental Studies Program. First, the Program is located in BLM because of its leasing responsibility. Second, the Program will generate information that will influence the post-leasing regulations administered by USGS and activities of other participants discussed in this section.

The National Environmental Policy Act (NEPA) of 1969 (42 USC

4231-4247, 1970) has been a more potent means of injecting environmental concerns into BLM decision making than OCSLA. While OCSLA does not specifically require evaluation of impacts before lease of public resources, NEPA requires federal agencies to consider environmental effects of their actions and to prepare environmental impact statements (EISs) for "major federal actions significantly affecting the quality of the environment." Parties concerned with protecting the environment have challenged BLM's leasing decisions under NEPA, and DOI has indicated that NEPA and the lawsuits brought to challenge the Bureau's EISs forced BLM to initiate its Environmental Studies Program.

Other legislation relevant to the environmental impacts of OCS leasing are the Federal Water Pollution Control Act Amendments of 1972 (33 USC 1251 et seq. 1973, PL 92-500) and the Marine Protection, Research, and Sanctuaries Act of 1972 (33 USC 1401 et seq., Sec. 1321, Supp. III, 1973). These Acts established authority for EPA to regulate discharge of pollutants into U.S. waters. The Coastal Zone Management Act also has a major effect on OCS development decisions. The Act provides for state development of management programs for coastal lands and waters. A program approved by the Secretary of Commerce must control development and resolve conflicts among competing users of the coastal zone. Approval qualifies a state for federal grants to assist in the program's operation. Once the plan is approved, no federal license or permit may be granted for any activity that affects the state coastal zone unless that program is "to the maximum extent practicable" consistent with the management program.

THE ROLE OF STATE AND LOCAL GOVERNMENT

The Submerged Lands Act of 1953 (43 USC 1301-1315, 1970) granted the states ownership of oil resources on the OCS out to three miles. (Texas has three marine leagues, Florida has three leagues on the Gulf side.) It gives states title to the beds of the territorial sea to a distance of three miles, and beyond that line for those states that meet certain conditions. Under the Submerged Lands Act, the states have authority to control OCS oil activities that occur on or under the continental shelf within their jurisdiction. For example, state approval is necessary before an oil company may put down a pipeline from an OCS oil rig to shore.

In state waters, inland waters, and onshore, states have authority to determine where oil facilities will be located. Although this power was traditionally expressed at the local level through zoning laws, in recent years most coastal states have adopted some kind of state program for their coastal areas. Atlantic coastal states have generally approached

coastal zone management through a series of laws that deal with specialized activities or areas. Most have assumed zoning and permit jurisdiction over coastal wetlands. West coast states have tended to enact comprehensive statewide coastal zone management acts with both permit and zoning elements.

The Coastal Zone Management Act of 1972 is not coercive; there is no requirement that states participate in the program nor threat of federal action if they do not. The Act does, however, offer two attractive incentives: federal funding and consistency provisions, which become effective once a state's coastal zone management program has been approved. These consistency provisions require that federal agencies conducting activities that directly affect the coastal zone do so in a manner which is to the maximum extent practicable consistent with approved state CZM programs. Washington and Oregon have the only statewide programs approved to date. The areas most likely to receive approval in addition to Washington and Oregon are California, the Virgin Islands, and Puerto Rico.

A state program will not obtain federal approval unless it adequately considers the national interest. It must assure that local land and water use regulations do not unreasonably restrict activities that might have regional, as opposed to local, benefits. The Coastal Energy Impact Program includes financial assistance designed to be an inducement for state approval of OCS operations.

States also control both water and air pollution in the onshore and nearshore environments, out to three miles, under the Federal Water Pollution Control Act Amendments of 1972 and the Clean Air Act Amendments of 1970; (42 USC 1857 et seq., 1970, PL 91-604) and relevant state water and air pollution control laws.

NON-GOVERNMENTAL INTEREST GROUPS

Specific interest groups play an increasingly important role in OCS management through access to the political and court systems. The spectrum of groups includes environmentalists such as the Natural Resources Defense Council, the Sierra Club, and the Audubon Society, who support the OCS drilling program but insist upon due consideration of environmental protection; petroleum industry groups such as the American Petroleum Institute, who advocate the advantages of speedy resource recovery; and industries such as fisheries, who fear interference by the oil industry.

CONCLUSION

To understand how to develop OCS resources, it is necessary to understand how the environment will be affected by that development. Environmental studies, designed to determine impacts the technology system will have on the onshore, nearshore, and offshore environments, produce results that must be used by decision makers in the policy system. The results should be amenable to use by the Department of the Interior, other federal agencies, state and local governments, industries, and citizen interest groups. The problem demands increased attention to the onshore and nearshore environments. Problems in these areas are exacerbated by jurisdictional complexity. Onshore social impacts represent a particularly difficult case; understanding and resolving them is impeded by gaps and overlaps within federal agencies and among those agencies and state and local governments. Although problems associated with sorting out onshore and nearshore impacts make studies difficult to plan and execute, those areas are of central concern to policymakers and must be considered carefully if a stable pattern of OCS operations is to be achieved.

3 Program Design

INTRODUCTION

The overall goals of the Department of the Interior in overseeing OCS activities are to determine fair market value for the resource, to provide for orderly development, and to protect the environment. The scientific aspects of the BLM-OCS Environmental Studies Program are directed toward environmental protection. The major part of the Program is devoted to baseline or benchmark data acquisition. The BLM Program definitions of these terms given below are central to the discussions in the remainder of the chapter. The studies require a program design that identifies clearly the scientific and social studies and research needed for OCS management decisions. This chapter outlines the BLM Program for Fiscal Years 1975-1976, discusses the Committee's conclusion that the current baseline or benchmark programs will not satisfy OCS management needs, and recommends an approach for developing a useful program design.

CURRENT ENVIRONMENTAL STUDIES PROGRAM

RESPONSE TO OCSESAC RESOLUTION

On 18 February 1976, OCSESAC issued a resolution (reproduced in Appendix A) calling on BLM to develop a Program rationale identifying (a) decisions to be made in connection with OCS operations, (b) data

needs, and (c) priorities for data collection. BLM's response to the OCSESAC resolution, prepared in November 1976, is used here as a concise reference to the current Program (see Appendix B). The response includes an enclosure (Appendix B, Enclosure 3) that identifies seven major study elements: summaries of historical data, conferences, reconnaissance studies, benchmark studies, studies of fates and effects, modeling, and site-specific monitoring.

Summaries of historical data require compilation of all information pertinent to the OCS environment within a given geographic area. Conferences are public, advertised gatherings of interested parties, within a geographic area, at which BLM's Program is discussed.

Reconnaissance studies are of two types. The first is described (Appendix B, Enclosure 3) as dealing with "broad area characterizations using a limited number of parameters. These can best be described as large-scale surveys to determine major geomorphological and population characteristics." The second type are defined as "more site-specific, short-term studies designed to gather qualitative information regarding well-defined areas of special interest or concern. They frequently are the earliest studies initiated, commonly in response to suspected potential impacts on such things as unique biological assemblages and critical habitats or to delineate natural hazards." The description goes on to list Program elements that include specific types of geological and geophysical data, biological survey data, and direct observation data. Enclosures 1 and 2 of the same document (see Appendix B) identify a series of leasing steps, but the connections between the reconnaissance and other data sets identified and the potential actions to be taken are obscure.

Benchmark studies account for approximately 75 percent of the total funds (Table 3.1). BLM defines benchmark studies as:

> A broad area, multi-year survey program intended to provide a statistically, scientifically sound characterization of key environmental aspects including physical, biological, geological, and chemical. The objective is to establish the range of variation of critical parameters that will reflect the impact of Outer Continental Shelf (OCS) oil and gas exploration and development activity (Appendix B, Enclosure 3).

The description also designates four specific types of information to be gathered in benchmark studies: (1) a chemical benchmark of ambient levels of selected hydrocarbons and trace metals; (2) identification of the resident species, nature, and status of biologic communities; (3) identification of possible indicator organisms or processes; and (4)

TABLE 3.1 Distribution of Program Funding by Study Type, FY 1975-1976

Table 3.1 shows the percentage of funds to each study type as shown in the BLM response to the OCSESAC Resolution (November 1976). Studies were classified by type according to their titles. Of the Program funds, 75 percent were used for baseline and benchmark studies, and only 2 percent for fates and effects studies. The total amount of funding, as shown here, is approximately $63 million. Percentages have been rounded, and therefore may not add to 100 percent.

Study Type	Total Funds Allocated %
Systematic Program Planning	1
Document Preparation, Methodological Developments & External Proposal Review	1
Literature Searches	<1
Physical Oceanography (Reconnaissance & Historical Studies)	13
Descriptive Environ. Analysis/Benchmark Studies (Reconnaissance & Historical Studies)	75[a]
Sampling & Analysis (Fates & Effects)	2
Modeling	<1
Social, Cultural, & Economic Impact Analyses	1
Workshops/Conferences Seminars & Symposia	<1
No Description	1

[a] Includes $27,900,000 for Alaskan OCS studies to NOAA

"information used to support the interpretation of other data sets." Specific items are listed within each category.

Fates and Effects Studies have been defined as:

Those studies conducted to determine the transport, dispersal, biological, chemical, and physical alteration, and final disposition of contaminents related to OCS petroleum development and the chronic and acute effects such contaminants impose on the marine environment (Appendix B, Enclosure 3).

Studies of fates and effects are intended primarily to improve understanding of processes as a basis for better predictions. At present, these studies constitute only 2 percent of the total Program effort (Table 3.1).

Modeling efforts as defined by BLM:

. . . integrate and synthesize information obtained through historical data summaries, reconnaissance, benchmark, fates and effects, and site-specific rig

monitoring studies. The objectives of modeling include the development of probability bases for: (1) Spill frequency estimates, (2) Pollutant trajectories, (3)Wave energy, (4) Impacts on the ecosystem (Appendix B, Enclosure 3).

At present, modeling accounts for approximately 1 percent of the total Program funds (Table 3.1).

The Committee found no evidence that studies of fates and effects or modeling studies have either made any impact on the preparation of EISs or influenced DOI lease decisions. Moreover, there was no evidence that BLM knows how to design such studies for use in management decisions which will lead to protection of the environment.

BLM provided the Committee with a summary of the types of information needed for decision-making predictions (Table 3.2). The questions are the best description the Committee found for determining the issues being addressed by BLM in developing a program design.

NOAA DEFINITIONS OF ELEMENTS OF THE ALASKAN PROGRAM

Early in 1977, NOAA released a Program Development Plan for the Alaskan work it performs as part of the BLM program (NOAA 1976). In FY 1977 the authorized funds for this program included $21 million from BLM, and NOAA ship-time contributions of $5 million. Although spent as a part of the BLM Program these funds have been administered differently from funds for the rest of the Program.

In describing Program implementation, NOAA identified three general activities: baseline studies, monitoring studies, and special studies. Baseline was defined as:

a measure of those parameters that will (1) provide information for predictions of the effects of OCS oil and gas development activities upon the components of the ecosystem; (2) provide a description of the physical, chemical, geological, and biological components and their interactions for further studies design and as a base upon which assessments can be made and (3) provide a base against which changes or impacts subsequent to oil and gas exploration and development can be compared (NOAA 1976).

Baseline studies, in NOAA's definition, also include "environmental characterization" and "complementary studies." The characterization is to be carried out through "studies, occurring early in the study period that compile, synthesize and analyze existing environmental data (e.g., from literature on an OCS area, file data, or reports)." The complementary studies include "a broad range of qualitative and quantitative field and laboratory studies designed and conducted to fill knowledge gaps and improve upon historical background data." A footnote in the

TABLE 3.2 Two Basic Types of Data Needed for Decision-Making Prediction

In BLM's June 1977 Briefing Documents, which were provided to the Committee, the primary questions posed by the present BLM Program are shown. The Committee believes the questions to be exemplary and necessary for a successful Program design. The suitability of the present Program for answering these questions is discussed in this chapter.

I. Short Term–Reconnaissance/Descriptive (Pre-Leasing)
Where are the unique communities, i.e., coral reefs?
What are their characteristics?
Where are the areas of high risk because of geologic hazards, i.e., unstable bottom sediments?
Where are the areas of highest concentrations of critical resources, i.e., commercial fishes?
Are there any unique or unusual meteorological/physical oceanographic conditions that will influence the movement of contaminants or pose a threat to operations?
What is the general nature of the biological environment that will permit application of available fates & effects information for impact prediction?
II. Long-Term Benchmark/Monitoring Information (Post-Leasing)
What are the long-term effects of the introduction of low level amounts of contaminants into the environment?
What are the cumulative effects of OCS exploration & development activities?
– Multiple sales
– Multiple platforms
– Multiple wells
What effects can be seen in previously leased tracts in close proximity to unique communities? (Are lease stipulations, etc., doing the job?)

Program Development Plan emphasizes that the concept of reconnaissance, as used in the NOAA Alaskan Program, should not be equated to baselines. However, there is no formal definition of the reconnaissance concept in the NOAA document, and the scope of the NOAA program clearly does include baselines.

The second major component of the NOAA program, monitoring, is defined as "a program of measurements after the onset of exploration" (NOAA 1976). No specific definition is provided for the third component, special studies. However, the Program Development Plan notes the need for determining effects, and for experimental studies on processes and mechanisms.

Within the categories described above, NOAA identified six major tasks in the Program Development Plan: contaminant baselines, sources, hazards, transport, reconnaissance, and effects.

DISTRIBUTION OF PROGRAM FUNDS

The distribution of funds by geographic area, responsibility for study performance, and type of study provides a description of the Environmental Studies Program as it was at the time data were collected for the BLM response to the OCSESAC resolution.

Geographic

Figure 3.1 shows the percentage of funds spent in each area for FY 1975 and 1976. Alaska, with approximately half of the frontier lease areas, has about half of the funds, while Southern California, South Texas, Mid-Atlantic, and North Atlantic each receive approximately 10 percent. Funding for Mississippi, Alabama, and Florida (MAFLA) has declined according to these data, and the Washington/Oregon and South Atlantic programs have just started.

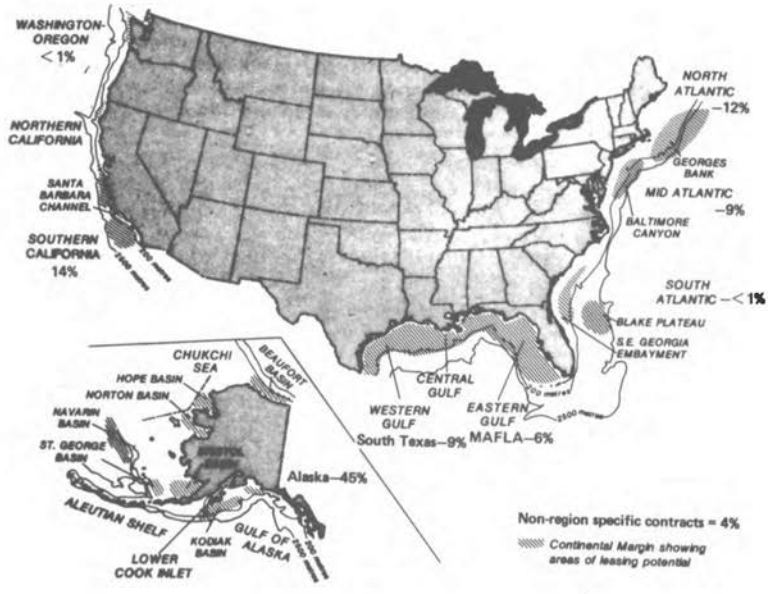
Four regional study areas are identified for expenditure of the $27.9 million in Alaska in FY 1975 (BLM Analysis Response to OCSESAC Resolution). The Gulf of Alaska, the Bering Sea, and the Beaufort Sea, each accounted for $5 to $6 million, miscellaneous work for slightly over $1 million, and the Chukchi Sea for approximately one-half million dollars.

Responsibility for Study Performance

The environmental studies have been performed by federal agencies, private consultants, and universities. The distribution is illustrated in Chapter 4, Table 4.1.

Type of Studies

Table 3.1 shows that one-half of the funds have been used for descriptive environmental analysis, benchmark studies, or reconnaissance and historical studies. Systematic program planning, fates and effects, research, and modeling studies each receive 1 percent or less of the total available funds. Physical oceanographic work accounts for about 15 percent of funds for both years. The descriptive activities for physical oceanography and benchmark studies combined accounted for approximately 90 percent of the total effort during FY 1975-1976. The analyses of social, cultural, and economic impacts do not include all BLM activities of that type. Therefore, the data are not complete, although



SOURCE: Map redrawn from U.S. DOI (1975a). Calculations are derived from the BLM response to the OCSESAC resolution.

FIGURE 3.1 Distribution of environmental studies funds by geographic areas in FY 1975-1976.

The figure shows areal percentages of the approximately $63 million of BLM funds described in the BLM response to OCSESAC. Shading indicates areas of leasing potential where program expansion might occur. In addition, multiple sales may follow the first one in a frontier area. Approximately half the funds and potential lease areas are located in Alaska where the environmental studies are under NOAA's direction.

presentations to the Committee by BLM officials indicate that the level of effort for such activities is approximately correct.

Distribution of types of study for the Alaskan region as a whole is discussed in the BLM Analysis in Response to the OCSESAC Resolution. The highest level of effort was expended on fish, plankton, benthos, and littoral studies (about 25 percent) and physical oceanography (about 15 percent).

THE BENCHMARK OR BASELINE CONCEPT

The bulk of the present BLM Environmental Studies Program is based on a concept of benchmark or baseline data as defined earlier in this chapter. Part of the rationale for this mode of operation is the need to show that subsequent development of petroleum resources has or has not changed the aquatic environmental system, or some selected characteristics of this system as stated in BLM's study plans. In many instances, especially for populations of living organisms, establishment of a benchmark or baseline useful to BLM will be difficult if not impossible. Both the populations of organisms living on the bottom and those living in the water column vary greatly in space and over time. A statistically significant change in many of these populations as reflected in the present program would imply nothing about the impact of anthropogenic stress on them. Extensive population changes occur, in the normal course of events, both seasonally and from year to year. It is the opinion of the Committee that the data now being acquired as a measure of the natural variability would not stand as scientifically defensible in any rigorous sense. Even if the data were taken to support the contention that exploitation of petroleum reserves had impacts smaller than those caused by natural variability, this would not exclude the possibility that significant changes had resulted from petroleum exploitation.

The benchmark or baseline approach as employed by BLM is particularly unsuited to chronic, low-level release of petroleum or other pollutants, which is a significant fraction of the total discharge of petroleum to the sea in some areas. The BLM biological benchmarks or baselines are too variable to allow cause and effect relationships to be established. This is also true of data on phosphate concentration, nitrate concentration, ATP, and chlorophyll. Similar arguments can be effectively presented regarding the transport or physical oceanographic studies.

BLM has been careful to build statistical treatment of the data into the specifications for contracts, and it might be argued that this will make it possible to deal with natural variability of benchmark or baseline data. However, most marine populations are highly clumped. That is, they have a negative binomial distribution. Statistical tests of such distributions are possible, if sampling is sufficient.

In fact, sampling often is not sufficient. The 95 percent confidence limits of sampling sets in oceanography commonly range from 20 to 500 percent of the mean (Wiebe and Holland 1968). These are not worst cases but examples of the best sampling design possible for distributions of motile organisms having patchiness in space and time. The best

sampling techniques are limited to this sort of crudity by the restraints of cost and statistical practice (Cassie 1963, 1968). Moreover, the data showing such high variability were collected in the open sea. In fact, variability is much greater on the continental shelves (Lorenzen 1966, Steele 1976). Review of the oceanographic literature shows that we do not have statistically meaningful measurements of the distributions in space and time of most marine organisms nor the means to get them. There is nothing in the BLM Studies Program that overcomes these state-of-art limitations. The above does not take into account the effects of major storms, shifting ocean currents, or changing climatic regimes. These have dramatic effects in which entire marine communities are replaced by new and different ones (Bougis 1976). Thus, if an oil spill occurs during winter storms, as happened last winter in the North Sea and off Nantucket, it might be difficult to separate the natural and anthropogenic causes of changes in the affected communities.

Adequate sampling often means taking stratified samples, as well as large numbers of samples. Sampling locations cannot be prescribed in advance unless they are randomized. Nonparametric approaches may also be used to overcome the patchiness problem, but again it would be necessary to make certain that sampling sites prescribed in advance in many BLM contracts were suitable for such treatment (OCSESAC 1976).

Biological variability is further complicated by physical variability due to day to day and seasonal processes as well as storm events. Recent literature documents these variations. For example, Voorhis et al. (1976) report that no main cross-shelf or vertical currents could be reliably measured off New England, while Beardsley and Butman (1974) showed that atmospheric storm events dominate the circulation across the New England continental shelf. Smith (1974) and Huyer et al. (1975) document similar intense variability off the Oregon-Washington coast. These references are illustrative of modern measurements of natural transport studies on the continental shelf.

The Committee concludes that further investment in multi-disciplinary oceanographic observational programs is unwarranted, and questions the capacity of the oceanographic community to use the data being collected to provide descriptions of the environment more useful for regulatory management of OCS oil and gas operations than those using extant data. In areas with limited existing data, modest reconnaissance and survey efforts may be appropriate. BLM should stop contracting for benchmark or baseline investigations.

Petroleum and its components are damaging to the environment, and research to define the effects of toxicants on organisms is therefore

required. Studies on sources of human error that lead to spills or catastrophic events are more appropriate than detailed benchmark or baseline investigations. The natural variability of the ocean precludes making useful probablistic estimates of the transport and dispersion of oil following an accident, and real time information about the meteorology of the affected region coupled with existing knowledge is sufficient to determine spill trajectories for clean up and protection purposes (Beardsley and Batman 1974). BLM should therefore discontinue investigations of the trajectories of hypothetical spills or for field programs to predict the fate of hypothetical spills. In the next section, a program design rationale is outlined, which leads to contracting only for those studies and research that can influence decisions for managing and regulating OCS oil and gas operations.

ALTERNATIVE PROGRAM DESIGN

At present the Environmental Studies Program must respond to all environmental concerns about the entire range of offshore oil and gas operations, whether or not any producible deposits of hydrocarbons exist in the offshore areas. This is true in spite of the fact that BLM jurisdiction is limited almost entirely to leasing decisions. Regulation of development and production are assigned to the Conservation Division of USGS, and jurisdiction over transportation and onshore development is shared by a large group of federal, state, and local bodies.

BLM therefore finds itself in the position (1) of having to provide an environmental reconnaissance of the potential lease, much of which can be synthesized from existing data, and (2) of having to predict and assess onshore, nearshore, and offshore impacts from the development of a presumed accumulation of hydrocarbons. In the Committee's opinion any such prediction and assessment of impacts before exploration can only be a speculative exercise, without sufficient credibility or confidence to be useful.

UNCERTAINTY OF HYDROCARBON RESOURCES IN FRONTIER AREAS

Resources differ from reserves in that the latter have been proved to be economically recoverable. There are resources in the oil shales of the western states, but since these are not yet economically producible, they cannot be classified as reserves. There are speculative resources, such as possible hydrocarbon deposits in frontier OCS areas that have not been specifically identified and that may or may not exist.

Public perception seems to be that leasing and drilling will naturally

lead to discovery and production of oil and gas on the OCS. This perception is reinforced by the USGS, which is required to produce numerical estimates of the potential resources and probable reserves, and industry, which offers large sums for leases. Both of these actions create the image of a large hydrocarbon resource waiting to be developed.

In reality, the degree of uncertainty is very large, the risks are great, and there may be no economically producible resources at all. Hunter Yarborough, formerly geological advisor for EXXON, summed up the problem of continental margins of the type found off the eastern United States:

> In spite of the great thickness of both marine and continental sediments that have been defined along the shelves and slopes of the continents, to date they have been found to be relatively barren of petroleum. Except for such great depocenters as the deltas of the Mississippi, Niger, and McKenzie rivers the shelves along the margins of the continents have been found to be extremely difficult exploration targets. In terms of giant oil fields even these most promising basins have been disappointing. Thirty years of exploring and developing the continental shelf of Louisiana have resulted in the discovery of about six billion barrels of oil, only a one-year supply for the United States. Even more surprising and disappointing has been the almost complete "wipe-out" of such highly potential areas as the Texas, Nova Scotia, Newfoundland, and Northwest Africa shelves (Yarborough 1977).

This observation does not create a high degree of confidence that recoverable resources are there. The problem is further complicated by uncertainties about petroleum sources, their nature, and their maturity (Dow 1977).

In areas like the Gulf of Alaska the principal obstacle to a high petroleum potential is the character of the reservoirs (Seely and Dickenson 1977). In this case, even if source beds existed and petroleum was generated, migrated, and was trapped, the nature of the reservoirs is such that it may not be possible to extract it economically.

ENVIRONMENTAL INFORMATION REQUIREMENTS

The BLM program must respond to environmental information needs associated with both the exploratory phase and with the development and production phases before leasing. The reason that BLM must respond at this early stage to both needs is that the public access provided for by present administrative arrangements can have an impact on the decision-making process only through the EIS before leasing. Subsequent public opportunity to comment is at the option of the USGS. While the opportunity for comment has been provided, there are no real

opportunities for substantial changes in the development and production activities. Concern about the onshore impacts associated with production and refining, or about pipeline corridors, must therefore be expressed before leasing.

It would be more logical for environmental information needed for the phases from leasing through exploratory drilling to be collected separately from the information required for orderly development and production, if oil or gas are found. If OCS operations are divided in this way, a program of studies and research can be designed that can more rationally influence management decisions on the different phases of OCS activity.

SCIENTIFIC INPUTS REQUIRED FOR THE LEASING THROUGH EXPLORATORY DRILLING PHASE

The environmental impacts for this stage are mostly limited to the lease areas themselves. Onshore impact caused by logistic bases will probably be concentrated in existing port areas.

BLM has identified a body of data required for pre-leasing reconnaissance that is, in general, responsive to the information needs. These data include the identification and characterization of unique communities, such as coral reefs; the delineation of areas that are at high risk because of geological instability, such as slump areas or faults; the location of areas in which living resources or their spawning grounds are concentrated; and oceanographic and meteorological data that are relevant to movement of potential contaminants or pose a threat to operations.

Many of the data mentioned above already exist, but need to be synthesized and put into a form that is useful to managers and decision makers. The principal exception, site-specific data on geological hazards and unique biological communities, can be obtained through modest survey efforts. BLM could, in a fairly short time, assemble, analyze, and synthesize these data in a useful form, with an expenditure of between 5 and 10 percent of the existing budget.

SCIENTIFIC INPUTS FOR THE DEVELOPMENT AND PRODUCTION PHASE

The information needed on the impacts of development and production of the presumed resources contains both scientific and social elements. In the current BLM Program, scientific data collection is focused on benchmark or baseline data (see section on the benchmark or baseline concept above), seeking "to characterize those key environmental

aspects that should exhibit change from OCS development," and information from monitoring that "examines the changes on and around a rig using benchmark parameters to verify and/or modify the original impact prediction model" (Table 3.2). This focus on baselines or benchmarks and monitoring is examined here.

Legal actions related to OCS development show that primary concerns are different from those emphasized by baselines and benchmarks. Those concerns are spills, onshore development, and other social factors. Oceanographic factors are secondary. The Committee is in general agreement with this latter focus for concern. The social impacts involved here have greater significance in the nearshore and onshore areas than in the lease areas themselves.

During development and production, there may be chronic discharge of hydrocarbons into the ocean. While quantities are not large, some of the compounds may be among the most toxic. Concentrations of petroleum that will have deleterious effects vary with the type of crude oil and its particular components as well as with the populations exposed to it.

Well-designed, long-term research on this chronic input problem would be far more productive than site-specific collection of the present sort of BLM benchmark or baseline data in prospective lease areas. Support of such research would insure the availability to DOI of competent scientists who would be aware of and responsive to the challenges presented by any catastrophic point source emission. Research on the effects of petroleum in the marine environment will be required. The research should be well designed, systematically conducted, and of sufficient duration to identify long-term effects.

If actual spills and their effects are to be studied, DOI must have available a cadre of concerned and competent scientists who can and will respond to the challenge immediately and who will remain with it as long as necessary to produce meaningful results.

A good model to follow is illustrated by the events following the loss of the submarine USS Thresher. A community of Navy-supported oceanographers was in existence and was aware of the potential problems. This community responded immediately to the challenge and remained until Thresher was found. It could respond rapidly, since the Navy supported it and minimized administrative constraints, and it responded effectively to the problem. This model might serve the country well if applied to the problems associated with large point-source releases of petroleum into the environment.

Detailed research on onshore and social impacts of development and production can be most usefully carried out after development and

production forecasts based on exploration data are available. The collection and analysis of existing data in this area could be accomplished at modest cost.

In summary, the DOI research program design for addressing management decisions for the development and production phases should include research on chronic inputs and their effect on biota and relevant social studies required for onshore and nearshore impact assessment. The Committee also recommends research on methods to reduce human error leading to spills. The Committee specifically recognises that the present Program does not permit research in the usual scientific sense. It is the Committee's opinion that OCS management decisions require information that can only be generated by multi-year applied scientific research.

4 Program Implementation and Use of Program Results

INTRODUCTION

This chapter relates how BLM operates its OCS Environmental Studies Program and how the resulting information is used by DOI. The processes for issuing Requests for Proposals, evaluating proposals, and awarding and monitoring contracts are outlined, followed by an assessment of the Program's success in obtaining the information it seeks, and of the effectiveness of the present mechanisms for communicating results. On the basis of this analysis, the chapter recommends more efficient ways of implementing the program and of using its output.

MANAGEMENT OF PROGRAM CONTRACTING PROCESS

Funds are allocated for environmental studies work by memoranda of understanding (MOUs), interagency agreement, and through contracts to outside groups. MOUs have been used to transfer Program funds to the Geologic Division of the USGS for earth science investigations in selected frontier areas. Interagency agreements (NOAA 1976:Appendix B) have transferred large sums (approximately 45 percent of funds for the Program in a given year) to NOAA under specific conditions. Work by nongovernmental organizations is arranged for by Requests for Proposals (RFPs) and contract awards.

BLM CONTRACTING

The BLM contracting process (Figure 4.1) is initiated by one of the regional OCS Field Offices (Anchorage, New York, New Orleans, Los Angeles) once the office perceives a clear need. Library research, either internal or contracted to outside organizations, and planning of studies by BLM for the lease areas under consideration, may precede preparation of RFPs in response to the regional office request. The RFP is ultimately issued by the regional office, and draws upon other RFPs, state views, comments solicited from other federal agencies, and conferences organized by the Washington Office for the purpose and attended by the scientific community. The RFPs, which describe in great detail the scientific work to be procured, require responses in 60 days. Responses, which come from universities, private nonprofit research laboratories, and private consulting firms, take the form of detailed specifications of how they would intend to proceed. One response can consist of several volumes. The structure of the process is such that the basic parameters of the study, the way the information will be synthesized, and the final utility of the work are already established by the RFP. This stage of Program execution has therefore attracted much criticism.

According to BLM, the Branch of Environmental Studies in Washington, D.C. evaluates the technical content of the responses with assistance from the regional office and other federal agencies. The evaluation of technical merit assesses, among other things, the scientists involved, the organization performing the work, and the management structure. A second evaluation, concerned exclusively with financial merit, is conducted by the Contracts Office of BLM.

After the contract has been awarded, the regional office is responsible for the day-to-day administration of the project. The Regional Contracting Officer's Authorized Representative (COAR), who monitors the individual contract, reports to the regional office manager. In addition, the COAR must report to the contracting officer in Washington, as well as to appropriate members of the Environmental Studies Branch. This dispersion of authority and responsibility hinders effective management of the Program.

Contracts that have resulted from this process are discussed in the section below on the North Atlantic OCS area as an example of the contracting process.

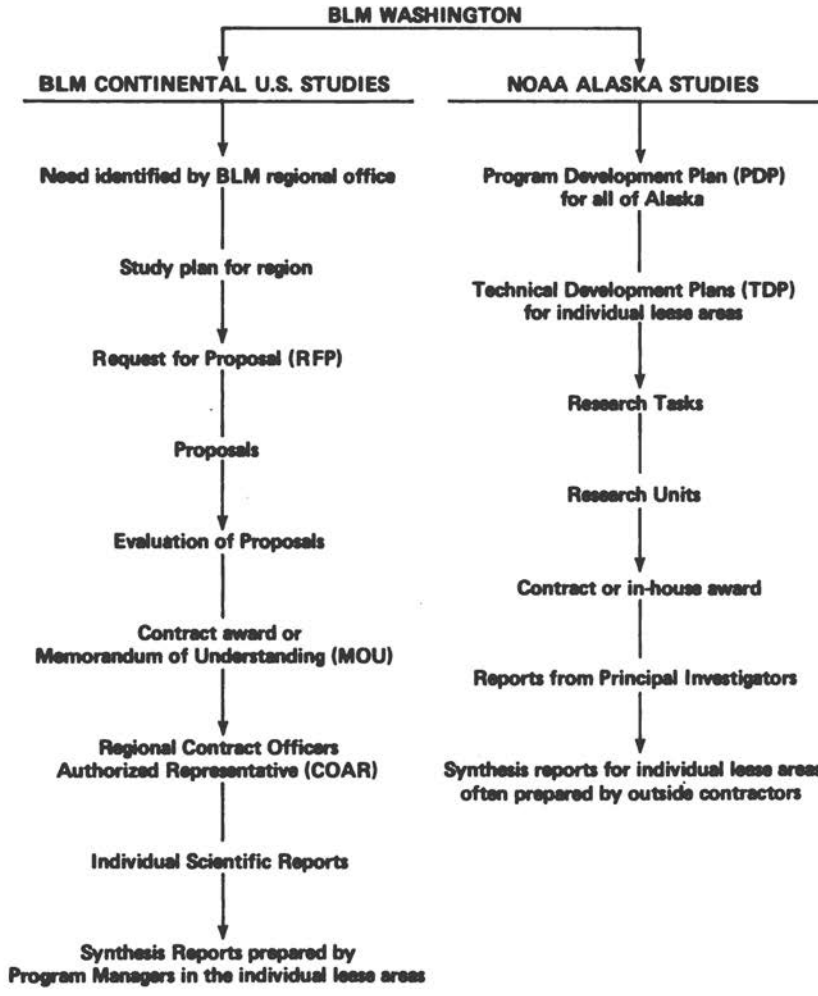


FIGURE 4.1 Schematic diagram of the information acquisition process in the Environmental Studies Program.

Program funds are divided nearly evenly between NOAA in Alaska and BLM in the continental United States (see Chapter 3, Figure 3.1). Each unit follows a different information acquisition process, as schematically shown here. The BLM process relies on the generation of adequate requests for proposals and on responses and implementation by competent Program Managers for individual lease areas. The NOAA process relies upon proper identification of Research Tasks and Units and the ability to synthesize the Principal Investigators' Reports. However, the NOAA process was not initially specific to lease area making the synthesis tasks particularly difficult.

TABLE 4.1 Distribution of OCS Environmental Studies Program Funds by Type of Contractor within Leasing Areas, FY 1975-1976

The percentage of Program funds going to universities, federal agencies, and private consultants is shown for each region and as a combined total, as shown in the BLM Response to the OCSESAC Resolution (November 1976). No data were available on subcontractors so that the actual performers may be in categories different from those of the main contract. For the years shown, federal agencies were the largest category because of the NOAA Alaska contract. Universities received the least funding. Owing to rounding, figures may not add to 100 percent.

	Universities	Federal Agencies[1]	Private Consultants[1]
North Atlantic	0	9	90
Mid-Atlantic	0	18	82
South Atlantic	0	0	100
MAFLA	100	0	0
South Texas	72	26	2
Southern California	21	2	77
Alaska	<1	99	1
Washington-Oregon	0	0	100
Miscellaneous[2]	30	28	42
Average over all areas	17	51	32

[1]Significant amounts have been subcontracted
[2]Projects not identified with a specific area

Distribution of Funds by Type of Contractor

The environmental studies have been performed by universities, federal agencies, and private consultants. Table 4.1, derived from BLM's analysis of the OCSESAC Resolution, shows the distribution of funds, expressed as percent by region and as a combined total for FY of 1975 and 1976. In each case, the prime contractor is used to identify the type of performer, but in every region there are a variety of subcontracts. No data were available to review the distribution of funds through subcontracts in each region. Government agencies, by virtue of the large NOAA Alaska contract, expended the largest amount of funds. Private consultants were a close second. In the same time period, university groups were third, with one-sixth of the total funds. The amount to universities decreased by almost 10 percent from FY 1975 to FY 1976.

BLM Contracts in the North Atlantic Region

The Program has developed three basic project areas in the North Atlantic region (Table 4.2): Geological Oceanography (USGS), Physical Oceanography (Raytheon Co. and EG&G Environmental Consultants Division), and Benchmark (Energy Resources Company). The descriptions of the data syntheses and interpretations expected from these efforts are derived from the respective contracts, since synthesis or interpretive reports were unavailable at the time of this study.

The Geological Oceanography effort is to produce information on bottom sediment transport, suspended sediment flux, trace metal distribution, and tectonic activity. The bottom sediment synthesis studies are intended to describe quantitatively the direction and rates of sediment movement; interpret the correlations between sediment movement, hydrologic data, and meteorologic stresses; and relate variations in sediment mobility, age, texture, and bed-form to pollutant transport. An important element of these bottom sediment studies is identification of areas that could be hazardous to oil development because of bottom scour and migrating sand waves. The trace metal effort calls for qualitative descriptions of sediments, measurement of vertical variations of copper, chromium, and zinc in surficial sediments, and correlations of trace metal variation with sediment texture, age, and environment. The tectonic activity studies will map shallow and intermediate depth slumps and other features indicating instability, discuss the extent and age of shallow seismic features, and relate unstable features and historic seismic activity to potential resource recovery activities.

The Physical Oceanography studies are divided into two categories: (1) data collection (Raytheon Co.) and (2) oversight, synthesis, and data management (EG&G Environmental Consultants Division). The object is to produce displays and analyses of patterns of surface and subsurface currents and bottom pressure. The project will also collect data from all possible sources, historic and contemporary, to determine the connection between observed meteorological conditions and observed oceanographic data. These data will relate surface currents to wind, density field, and other forcing functions, and the locations and strengths of frontal zones, along with the extent and manner of mixing across the continental shelf.

The Benchmark studies are intended to produce syntheses of hydrographic data, including nutrient and oxygen levels, to characterize the water regime at each sampling time. They will compare zooplankton species distribution with total biomass and hydrographic data, and correlate metal and hydrocarbon concentrations in the water column

TABLE 4.2 OCS Environmental Studies Program Contracts for the North Atlantic

In the North Atlantic, the OCS Environmental Studies Program has developed three basic project areas: geological oceanography (USGS), physical oceanography (Raytheon, EG&G), and benchmark (Energy Resources Company). Synthesis reports for these projects were unavailable at the time of this study. Funding amounts for the listed projects were obtained from copies of contracts provided by BLM, and from a BLM presentation at the Georges Bank OCS Environmental Studies Workshop at the University of Rhode Island, April 1977.

Study	Amount	Contractor	Final Report Due
Study effect of the Tamano oil spill in Casco Bay, Maine	$ 28,000	State of Maine	April 1977
Inventory of Environmental Parameters in the Deep Atlantic Shelf and Slope (includes mid-Atlantic)	$ 47,244	The Research Institute of the Gulf of Maine South Portland, Maine	March 1977
Conference and workshop to assess the state of knowledge of Georges Bank area and to recommend baseline and monitoring research	$ 19,770	New England Natural Resources Center	
New England OCS Geological Oceanography	$ 946,475	U.S. Geological Survey	June 1978

New England OCS Environmental Benchmark	$3,013,839	Energy Resources Company, Inc. Cambridge, Mass.	July 1978
Summary and Analysis of Environmental Information on the Continental Shelf from the Bay of Fundy to Cape Hatteras (includes mid-Atlantic)	$ 155,904	Center for Natural Areas South Gardiner, Maine	November 1977
New England OCS Physical Oceanography	$3,330,000	Raytheon Company Portsmouth, RI	November 1978
	$ 658,064	EG&G Environmental Consultants Division Waltham, Mass.	November 1978
Wind and Wave Information	$ 25,200	NDBO	Information supplied to BLM users
Argo Merchant Study	$ 270,000	NOAA	First report-April 1977 Second report-Oct. 1977
Lobster Toxicity Study	$ 317,400	Westinghouse	First report-Oct. 1977
Seismic Risk Study	$ 150,000	USGS	September 1978
Hydrocarbon Fate Study	$ 100,000	WHOI	Tentatively-April 1977

with those in zooplankton by species. Microbiological investigations are to characterize the indigenous populations, their variations, and their potential for petroleum degradation. Distributions of foraminiferal species will be correlated with environmental data. The overall distributions of petroleum hydrocarbons and trace metals in sediments will be discussed, including interpretations of transport pathways.

To illustrate the Environmental Studies Program in action, the Committee has evaluated the contracts and other program documents related to the North Atlantic studies, and interviewed principal investigators, managers, and administrators. This evaluation has led to a number of conclusions generally applicable to the entire Program.

Many of the data being collected are unlikely to produce information useful for making better OCS decisions within the next five years or more. Equally important, except for studies of hazards or unique communities where these are being done, the design of the studies is such that the data will probably not be useful in advancing understanding of the environmental processes working on the OCS. It is important to conduct those studies that will establish the allowable limits of petroleum loss to the OCS environments or other permissible environmental impacts prior to authorizing such development. Experimental work to establish specific hazard levels or risks to organisms by OCS actions is needed. Although laboratory experiments to construct dose-response relationships may be helpful, field-scale experiments are more realistic. We recognize the difficulty of conducting such experiments with meaningful controls and unambiguous results, but such is the clear need. Although much of the technology being used for the studies is or extends the state of the art, without stated hypotheses to be tested many of the present data produced will be too random to produce knowledge commensurate with their cost. While, in theory the management system is flexible and adaptable to accrued information, in practice it is overly rigid and constrains the intellectual activity and advancement that characterizes worthwhile science. The problem begins at the RFP stage with the decision to collect almost every possible kind of physical, chemical, and biological data without discrimination.

The data and understanding available now can be assembled and synthesized to make as good a contribution to decision making for OCS development as will be possible at the end of the current program (five years), with the possible exception of some selected reconnaissance of community structure or environment in specific areas. The support of these types of studies should be designed to gather basic knowledge upon which the Secretary of the Interior and BLM can call for specific technical advice.

PROGRAM RESULTS

To justify its existence the Environmental Studies Program must provide useable results for decisions on OCS leasing and management. The Committee, however, has concluded that the Program has neither been designed nor implemented in a way likely to be useful for BLM decision making. The Committee is aware that there have been some major obstacles to ensuring that information is timely and consistent, but the fact must be faced that the attempt to supply useable data as it was needed by decision makers has been almost totally unsuccessful. Synthesis reports have not been prepared in a way that provides DOI with analyzed data for its decisions or outside parties with a basis to review those decisions. Decisions instead have been made on the basis of Environmental Impact Statements and decision documents that were prepared independently of the Environmental Studies Program.

It should be noted that in the response to the OCSESAC Resolution (see Appendix B) BLM does claim to have used information from the environmental studies for decisions. For example, the decision to delete tracts from a lease sale off southern California is linked to the discovery of important breeding and feeding areas for certain birds and pinnipeds. The actual value of the Studies Program, however, may not be reflected by the achievements claimed by BLM, for in many cases it appears that the environmental information was available from other sources or would have been discovered by basic survey studies. In any case, it appears that the information was communicated informally by Program staff rather than through a formal decision-making process. An informal process for coordinating decisions with results from the Environmental Studies Program is not desirable. If the informal process continues, however, it becomes even more essential for BLM to have a competent professional staff that is privy to current information and can recognize the significance of the information for leasing decisions.

AVAILABILITY OF RESULTS

The value of a useful program of environmental studies is not limited to BLM's decisions. Many other parts of DOI are involved in OCS leasing issues and are responsible for decisions involving exploitation of OCS oil and gas reserves. USGS, for example, has the important responsibility of regulating production operations. The environmental information resulting from the Studies Program therefore should be easily available to all of DOI. For that to occur, better management and greater coordination will be necessary. More importantly, the Studies must be

given adequate significance and visibility within DOI, and must be carried out and analyzed for the purposes of all levels of OCS decisions.

SYNTHESIS REPORTS

The final measure of the success with which the Program has been implemented is the usefulness of the synthesis reports that are intended to provide analytical summaries of the results of the studies. Reports should be directed toward specific decisions, rather than presenting encyclopedic data collections. The syntheses would be expected to summarize the work accomplished and note major implications for leasing decisions, including potential conflicts with other resource uses such as fisheries. Most of the available reports provide little synthesis, and many of the kinds of data being collected will not be relevant to OCS development. In general, synthesis reports cannot be expected to be useful until the goals and approaches of the entire Program have been re-examined.

A report must be available to all interested parties before the decision they are concerned with is made. For OCS leasing this means that synthesis reports should be available to the public at the time of the Draft Environmental Impact Statement for initial leasing in the frontier area. So far, few synthesis reports have been prepared in time for use in leasing decisions, because of the difficulty of the task and the shortness of time between identification of a frontier area and leasing. The availability of synthesis reports in relation to the scheduling of lease sales was analyzed by taking dates for public hearing and lease sales for specific leasing tracts from recent Proposed OCS Planning Schedules (BLM January and May 1977) and comparing them with the dates of the synthesis reports for the corresponding lease areas. For approximately half the sale areas, the public hearing date preceded the synthesis report, and lease sale dates preceded the report for almost half of these. Moreover, even where the date for the study report was earlier than that for the public hearing or lease sale, in most cases the report was in draft rather than final form and therefore unavailable to interested groups at the time of public hearings on lease sales.

Analysis of Synthesis Reports for Alaska and the Contiguous United States

NOAA is responsible for selecting tasks and individual research units in the Alaskan region. The agency has, however, chosen to subcontract the vital task of synthesis for some lease areas to Science Applications

Incorporated (SAI), a private consulting firm. Analysis of the NOAA Alaska Principal Investigators' report (NOAA 1977) revealed a considerable obstacle to the task of synthesis: the initial data collection was not specific to lease-area. Consequently, information appropriate to a decision for a given lease area might be distributed anywhere in the fourteen-volume set of reports. This obstacle effectively prevented any attempt to synthesize the interactions of the different fields of oceanographic knowledge.

The Northeastern Gulf of Alaska (NEGOA) synthesis report (SAI, Inc. 1976b) contained no microbiology or heavy metal research. There was a limited discussion of fish as receptors. Unique communities of benthic organisms and marine mammals were given great attention. Biota of the Pribilofs are treated in detail, as are ice-related hazards and transport processes. Wind-stress effects on transport were discussed in a limited way, but no environmental information on waves and tides was presented.

In studies such as that for NEGOA, hydrodynamic models are being implemented on computers, which generate impressive pictures of the transport vectors in the region. The model output does not even approximate the near-surface currents in the region that are required to calculate trajectories. Careful reading of the synthesis reports reveals equivocal statements by the modeling investigators that admit the non-reality of the calculated circulation pattern. The transport models being developed for NEGOA have never been verified with actual data or reported in the scientific literature.

Compilation in the Kodiak Island Synthesis report (SAI, Inc. 1976a) of the limited information on the physical environment and biota may interest some readers, but there is no synthesis in a framework that leads to quantitative evaluation of probable effects of OCS oil and gas activities.

The Lower Cook Inlet report (NOAA and SAI, Inc. 1977) synthesizes the principal findings in a cross-disciplinary format and qualitatively describes the anticipated lifetime of the oil and gas fields and associated impacts. If the report were available for OCS leasing decisions, its descriptions of environment, ecosystem, and potential impacts could be used in pre-leasing decisions.

The Beaufort Sea synthesis report (Weller et al. 1977) appears to be a competent effort to collate and summarize knowledge of the Beaufort Sea area. The total OCS activities are considered in developing possible scenarios for impact assessment, and the reader is provided with a good overview of this particular leasing area. Information gaps are identified and estimates of research priorities are presented. This report was the

best available from Alaska in terms both of the science summarized and of potential utility.

The South Texas report (Berryhill 1976) is a thorough, comprehensive compilation of what appear to be credible scientific investigations. While there is some attempt at correlation of parameters, there is little that could be classified as data synthesis; however, this defect should not be judged too critically since the South Texas project is still young. The chief fault of the report is that little of the total data bank is likely to influence decision making on leasing.

For the Mid-Atlantic studies the 238-page executive summary is a selection of material from the preceding volumes of data (Virginia Institute of Marine Science [VIMS] 1977). There is no summary or conclusion section and no synthesis across disciplines or subjects. There is little attention to BLM's potential problems, and only two references to potential impacts of petroleum. In the conclusions on benthos, it is suggested that oil would damage the fauna. It is also ventured that an oil spill of the magnitude of the Argo Merchant spill would be very damaging to neuston, and if such a spill occurred in the spring, it would kill eggs and larvae of fishes and shellfish living in the neuston. It would be difficult to use this summary as an aid to pre-leasing decisions.

Synthesis reports for Alaska and the contiguous United States were examined for specific types of information called for in the BLM Analysis of the OCSESAC Resolution (Appendix B): identification of unique environments, hazards, resource use conflict, and data results. The results of this examination are summarized in Table 4.3. The table illustrates that the synthesis reports examined do not generally provide useful information in the categories identified.

USE OF ENVIRONMENTAL STUDIES IN BLM DECISIONS

Although DOI remains committed to the expeditious development of OCS resources, it also recognizes the need to protect the environment. To carry out both tasks, the revised environmental studies recommended must be fully available in useable form to decision makers. Until recently, data from the Studies Program have not been publicly available; BLM must now ensure that its decisions are made on the basis of decision documents prepared using the needed environmental data and analyses.

The Program Decision Option Document

The Program Decision Option Document (PDOD) is the basic decision document in DOI and is used to inform the Secretary of major issues and

available options. The PDOD describes the economic and environmental impacts and, if costs and benefits are analyzed, summarizes the analysis. At the time BLM performs its preliminary environmental analysis, it begins to develop a PDOD, and in theory the PDOD is used in conjunction with environmental impact statements to guide decision making (BLM 1976, U.S. DOI 1974).

The PDOD is an intra-agency memorandum and DOI need not and does not release it to the public before the decision (see Freedom of Information Act, 5 USC 552, 1976). The information summarized in the document, however, should be available to the public, and BLM has been appropriately criticized for including environmental information in the PDOD that was not publicly available in an EIS (*Alaska* v. *Kleppe* 1976, *Southern California Association of Governments* v. *Kleppe* 1976).

The average length of a PDOD is about 20 double-spaced pages; many also contain appendices ranging from 10 to 30 pages. The more recent PDODs contain as many as five sections. There is normally an introductory or background section that describes the need for increased oil and gas production and the proposed sale. The analysis section briefly summarizes the economic and environmental impacts. The PDODs also often contain further descriptions of important issues and special stipulations. For example, in the PDOD for the proposed lease sale No. 47 in the Gulf of Mexico (BLM 1977), EPA's recommendation that certain tracts be deleted is discussed, and a requirement of deep shunting of drill cuttings is stipulated. Finally, each PDOD lists options for a decision, briefly describing the advantages and disadvantages of each.

Since the PDOD is a document used to brief the Secretary on all important issues, it cannot contain an extensive description of the environmental effects of the lease sale. The document should, however, discuss the major environmental issues and assess objectively the alternative decisions.

NEPA Requirements for Information

In contrast to the PDOD, the environmental impact statement is a public document that describes in detail the potential environmental impacts of decisions to lease OCS lands for oil and gas exploration, development, and production. Since DOI views the PDOD, and not the EIS, as the actual decision document, EISs have been limited to environmental impacts and have not described the economic costs and benefits or jurisdictional conflicts that must be considered. In several lawsuits, however, parties have argued that NEPA requires that the EIS must be used as the decision document or that the EIS should contain all the basic environmental and economic information that outside parties need

TABLE 4.3 Analysis of Synthesis Reports

The synthesis reports listed here were qualitatively assessed against specific types of information called for in the BLM Response to the OCSESAC Resolution (November 1976). The table illustrates that the synthesis reports in general fail to provide useful information in those same categories that the Program identifies as being important. With the exception of the Beaufort Sea report, syntheses from Alaskan areas are in general less satisfactory than those for the continental United States.

Title, Author, Date	Identification of Unique Environments	Location and Severity of Hazards	Resource Use Conflict	Data Needs Identified
NEGOA: Draft Environmental Synthesis, SAI Inc. (1976b)	Benthic communities and habitats of marine mammals	Ice-related	–	–
Kodiak Island: Physical Environment, Biota, and Potential Problems Related to Oil Exploration (Draft). SAI Inc. (1976a)	–	–	–	–
Lower Cook Inlet (Draft). NOAA and SAI Inc. (1977)	Several natural regions described	Climatic, seismic, volcanic	–	Extensively in biota, physical processes, toxic transport

OCS Environmental Assessment Program Beaufort Sea: Synthesis Report. Weller et al. (1977) University of Alaska Arctic Project. Special Bulletin #15.	Sensitive habitats, e.g., bird nesting areas– (scenarios elaborated)	Weather, ice, seismic	–	Several in sea ice and circulation, geology, biota
South Texas OCS, 1975: Atlas and Integrated Summary (Draft). Berryhill (1976)	–	–	–	Variations of measured parameters over time
Chemical and Biological Benchmark Studies on Mid-Atlantic OCS: Executive Summary (Draft Final Report). VIMS (1977)	–	–	–	–
Baseline Monitoring Studies: MAFLA, State Univ. System of Fla., Inst. of Oceanography	Reefs, barrier islands, mangrove swamps, sea grass beds	–	Fishing, Florida Middle Ground	Complementary analyses[1] of polluted and unpolluted areas
Southern California Baseline Study: (Draft Final Report). SAI Inc. (1977)	Intertidal, water column, and benthic environments distinguished	–	–	Temporal variation in benthic species; space and time variation in trace metals and hydrocarbons, metal bioavailability, aromatic metabolism

NOTE: (–) = Information not specified in synthesis report
[1] May not be possible to accomplish this type of study

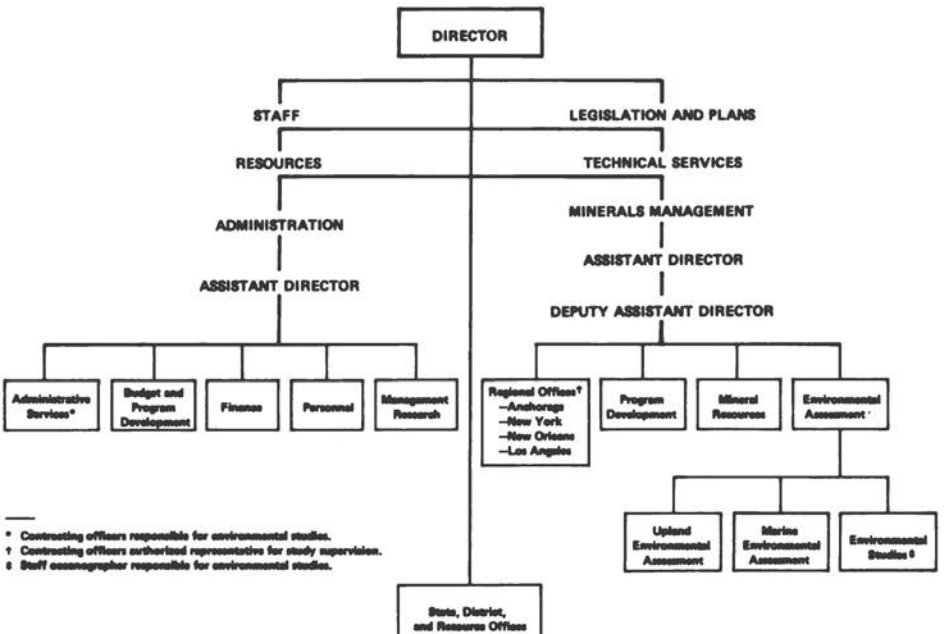


FIGURE 4.2 Schematic diagram of BLM organizational structure with reference to the Environmental Studies Program.

Because of the complex organizational structure, it is unlikely that the Environmental Studies unit with a professional staff of about 10 could effectively assume responsibility for scientific leadership of the program. Regional offices, which are involved in studies, do not report directly to the Branch Chief for Environmental Studies. Contracting officers responsible for environmental studies are located in Administrative Services, and report to a different Assistant Director in BLM. This diagram does not include all Department of the Interior units involved in OCS activities. Their inclusion would illustrate the even greater coordination problems discussed in the text.

to evaluate BLM decisions effectively. Both an internal assessment by DOI of its EIS preparation (U.S. DOI 1974) and an external review of NEPA by the Council on Environmental Quality (CEQ 1976) have resulted in recommendations that the EIS be used by BLM more extensively as the decision document. Such a procedure would require a broader scope for the EIS than is provided by its current limited discussion of the environment as described in reconnaissance studies. NEPA requires that federal agencies fully analyze their decisions in light of the probable environmental impact, and stipulates that this analysis must be performed by considering all other factors in the decisions. A more fully detailed EIS would ensure that the public have access to the basic analysis on which decisions are based. BLM, however, relies on the PDOD as the decision document and uses the EISs as the technical support for the PDOD.

Coordination of Decision Documents

Several units within BLM are involved in the Environmental Studies Program. As shown in Figure 4.2, they include the Branch of Environmental Studies (overall direction for the program), Administrative Services (contracting), and regional offices (day-to-day oversight of specific contracts). In April 1976 the Environmental Assessment Unit (732) and the Environmental Studies Unit (733) were split into their present configuration. The former oversees preparation of Environmental Impact Statements, the latter directs the Studies Program. Although the Environmental Studies Unit directs the Program, the Program's implementation rests with the contracting unit in the regional offices, where the EISs and PDODs are prepared. Informal coordination of environmental studies and decision documents is therefore possible, and is all that has so far taken place. In the future, however, results from the Studies Program should be formally provided to the preparers of the EISs and PDODs.

GUIDANCE FOR MORE EFFICIENT PROGRAM IMPLEMENTATION AND USE OF PROGRAM RESULTS

Information now being procured for the Environmental Studies Program lacks relevance and utility principally because of the lack of initial definition of Program objectives. The foregoing discussion indicates that data now being gathered will not adequately help to make leasing decisions within the five-year time frame of the Program; it appears also

that the data do little to advance knowledge of processes on the outer continental shelf. Contributory to these problems is the constraint placed on scientific innovation by the inflexibility of the management and operation of the Program, as well as lack of initial problem definition.

NEED FOR ONSHORE/NEARSHORE INFORMATION

Examination of the synthesis reports shows that none of them covers onshore or social impacts of OCS oil and gas leasing activity. Certain information on onshore-nearshore environmental impacts should be gathered and assessed before the leasing-exploration phase of OCS oil and gas exploitation. This environmental information should feed directly into the Environmental Impact Statement process. The logic separating the EIS into two separate statements, one addressing the lease-exploration phase with projections of onshore impacts, and one subsequently addressing the development-production phase with more detailed treatment of onshore impacts based on exploration information, is sound and ought to be followed.

The adequacy of consideration of onshore and social impacts has been a major component of all court challenges to the OCS leasing program. The Environmental Studies Program neither provides nor purports to provide onshore and social impact information for DOI's consideration in its leasing actions. It should do so, or DOI should insure that such information is gathered elsewhere and presented in timely and appropriate form for consideration.

ENVIRONMENTAL STUDIES FOR EXPLORATION

To execute its OCS leasing function effectively, BLM basically needs a series of selected reconnaissance surveys designed specifically to answer questions relating directly to decisions on leasing. While these surveys may require some short-range applied research investigations, scientific input is readily available for their implementation. For the most part, the technology is already well known for the required reconnaissance.

Survey Strategy

As a preparatory step, BLM should select sites with high petroleum potential in each of the OCS areas for definitive, relevant reconnaissance surveys. These surveys should be directed to both technological and social concerns in each of the pertinent domains, offshore, nearshore,

and onshore. Every effort should be made to secure the input and support of other federal agencies, state and local authorities, and public interest groups. Industry would be expected to cooperate as fully as possible in the development of answers to all concerns involved in the decision-making process. RFPs for such surveys will need to be directed to clearly stated objectives, and should keep to a minimum performance specifications and experimental prescription except for reasonable, negotiable completion targets.

Ecological Surveys

The first requirement of a viable OCS lease is a reasonable absence of fragile biological communities such as living reefs or particularly hydrocarbon-sensitive species. Also critical are geological factors such as turbidity layers, bottom sediment competence, stability and major faulting where the environment may effect petroleum operation. Unless the site meets acceptable standards in these respects it cannot be considered for lease.

Once a site passes the first reconnaissance screening, studies should move shoreward. Where vulnerable bays, beaches, estuaries, and marshes are present, special studies are needed to determine precautions to be stipulated in leases; the technology for protecting these susceptible environments appears to be readily available. It is essential that concerned environmental groups be involved in these surveys.

Social Studies

One of the major social concerns of OCS petroleum operations is that of conflicts in multiple land use. Other business and industry interests, such as commercial fisheries, must contribute to any reconnaissance studies related to such conflicts. Studies should then be undertaken, with the involvement of state and local authorities, to explore suitable harbor facilities, pipeline corridors and accessible areas for supply bases, peripheral service and repair groups, and potential oil storage tank sites. Industry input for this type of study might well be required to accompany any request for a lease sale in a particular area.

Preparation of Lease Schedules

Once petroleum exploration and exploitation has been authorized for a specific area, industry can be permitted to proceed with detailed

geophysical surveys and to make nomination for specific tracts in the area. BLM can then assess the tracts, hold public hearings, and select the date for a lease sale.

If such a program of reconnaissance surveys is designed emphasizing relevance to the prospective location and is directed toward expediting BLM's decision making on leasing, the entire process will be improved and accelerated and costs to society minimized.

ENVIRONMENTAL STUDIES FOR DEVELOPMENT AND PRODUCTION

Knowledge of possible effects of OCS oil and gas production and distribution is not adequate. Research programs are needed, using physical, biological and social scientists, to supply this deficiency. The procurement strategy for these programs should be different from that used in the reconnaissance survey work. The goals of the research programs should be clearly identified and proposals solicited from professionals in federal, state, academic, and private research laboratories. The proposals should be evaluated by the scientific program managers in DOI in collaboration with their advisory committee and with help of external written reviews for scientific quality and relevance to program goals.

Detailed planning for each stage in the study's progress towards its objective is clearly required; room will also be needed for updating and modification as the programs develop. Such changes should not be viewed as "slippage," as they would be in routine survey work, but rather as signs of vitality. If improved perceptions of problems and innovative approaches to the research do not occur during the work, the probability of falling short of goals is extremely high. "Right on schedule" may indicate simplistic execution and inferior products.

An advantage of these studies, in contrast to short-term survey work, is that over a period of years a group of people with expert knowledge of the problems and possible solutions would become available to DOI. A major product of the fuller understanding of effects of OCS resource development contributed by research will be better advice for management decisions for development and production activities.

The quality of the Program would depend critically both on the skill with which the needs of the decision-making processes are explained to the social and natural scientists and, conversely, depend on the effectiveness with which the research results are translated into information useful to the decision-making officials. The need for experienced professionals to carry out the "feed-back" aspects of the Program functions make senior staff positions essential for this role.

ROLE OF AN ADVISORY FUNCTION

The value of the BLM Environmental Studies Program depends on the reliability of the product delivered. A continuing and objective evaluation of the substantive content of the design, implementation, and use of the Program is therefore desirable. Such a function is best performed by experts convened as a panel to advise the Program director. Aware of this need for outside review, DOI formed the Outer Continental Shelf Environmental Studies Advisory Committee (OCSESAC) in 1974. OCSESAC includes independent scientists and state and government representatives, and has made a series of recommendations for improvement of BLM's environmental studies program. These recommendations include, for example, the documentation of the purpose and approach of the Program, the enlargement of the Program to include coastal data and the inputs important to the states, and increased relevance of the studies to management decisions. Other suggestions include intercalibration of methods, requirement of statistical confidence levels, and use of regional review committees.

The Committee has reviewed these recommendations of OCSESAC and the BLM response to them by examining the annual reports and minutes of OCSESAC and by attending its meetings. It is clear to the Committee that OCSESAC recommendations have been generally valid and generally ignored. Therefore, DOI should reassess the use of OCSESAC and consider whether new advisory panels need to be formed. For example, an advisory panel for each frontier area could be convened or a panel of scientists could be used to review the design of the Studies Program. It is especially important the the appropriate physical, biological, and social scientists be involved in the review process. DOI should also ensure that the advice of OCSESAC and other panels is fully considered by BLM.

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APPENDIX

A OCSESAC Resolution Concerning Program Rationale

The resolution reproduced below was introduced by the State of Washington at the February, 1976 meeting of the Outer Continental Shelf Environmental Studies Advisory Committee. It is reproduced verbatim from Appendix E of the OCSESAC Annual Report to the Secretary of the Interior for Calendar Year 1976, submitted by the Chairman in 1977.

COMMITTEE RESOLUTION CONCERNING PROGRAM RATIONALE

A statement on the design and implementation of baseline studies for assessing and monitoring offshore, nearshore and onshore impacts from Outer Continental Shelf oil and gas exploration and development.

Whereas such exploration for and development of OCS oil and gas reserves is a necessary part of our Nation's total energy program.

Whereas there exist risk and potential impact to the natural resources and human activities of the offshore, nearshore and onshore areas from such exploration and development.

Whereas there must be meaningful attempt by both the government and the oil industry to reduce the risk of impact through proper placement of structures and timing of activities necessary to or attendant to OCS oil and gas exploration and development, as well as adequate monitoring of effects of such structures and activities.

Whereas the Bureau of Land Management and the Department of the

Interior have acted responsibly and commendably in initiating major environmental assessment studies to attempt to promote necessary knowledge, but without adequate attention to date, to all user needs, and to timely application of knowledge to decisionmaking.

Be it resolved by the OCS Environmental Studies Advisory Committee that:

The Bureau of Land Management shall, in cooperation with the National Oceanic Administration (NOAA) and its various branches, the Fish and Wildlife Service, the U.S. Geological Survey, the Environmental Protection Agency, the Coast Guard and other Federal agencies, and the affected States as necessary, develop the following:

(a) Identification of all decisions that need to be made in connection with OCS operations and the data which must be available in order to make those decisions.

(b) Identification of specific data needs insofar as possible, including acceptable ranges of variance for satisfying users' needs.

(c) A prioritized schedule of data acquisition responsive to the timing of decisionmaking relative to OCS exploration and development for each region.

(d) A report of findings of the activities of a, b, and c for this Committee by the summer 1976 meeting.

As part of this effort, the Bureau should make very clear the adequacy of their position of securing chemical data in preference to biological data and the relationship in terms of impact upon the environment and the citizens of the concerned States of their current emphasis upon offshore studies as opposed to nearshore and onshore studies.

APPENDIX

B BLM Analysis in Response to OCSESAC Resolution

The explanatory memorandum from BLM's Assistant Director of Minerals Management and the enclosures that made up BLM's response to the OCSESAC resolution are reproduced verbatim below, with the exception of the detailed listing of contracts awarded in FY 1975 and FY 1976.

Memorandum November 5, 1976

To: Chairman, Outer Continental Shelf
Environmental Studies Advisory Committee

From: Assistant Director, Minerals Management
Bureau of Land Management

Subject: Jamison Resolution Analysis

The enclosed documents were prepared by the Bureau of Land Management (BLM) in response to a resolution by the Outer Continental Shelf Environmental Studies Advisory Committee (OCSESAC). The resolution, a copy of which is enclosed,* shall be referred to as the Jamison Resolution after its originator, Dr. David Jamison, representative of the State of Washington. This analysis will address points a, b, and c only; point d is a *fait accompli* since the summer of 1976 is past. It relates only to environmental data input and sources and does not consider socioeconomic, resource potential, or political information. Decision points which do not consider environmental data, i.e., post-sale analysis are omitted.

Enclosure 1 presents the major decision points, or points of input of environmental data, in the decisionmaking process related to OCS oil and gas exploration and development activity. It also lists the principal categories of information utilized by the Department of the Interior in decision making. Enclosure 2 is an expansion of Enclosure 1 and includes general statements about the decision itself, specific types of environmental data that go into the decision, level of detail (resolution of data), timing, and the impact of the information on the decision. Enclosure 3 briefly describes the major environmental studies program elements and the specific disciplines that contribute information to those elements. It also addresses the specific questions that a decisionmaker would ask of the environmental data. Studies conducted in any given area are slightly different in regard to emphasis or timing because of the availability of existing data, the uniqueness of the area, and the stage in the leasing process at which the program of study was initiated. The objective of the BLM has been to begin studies as far in advance

*See Appendix A.

of any scheduled leasing activity as possible so that the maximum amount of information is available at any given decision point.

The timing to which reference is made in Enclosure 2 refers to the time at which the decision is made relative to the scheduled lease sale. This does not imply that studies must have been undertaken in time to provide new data for any decision point, including scheduling. The scheduling decision is based on the amount and quality of available data. One must bear in mind several key points in evaluation of the design of an environmental studies program where timing is concerned. The OCS minerals management decisionmaking process is dynamic in that data is continuously feeding into the system. Each succeeding step is predicated on a positive decision at the preceding decision point. If a particular point is reached and it is determined that there are insufficient data on which to make a decision, the process can be stopped and measures can be taken to obtain the required information before proceeding.

It should be emphasized that the environmental studies program produces data for basically two types of needs: short-term and long-term. Short-term information needs are cyclical in nature for a given area, include broad reconnaissance studies, and primarily influence pre-leasing decisions. It must be borne in mind that there will likely be more than one lease sale in an area, even if mineral resources are not discovered as a result of the initial lease sale. This means that the initial lease sale, although a point of focus, is not the only critical decision point in the minerals management program. Long-term data needs are required for long-range planning of minerals development. More accurate descriptions of the environment, identification of possible indicators of impact from oil and gas operations, providing a better basis for prediction of long-term cumulative impact, and assessing the impacts of chronic pollution are all long-range problems.

Donald P. Truesdell
Acting Assistant Director
Bureau of Land Management

Enclosures

ENCLOSURE 1

Listed below are the nine major decision points in the Outer Continental Shelf (OCS) Minerals Leasing Program and the corresponding *principal* categories of information utilized by the Department of the Interior in decisionmaking. This brief outline is an abstract of Enclosure 2 which lists more specific information including level of detail, or resolution, of environmental data utilized in the OCS minerals leasing program.

1. Timing and Sequence of Lease Sale Offering—Schedule Preparation

   A. Resource Potential (industry interest)
   B. Location and Assessment of Hazards
   C. Resource Use Conflict

2. Amount and Location of Area Offered in Call for Nominations

   A. Resource Potential (more emphasis on economic information)
   B. Broad Area Environmental Characterization

3. Initial Selection of Tracts to be Offered in Lease Sale

   A. Identification of Unique Environments
   B. Location of Hazardous Areas
   C. Resource Use Conflict
   D. Risk Assessment and Pollutant Trajectory Analysis.

*4. Environmental Analysis of Tracts and Impact of Proposed Action

   A. All Environmental and Socioeconomic Data—(tract specific)
   B. Identification of Data Gaps—(tract specific)

5. Final Decision Regarding Lease Sale Action

   A. Resource Use Conflict
   B. Identification of Unique Environments

*No actual decision is made or implied at Point #4. This is an important point, however, influencing later decisions.

C. Broad Area Environmental Characterization
D. Risk Assessment

6. Approval of Exploratory Drilling Permits for Each Tract

A. Potential Resource Recovery Information
B. Assessment of Anticipated Hazards

7. Approval of Development Plan for Each Tract

A. Resource Recovery Information
B. Site-specific Rig Monitoring
C. Anticipated Hazards

8. Approval of Pipeline Permits

A. Biological—Geological—Chemical Data
B. High Resolution Reconnaissance Data
C. Area Specific Resource Data

9. Modification of OCS Leasing and Development Program

A. Site-specific Rig Monitoring
B. Chemical/Biological Data
C. Time Series Sampling

ENCLOSURE 2:
DEPARTMENT OF THE INTERIOR UTILIZATION OF ENVIRONMENTAL INFORMATION FOR OCS MINERALS LEASING PROGRAM

1. Timing and Sequence of Lease Sale Offerings—Schedule Preparation

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A. General

(1) All types of sale area specific environmental information are evaluated to determine reliability, quantity, quality, etc. of data.

(2) Other factors considered are political and socioeconomic.

(3) Primarily a Washington Office function with input from the field.

(4) Final decision by BLM Director.

B. Level of Detail

(1) Cursory.
(2) Summary-type information.
(3) Qualitative judgments.
(4) Area-wide.

C. Information Required (Emphasis)

(1) Identification of unique environments.
(2) Location and severity of hazards.
(3) Resource use conflict.
(4) Identification of data gaps that if filled would enhance later decisions.

D. Timing—This activity generally occurs three years prior to lease sale.

E. Impact of Information on the Decision

(1) Change in timing and sequence of studies or leasing action to accommodate availability of information at some later date.

(2) Change in nature of studies to provide certain information at later points in time.

2. Amount and Location of Area Offered in Call for Nominations

A. General

(1) In preparation for a call for nominations, BLM requests resource reports on a sale area from other Federal agencies. These reports are evaluated to determine areas that should not be included in the call based on:

(a) Environmental sensitivity such as:
(1) Wildlife refuges.
(2) Unique environments.
(3) Extremely hazardous areas.
(b) Resource assessments.
(c) Multiple use conflicts.

(2) Frequently will call for marginal areas to determine level of interest. Tract selection will eliminate hazardous or sensitive tracts.

(3) Basically a Washington office function.

(4) Final Decision by OCS Office Manager in consultation with USGS and FWS. Announcement comes out under signature of the Director of BLM.

(5) Not a critical decision to be influenced by environmental studies data.

B. Level of Detail

(1) Tens of square miles
(2) General Coverage of an area.
(3) Qualitative judgments.

C. Information Required (Emphasis)

(1) Delineation of gross environmental features (broad area environmental characterization of biological, geological, chemical, and physical aspects).

(2) More emphasis on economic (potential resource recovery) information.

D. Timing—This activity generally occurs two years prior to lease sale.

E. Impact of Information on the Decision

(1) Elimination of large areas from offer.

(2) Recognize additional information to dirve risk analysis models.

3. Initial Selection of Tracts to be Offered in Lease Sale

A. General

(1) All types of environmental data are evaluated. Environmental and resource potential data are most important.

(2) First run of Harris, SEAS, and Davis-Smith Models.

(3) Basically a Field Office responsibility.

(4) Decision by OCS Office Manager in consultation with USGS and FWS.

(5) Still two more critical pre-leasing decision points that can be influenced if a tract slips by.

(6) Significant decision point that can be influenced by environmental studies data.

B. Level of Detail

(1) Small groups of tracts (3 to 10).

(2) Seasonal data.

(3) Semi-quantitative bases for decisions on a tract-by-tract basis.

C. Information Required (Emphasis)

(1) Identification of unique environments.

(2) Location of hazardous areas.

(3) Resource use conflict.

(4) Risk assessment and pollutant trajectory analysis.

D. Timing—This activity generally occurs seventeen months prior to lease sale.

E. Impact of information on the Decision

(1) Elimination of tracts from offer.

(2) Recognize additional information to drive risk analysis models.

4. Environmental Analysis of Tracts and Impact of Proposed Action

A. General

(1) Most intensive analysis of data.
(2) Broadest range of environmental and socioeconomic data.
(3) Critical sections include:
  (a) Description of the environment.
  (b) Anticipated impact of the action.
  (c) Mitigating measures.
    (1) Operating Orders.
    (2) Notices to Lessees and Operators
    (3) Uncommitted Mitigating Measures
  (d) Long term vs. short impacts.
  (e) Cumulative effects.
(4) Second run of the risk analysis models.
(5) Preparation of impact-risk matrix.
(6) Document prepared by BLM OCS Office for signature of the Director.
(7) *No decisions made or implied.*
(8) Critical document to be influenced by environmental studies information.
(9) Discussion of alternatives to the action.
(10) Objective analysis.

B. Level of Detail

(1) Tract specific.
(2) Quantitative assessment of impact.
(3) Resolution on a scale of 2 to 5 miles.

C. Information Required (Emphasis)

(1) Environmental and socioeconomic data.
(2) Identification of data gaps.

D. Timing—Eight months prior to lease sale–Draft Environmental Impact Statement (EIS); Four months prior to lease sale–Final EIS.

E. Outcome

(1) Recognition of sensitive tracts.
(2) Identification of data gaps.
(3) Relative impact of alternatives.
(4) Recommendations for stipulations, operating orders, tract elimination.

5. Final Decision Regarding Lease Sale Action

A. General

(1) Weighs resource value of various alternatives.
(2) Considers biological, mineral, social, economic, legal, and political aspects.
(3) Final formal decision point before sale notice.
(4) Uses all the most recent information.
(5) Davis-Smith Model, final run.
(6) Economic, social, political, and environmental data given nearly equal weight.
(7) Significant decision point that can be influenced by environmental studies.

B. Level of Detail

(1) Tract-specific.
(2) Value of resources in dollars saved or unrecovered.
(3) Quantitative evaluation.

C. Information Required (Emphasis)

(1) Tracts recognized for conflict of resource use.
(2) Tracts recognized for conflict with sensitive or unqiue environments.
(3) Greater detail on crucial items recognized in EIS.
(4) Broad area environmental characterization—biological, geological, chemical, and physical aspects.
(5) Risk assessment.

D. Timing—One month prior to lease sale.

E. Impact of Information on the Decision

(1) Elimination of tracts from offer.
(2) Approval of lease sale.
(3) Cancellation of lease sale.
(4) Approval or disapproval of lease stipulations and operating orders.
(5) Change in timing of sale.

6. Approval of Exploratory Drilling Permits for Each Tract

A. General

(1) Permit requests concentrate on geologic information and potential resource recovery.

(2) Engineering data included in permit request.

(3) High resolution seismic, side scan sonar and TV transect data are required and are available to BLM on a proprietary basis.

(4) Any stipulation requirements are fulfilled, or plans for fulfillment are included, in these permit requests.

(5) USGS-Conservation Division is lead agency in approval; BLM is consulted.

B. Level of Detail

(1) Tract specific (3 × 3 miles).
(2) Site specific within tracts.
(3) Based on "in-hand" data.

C. Information Required (Emphasis)

(1) Geologic data, potential resource recovery information.
(2) Rig siting.
(3) Target horizon(s) or depth(s); anticipated hazards.

D. Timing—Generally between one month and five years after initial lease sale.

E. Impact of Information on the Decision

(1) Possible relocation of site.
(2) Site approval.
(3) Disapproval of permit.

7. Approval of Development Plan for Each Tract

A. General

(1) Development plan concentrates on geologic information, amounts and timing of resource recovery, and onshore plans for servicing field development and handling production.

(2) Engineering data, proposed transportation mode, onshore facilities included.

(3) Well log data are available on proprietary basis.

(4) All stipulation requirements must be satisfied, or plans for satisfaction included.

(5) Coastal State involvement and coordination are important.

(6) USGS is lead agency in approval; BLM and Coastal States are consulted. States have approval over pipelines coming ashore.

B. Level of Detail

(1) Tract specific (3 × 3 miles).
(2) Site specific within tracts.
(3) Onshore specific; facility siting.
(4) Based on "in-hand" data.

C. Information Required (Emphasis)

(1) Geologic data, resource recovery information, onshore planning.

(2) Site-specific rig monitoring.
(3) Target horizon(s) or depth(s); anticipated hazards.

D. Timing—Variable, anytime after discovery of economically recoverable hydrocarbons.

E. Impact of Information on the Decision

(1) Relocation of site.
(2) Approval of site.

(3) Modification of development plan to accommodate environmental concerns and State coastal development requirements.

(4) Disapproval of development plan.

8. Approval of Pipeline Permits

A. General

(1) "Common Carriers" permitted by BLM.
(2) "Gathering Lines" permitted by USGS.
(3) Conditioned upon availability of "commercial quantities of oil and/or gas."
(4) Examination and selection of pipeline corridors.
(a) Determination of possible land fall based on socio-economic, political and gross environmental considerations.
(b) Connecting offshore producing areas with possible onshore receiving areas.
(c) Detailed environmental investigation of possible corridors.
(5) Joint Federal-State effort.
(6) Decision by Director of BLM or recommendation of OCS Manager; Environmental Assessment Report is required presently, perhaps will require an EIS in the future.

B. Level of Detail

(1) Site-specific-corridor area 3 to 5 miles wide.
(2) Enough to determine rate and scale of recovery of area after pipeline has been emplaced.

C. Information Required (Emphasis)

(1) Biological-Geological-Chemical data.
(2) High resolution reconnaissance data.
(3) Area specific resource data.

D. Timing—Variable, anytime after discovery of economically recoverable hydrocarbons (generally three to seven years after initial lease sale).

E. Impact of Information on the Decision

(1) Selection of appropriate corridors.
(2) Approval or disapproval of permit and right-of-way.
(3) Preparation of stipulations for emplacement.

9. Modification of OCS Leasing and Development Program

A. General

(1) Not a mandated function of BLM; USGS monitors produced formation waters; EPA has issued effluent guidelines for OCS rigs.

(2) To deal with basic unknowns about what comes off of rigs, where it goes, what its residence time is and so on. Will help answer long term, chronic contamination problems.

(3) Based on results of benchmark program.

(4) Answers to long standing questions regarding cumulative effects, long- vs. short-term effects.

B. Level of Detail

(1) Site specific, using broader benchmark data for comparison with range of conditions.

(2) Changes on at least a quarterly basis, monthly in particular areas.

C. Information Required (Emphasis)

(1) Site-specific, rig monitoring
(2) Chemical/Biological Data
(3) Time series sampling.

D. Timing—Continuous process.

E. Impact of Information on the Decision

(1) Modification of Operating Orders, Operating Regulations, or Leasing Regulations.

(2) Issuance of Notices of Lessees.

(3) Modification of overall leasing strategy or schedule.

ENCLOSURE 3: DEFINITIONS OF ENVIRONMENTAL STUDIES ELEMENTS USED IN THE ACQUISITION OF INFORMATION REQUIRED FOR DECISIONMAKING IN THE OCS MINERALS LEASING PROGRAM

The Bureau of Land Management (BLM) Environmental Studies Program consists of seven major study elements. These include:

1. Historical Data Summaries
2. Conferences
3. Reconnaissance Studies
4. Benchmark Studies
5. Fates and Effects Studies
6. Modeling
7. Site Specific Monitoring

These study elements and their specific component disciplines are defined herein. Within each program element definition, the specific information requirements as listed in Enclosure 1, are addressed.

1. HISTORICAL DATA SUMMARIES

These summaries provide a compilation and summary of existing information as well as an update on the current status of the data base for broad disciplinary elements (e.g. biological, chemical, geological, and physical information) or very specific study elements (e.g. histopathology, toxicology of petroleum hydrocarbons and selected trace elements, etc.). They should include a comprehensive survey and evaluation of existing literature, both published and unpublished, available data sets, relevant on-going and projected research activities and programs. The evaluation should include some statement as to the pertinence and reliability of the available information. The assembled data are synthesized and prioritized in such a manner, as to generate specific recommendations for the design of study programs to addressed identified data gaps. The greatest value is realized from these summaries only if they are reviewed and up-dated on a periodic basis for the duration of each regional study.

Questions considered in the development of comprehensive historical data acquisition, summary and synthesis include:

1. Is the existing data base adequate in terms of supplying the proper quantity and quality of information to the decisionmakers? A positive response would of course preclude initiation of additional studies.
2. What data gaps exist in the historical data base and what type of studies would generate data germane to that information requirement?

As indicated in the introductory paragraphs, historical data summaries are more of a management and researcher tool than a specific study type. A discussion of specific topics which might be considered for preliminary summarization and synthesis would merely be a reiteration of every scientific discipline and attendant study element represented in the OCS Environmental Studies Program. The value of their proper utilization, however, is incalculable in terms of efficient use of time and available resources to selectively acquire relevant information.

2. CONFERENCES

The effective preparation and judicious use of various conferences and committees is another example of a multi-purpose management tool. They permit the greatest flexibility and focus for a specific problem. Ad hoc groups of individuals with specialized expertise can be formed in a comparatively short time frame to consider very discrete problems. An example was the trace metal and hydrocarbon methodology seminars held during the week of September 8, 1975 to consider "state-of-the-art" analytical instrumentation and procedures for determinations of selected trace metals and petroleum derived hydrocarbon compounds. Larger committees or standing advisory bodies can be formed to consider broader interdisciplinary topics, or serve in the generation of a conceptual nucleus for an entire program element, such as our fates and effects program. A final, most important use of conferences or committees is to act as a mechanism for rapid dissemination of information regarding new program elements, or redirections, to all concerned parties.

Examples of conferences and committees which the BLM has either helped to develop, or maintains active participation in, include:

1. The OCSESAC, as well as the regional advisory boards for policy matters.
2. The aforementioned trace metal and hydrocarbon seminars which will probably be held on a continuing basis.
3. The steering committee membership for the fates and effects

program planning has recently been designated and announced to OCSESAC.

4. A steering committee has been formed to advise the BLM on the most recent developments in hydrocarbon analytical methodologies due to their complexity and "state-of-the-art" nature.

5. In addition, the BLM encourages dissemination of the environmental information it collects on the OCS through funding of various professional meetings and conferences, as well as providing travel funds for principal investigators from each regional OCS program to participate in such meetings.

There are also conferences anticipated for certain program elements to solicit recommendations for their modification or increase in scope with regard to the BLM studies program. They deal with the following topics:

1. Microbiology in general, and the efficacy and utility of data on the hydrocarbon degradative potential of microbes.
2. Histopathology
3. General benthic ecology, including the most representative sampling methods and the use of the most appropriate community structure indices.

3. RECONNAISSANCE STUDIES

These types of studies generally fall into two categories. The first deals with broad area characterizations using a limited number of parameters. These can best be described as large scale surveys to determine major geomorphological and population characteristics. The second type are more site specific, short-term studies designed to gather qualitative information regarding well-defined areas of special interest or concern. They frequently are the earliest studies initiated, commonly in response to suspected potential impacts on such things as unique biological assemblages and critical habitats or to delineate natural hazards. Reconnaissance studies may occasionally provide information adequate to fulfill program objectives, but they are more often the first step in the development of a strategy to define the temporal and spatial aspects of a more efficient sampling design with a minimum expenditure of time and resources. It should be emphasized they are generally of comparatively short duration.

Questions used to develop the conceptual framework for the design and implementation of reconnaissance type studies are:

1. Are there any unique biological assemblages, resources, or physical environments in these areas which by virtue of their location or sensitivity, are likely to undergo perturbation if subjected to OCS petroleum development activities?

2. Conversely, are there any natural hazards or conditions which would preclude OCS exploratory or production activities due to the increased likelihood of an accident?

3. If there are hazards, where specifically are they located? What is the probability of their occurrence? What is their magnitude or areal extent? What estimates have been made of the probability and severity of an accident occurring given that a certain disastrous event takes place.

Listed below are program elements commonly included in gathering this type of information:

Geological and Geophysical

Side Scan Sonar
High Resolution Geophysics
Bathymetric Mapping
Studies of Rapid Deltaic Sedimentation and Front Stability

Biological Surveys

Diver Survey
Pre-drilling Study (generally required of lessee by lease stipulation)
Bird and Mammal Censuses Using Aircraft
Delineation of Critical Migration Routes, Reproductive Sites (e.g., rookeries, haul-out areas, spawning grounds, etc.)

Direct Observation

Submersible Cruises
Underwater CCTV (videotape)
Various Still Photography Techniques
Ice Overflight
Interpretation of Various Remote Sensing Techniques.

4. BENCHMARK STUDIES

A broad area, multi-year survey program intended to provide a statistically, scientifically sound characterization of key environmental aspects including physical, biological, geological, and chemical. The

objective is to establish the range of variation of critical parameters that will reflect the impact of Outer Continental Shelf (OCS) oil and gas exploration and development activity. This benchmark will be used as the framework for comparison of measurements made on site specific surveys to determine whether the site is representative or atypical of that geographic area and will be used to determine which sites should be monitored or studied more closely. Benchmark data will also be useful in defining the general type of environment with which we are dealing, and in evaluating the longer-term natural variability of environmental parameters.

Benchmark studies will help us address critical questions that the decisionmaker will need to have answered.

1. What is the biological, chemical, geological, and physical nature of the environment being considered for leasing?
2. Are there any unique or sensitive aspects to that environment that will be upset if exploration and production take place? (This assumes we know something about sensitivity of various species, populations, or ecosystems to the effects related to oil and gas development).
3. If development proceeds what organisms are present that might be impacted?

The benchmark study generally consists of four types of information. That used to establish a chemical benchmark of ambient levels of high molecular weight hydrocarbons and selected trace metals; that used to establish the nature and status of biologic communities especially resident species; that used to identify possible indicator organisms or processes; and that information used to support the interpretation of the other data sets. Listed below are the specific study elements generally included in a benchmark study.

Chemical Indices

High Molecular Weight Hydrocarbons in:
- Benthic organisms
- Sediments
- Pelagic organisms
- Dissolved in seawater
- On particulate matter in seawater
- Zooplankton

Low Molecular Weight Hydrocarbons in Water

Trace Metals in:

Benthic organisms
Sediments
Pelagic organisms
On particulate matter in seawater
Zooplankton

Biological Indices

Benthos (taxonomy and biomass)
Macroepifauna
Macroinfauna
Meiofauna
ATP—biomass
Demersal fishes
Microfauna (especially Foraminifera)
Water Column
Zooplankton
Neuston
Ichthyoplankton
Pelagic fishes
Bacteria
Phytoplankton
Histopathology

Indicator Organisms/Processes

Selection of parameters to be monitored at some later date is based on the sum total of all the data when viewed in the light of the following criteria.

1. Ready availability of samples; ease of collection.
2. Parameter for which error limits can be established; quantifiable.
3. Ubiquitous, has economic value, or is ecologically important in the case of organisms.
4. Is responsive to longer term events; stable population or condition under normal circumstances.
5. Sensitivity to contaminants related to OCS oil and gas activities.

Supportive Information

Sediments
Clay Mineralogy

Textural Analysis
Total Organic Carbon
Total Carbonate
ATP
Water Column
Weather and Wave Observations
Temperature, Salinity, Dissolved Oxygen
Nutrients
Chlorophyll $_a$
^{14}C—Primary Productivity
Particulate Organic Carbon
Dissolved Organic Carbon
Transmissometry/Nephelometry
Current Measurements

5. FATES AND EFFECTS STUDIES

Those studies conducted to determine the transport, dispersal, biological, chemical, and physical alteration, and final disposition of contaminants related to OCS petroleum development and the chronic and acute effects such contaminants impose on the marine ecosystem. Fates and effects data are useful in evaluating potential hazards to the environment resulting from OSC oil/gas exploration and development activities. This information is also required in assessing potential impacts of contaminants on marine organisms. The fates and effects studies are important in the interpretation and correlation of benchmark and site-specific monitoring programs. These studies are primarily physical and biological and are required in answering questions such as:

1. If contaminants are released into the environment:
   a. Where will they go?
   b. What are the factors primarily responsible for their dispersal?
   c. How quickly will they disperse?
   d. What will the duration of the effect be?
   e. What will their final disposition (condition and location) be?
2. What effects result from the introduction of a single large amount of contaminants over a short period of time?
3. What effects result from a continuous, incremental increase of contaminants over a long period of time?
4. How are petroleum derived hydrocarbons distinguished from biogenic hydrocarbons?

Specific studies elements investigated in obtaining information to answer the questions listed above include the following:

1. Physical
    a. Lagrangian drift
    b. Transport mechanisms
    c. Physical alteration of petroleum (e.g. evaporation, dissolution, emulsification, photooxidation, etc.)
    d. Surface and subsurface current patterns
    e. Weather and wave observations
    f. Hydrography
2. Biological
    a. Biological alteration of contaminants
    b. Acute toxicity data (for comparison with benchmark hydrocarbon and histopathological data)
    c. Chronic toxicity data (for comparison with benchmark hydrocarbon and histopathological data)
    d. Sublethal physiological effects (for comparison with benchmark hydrocarbon and histopathological data)
    e. Potential indicators of contamination (e.g. the ratio of hydrocarbonoclastic bacteria to total heterotrophic population)
    f. Biological accumulation and depuration of contaminants
3. Geological
    a. Suspended sediments (transmissometry, mineralogy, etc.)
    b. Sediment-organism relationships
4. Chemical
    a. Biogenic sources vs. petroleum-derived hydrocarbons
    b. Chemical characterization of petroleum
    c. Speciation of trace metals

6. MODELING

These efforts integrate and synthesize information obtained through historical data summaries, reconnaissance, benchmark, fates and effects, and site-specific rig monitoring studies. The objectives of modeling include the development of probability bases for:

1. Spill frequency estimates
2. Pollutant trajectories
3. Wave energy
4. Impacts on the ecosystem

All elements of the study types mentioned above are utilized in modeling efforts. Refinement of existing descriptive models is achieved through continuous input of information from these studies. A model with sufficient predictive capability to be a reliable management tool is the goal of any modeling effort.

Information needs served by modeling include:

1. Location and severity of hazardous impact
2. Identification of data gaps
3. Delineation of gross physical environmental features
4. Risk assessment and pollutant trajectory analysis
5. Rig siting.

7. SITE SPECIFIC MONITORING

A small area, multi-sampling survey program designed to examine the extent, duration, and effects resulting from exploration or operations at a specific site. The objective is to obtain data to answer the following questions:

1. What contaminants are coming off the rigs?
2. Where are they going and at what rate are they being transported?
3. Are they, or their effects, detectable in the area around the rig?

As indicated in the discussion of benchmark studies, sites that are selected for monitoring are compared to the results of the benchmark studies to determine the representativeness of the site selected. Other criteria applied to the selection of sites include proximity to unique or sensitive environments, timeliness of operations, duration of operations, and anticipated applicability of results in a broader context. Significant site-specific monitoring studies will generally only come in the later stages of development. It is at that time that more permanent facilities will be constructed that will act as potential continuous point sources of pollutants. Exploratory operations generally do not last long enough to obtain any meaningful data or do any significant damage.

The kinds of investigation include the following:

Chemical Indices

High Molecular Weight Hydrocarbons in:
sediments

macrofauna
water (dissolved and on particulates)
fishes
Low molecular weight hydrocarbons in water
Trace metals in:
sediments
suspended particulate matter
macrofauna
fishes

Biological Indices

Benthos (taxonomy and biomass)
Macroepifauna
Macroinfauna
Meiofauna
Microfauna (especially Foraminifera)
Demersal Fishes
ATP—biomass
Water Column
Phytoplankton
Zooplankton
Bacteria
Neuston
Ichthyoplankton
Pelagic Fishes
Histopathology

Physical Parameters

Currents
Transmissometry/Nephelometry
Weather and Wave Observations
Temperature, Salinity, Dissolved Oxygen

Supportive Information

Water Column
Nutrients
Chlorophyll $_a$
^{14}C—Primary Productivity
Particulate Organic Carbon

Dissolved Organic Carbon
Sediments
Clay Mineralogy
Textural Analysis
Total Organic Carbon
Total Carbonate
ATP

ENCLOSURE 4

[The material supplied by BLM to OCSESAC under the headings listed below was too detailed for inclusion here. Portions of the material relevant to the report can be found in discussion in the text.]

Contracts Awarded in Fiscal Year 1976 By Region
Contracts that are not listed in a specific area
Contracts Awarded in Fiscal Year 1975 by region
Contracts not listed under specific regions
Alaskan OCS Studies

ENCLOSURE 5: SPECIFIC APPLICATIONS OF ENVIRONMENTAL STUDIES DATA TO THE MINERALS MANAGEMENT DECISIONMAKING PROCESS

1. MISSISSIPPI-ALABAMA-FLORIDA (MAFLA)

The extent and nature of a known reefal community, the Florida Middle Ground, in the eastern Gulf of Mexico, was definitized as a result of the benchmark studies in the MAFLA area. Lease Stipulation three, which required the conduct of biological surveys at the expense of the lessee prior to submission of a drilling permit request, was applied to 25 of the 29 lease blocks in the Florida Middle Ground area in order to ensure the protection of those unique coral areas.

Specifically, diver reconnaissance studies of this area were conducted by Dr. Thomas Hopkins of the University of Alabama under the Bureau of Land Management (BLM) Contract 08550-CT4-11, as part of the benchmark studies. The results of these investigations were subsequently used in designing the biological survey, funded by Texaco, prior to initiating drilling in their lease area. These diver surveys were continued under the renewal contract (i.e., 08550-CT5-30) for benchmark studies and have produced a wealth of information on reefal zonation, and the biological communities associated with it. Due to the rich and diverse marine life found in the Florida Middle Ground area, it may become the object of a separate, more intensive special study. This information will serve to better define the proper design of biological surveys in other critical habitats encountered in other potential lease areas.

These continued efforts also revealed the enormous influence that isolated, infrequent natural events may have on the Outer Continental Shelf (OCS) environment. A fortuitous opportunity to resample several stations in the Florida Middle Ground after the passage of Hurricane Eloise indicated a tremendous upheaval of bottom sediments, scouring and siltation effects, as well as resuspension of surficial sediments into persistent, highly turbid, nephloid layers. These periodic passages of high energy events require further evaluation, since their impact may be equivalent or actually exceed those of OCS drilling activities.

Site-specific rig monitoring studies were initiated under Contract 08550-CT5-30, and the performance of various analyses for chemical indices such as selected trace metals and hydrocarbons suggest the effect of exploratory drilling operations on the benthic environment is confined

to an area less than 100 meters from the rig. Continuing studies of rigs will be required to quantify effects on biological indices, as well as dispersal of any contaminants in the water column. This information has proved useful in the continuing evaluation of certain operational requirements placed on lessees, such as shunting of drill cuttings to the bottom.

The integration of data on biological communities in the MAFLA area with the results of 2000 line miles of high resolution geophysical and side scan sonar data has assisted in the delineation of major biotopes and lithotopes in the eastern Gulf of Mexico. These data syntheses permit some broad environmental characterizations which can be extrapolated outside of the immediate areas of study, and should therefore prove extremely useful in tract selection for any future lease sales in the MAFLA area.

2. SOUTHERN CALIFORNIA, SALE 35

The Marine Mammal and Bird Survey conducted by the University of California indicated that the northern Channel Islands are important breeding, resting, and feeding areas for birds and pinnipeds. To preserve the rookeries, it was recommended in the Program Decision Option Document (PDOD) that all affected tracts be deleted from sale. The recommendation was approved by the Secretary and 29 partial or whole tracts south of San Miguel and Santa Rosa Islands and five tracts off Santa Barbara Island were withdrawn from sale. Subsequent to that decision, and in preparation for Sale 48, additional data collected in this study supports our initial findings and has helped to definitize the locations and seasonal nature of the bird and mammal populations that should be protected.

3. SOUTHERN CALIFORNIA, SALE 35

A special reconnaissance study performed by the BLM on the Tanner-Cortes Bank area revealed that there were particularly sensitive biological communities in residence there. Benchmark studies more clearly defined the areas of concern and described the populations. A special lease stipulation, No.6, was placed on eight tracts that covered the unique areas; it provided for special biological surveys to be conducted before any drilling activity could commence. It also prohibits dumping of drill cuttings and/or drilling muds on the drill site; all such waste must be dumped a minimum of five miles beyond the 80 meter isobath surrounding the banks. In addition, Stipulation No.3 was

included in all leases in order to provide for the contingency of finding other such sensitive biological resources in the course of the environmental studies. The stipulation reads as follows:

> Should any new areas of special biologial significance be discovered within two years of the lease sale or as a result of BLM baseline studies, whichever terminates first, the lease blocks, or portions thereof, containing these areas and appropriate buffer zones, shall be explored and developed using the best available technology and all reasonable care to prevent to the maximum extent possible detrimental impact upon such areas.

4. SOUTHERN CALIFORNIA, SALE 35

Four tracts, one near Santa Rosa, two on Tanner-Cortes Bank, and one south of Santa Pedro, were deleted because of the presence of geologic hazards in the form of unstable near surface sediments. This information was, in part, gathered by the U.S. Geological Survey using BLM funds provided them through a Memorandum of Understanding.

5. SOUTHERN CALIFORNIA, SALES 35 AND 48

The literature summary conducted by the Southern California Ocean Studies Consortium (SCOSC) under contract to BLM provided a substantial information base for the tract selection process in Sale 35, the subsequent environmental impact statement (EIS) and the Program Decision Option Document (PDOD). This summary is currently being up-dated and along with the information from the benchmark study conducted by Science Applications Incorporated (SAI) is being used extensively in the initial tract selection process, for Southern California Sale No. 48, which is currently underway in the Pacific OCS Office. This same information will be used in the draft EIS for that sale which is due to be completed in January 1977.

6. SOUTH TEXAS, SALE 37

Previous investigations by universities and private research institutions had located and described two unique coral reef assemblages in the west central Gulf of Mexico (East and West Flower Garden Banks). Concern was expressed by the general public at EIS hearings that other topographic highs in the central and western Gulf of Mexico were similarly unique and/or that they were important fisheries resource areas. It was decided that special lease stipulations should be placed on

any lease tracts in the area of topographic highs to mitigate the impact of dumping of drill cuttings or muds. Stipulations 4 and 5 permitted leasing of those blocks, but prohibited exploration until a complete bathymetric mapping and reconnaissance of 13 tracts on 7 banks, and gravity survey of 26 other tracts, could determine the extent and nature of these topographic expressions. The surveys, conducted by Texas A&M University under contract to BLM, determined that none of these highs were viable coral reefs, and that there was a high ambient level of turbidity over these areas that was the result of natural processes. It was determined that any additional turbidity resulting from exploration or development activity would not adversely impact biota on or around the topographic highs; therefore, permission was given to proceed with drilling.

A benefit of the topo highs study was that the knowledge of such features gained from the field work has provided the BLM with the ability to survey similar topographic features, should they become known, and assess the potential for damage resulting from oil and gas exploration. This would result in the application of appropriate lease stipulations or in tract exclusion, if necessary.

7. GULF GENERAL SALE 47

Information and data being generated by BLM studies conducted by the University of Texas, Texas A&M University, Rice University, the U.S. Geological Survey, and the National Marine Fisheries Service are being used extensively in the tract selection and EIS preparation for the lease sale noted. The descriptive and reconnaissance work has delineated several areas of unstable, near-surface sediments which are receiving careful scrutiny before a final decision is made to offer them for leasing.

The current aim is to evaluate the long-term effect of multiple sales and widespread exploration and development activity on the biota of the Gulf of Mexico. The benchmark programs are to be followed with a site-specific monitoring program and a broader monitoring program which is designed to distinguish trends in selected critical parameters. It is hoped that ancillary studies on the fates and effects of petroleum hydrocarbons in the marine environment will permit us to relate field observations to specific impacts of oil and gas development activity. This same approach will be used in each study area, i.e., Southern California, the Northeast Gulf of Alaska, etc., to provide critical region-specific information about such impacts.

8. NORTHEAST GULF OF ALASKA, SALE 39

Field information, along with a model of the circulation pattern, in the northeast Gulf of Alaska indicated that there was a surface gyre which could transport pollutants from an area under consideration for lease sale offering directly into the protected habitats of Controller Bay west of Kayak Island. This area is a critical habitat for marine mammals and, as such, is unique. It was decided as a result of the PDOD that the 16 tracts west of Kayak Island would be deleted from the offering.

9. WESTERN GULF OF ALASKA, SALE 46

An information summary prepared by the Arctic Environmental and Information Data Center of the University of Alaska served as the basis for the initial tract selection and EIS preparation for an area on the continental shelf just east of Kodiak Island.

10. PREPARATION OF 5-YEAR LEASE SCHEDULE

The Department of the Interior recently released an up-dated version of the five year lease sale schedule for all OCS areas. This schedule reflects a greater spread of sales in the Alaska region than does the previous schedule. Input from the environmental studies contributed signficantly to this shift in emphasis. It was, for instance, basically because of a lack of reliable data that the Chukchi Sea was dropped from the lease schedule for the time being. It is hoped that environmental studies being conducted in those areas will provide enough data to have the Chukchi area reconsidered for inclusion on the schedule.

APPENDIX C

Lawsuits over OCS Oil and Gas Development

NATURAL RESOURCES DEFENSE COUNCIL, INC.
v. MORTON 458F.2d827 (D.C. Cir. 1972)

In 1971, NRDC sued to enjoin the Department of the Interior (DOI) from leasing OCS lands off Louisiana under an accelerated leasing program. NRDC alleged that the Environmental Impact Statement (EIS) was inadequate because it failed to discuss some alternatives to the lease sale. A federal appellate court upheld the trial court's decision to enjoin DOI from leasing the land until an EIS was prepared that discussed alternative short-term solutions to energy shortages, such as increased nuclear power production, elimination of oil import quotas, and reexamination of natural gas pricing policies. The court ruled that, even though DOI did not control decisions on alternative energy sources, leasing decisions were part of the federal energy policy and the environmental impacts of the alternatives within that policy must be evaluated before irreversible commitment is made to one alternative.

SIERRA CLUB v. MORTON
510F.2d.813 (5th Cir. 1975)

On December 14, 1973, the Sierra Club filed suit in a district court in Florida to enjoin the sale of leases off the coast of Mississippi, Alabama, and Florida (MAFLA). The plaintiff alleged that the environmental impact statement was insufficient in its analysis of the present

environment, of the environmental impact, and of the alternatives. The Sierra Club also charged that DOI's decision to leave to adjacent states the responsibility to protect against onshore impacts violates NEPA's requirement that the federal agency protect the environment from all harmful actions.

On July 13, 1974 the district court held that the EIS was adequate and the decision to sell was, therefore, reasonable. Upon appeal the Fifth Circuit Court upheld the district court's findings on the basis that the EIS was "compiled with objective good faith," and "would permit a decisionmaker to fully consider and balance environmental factors." The court agreed with the plaintiffs that baseline studies were inadequate, but that NEPA does not require baseline studies prior to deciding whether to hold an OCS lease sale. "In a project . . . where developers sign leases and conduct separable operations over a period of months and years, and where restrictions in those leases give the agency the ability to constantly control and adjust future action, this continuing control must be considered in determining the reasonableness of the impact statement." The court noted that the lease sale does not involve a project that becomes a "fait accompli" the day the decision to proceed is made.

CALIFORNIA v. MORTON 404 F. Supp. 26
(C.D. Cal. 1975) appeal pending

On August 15, 1974 California sued DOI alleging that decisions concerning Lease Sale No.35 did not conform with requirements of NEPA. The plaintiff contended that both the programmatic EIS for accelerated leasing and the site-specific EIS for the proposed sale were not based upon sufficient data or upon adequate analysis. California also argued that NEPA requires that DOI's decisions to recommend accelerated OCS leasing, to publish a leasing schedule, and to invite nominations of land for leasing be made only after completing studies of the impact of those decisions. The court rejected all of the plaintiff's arguments and ruled that NEPA requires neither that complete information concerning the environmental impacts be obtained prior to decisions nor that an EIS contain a formal (mathematical) cost-benefit analysis.

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS v. KLEPPE 413 F. Supp. 563 (D.D.C. 1976) appeal pending.

Plaintiffs filed suit on November 21, 1975 to enjoin all DOI lease sales, particularly lease Sale No.35, until DOI modified its program (1) to require a new EIS after exploration and prior to production, (2) to require an ongoing program of environmental monitoring (3) to require PDODs to be made public prior to decisions, and (4) to take into consideration state and local objectives as is required under the Coastal Zone Management Act and the Intergovernmental Cooperation Act. Suits brought by the State of California, the County of Los Angeles and the American Littoral Society were consolidated with the Southern California case and transferred to a district court in California. The district court dismissed the suits holding that *California* v. *Morton* ruled on the same issues and barred further action.

COUNTY OF SUFFOLK v. SECRETARY OF INTERIOR 7 ELC 20230 (E.D.N.Y. 1977)

Plaintiffs filed suit in February, 1975 to stop DOI from carrying out its decision to lease several million acres of Atlantic OCS lands. Plaintiffs argued that DOI was violating several laws by simultaneously promoting and regulating the sale and development of OCS lands. A similar suit, *New York and Natural Resources Defense Council, Inc.* v. *Kleppe* was combined with the County of Suffolk suit. In this second suit plaintiffs alleged that the EIS for leases offshore in the mid-Atlantic area did not satisfy NEPA because it failed to assess adequately alternatives to and the cumulative impacts of this and other proposed sales in the mid-Atlantic. The other allegations were similar to those raised in previous OCS suits.

The district court granted plaintiffs motion for a preliminary injunction to prevent Lease Sale No.40 on the grounds that DOI had failed to consider adequately the effects of coastal states' land-use controls upon the OCS development. (Plaintiffs had not raised this issue.) The Court of Appeals for the Second Circuit stayed the lower court's injunction, and a Supreme Court Justice refused to vacate the stay.

After hearing the merits of the case, the district court reaffirmed its position and held that the lease sales that had taken place must be cancelled. The court held that the EIS (1) failed to evaluate the impact of potential restrictions by state and local governments on onshore sitings of pipeline and facilities, (2) failed to provide the specifics of alternative

tanker and pipeline-delivery systems, (3) failed to make a meaningful inquiry into the costs and benefits of the leasing, and (4) failed to consider alternatives to the leasing program, such as separation of exploration and production leases and leasing of alternative tracts.

The order of the District Court, which enjoined the Secretary of the Interior from conducting Sale No. 40, was reversed by the U.S. Court of Appeals.

ALASKA v. KLEPPE
9ERC 1497(D.D.C. 1976) appeal pending

On March 4, 1976 Alaska sued to enjoin the OCS Lease Sale No.39 in the northern Gulf of Alaska. Alaska alleged that the EIS was not based on sufficient environmental information and that DOI had failed to consider the full impact of OCS development on the social structure of the small towns on the coast as well as on the economic development of the state. Notwithstanding the opposition of EPA, CEQ, and other federal agencies, the district court denied plaintiff relief, finding that the EIS was an "objective, good faith document" based on sufficient information.

ENGLISH BAY VILLAGE CORPORATION v.
SECRETARY OF INTERIOR
Civil Action No. 77-0174 D.D.C. file January 31, 1977

Plaintiffs contend that the final EIS for the proposed OCS lease sale in the Lower Cook Inlet does not meet the requirements of NEPA, because (1) the EIS fails to describe adequately present environmental conditions and potential impacts, (2) the EIS fails to examine state land-use plans and the onshore facilities that will be needed to support OCS development, (3) the EIS should be completed after baseline studies are completed, and (4) the sale threatens a native American culture and fish and wildlife resources of Alaska. A decision by the Secretary of the Interior to postpone the lease sale has delayed the resolution of this case.

Glossary

Baseline (from BLM definition of *reconnaissance studies*): large-scale surveys to determine major geomorphological and population characteristics; or, more site-specific, short-term studies designed to gather qualitative information regarding well-defined areas; may identify unique environments or habitats, or delineate nature hazards.

(from NOAA PDP)—a measure of those parameters that will provide information for predictions of effects, a description of physical, chemical, geological, and biological components and their interactions, and a base against which subsequent changes or impacts can be compared.

(from USCS)—baseline information is made up of benchmark and monitoring data together.

Benchmark (BLM definition): a broad area, multi-year survey program intended to provide a statistically sound characterization of key environmental aspects including physical, biological, geological, and chemical

(Webster definition)—a marked point of known or assumed elevation

BLM: Bureau of Land Management

CZMA: Coastal Zone Management Act

DEIS: Draft environmental impact statement

EIS: Environmental impact statement

ERL: Environmental Research Laboratories (NOAA, Boulder, Colorado)

Fates and Effects: studies on transport and degradation of hydrocarbons released into the environment, and their interaction with the biota.

Forecast: to predict a future event by analyzing available pertinent data

Hypothesis: a tentative assumption made in order to test its logical or empirical consequences

Jamison Resolution: see Resolution by Jamison

Leasing: process by which DOI, under OCSLA, will manage the development of mineral resources of the OCS; includes responsibility to conserve resources and safeguard the environment.

MAFLA: Mississippi, Alabama, and Florida; leasing area

Modeling: computer generated mathematical representations of, for example, transport vectors on the OCS

Monitoring: sampling of chemical, physical and biological parameters during oil production to measure environmental trends

Nearshore: within state-controlled waters—three-nautical mile limit

NEGOA: Northeast Gulf of Alaska; leasing area

NEPA: National Environmental Protection Act

NOAA: National Oceanic and Atmospheric Administration

OCS: Outer Continental Shelf

OCSEAP: Outer Continental Shelf Environmental Assessment Program (NOAA program in Alaska)

OCSESAC: Outer Continental Shelf Environmental Studies Advisory Committee

OCSESAC Resolution Analysis: documents prepared by BLM in response to a resolution by OCSESAC, relating only to environmental information, and not socioeconomic (See Appendix A)

OCSESP: Outer Continental Shelf Environmental Studies Program

OCSLA: Outer Continental Shelf Lands Act, authorizes DOI to lease mineral resources of OCS.

Offshore: beyond limit of state-controlled waters (see nearshore)

Oil development: construction of facilities for extraction, transportation, and processing of oil and gas, onshore, neashore, and offshore

Oil exploration: reconnaissance by seismic survey for geologic formations that may contain oil or gas; these surveys have insignificant environmental impacts

Oil production: extraction, transportation, and processing of oil and gas after well completion and connection

Onshore: landward of mean low water

PDOD: Program Decision Option Document

PDP: Program Development Plan

Prediction: a foretelling based on observation, experience, or scientific reason

Projection: an estimate of future possibilities based on current trends

Reconnaissance, short term: survey to provide environmental information relating to leasing decisions

Reconnaissance, long term: investigations to provide environmental information relating to OCS development and production

RFP: request for proposal

Resolution by Jamison (OCSESAC Resolution Concerning Program Rationale): a statement on the design and implementation of baseline studies for assessing and monitoring offshore, nearshore, and onshore impacts from outer continental shelf oil and gas exploration and development. BLM shall identify OCS-related decisions and data needs, develop data acquisition schedule for

each region, and report findings to Committee by summer 1976. See OCSESAC Resolution Analysis.

Resource, oil (or gas): a naturally occurring concentration of oil (or gas) in such a form that extraction is feasible. Can be proved or probable.

Reserve: that part of a resource from which a usable commodity can be economically and legally extracted.

SAI: Science Applications, Inc., BLM contractor

Synthesis Report: report prepared by contractors to analytically summarize the results of the environmental studies so as to use them in leasing decisions.