THE ALASKA OUTER CONTINENTAL SHELF
REGIONAL ENVIRONMENTAL STUDIES
PLAN - draft

Bureau of Land Management

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DRAFT

THE ALASKA OUTER CONTINENTAL SHELF

REGIONAL ENVIRONMENTAL STUDIES PLAN

An Environmental Studies Program Design For Resource Management Decisions

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PREFACE

This document is a statement of the Alaska regional studies plan, for the Bureau of Land Management's (BLM) Outer Continental Shelf (OCS) Socioeconomic and Environmental Studies Program. It contains an explicit statement of the program objectives and approach that has been taken to allow the information needs of the OCS minerals management decision-making process to drive the studies program. The original Environmental Studies program plan was published in draft form in 1974, and was a "first cut" approach at conducting broad-based, interdisciplinary environmental studies to support resource management decisions. From 1974 through 1976, the program grew rapidly in size and in an understanding of the limitations inherent in the initial program design. In mid-1976 the Alaska Socioeconomic Studies Program was initiated to assist in the decision-making process.

In mid-1976, the BLM contracted with the National Academy of Sciences (NAS) to perform a critical review of the environmental program focusing on the adequacy of the program to meet the stated objectives, and the relevance of the information being generated by the studies to the minerals management questions being asked. In December of 1977, the OCS Advisory Board passed a resolution (Table A) recommending that the BLM undertake an intensive effort to prepare a revised program document which should serve as the basis for future regional environmental studies plans. The findings and recommendations of these evaluations formed the basis for this revised program plan.

This studies plan is intended for use by a broad spectrum of people. First, it is for general consumption by those people with no knowledge of the OCS minerals management decision-making process. It also is written as a reference framework for the specialist who has more in-depth knowledge about the OCS and about programs involving scientific

December 14, 1978

Table A: OCS Advisory Board Resolution on Environmental Studies Program

WHEREAS, the Environmental Studies Program of the Bureau of Land Management is a critical element in the exploration and development of oil and gas resources on the OCS; and

WHEREAS, the baseline-monitoring concept currently used by BLM has serious technical deficiencies in terms of biological, chemical and oceanographic baselines; and

WHEREAS, there is a critical need to redesign the Environmental Studies Program to guide policy and management decisions to be made by Federal, State and local government agencies; and

WHEREAS, a mechanism must be developed to assure the continual evaluation of research results by the scientific community; and

WHEREAS, the Environmental Studies Program must encompass nearshore-onshore effects as well as the effects on the area leased;

NOW, THEREFORE, BE IT RESOLVED THAT, the OCS Advisory Board makes the following recommendations:

(1) BLM, in cooperation with other involved Federal agencies, should frame the basic management questions that need to be addressed as a part of the total exploration-development process. These questions, along with types of information needed to answer them, should be circulated to the State and local governments and the scientific community (OCSESAC) before January 31, 1978, for their review and comment. Comments should be received by BLM by February 28, 1978.

CHAPTER 1

CHAPTER 1. INTRODUCTION

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1.1 SUMMARY OF REGIONAL STUDIES PLAN

The purpose of environmental studies about OCS oil and gas development is "to establish information needed for prediction, assessment, and management of impacts on the human, marine, and coastal environments of the Outer Continental Shelf and nearshore area which may be affected..." (Federal Register 43: 3893).

The approach adopted here leads to the development of specific studies from the OCS management steps before the Department. The problem analysis examines the management steps, the technologies they control, the ensuing impacts, relevant management questions, and the use of these considerations in developing individual study designs. The details of relationships between each are described in subsequent chapters of this plan.

1.1.1 DECISIONS

There are many steps in the management of submerged federal lands for minerals development. Fourteen of them are described in detail (Chapter 3). They include: tentative scheduling, call for nominations, tentative tract selection, preparation of environmental statement, draft Secretarial Issues Document (SID) and preliminary notice of sale, final SID, final tract selection, notice of sale, sale and leases issued, exploration plan and drilling permit evaluation, transportation management plan evaluation, development and production plan evaluation, pipeline permit issuance, lease termination or expiration. A step may be either a decision itself or the aggregation of information that leads to a decision. Each step can potentially be served by study activities.

The studies are mandated to serve <u>all</u> the steps in the management process even though a significant number of the steps or decisions impacts to be identified in decision documents prior to the development plan. The onshore site specific information would not be necessary until a development plan is evaluated. Two recent sets of regulations specify what environmental information is to be sought and how it is to be used at the development and production plan evaluation stage. The first set of regulations (Federal Register 43: 3892) applies to all steps in the management process. It requires socioeconomic and environmental studies of various types. The second set (Federal Register 43: 3880) examines how lessees are to report, how those reports are to be treated by the Department, and their ultimate use in development and production plan approval.

1.1.2 TECHNOLOGY AND IMPACTS

Each operational phase of OCS oil and gas development implies a specific technology or activity. That activity is the source of a pollutant or agent that may cause an impact on the environment. The generic relationship between the operational phase and the potential impacts ensuing from it (Chapter 3) is a basis for the regional study design.

Successive decisions in a specific geographic region more narrowly define and limit the types of technology or equipment that could be employed in subsequent operations. Subjects for study are consequently limited in scope as steps are passed, but the quality and specificity of the information required grows.

Similar impacts may result from different technologies which are triggered by separate steps or decisions. Most studies, to be most effective, will be targeted on more than one specific decision.

(3) reviewing the generic impacts associated with the technology;

(4) considering those potential impacts in a resource management framework through the decision-makers questions;

(5) identifying what part or parts of the information needed is not currently available; and

(6) describing the specific topic.

An effective regional study plan is developed from a set of common principles that result from OCS management steps. The public issues and scientific details unique to an individual region, however, must be developed by individuals in that area.

1.1.4 PROGRAM IMPLEMENTATION

The individual studies to be commissioned in a lease area are determined through the application of the plan presented in this report. The regional activity consists of BLM staff work in literature review and draft regional plan preparation. The studies plan includes input from and review by the public, local government, state government, and the scientific community. The regional study plan will be reviewed and updated as required.

Federal coordination occurs on at least two levels. One is the coordination of federal agency resource management actions or decisions. The other is the coordination of research and study activities likely to serve these decisions.

1.2 BACKGROUND OF STUDIES PROGRAM

Rapidly diminishing oil and gas reserves and a presently inflated national demand for petroleum resources are a source of ever increasing public concern. Immediate development of new oil and gas supplies within the United States has high government priority, and the OCS is, with the exception of Alaska, the last U.S. frontier remaining to be explored for such resources. Since the unexplored continental shelves are believed few guidelines. The program developed through a series of iterations, the basic design being the result of extensive consultation and advice from representatives of the affected states, academic scientists, and other government agencies. As it is constituted today, the program bears little resenblance to the initial effort or perceptions of 1974. An attempt has been made to maintain a basic continuity, while allowing flesibility to increase the effectiveness of the output.

As studies increased in scope, budget, and significance, the political and scientific exposure of the program also increased, and a growing number of interests found it expedient to review and comment on the program. Internal and external reviews consistently recommended clarification of the relation of the studies program to leasing decisions. The following are more significant review efforts:

1. Jamison Resolution: OCSESAC request for information (February 1976).
2. OCSESAC North Atlantic environmental study plan review (March 1976).
3. OCSESAC South Atlantic environmental study plan review (May 1976).
4. Office of Technology Assessment review entitled: Coastal Effects of Offshore Energy Systems (November 1976).
5. BLM internal program review (July 1977).
6. DOI and GAO program studies (November 1977).
7. OCSAB Environmental Studies Program Evaluation Committee report to OCSAB (December 1977).
8. National Academy of Sciences review entitled: An Assessment of the Department of the Interior Environmental Studies Program (December 1977).

The Jamison Resolution requested BLM to provide a clear statement of the rationale used in the formulation of the OCS environmental study plans. It asked specifically that the decision points in the OCS operations requiring environmental data be identified along with the necessary resulted in a recognition by management of the need for program re-definition. Recognizing that need, BLM presented fundamental resource management questions to an OCSESAC subcommittee on which the Studies Program should be based. These were regarded by OCSESAC as necessary first step in the establishment of a sound research plan which would actively support the OCS leasing program.

The Office of Management and Budget (OMB) advised DOI/BLM (November 17, 1977), of a significant cutback in the funding level for the fiscal year 1979 Studies Program. This action, based on an OMB determination that 18 months of data collection in non-frontier areas would satisfy BLM needs, necessitated a revision in planned fiscal year 1978 program activities in order to efficiently phase out the affected programs. Ensuing activities between the BLM and the Assistant Secretary for Land and Water Resources office resulted in the requirement that the entire program be reassessed and that a formal program plan be prepared.

The OCSAB Program Evaluation Committee submitted a report (December 1977) to OCSAB which contained its findings and recommendations--ranging from the development of a program plan to mechanistic issues such as contract renewals.

To summarize, the predominant underlying theme in all of the reviews was that a program plan should be developed and based on a rigorous, formal problem analysis in which questions of importance to the resource manager are considered prior to the initiation of studies. As a result of the OMB action to cut funds, the BLM has finally been provided with an opportunity to pause and evaluate the entire Environmental Studies Program on the basis of its responsiveness to original objectives, and to prepare the necessary program documents.

for major actions undertaken. During the leasing and development procedure, the DOI is required by NEPA to solicit review and comment on proposed actions that will affect the environment.

1.3.3 MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT OF 1972

This legislation addresses problems of ocean dumping, comprehensive marine environmental research programs, and special protection to unique coastal areas. Title II, Section 202, of the Act assigns to the Secretary of Commerce (NOAA) responsibility for initiating comprehensive and continuing programs of research with respect to the possible long-range effects of pollution, overfishing, and offshore development activities. The Act further states that the Secretary, in carrying out the mandated research, shall take into account economic considerations involved in both the protection and the use of the oceans, possible alternatives to existing programs, and ways in which the health of the oceans may be best preserved.

Title III of the Act states that the Secretary of Commerce, after consultation with the heads of other appropriate departments and agencies, may designate as marine sanctuaries those coastal areas that he determines necessary for the purpose of preserving or restoring such areas for their conservation, recreational, ecological, or aesthetic values. The Secretary, prior to designating a marine sanctuary, is also required to consult with, and give due consideration to the views of the responsible officials of the State involved. After designation of a marine sanctuary, the Secretary shall issue appropriate regulations to control any activities proposed to take place within the designated marine sanctuary. Title III of the Act is also administered by NOAA.

1.3.4 COASTAL ZONE MANAGEMENT ACT OF 1972

This legislation addresses management of the Nation's coastal zone in a coordinated and uniform basis. The Act declares that it is maintain the health and stability of the marine ecosystem as a whole. The Act also created the Marine Mammal Commission whose responsibility is to undertake a continuing review of the condition of the stocks of marine mammals and other related matters and to make recommendations to appropriate departments to further the purposes of the legislation.

1.3.6 ENERGY RESEARCH AND DEVELOPMENT ACT OF 1975

The special Energy Research and Development Act of 1975, provided for the reactivation of three NOAA vessels ".... for the purpose of conducting surveys, investigations and research connected with the environmental effects of offshore energy-related activities." Specifically, all government agencies are to give preference to the use of these vessels in conducting environmental assessment studies in connection with OCS energy development. These vessels are the primary ship support for the Alaskan OCS environmental studies.

1.3.7 BASIC AGREEMENT BETWEEN NOAA/BLM

The specific authority under which the OCS Environmental Assessment Program (OCSEAP) in Alaska is implemented is the Basic Agreement (Appendix I) between the National Oceanic and Atmospheric Administration and the Bureau of Land Management. This agreement sets forth the objectives of the BLM environmental studies program and designates NOAA as the manager for Alaskan OCS marine environmental data acquisition and analysis studies. The Basic Agreement also delineates the respective agency responsibilities with respect to funding, reporting requirements, information exchange, project modification, data handling, the news media, and other matters.

1.4 OBJECTIVES

1.4.1 OBJECTIVES OF THE OCS LEASING PROGRAM

Subsequent to passage of the OCS Lands Act of 1953, the Secretary of the Interior designated the Bureau of Land Management (BLM) as

- Receipt of fair market value has basis in two separate mandates. United States Code 31, Section 483 (a) obligates the Federal Government to obtain a fair return for public lands that are sold or leased. This is further implemented within the Executive Branch by the Bureau of the Budget Circular A-25.

In carrying out this program, the Department has faced litigation on a variety of issues. A synopsis of Outer Continental Shelf NEPA Litigation has been prepared (Bohlke Memorandum of February 17, 1978, 37 p.) and presents a detailed discussion of these cases.

The Annual BLM Congressional Appropriations Bill gives to BLM those monies necessary to carry out its required tasks. This is probably the strongest piece of legislation for any program because it reflects the administration's desire to have a program administered by a certain agency, and it also shows Congressional approval. The Environmental Studies Program has received funds identified as specific line items in FY 75 through FY 78 budgets.

In addition to these Acts, there have been a number of other reports by CEQ ("OCS and Gas - An Environmental Assessment"), the Stratton Commission Report, National Academy of Sciences Studies, and others, that have recommended studies of this type be performed. The CEQ Report probably summarized the situation best of all by saying,

> "The Outer Continental Shelf Lands Act of 1953 is the basic charter governing exploration for the development of the minerals and other resources under the OCS. In essence, it is a statute designed to promote development, enacted well before the major environmental legislation of the past few years: the National Environmental Policy Act of 1969 (NEPA) and three 1972 laws - the Coastal Zone Management Act, the Federal Water

The objective of the OCS Studies program is solely to provide management with timely and useable information to support decisions concerning OCS leasing and subsequent oil and gas development. This information is acquired to answer questions regarding the:

- location and characteristics of sensitive areas of environmental concern,
- design and evaluation of stipulations to protect or mitigate adverse impacts on environmentally sensitive areas,
- probabilistic eventuality of adverse environmental impacts from offshore operations, and
- evaluation of social, economic, and physical impacts.

Consequently, investigations funded by the Studies Program must provide specific information of practical applicability to pertinent management questions--in contrast to theoretical research. This information may be required either to evaluate some aspect of the multiple hazards potential to OCS hydrocarbon recovery operations, or to attain a capacity for quick reaction to special, short-term problems. Investigations may include:

- summaries of existing knowledge;
- identification and quantification, to the extent possible, of the pertinent aspects of the socioeconomic, physical, geological, and bio-chemical environment;
- monitoring of social and environmental conditions after operations have begun; or
- investigation of the fates, effects, and transport mechanisms affecting pollutants during their residency in the marine environment.

These funded studies must also provide interpretive products based on scientific data to enable the user to:

established channels between appropriate BLM organizational components involved in the leasing procedure.

1.4.3 OBJECTIVES OF THE ALASKA OCS ENVIRONMENTAL ASSESSMENT PROGRAM

In each OCS area for which development is proposed, extensive socioeconomic and environmental studies must be conducted before such development is allowed. If these studies show that development of specific areas will result in unacceptable environmental risks, those areas will not be leased. As manager of the Outer Continental Shelf Leasing Program, the Bureau of Land Management (BLM) of the Department of Interior (DOI) has initiated the Outer Continental Shelf Environmental Assessment Program (OCSEAP) as an essential part of its management responsibility in order to ensure that the Alaskan marine environment is not deleteriously disturbed. Study programs for the nine lease areas of Alaska and one additional general or non-site-specific studies group are planned and conducted under interagency agreement (Appendix I) for BLM by the OCSEAP offices of the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce.

In May 1974, the Bureau of Land Management requested that the National Oceanic and Atmospheric Administration initiate a program of environmental assessment in the Northeastern Gulf of Alaska in anticipation of possible oil and gas lease sales in the region early in 1976. These studies were initiated in July 1974.

In October 1974, a major expansion of the environmental assessment program was requested by BLM to encompass eight additional areas of the Continental Shelf of Alaska during the FY 1975-1976 period. After an intensive planning effort, including workshops, public comment and consultations with more than 300 scientists and other concerned persons, a program proposal equivalent to a plan was published. This document was entitled "Environmental Assessment of

- To project and evaluate the potential changes associated with the possible range of OCS development activity in each proposed OCS lease-sale area;
- To assess the implications and potential consequences of such changes for individual communities, regions, and the state as a whole;
- To provide for timely development and dissemination of information on the potential effects of Alaska OCS petroleum development for use by decision-makers;
- To provide detailed information to support the preparation of OCS lease-sale development stipulations and environmental impact statements;
- To assess the potential capacity of existing and emerging political and management institutions to respond to changes likely to be generated by OCS petroleum development activity;
- To identify and perform investigation necessary to understand the full range of socioeconomic, cultural, and associated physical implications of Alaska OCS development at the local, regional, and state-wide levels; and

- To provide for continuing participation within the program by the residents of those communities and regions likely to be significantly affected by OCS development activity.

1.5 APPROACH OF ALASKA STUDY PLANS

The approach taken in the regional study plans is to analyze multiple use problems in a way that leads to the development of study designs from the decisions before the Department. In the problem analysis, we first consider the timing, content, and documentation of steps in OCS resource management (Chapter 2). Next, we identify the technology, equipment, or activity that is actually or potentially affected by a decision or step (Chapter 3). The possible impacts are specified by relating them to the technologies. Those generic impact specifications lead through management questions to environmental information needs.

operations that follow. A number of Memoranda of Understanding (MOU's) have been entered into by BLM and USGS to define better the relationships and duties of the bureaus, although these MOU's do not exhaust the extensive cooperative activities that occur. One MOU deals with tract selection recommendations for the Secretary prior to the drafting of a sale environmental statement. This operation must be, and is, supported by environmental information upon which initial, tentative decisions can be made. Other MOU's deal with pipeline permits and the evaluation of the permits and with cultural resource protection.

Again studies data and information on the environment are an essential element of the relationships spelled out in agreements. Another MOU deals with sale evaluation and, while not a major element in the decision process at this stage, environmental considerations are involved in formulating recommendations for the Secretary on bid acceptance or rejection.

1.6.1.1 U.S. GEOLOGICAL SURVEY

The U.S. Geological Survey shares responsibility for many parts of the OCS leasing process with the BLM. Environmental information from the OCS program is used in many areas of the leasing process, including the tract selection process and risk assessments formulated by Interior. OCSEAP data are also used in the establishment of requirements for post-sale activities such as performance standards for OCS Orders or design factors for offshore facilities, to the extent that these can be determined on a regional basis. Examples of post-sale activities to be conducted under constraints imposed by environmental factors include: (1) drilling rigs, (2) installation of platforms, and (3) construction of pipelines. The USGS needs are sea floor data, atmospheric data, and oceanic data in order to accomplish the above responsibilities.

the process and in what manner FWS deals with and supplies information to BLM. The three bureaus, BLM, USGS, and FWS, have a tripartite agreement in the form of an MOU on the design of and contracting for environmental studies. This ongoing relationship should serve as a basic building block in the reordering of the process and products of the environmental studies program.

1.6.1.3 SECRETARIAL ORDER 2974

Mention should be made of an established procedure, promulgated initially by Secretarial Order 2974, for consultation and information exchange between and among all Departmental OCS agencies, to include not only BLM, FWS and USGS, but also the National Park Service and the Heritage Conservation and Recreation Service. This procedure requires consultation on the design and implementation of environmental and cultural resources studies and on the authorization of lessee activity on the OCS. An umbrella-type authority granted by the Secretary, "2974" procedure requires that all legitimate interests of institutional elements within the Department is available when and where needed. This procedure also establishes mechanisms for the resolution of differences between bureaus that may arise on specific issues.

1.6.2 OTHER FEDERAL AGENCIES

Within the Federal community, a number of other departments and agencies have specific and continuing responsibilities for OCS activities that are discharged only with adequate environmental information which, in turn, has direct applicability to oil and gas development questions. These are agencies that have regulatory responsibilities on the OCS, such as the Corps of Engineers and the Coast Guard, who exercise responsibility for decisions regarding impediments to navigation; the National Marine Fisheries Service

1.6.2.1 ENVIRONMENTAL PROTECTION AGENCY

The Environmental Protection Agency is responsible for the issuance of permits for municipal and industrial waste discharges (NPDES - National Pollutant Discharge Elimination System). In addition, for each discharge permit, EPA has the responsibility of either publishing a negative declaration or an Environmental Statement, depending on the envisioned extent of deleterious impacts.

In order to either issue the NPDES permit or write the negative declaration/ES, EPA needs environmental information dealing with the existing water quality, the natural resources dependent on that water quality, and the probable impact of the proposed discharge on that water quality. If such information is not available or is inadequate, EPA risks issuing NPDES permits deleterious to the flora and fauna of the area and possibly the socioeconomic welfare of the resident human population as well. The criteria and requirements of EPA's NPDES permits are written for specific industries and are in part dependent on their location and remoteness to man and to the natural resources important to man's welfare. Without biological inventory and ecological process information for the Alaska Outer Continental Shelf region, discharge criteria and requirements formulated for the Alaskan offshore petroleum industry could unwittingly result in major damage to the ecosystem or certain of its component parts. Therefore, socioeconomic, biological and ecological data are needed by EPA.

1.6.2.2 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

The responsibilities of the National Oceanic and Atmospheric Administration (NOAA) concern management of marine fisheries and mammals, research with respect to long-range effects of pollution and effects of offshore development activities on

To meet these broad responsibilities NOAA requires additional information for those areas specifically selected for OCS oil and gas development. While NOAA's own studies will contribute to the environmental assessment of these areas, more information is required to meet NOAA needs.

1.6.2.3 U.S. COAST GUARD

The U.S. Coast Guard has lead agency responsibility for organizing cleanup operations for oil spills off the coast of Alaska. In cooperation with local oil companies, they have developed contingency cleanup plans to be followed in the event of a spill. They require prior information concerning the likely trajectories of spills from various source locations in order to decide where cleanup equipment should be predeployed. Once a spill occurs the Coast Guard needs ocean circulation, meteorological, and oil behavior information to determine potential dispersion patterns in order to conduct any cleanup activities.

1.6.3 STATE OF ALASKA

The State of Alaska requires OCS research information that addresses the avoidance or mitigation of adverse impacts on the natural and human environment of the Alaskan coast. A variety of environmental information is required to accomplish this purpose, and in order to be useful this information must be analyzed, synthesized and adequately distributed. One of the major classes of data needed by the Alaska Department of Fish and Game deals with fish and wildlife populations.

Another major area in which information is desired by the State Department of Environmental Conservation concerns principal factors controlling the behavior and fate of development-related pollutants. Information must include not only the effects of catastrophic and

CHAPTER 2

CHAPTER 2. STATUS AND FUTURE SCHEDULING

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2.1 INTRODUCTION

Resource management decisions relating to oil and gas development in the marine environment are the driving mechanism for study design. The decisions themselves are merely individual steps in the overall minerals management process. They are founded on other steps, such as the Environmental Statement (ES) that array all available information in the best possible format for the decision-maker. The objective, timing, and bases of the steps contain a series of instructions for satisfactory studies design, insofar as the study results must be amenable to the format for the decisions before the Department and the nation.

2.2 DECISION POINT IDENTIFICATION

Decision-making in resource management relies on a complex body of information that is often difficult to assess and compare. Mineral resource recovery poses questions of social and environmental impacts, economics, and politics. Federal decision-making related to leasing and mineral resource recovery must strive to identify diverse sources of information, assess the reliability and availability of that information, and assign a factor of importance to the information.

Decisions regarding mineral resource management consist of the following components: 1) economic consequences (resource market value, increased employment); 2) socioeconomic consequences (altered social infrastructure, increased need for social services); 3) environmental impacts resulting from chronic and acute oil spillage, and from other OCS related activities (threats to valuable habitats, land use withdrawal); and 4) political/ institutional pressures (National or regional need for resources, industry and Treasury needs, State roles and perceptions). A series of decisions are made during the pre-leasing process which lead to decisions to conduct a lease sale and award leases for Outer Continental Shelf (OCS) exploration and potential development.

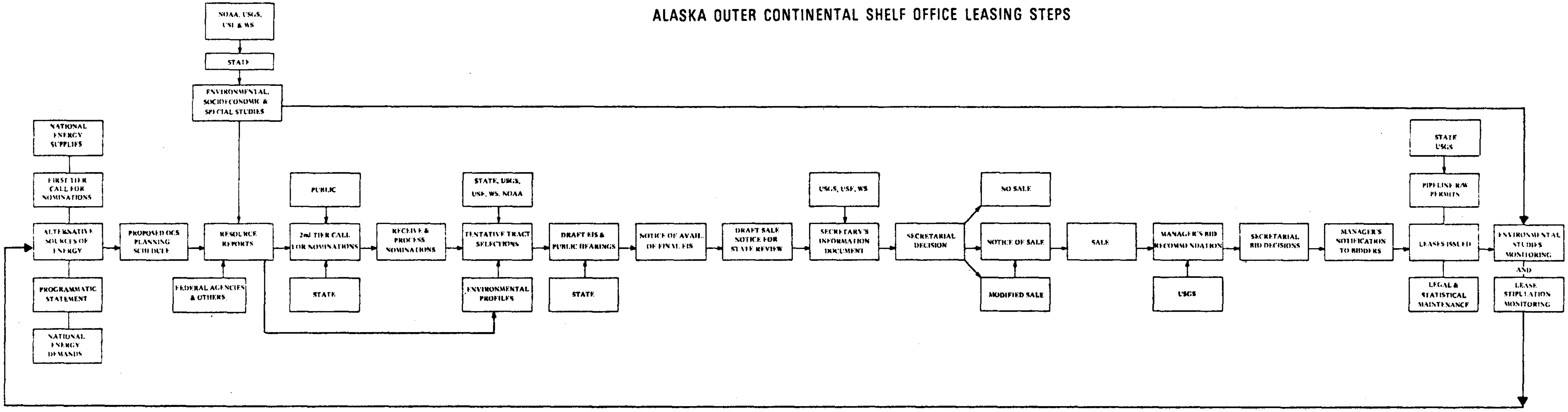
The OCS leasing process incorporates critical decision points which utilize the available environmental, sociocultural, and economic information. Presently there are eight (8) major decision points in the leasing process which require information bases: Preparation of the Tentative Leasing Schedule; Call for Nominations; Tentative Tract Selection; Sale; Award of Leases; Approval of Exploration Plan and Issuance of Drilling Permits; Approval of Development Plan; and Issuance of Pipeline Right-of-Way. These decision points are identified on the following flow diagram as (Figure 2-1). Supportive to the major decision actions are milestones which provide a cumulative information base to the decision-maker during the leasing process. Identified milestones include preparation of Regional Resource Assessments, Resource, Reports, Risk Assessments,

Identification of Unique Areas, Resource Use Conflicts, Preparation of Draft Environmental Statements (DES), Final Environmental Statements (FES), Bid, Monetary Evaluation of Tracts, and Phases I-IV of the Transportation Management Program. All major decisions prior to the sale are reversible in the sense that, although they may allow the pre-leasing process to continue, they do not guarantee that a sale will be held. Major adverse environmental, socioeconomic, or technological impacts could preclude a sale, result in a diminished number of tracts being offered, or necessitate strict mitigating measures on any development. The sale decision (or more properly the decision to award leases) is an irreversible one in that, once awarded, a tract can be explored and developed at leaseholder's discretion, as long as regulations, operating orders and stipulations existing <u>at the time of award</u> are followed.

Steps in the leasing process can be structured somewhat differently to indicate those actions that help accomplish the three Bureau of Land

FIGURE 2-1

ALASKA OUTER CONTINENTAL SHELF OFFICE LEASING STEPS



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Management (BLM) priority goals of OCS leasing: 1) orderly resource development, 2) environmental protection; and 3) receipt of fair market value. Figure 2-2, prepared in 1976 by the Alaska OCS Office, presents the leasing steps related to the goals, indicates in more detail some of the information requirements for certain decisions, and indicates that many information requirements are identified early in the leasing process before any decision is made. Most specifically, an "Assessment of Environmental Problems" is indicated as a procedural step taken some time before nominations are received. This early identification of "problems" is a strategy that, if more rigorously managed, can provide optimum identification of information needs and analyses, which in turn can provide for more responsive and informed decision-making.

2.3 DECISION STEPS IN OCS LEASING

In order to better understand the steps in the OCS minerals management process and the resulting decisions, this chapter discusses fourteen of the steps in detail (see Figure 2-3). The discussion includes a description of the decision content and objectives, timing, information bases, and resultant documents; it forms a means by which we can understand the information requirements of the decisions and consequently can provide insights into the study design to meet them.

1. TENTATIVE SALE SCHEDULE

OBJECTIVES: To provide a framework for orderly development of OCS resources. To provide advance notice of proposed leasing actions to the public. To program the timing of Departmental pre-leasing steps and prioritize issue development by region.

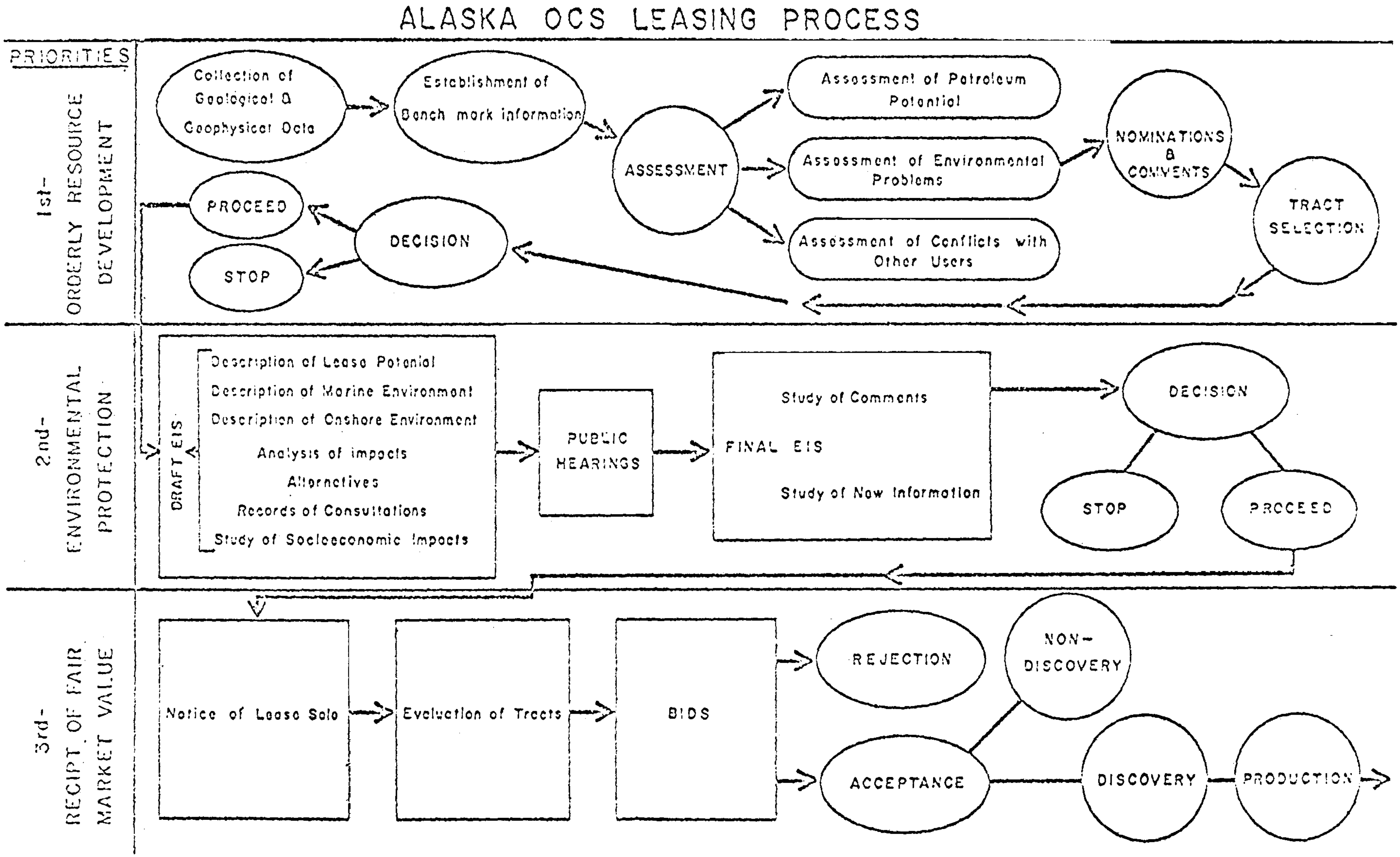
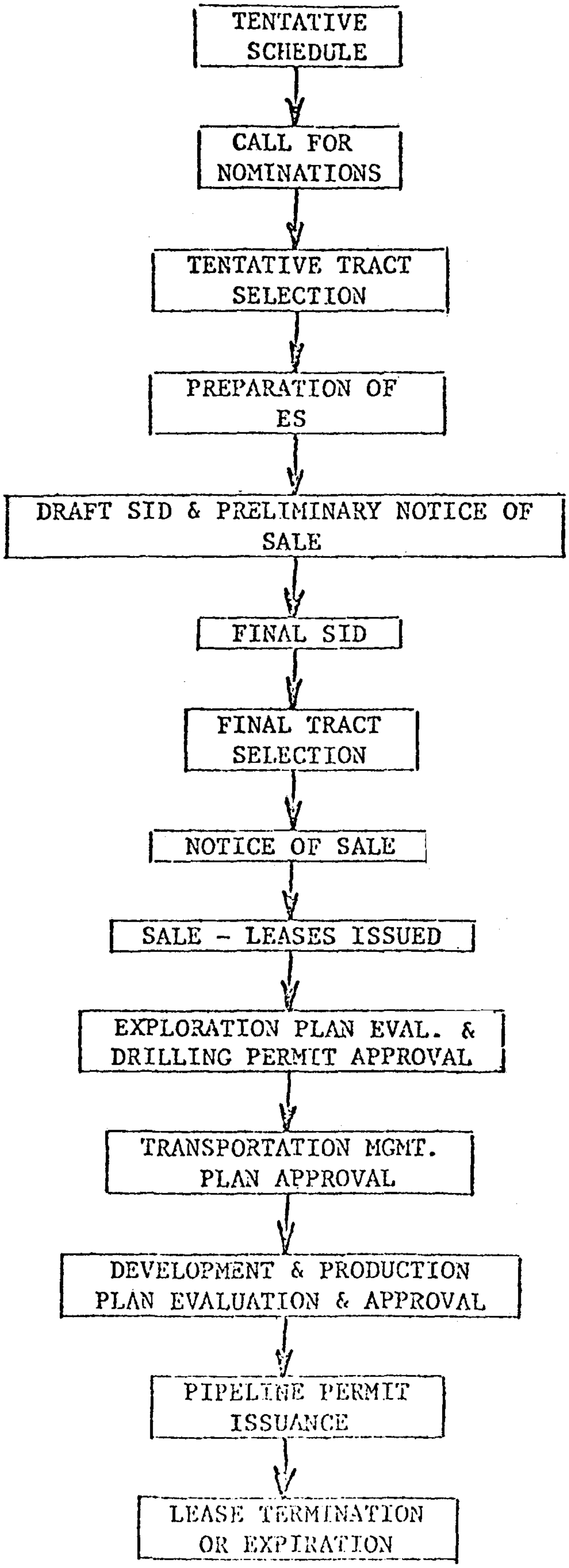


FIGURE 2-2 GOAL-ORIENTED PROCEDURES IN THE OCS LEASING PROCESS

FIGURE 2-3 STEPS IN THE DECISIONMAKING PROCESS



CONTENT/FORMAT: One page showing tentative sale dates and timing of pre-sale steps for a four to five year period.

TIMING: Revised periodically, historically approximately bi-annually; OCS Lands Act amendments would require annual update.

MANDATE: Departmental policy based on OCS Lands Act requirement for orderly resource development.

PRIMARY BASES: Regional resource and environmental data, current energy situation, industry capabilities, availability of technology, proximity of resources to market, general hazards to development, desirability of regional development based on recommendations by States and others.

ASSOCIATED DECISIONS: The final selection of a tentative sale schedule is the culmination of a series of relational judgments regarding potential development of one area as opposed to another, and regarding the sequencing of sale scheduling within each area. Qualifying parameters used in these judgments include orderly development, protection of the marine environment, gradual development of all frontier areas, current and projected energy supply picture.

RESPONSIBLE PARTIES: BLM, in consultation with POCS, drafts schedule and options. Options reviewed by AS/PBA and AS/L&WR. Director, BLM recommends one option. Final selection by Secretary. Signed by Director, BLM.

INPUT GROUPS: BLM, USGS, FWS, POCS, AS/PBA, AS/L&WR, States, industry, special interests.

AVAILABLE DOCUMENTATION: First tier of two-tier nomination report; regional resource estimates by USGS; other comments, recommendations, and data offered by anyone.

2. CALL FOR NOMINATIONS

OBJECTIVES: To solicit industry's interest in specific tracts within a defined geographic region. To initiate the pre-leasing coordination process. To receive positive or negative nominations and comments from Federal and State agencies and the public. To begin to focus information needs on areas where there might be leasing activities and where issues are being more clearly defined.

CONTENT/FORMAT: Federal Register notice indicating geographic boundaries of call area, criteria and format for nominations (both positive and negative), closing date.

TIMING: Identified on leasing schedule, and generally held to unless major objection. Call generally open 50-70 days.

MANDATE: 43 CFR, part 3300, subpart 3301.3.

PRIMARY BASES: Resource Reports from Federal and State agencies, estimates of desired sale size, areas of special significance to be excluded from call area.

ASSOCIATED DECISIONS: Evaluation of Resource Reports and Resource estimates and any actions to limit call area or identify preliminary stipulations that may apply to certain tracts.

RESPONSIBLE PARTIES: BLM - FO and WO, Director BLM (with approval by Secretary).

INPUT GROUPS: BLM (USGS, FWS under 2974) FO & WO 722, 732.

AVAILABLE DOCUMENTATION: Resource Reports from Federal and State agencies.

3. TENTATIVE TRACT SELECTION

OBJECTIVES: To select a set of tracts for intensive environmental analysis to determine each tract's appropriateness for lease offering. To provide to the Secretary and the public a preliminary list of tracts to be considered for leasing. To begin preparation of development scenarios.

CONTENT/FORMAT: List of tracts identified by block number on Protraction Diagram, acreage, average water depth and distance from shore, preliminary stipulations (if any).

TIMING: At least 60 days after Call for Nominations.

MANDATE: 43 CFR, part 3300, subpart 3301.4.

PRIMARY BASES: Nomination patterns, negative nominations, socio-economic and environmental information from Federal, State and local agencies, identifications of unique areas, preliminary risk assessment and pollutant trajectory analysis, major resource use conflicts, special interest by BLM or USGS (e.g., tracts previously offered or tracts in danger of drainage).

ASSOCIATED DECISIONS: Policy decision on approximate size of lease offering; resource use conflicts that appear unmitigatable; preliminary tract evaluations and possible revenues; method of bidding (royalty v. bonus).

RESPONSIBLE PARTIES: BLM and USGS in field recommend to BLM/USGS in Washington; mutual list agreed on and submitted to Secretary through Director, BLM.

INPUT GROUPS: BLM, USGS, States, local governments, private parties, industry, FWS, other Federal agencies.

AVAILABLE DOCUMENTATION: Nomination pattern without names of companies; set of negative nominations and recommended stipulations.

4. PREPARATION OF ES

OBJECTIVES: To describe existing environmental conditions. To predict short and long-term impacts of the proposed lease sale on human, marine, and coastal environments. To identify possible ways of mitigating adverse impacts. To present alternatives to the proposed action. To allow public review of proposed action.

CONTENT/FORMAT: Generally a large document with complete descriptive, predictive and anlytical information on physical, biological and socioeconomic conditions and impacts. Specific regional issues should be thoroughly discussed. First full presentation and discussion of stipulations that might be imposed. Final ES addresses all comments.

TIMING: Begins with tract selection; draft ES approximately 4-5 months later; public hearings and comment period during subsequent 2 months; final ES 3-4 months later.

MANDATE: NEPA.

PRIMARY BASES: All available environmental and socioeconomic information; development scenarios supplied by USGS; oil spill trajectory model; Man-in-the-Arctic (MAP) socioeconomic models; previous sale ES's (if any); Federal, State, local, and public review comments on draft ES; possible transportation routes identified by TRAMP.

ASSOCIATED DECISIONS: Methods of mitigation (including stipulations and the tracts to which they would be applied), status of resolution of significant regional issues; Solicitor sign-off; Environmental Project Review sign-off.

RESPONSIBLE PARTIES: Both ES preparation and hearing conducted by appropriate FO; review by WO 732 and 712; Director, BLM; Solicitor; EPR; Secretary sign-off; USGS and FWS under S.O. 2974; public hearings and written review comments in final ES by Federal agencies, States, public.

AVAILABLE DOCUMENTATION: All included in ES except tract specific resource estimates (which are never made public and need not be completed until just before the lease sale).

5. DRAFT SID AND PRELIMINARY NOTICE OF SALE

OBJECTIVES: To provide Secretary and public with notification of possible lease sale and the tentative bases on which the Secretary will make his decision. To allow additional public review and comment on anticipated Federal actions.

CONTENT/FORMAT: SID format discussed in subsequent step; proposed Notice of Sale identifies tracts proposed for offering; applicable stipulations; criteria for bidders qualifications; format of bidding and method.

TIMING: Approximately 60 days after final ES.

MANDATE: NEPA and Department policy

PRIMARY BASES: See subsequent step.

ASSOCIATED DECISIONS: See subsequent step.

RESPONSIBLE PARTIES: See subsequent step.

AVAILABLE DOCUMENTATION: Final ES and comments; SID.

6. FINAL SID

OBJECTIVES: To synopsize all factors related to proposed action. To present to Secretary alternatives to the action with concomitant environmental and economic impacts. To present Secretary with regional issues, and their possible resolutions.

CONTENT/FORMAT: Executive summary format; presents significant environmental and socioeconomic information derived from ES; may present other economic, technological or polictical information not required in ES; all proposed stipulations and associated impacts included. Attached to ES.

TIMING: At least 60 days after proposed Notice of Sale.

MANDATE: NEPA.

PRIMARY BASES: Final ES; proprietary resource evaluations from USGS; additional information supplied or acquired since final ES and resulting from proposed Notice of Sale; DOE coordination.

ASSOCIATED DECISIONS: Desired size of lease offering; political considerations; evaluation of ability to mitigate adverse impacts and resource use conflicts.

RESPONSIBLE PARTIES: WO 712 in consultation with POCS prepare draft; reviewed through BLM and USGS; recommended course made by Director, BLM.

AVAILABLE DOCUMENTATION: Comments from review of draft SID and draft Notice.

7. FINAL TRACT SELECTION

OBJECTIVE: To compile the list of tracts that will be offered and the stipulations that will be imposed on each.

CONTENT/FORMAT: List of tracts identified by block number, water depth, location, distance from shore; stipulations and the blocks to which they will be applied (general and specific).

TIMING: After SID and before Notice of Sale

MANDATE: Departmental policy.

PRIMARY BASES: SID and final ES; newly acquired information.

ASSOCIATED DECISIONS: Scheduling of Notice of Sale and Sale date.

AVAILABLE DOCUMENTATION: None.

RESPONSIBLE PARTIES: OCS FO and WO 722; Solicitor; Director, BLM.

8. NOTICE OF SALE

OBJECTIVE: To provide to all interested parties notification of lease sale and date, tracts being offered, bidding factors, lease terms (including applicable stipulations).

TIMING: At least 30 days before proposed sale date.

MANDATE: OCS Lands Act; regulations 43 CFR; 3301.5

PRIMARY BASES: Final tract list; applicable stipulations; resource evaluation.

ASSOCIATED DECISIONS: Royalty v. bonus bidding determinations.

AVAILABLE DOCUMENTATION: None.

RESPONSIBLE PARTIES: OCS FO and WO 722; Solicitor; Director, BLM.

9. SALE - LEASES ISSUED

OBJECTIVE: To conduct competitive bidding (sealed bids).

10. EXPLORATION PLAN EVALUATION AND DRILLING PERMIT APPROVAL

OBJECTIVE: To provide for effective and environmentally sound exploration for oil and gas on the OCS. To monitor anticipated exploration activites.

CONTENT/FORMAT: Plan is a technical document submitted by operator indicating, among other things; specific tract and approximate location(s) to be drilled on tract; type of rig to be used; depth to be drilled; mud program; desired time of drilling; high resolution seismic data coverage of tract; reservoir maintenance program; results of any required environmental surveys.

TIMING: May be submitted any time up until final 90 days of five year lease term. Approval may take 2-3 months.

MANDATE: Operating regulations.

PRIMARY BASES: Bases for approval are generally compliance checks with sound practices and administrative requirements. These include compliance with applicable Operating Orders and regulations, stipulations on the tract, proof of NPDES permit from EPA, CZMA, rig verification program (when completed).

ASSOCIATED DECISIONS: Inspection scheduling.

RESPONSIBLE PARTIES: Industry, USGS Conservation Division, BLM, FWS, NPS, HCRS, States, EPA, USCG.

AVAILABLE DOCUMENTATION: Operating Orders, stipulations and Notices to Lessees and Operators, if any.

11. TRANSPORTATION MANAGEMENT PLAN APPROVAL

OBJECTIVES: To facilitate orderly and timely development of hydrocarbon resources on the OCS and in coastal areas. To establish a process for early and continued cooperative planning to meet management information needs of affected decision-making bodies in the region.

CONTENT/FORMAT: Analysis and recommendations for discrete pipeline corridors and alternatives; identification of sound alternative areas for the location of onshore facilities; alternatives regarding surface vessel transportation (coordinated with appropriate regulatory agencies); plans for monitoring construction and operations and follow-up studies that may be required; stipulations and use requirements applicable to rights-of-way.

TIMING: Planning process begins with Call for Nominations; final approval targeted for before development plan submission.

MANDATE: Departmental policy; program not yet implemented.

PRIMARY BASES: Results from regional and site-specific management studies; results from socioeconomic studies conducted by States; hazards assessments; spill trajectory modeling; ES on sale.

ASSOCIATED DECISION: Regional Management Studies Plan; Site-Specific Management Studies Plan; funding sources and procurement of studies; quality, availability, utility of existing information; other agency responsibilities (beside BLM and affected States); composition and tasks of working groups.

RESPONSIBLE PARTIES: Primarily BLM and potentially affected State(s); all Federal agencies with jurisdictional or regulatory responsibilities for OCS operations; industry; local regulatory groups; public and special interest groups.

AVAILABLE DOCUMENTATION: Regional and site-specific plans and studies results; refined development scenarios; refined spill trajectory models (applied); approved coastal zone management plans.

12. DEVELOPMENT AND PRODUCTION PLAN EVALUATION AND APPROVAL

OBJECTIVES: To provide for effective and environmentally sound development and transportation to market of OCS oil and gas. To provide advance notice of need for offshore and onshore production and transmission facilities.

CONTENT/FORMAT: Development/production plans are again highly technical documents that describe the company's proposed method of producing and delivering hydrocarbons from a field. Of particular importance are the results from exploration activity (which serve to define reservoir size and producibility), additional geological and geophysical information, type of hydrocarbon (oil, gas, condensate), well development and maintenance programs, estimates of maximum efficient rate of production to maintain the reservoir, preferred method of transport to shore and landing points, and required onshore facilities.

TIMING: 1½ to 8 years after producible discovery.

MANDATE: 30 CFR, part 250.34

PRIMARY BASES: Bases for approval, as for exploration plans, are generally compliance and consistency checks on sound practices and administrative requirements. These include compliance of the proposed field development plan with Operating Regulations and Orders, stipulations on the lease, inclusion of certain permit approvals (EPA for pollutant discharges, Corps of Engineers for placement of mobile or permanent structures, state and local approvals for development staging areas, USGS permit to install platform) and consistency with other state and local regulatory requirements, including approved coastal zone management plans. Of particular importance here is consistency with an approved regional Transportation Management Plan (TMP) for that portion of the development plan that relates to transportation of product. Development of the TMP involves coordination, studies, and planning by all the involved state, local and federal agencies, as well as industry, that have responsibilities in OCS activities. The planning program being developed by BLM will streamline development plan preparation, allow for more integrated review and approval, and provide significant information to any EAR or ES that might be required on the development plan.

ASSOCIATED DECISIONS: Need for an ES on development plan (current Secretary has committed Department to prepare at least one in each frontier area); actions on all permits to be included in plan; development scenario; EAR; USGS permit to install platform.

RESPONSIBLE PARTIES: Industry submits plan; prior action by Corps, USGS (with BLM, NPS, FWS) for permit to install platform and EAR; states and local agencies for permits for development staging areas; Area Supervisor (USGS) approves development plan.

DOCUMENTATION: Geological/geophysical information; well logs from exploratory drilling program (proprietary); approved State coastal zone management plan(s); Transportation Management Plan for region, which includes results of regional and site-specific studies; Corps permit; USGS permit to install platform.

13. PIPELINE PERMIT ISSUANCE

OBJECTIVES: To provide for environmentally safe and sound transport of oil and gas from the OCS.

CONTENT/FORMAT: No specified format; must state purpose, material to be transported, size of pipeline, total distance and width of right-of-way proposed, accurate locations of initial and terminal points, and a 1:160,000 map showing accurately located center line of right-of-way proposed.

TIMING: Sometime after production wells drilled; all permits issued within 10-30 days (API estimate), contingent on archeological survey; five years in which to construct.

MANDATE: OCS Lands Act - 67 Stat.464, Sec.5(c).

PRIMARY BASES: Approved development plan; approved Transportation Management Plan (for BLM right-of-way approval); regional and site-specific studies and available information on resource use conflicts, hazards, and severity of impacts; oil spill trajectory analyses; development ES (if any).

RESPONSIBLE PARTIES: USGS, BLM, FWS, DOE, USCG, FCC, ICC, MTB, state and local regulatory bodies. None of the Federal agencies is required to be the last approving agency. State and local permits come after Federal.

DOCUMENTATION: As in previous step plus any new information.

14. LEASE TERMINATION OR EXPIRATION

OBJECTIVE: To assure diligent exploration, and development of tracts with marketable reserves of hydrocarbons. To provide for orderly development of resources.

CONTENT/FORMAT: Notification by Secretary in writing; voluntary relinquishment by lessee in writing.

TIMING: Any time during lease term.

MANDATE: OCS Lands Act.

PRIMARY BASES: Several different conditions can result in termination or cancellation. The primary lease term is five years, renewable under terms whereby the lessee shows indications of marketable reserves or when in production. Lease term may not be renewed when there is unproductive testing by drilling, or lessee through inaction shows lack of diligence. Leases may be relinquished (terminated) voluntarily by the lessee, as in the case of unproductive exploratory drilling. Other conditions affecting lessee's ability to explore or produce (lack of capital, lack of equipment, etc.) would likely result in an assignment of lease to another lessee, rather than relinquishment. Leases may also be cancelled by the Secretary (subject to judicial review) if he feels there is evidence of non-diligence or non-compliance with applicable stipulations, Orders, or other lease terms.

ASSOCIATED DECISIONS: Economic producibility; adequate transportation capabilities; compliance monitoring.

RESPONSIBLE PARTIES: Primarily USGS Conservation Division.

AVAILABLE DOCUMENTATION: Inspection reports, logs, G&G data.

2.4 REGULATORY FRAMEWORK

The major and most widely circulated public documents are the tentative schedule and the environmental statement for the sale. There are a variety of other documents which relate to each of the decision steps in a lease schedule.

Regulatory actions affecting the mineral leasing provisions of OCS and coastal resource management appear in the Federal Register and are summarized in "Regulations Pertaining to Mineral Leasing Operations December 1976." Other regulatory actions, such as Coastal Zone Management, Marine Protection Research and Sanctuaries, Endangered Species, input into these regulations. Additional federal government responsibilities with respect to minerals management have been summarized in "Policies, Practices, and Responsibilities for Safety and Environmental Protection in Oil and Gas Operations on the OCS" (USGS June 1977). Within the variety of regulatory actions, there are two recent regulations that emphasize the environmental information to accompany OCS management decisions. "Assessment and Management of Environmental Impacts on Marine and Coastal Environments," (January 1978) identifies, in a general way, subjects that are appropriate for the Environmental Studies Program. The other, "Outer Continental Shelf Oil and Gas Information Program," (January 1978) discusses procedures for incorporating environmental information in development and production plan approvals. Each of these regulations makes clear the pervasive importance of environmental data in activities relating to mineral leasing.

Within the steps identified earlier, two specific actions, the issuance of stipulations and orders, allow semiquantitative review of the value of environmental information. Of the stipulations issued for recent sales, fully one third of them included or relied upon environmental information.

OCS Orders, whether regional or national in scope, are another focus for the use of environmental information in resource management. While they contain no environmental information, they state certain operational practices that will be followed to best minimize accidental environmental contamination and maximum human safety. For example, OCS Order 7, which applies to all regions, addresses the issue of marine pollution and waste disposal from OCS operations. Environmental information also is needed in the activities associated with emergency suspension or termination of a lease. The OCS Orders, and suspension and termination regulations, are briefly described in the following sections.

2.4.1 OCS ORDERS

The general intent of OCS orders, as well as other operating rules, and regulations, is to provide requirements, specifications and standards to promote safety of operations, protect facilities and equipment and to minimize pollution of the environment. OCS Orders are published in either draft or final form in Section IV of the DEIS which addresses mitigating measures of the proposed action.

The OCS Orders are formally numbered directives issued to implement the provisions of Title 30 CFR. OCS Orders providing common requirements for all OCS areas are issued as National OCS Orders. Where requirements are necessarily different to accommodate special situations peculiar to operations in each area, they are set forth as appendices to the particular National Order pertaining to that subject.

The orders prescribe that certain records be kept, certain drilling/operating procedures be followed, certain types of equipment be used, and various contingency plans developed. Because of the time involved for the promulgation or revision of an OCS Order, they cannot ordinarily respond on a real-time basis to an immediate crisis. An OCS Order can, however, be waived by the USGS Supervisor when such a departure is determined to be necessary. Criteria for such a determination are:

- the proper control of a well
- conservation of natural resources
- protection of aquatic life
- protection of human health and safety
- protection of property
- protection of the environment

These orders and appendices are continuously revised to meet new technological discoveries and improvements, changes in the regulations, or for other reasons.

The five step procedure followed in the development or revision of an OCS Order is as follows:

i. A "Notice of Intention" in the Federal Register states that a new order or a revision of an existing Order is being considered by the Geological Survey and solicits comments by all interested parties.

ii. A draft copy of the Order or revision is prepared and reviewed by appropriate GS personnel and submitted to other Federal and State agencies for review; it is then published in the Federal Register.

iii. All comments on this draft are reviewed and the order modified when needed. Rationales for accepting or rejecting comments are developed and documented. The technical aspects of the Order may be discussed with persons from industry, adjacent states, or other affected organizations.

iv. A final Order or revision is published in the Federal Register, with accompanying explanations of changes made in the draft version.

v. USGS field offices revise present regulatory procedures to accommodate the new or revised Order.

2.4.2 SUSPENSION AND TERMINATION REGULATIONS

In accordance with 30 CFR Part 250.12, the Area Oil and Gas Supervisor (USGS) is authorized to suspend any operation, including production, with notification in writing, or orally with written confirmation, which in his judgment threatens immediate, serious, or irreparable harm or damage to aquatic life, property, the leased deposits or other valuable mineral deposits, or the environment. Such emergency suspensions continue until lifted by action of the Supervisor.

Emergency suspension procedures prepared by the USGS were published in the Federal Register October 4, 1977. These procedures:

1. specify the manner in which threats of significant irreparable damages will be studied;
2. treat the procedure for establishing necessary mitigating measures
3. re-define the property rights granted with the lease to provide that, if adequate mitigating measures cannot be designed, the Secretary may, as a last resort, and under stated limitations, terminate an emergency suspension and allow the lease term to run without renewal of operations of the lease. The rule applies only to oil and gas leases issued subsequent to its publication date.

This regulation provides for consultation between the Supervisor, federal agencies, and affected state and local governments prior to approval of a study program when such a program is required. Also, the regulation places the full responsibility for costs of such a study on the lessee.

Presently, no criteria have been presented by the USGS which help in determining what constitutes "...immediate, serious, or irreparable harm or damage...." It is anticipated that such determinations will be made as specific cases arise. There is a stated, but undefined, distinction between actions resulting in suspension of operations vs. actions requiring studies and formal imposition of mitigating measures. The distinction is taken to be one of degree, but again there are no standards or criteria for making that determination.

2.5 TIMING OF DECISIONS

The tentative scheduling of an area establishes, in a general way, the time frame for the decisions. To contribute to the information available at a given decision point, the socioeconomic and environmental studies process must recognize the time inherent in commissioning, executing, and evaluating the results from a study. If the time it takes to respond with useful study results is correlated with the time of the anticipated decisions that could benefit from the information, then the initiation date of the study activity may be fixed.

Table 2-1 summarizes much of the scheduling information for Alaska by combining all proposed OCS planning schedules (November 1974 - August 1977), the USGS/BLM Management by Objectives (MBO) tracking reports, and the BLM Summary OCS Status Reports. Dates to the right of or below the line are future decisions or activities. Sales and sale dates appearing in Table 2-2 have been dropped from the present schedule or modified although they had been identified on an earlier schedule. Dates corresponding to the steps in the OCS decision-making process have been identified in the scheduling table as follows:

TABLE 2-1 ALASKA OCS SCHEDULING TABLE

Area	Number	Tentative Schedule (Date of Publication)	Call for Nominations	Tentative Tract Selection (Date of Policy Decision-Sale Size)	Draft Environmental Statement	Final Environmental Statement	Secretarial Issue Document (Date of Secretary's Decision Meeting	Final Notice of Sale and Stipulations	Sale (Lease Award)	Exploration Plan Evaluation (Date of First Exploration Plan Approval)
Gulf of Alaska	39	11/74	11/74	2/75	6/75	11/75	2/76	3/76	4/76	8/76
Cook Inlet	CI	11/74	9/75	3/76	7/76	12/76	9/77	9/77	10/77	5/78
Kodiak	46	11/74	10/75	4/76	12/79	5/80	7/80	9/80	10/80	
Federal/State Beaufort Sea		1/77	2/78	4/78	3/79	8/79	9/79	11/79	12/79	
Gulf of Alaska	55 S	1/77	5/78	10/78	8/79	1/80	3/80	5/80	6/80	
Cook Inlet	60	1/77	12/78	5/79	2/80	10/80	12/80	2/81	3/81	
Bering-Norton	57 S	1/77	4/79	2/80	12/80	7/81	9/81	11/81	12/81	

TABLE 2-2 ALASKAN SALES DROPPED FROM PROPOSED OCS PLANNING SCHEDULE AND SALES MODIFIED AND RESCHEDULED

SALES DROPPED FROM SCHEDULE OR MODIFIED

Area	Number	Tentative Schedule (Date of Schedule)	Schedule Sale Date	Date of Schedule Modifying or Dropping Sale	Result	
Bering Sea (St. George)	45	11/74	10/76	1/77	Dropped	(Gulf of Mexico Substituted)
Beaufort Sea	50	11/74	9/77	1/77	Modified	(To State/Federal)
Outer Bristol Basin	51	11/74	10/77	1/77	Dropped	(Gulf of Mexico Substituted)
Gulf of Alaska (Aleutian Shelf)	56	11/74	9/78	1/77	Dropped	(South Atlantic, Ga. Embayment Substituted)
Chukchi Sea (Hope Basin)	58	11/74	12/78	1/77	Dropped	

- Tentative schedule of OCS oil and gas offering	- date of schedule publication
- Call for Nominations	- date of Call for Nominations publication
- Tentative Tract Selection	- date of policy decision on sale size
- Lease Sale/Environmental Statement	- dates of draft and final environmental statements
- Draft Secretarial Issue Document (SID) and preliminary Notice of Sale, Final SID, and Final Tract Selection	- date of Secretary's decision meeting
- Notice of Sale	- date of final Notice of Sale publication
- Sale/Leases Issued	- date of sale
- Exploration Plan Evaluation and Drilling Permit Approval	- date of first exploration plan approval following sale
- Transportation Management Plan Approval	- no dates (new step)
- Development and Production Plan	- no dates (pipeline approved in developed Gulf of Mexico

areas are tracked by lease block numbers rather than sale numbers. No pipelines have been approved following sales in frontier areas).

- Lease Termination or Expiration - no dates (this step has not been attained for any leases on sales conducted since development of 11/74 schedule

Certain time intervals between steps in the decision-making process are legally mandated. Those include:

- Time between draft environmental statement and final environmental statement - minimum of 90 days.

- Time between Final Notice of Sale and Sale - 30 days.

New Requirements of HR1614

- 30 day moratorium on lease issuance or extension following USGS analyses and recommendations on bids.

Historical averages and ranges for times between each of the steps in the decision-making process are shown in the Table 2-3. The planning horizon from tentative scheduling to sale is approximately 5 years. At the same time, it is unlikely that the studies response would be less than three years. Thus, it is apparent that if environmental studies' results are to be routinely incoroporated in decisions or milestones at the DES stage for leasing or prior to it, the studies must in many cases be commenced *prior* to the time of scheduling a specific area. From time

TABLE 2-3

HISTORICAL AVERAGES FOR TIMES BETWEEN EACH OF THE STEPS IN THE DECISION-MAKING PROCESS

1)	Between schedule publication date and call for nominations	- x = 14.2 months range = 1 to 48 months
2)	Between call for nominations and tentative tract selection	- x = 5.6 months range = 2 to 10 months
3)	Between tentative tract selection and draft environmental statement	- x = 5.2 months range = 2 to 11 months
4)	Between draft environmental statement and final environmental statement	- x = 5 months range = 2 to 10 months
5)	Between final environmental statement and Secretary's decision meeting	- x = 2.4 months range = 1 to 10 months
6)	Between Secretary's decision meeting and final Notice of Sale	- x = 1.3 months range = 1 to 2 months
7)	Between final Notice of Sale and Sale	- x = 1.3 months range = 1 to 3 months
8)	a. Between Sale and exploration plan approval (developed areas - Gulf of Mexico and Southern California)	- x = 2.7 months range = 1 to 6 months
	b. Between Sale and exploration plan approval (frontier areas)	- x = 8.7 months range = 4 to 15 months
9)	Between exploration plan approval and development plan approval (developed areas only)	- x = 9.2 months range = 2 to 26 months

of scheduling to final decision concerning onshore activities, a total of possibly nine years may exist. (Scheduling to sale 5 years; Sale to Development and Production plan evaluation 4 years?). Thus, the time available to study sitespecific onshore impacts is much greater than that available for study of issues relating to the sale decision.

2.6 OCS DEVELOPMENT IN ALASKA

The pace of oil and gas exploration and development in Alaska was sharply accelerated by the 1973 "fuel crisis" and the earlier discovery of the large onshore oil field at Prudhoe Bay. OCS oil and gas development had been occurring in Gulf of Alaska coastal waters since 1959 when the state began leasing oil development rights in Cook Inlet. In 1976, the federal government greatly accelerated its entire OCS program and began leasing development rights in northern Gulf of Alaska areas beyond the 3-mile limit and developed a "proposed OCS leasing schedule" for further exploration and development of other Alaska OCS areas.

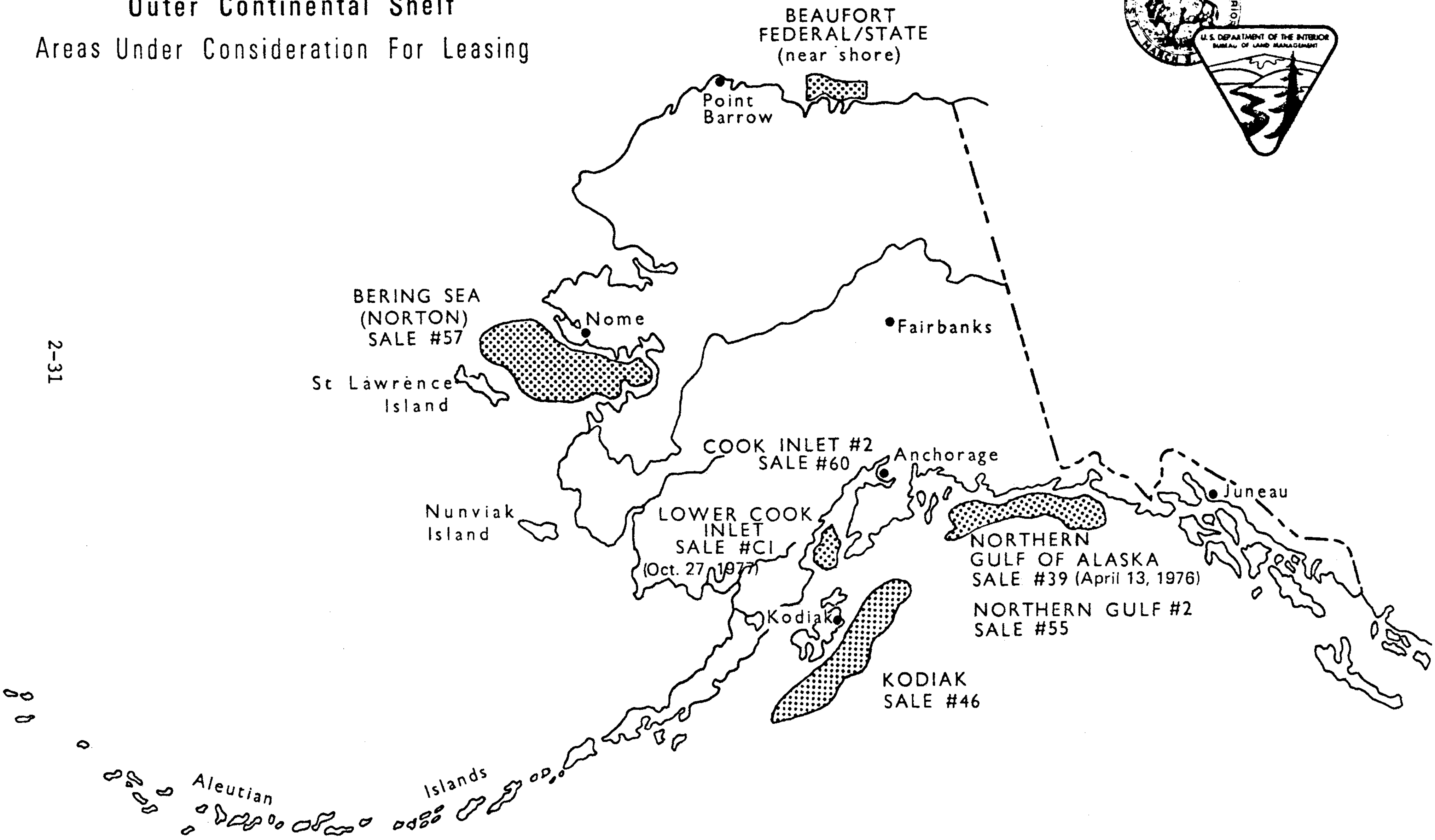
The major basins of the Alaska Outer Continental Shelf (Figure 2-4) are large and occur in the Gulf of Alaska, Beaufort Sea, Bering Sea, Chukchi Sea and south of the Aleutian Chain. The schedule is a planning document and continues to be substantially altered as political, sociological, economic technological, and environmental issues are explored.

Figure 2—4

ALASKA

Outer Continental Shelf

Areas Under Consideration For Leasing



August, 1977

CHAPTER 3

CHAPTER 3. SCIENTIFIC ASSESSMENTS

3.1 INTRODUCTION

The OCS Environmental and Socioeconomic Studies Program was initiated with the objective "to provide scientific data which would allow for better informed management and orderly development of mineral resources...." Factors which influenced the initial direction the program developed fell into two categories--environmental uncertainties and lack of administrative guidelines. As a result, the program developed along scientific, not user-oriented lines.

Environmentally, the Alaska Studies Program was confronted with:

1. A paucity of readily available information which could be used to assess the impact of OCS development.

2. A poor understanding of the complex interrelationships between the diverse coastal and marine environments.

3. The difficulties inherent in predicting potential impacts, due to lack of previous development in the lease areas.

At its inception, the role of environmental studies and the scientific data to be provided by these studies for leasing decisions remained to be clarified. No tried mechanism existed for either identifying the programmatic needs of management or directly communicating pertinent available information to those involved in utilizing study results. Consequently, the program tended to develop, at first, at the direction of the scientific community according to their perceptions, not along user-oriented lines. Scientists in conclave, not management users, defined the goals that would best address environmental assessment. It was recommended that the Bureau needed to:

- Characterize the environment
- Establish environmental benchmarks
- Monitor these benchmarks after operations commenced.
- Study the possible fates, effects, significance, and transport of contaminants.
- Develop a capacity for quick reaction to special problems on a short-term basis.
- Develop a predictive capability.

Because several years of data are necessary for any degree of assurance in environmental characterization, it was decided that benchmark studies would be initiated as soon as possible in all areas where a lease sale was scheduled. In this way, a base against which to monitor would be available when operations commenced. As the studies program began to expand and evolve from the modest start of several thousands of dollars to a multi-million dollar program, its' studies addressed potential OCS oil and gas areas as diverse as the Georges Bank region of the North Atlantic, the Gulf of Mexico, and the Arctic Beaufort Sea.

During its first three years, through input from scientists, planners, managers, policy-makers, and mostly from experience, the studies program gradually evolved into a functional entity serving the OCS decision process. Although, the program expanded rapidly in funds and number of projects in response to the urgencies of an accelerated Federal offshore leasing policy, it gradually became apparent that the program, as designed, was not necessarily providing the best answers to the type of questions posed by management, nor was the timing of data availability always appropriate.

However, the program was expanding so rapidly in response to the urgencies of an accelerated federal offshore leasing policy, that internal program review was continually deferred. During the formative years, the program was structured almost exclusively around this set of broad informational goals which program planners had identified as responsive to the original objectives. As the Studies Program developed and evolved to serve anticipated needs, it became apparent to the BLM, as well as to others, that the program was not necessarily providing answers to the type of questions posed by users of the data, nor was the timing of data availability always appropriate.

3.2 BACKGROUND OF THE ALASKA STUDIES PROGRAM

3.2.1 PRIOR ENVIRONMENTAL STUDIES PROGRAM

The Bureau of Land Management (BLM) initiated the Outer Continental Shelf Environmental Studies Program in response to national needs for marine environmental studies to assess the effects of OCS oil and gas development and to protect the environment. The environmental part of the study program for the nine lease areas of Alaska plus non-area specific studies is being conducted for BLM by the National Oceanic and Atmospheric Administration's (NOAA) OCSEAP offices.

The BLM/NOAA Program Development Plan (December 1976), presented an applied environmental study program geared to the specific needs, goals and objectives of BLM. A program management system detailed mechanisms for developing and implementing an interdisciplinary scientific program that provides guidance to investigators, contracting for specific deliverables, and reporting the results and interpretations and recommendations to BLM. This has been accomplished through the use of an interdisciplinary staff in the planning activities and in the synthesis and integration of the results.

Both environment information needs stated by BLM and analysis of the program results were used in the planning. Special Users Panel meetings provided other agency inputs to planning. Meetings have been held with scientists to coordinate efforts and to improve program direction. The planning activity produces annually a Technical Development Plan (TDP) for each of nine lease areas and a Plan for non-area specific studies. After approval by BLM, these plans are implemented by NOAA and the results reported on an annual basis as well as in quarterly status reports.

NOAA-OCSEAP also provides and arranges for the ships (these in large part with NOAA funds) and arranges for the aircraft support needed to operate in the inhospitable Alaskan environment. OCSEAP monitors contracts and evaluates and reports on performance, adjusting resources as needed within the scope of the approved TDPs.

NOAA also manages the data flow from the Alaskan program, from providing formats to reporting the data, to archiving data and performing analyses on it. NOAA monitors and works to improve data quality, both in the encoding and in the instrument quality and calibration aspects.

The products and deliverables of the program are prepared for direct and immediate use by BLM for prediction, assessment, setting stipulations and regulations. These products include models for calculating oil transport and for estimating biological damage, charts of geological hazards and of the distribution of biological parameters and biota, probability distributions for hazards, and data sources and banks for future reference and analyses.

The authorized funds for FY 1978 Alaskan program are $19.1 million from BLM, plus NOAA ship-time contributions of $5.0 million. These funds are distributed by lease area in accordance with the lease schedule and deficiencies in environmental information. The program recognizes that there will be successive sales in the same lease area, and that even after development proceeds, a study and monitoring effort will be essential.

3.2.2 SOCIOECONOMIC STUDIES PROGRAM

In Alaska, unique cultural differences and climatic conditions create a need for developing additional socioeconomic and environmental information to improve OCS decision-making at all governmental levels. In fulfillment of its federal responsibilities and with an awareness of these additional information needs, the BLM has initiated several investigative programs, one of which is the Alaska OCS Socioeconomic Studies Program.

The Alaska OCS Socioeconomic Studies Program is a multi-year research effort which attempts to predict and evaluate the effects of Alaska OCS Petroleum Development upon the physical, social, and economic environments within the state. The analysis addresses the differing effects among various geographic units: the State of Alaska as a whole, the several regions within which oil and gas development is likely to take place, and within these regions, the various communities.

The overall research method is multidisciplinary in nature and is based on the preparation of three research components. In the first research components, the internal nature, structure, and essential processes of these various geographic units and interactions among them are documented. In the second research component, alternative sets of assumptions regarding the location, nature, and timing of future OCS petroleum development events and related activities are prepared. In the third research component, future oil and gas development events are translated into quantities and forces acting on the various geographic units. The predicted consequences of these events are evaluated in relation to present goals, values, and expectations.

In late 1976, BLM-AOCS Office contracted Peat, Marwick, Mitchell & Co. to act as the program manager and prime contractor for the program. The prime contractor is responsible to the BLM Socioeconomic Studies Program Director (COAR) for coordinating the work of all technical subcontractors, and for ensuring that individual investigators' biases are minimized. The program manager is responsible for performing a final interdisciplinary interpretation of the results of the program, for drawing appropriate conclusions and recommendations, and for synthesizing all findings, conclusions, and recommendations in the form of successive annual reports.

The products and deliverables of the program are prepared by the prime contractor and each subcontractor for use by BLM. The products include literature surveys, reports and maps related to the fields of sociology, economics, anthropology, planning, petroleum scenarios and cultural resources (archaeology).

The funding level has been approximately $1.3 million each fiscal year with studies geared to lease areas.

3.2.3 COORDINATED STUDIES EFFORTS

Recently it has become apparent that the Environmental and Socioeconomic Study Programs are not exclusive of each other in goals and objectives. Information provided by both staffs has been input to the decision-making process discussed in Chapter 3. In response to this need for coordination between disciplines, the Alaska Outer Continental Shelf Office is integrating both disciplines into a combined Alaska Regional Studies program. The Environmental Studies

Field Coordinator and the Socioeconomic Studies Program Director coordinate study needs and timing for information for the environmental assessment process. This obligation for a coordination of study efforts is inherent throughout this study plan and is required to be continuously affected throughout the OCS program.

3.3 THE ALASKA STUDIES EFFORT

3.3.1 PRIOR ENVIRONMENTAL STUDIES PROGRAM

In May 1974, the BLM requested that NOAA initiate a program of environmental assessment in the Northeastern Gulf of Alaska in anticipation of possible oil and gas lease sales in that region early in 1976. These studies were initiated in July 1974. A major expansion of the environmental assessment program was requested by BLM in October 1974 to encompass eight additional areas of the Continental Shelf of Alaska during the FY 1975-76 period. After an intensive planning effort including workshops, public comment and consultations with more than 300 scientists and other concerned persons, a program proposal equivalent to a plan was published. This document was entitled "Environmental Assessment of the Alaskan Continental Shelf, First 18-month Program - Gulf of Alaska, Southeastern Bering and Beaufort Seas, April 1975."

Once that document was approved, scientific efforts extended into the northern Bering Sea, Chukchi Sea, and lower Cook Inlet. Many of these efforts were simply geographic extensions of the work underway in earlier areas, already subjected to wide review and comment.

The Program Development Plan (PDP) brought into one interagency document the planned environmental study program for all nine proposed lease areas of the Alaskan OCS. A program of studies for the nine lease areas of Alaska plus some non-area specific studies was planned and conducted for BLM by the National Oceanic and Atmospheric Administration's OCSEAP offices. This program assembled existing fragmentary historical data about the Alaska OCS as well as to conduct and integrate new studies necessary to provide a basis for assessment of impacts of petroleum exploration and development.

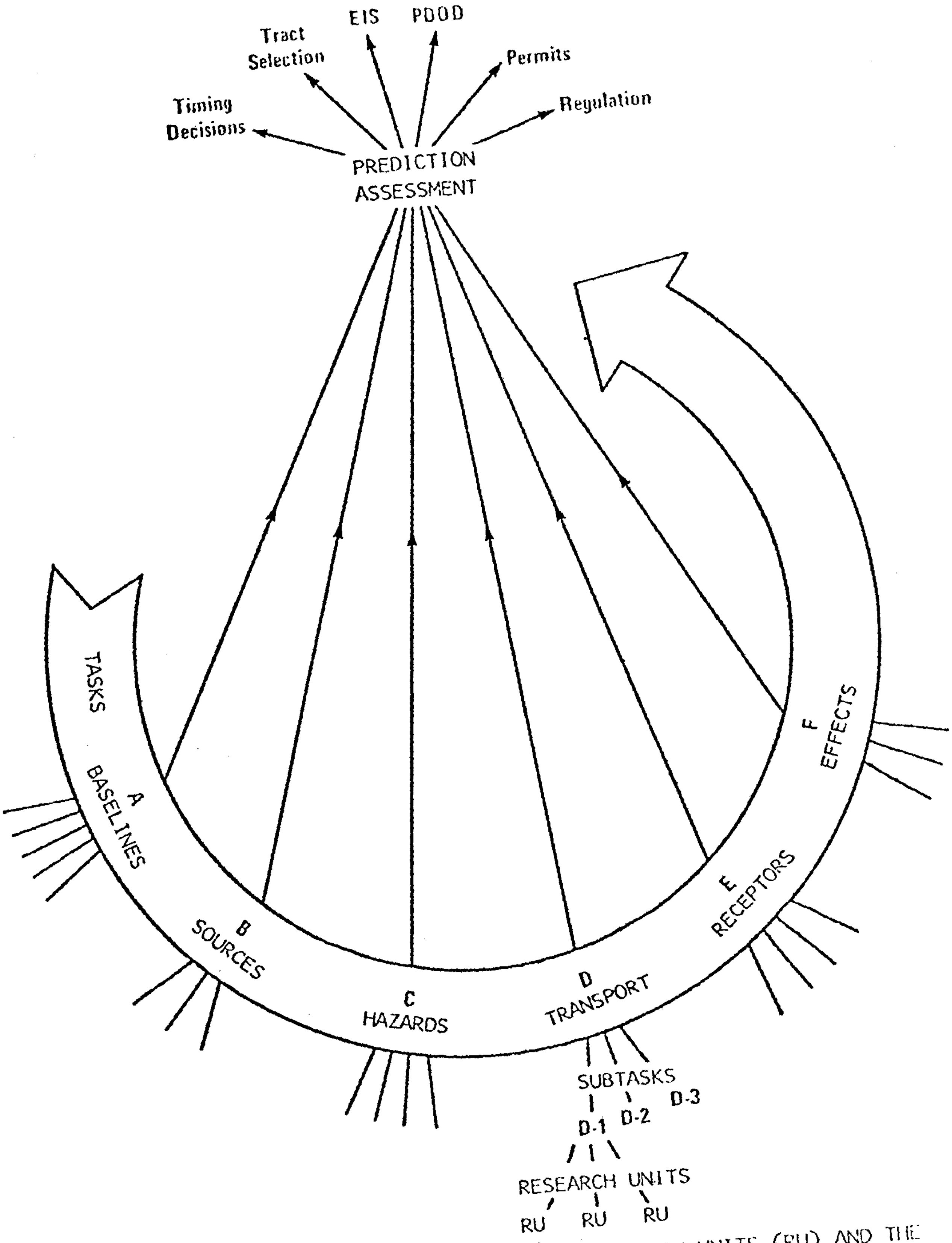
Major efforts of studies since 1975 were those of broad scale surveys or reconnaissance. They produced information defining circulation patterns, current trajectories, ice hazards, seafloor faults, seismic activity, areas of unstable sediments, critical habitats, and biological populations. They also provided baselines for hydrocarbon and trace metal concentrations. Site specific studies were amplified in fiscal year 1978 (FY 78) to fill data gaps in nearshore processes and trophic relationships of various biological communities.

In response to stated program objectives in the PDP, the environmental investigations of the Alaska OCS Environmental Assessment Program addressed six scientific objectives (henceforth referred to as Tasks). These Tasks were to determine:

A. Contaminant Baselines
B. Sources
C. Hazards
D. Transport
E. Biological Receptors
F. Effects.

The interrelationships among the tasks, subtasks and research units is depicted in Figure 3-1.

FIGURE 3-1



RELATIONSHIP BETWEEN INDIVIDUAL RESEARCH UNITS (RU) AND THE ASSESSMENT PREDICTION FUNCTION OF BLM. ALSO, THE SEQUENTIAL RELATIONSHIP AMONG THE SIX TASKS, ALL OTHER TASKS FEEDING INTO EFFECTS AND THENCE TO ASSESSMENT.

Task A (Contaminants)

The distribution of petroleum-related contaminants needs to be described before further development of petroleum resources; later changes, if any, in a contaminant's concentration or occurrence can then be detected and examined for possible correlation with concurrent ecological changes. The Alaskan research program emphasized the high-molecular-weight petroleum hydrocarbons and trace metals in each lease area. In addition, it determines the ambient concentrations and distribution of light hydrocarbons and explores the feasibility of using C_1-C_4 concentrations as a monitoring indicator of hydrocarbon contamination.

The contaminant sampling efforts studies are essentially completed. Future chemistry efforts will be concentrated on processes controlling contaminant distribution and modifications. Some site-specific surveys may be conducted where planned facilities are to be located.

Task B (Sources)

To guide the studies undertaken in succeeding phases of the Alaskan OCS program, a general understanding of the nature and magnitude of potential contaminants and environmental disturbances is required. It is necessary for program planning to obtain and continually updated estimates of the location, nature, and timing of platform, pipeline, and facility development in each lease area, to estimate the quantity and physical and chemical nature of contaminants from each potential source, and to estimate the nature and amount of possible environmental disturbance likely to accompany development.

Task C (Hazards)

It is important to identify environmental hazards early in the decision-making process. Such information can be used by the Department of the Interior: (1) To determine which OCS areas are less environmentally hazardous than others and thus contribute to a risk/benefit analysis of areas to be leased; (2) To exclude particular tracts from leasing; and (3) to develop appropriate OCS orders, regulations, and stipulations to control the safety of energy development on the shelf. Consequently, hazard studies receive priority emphasis early in the program.

The approach is to achieve an initial broad regional understanding of the geologic, ice, and oceanographic hazards that might affect development. In subsequent studies, the level of detail is increased with the objective of quantifying the particular risks of specific proposed actions. Geographically, the progression is (1) regional reconnaissance of the entire lease area, (2) more detailed studies of the lease area to enable tract hazard evaluations, and (3) studies related to hazards in oil transport corridors.

Task D (Transport)

In order to relate or "connect" the oil (or other contaminant) released from operations with the effects on the environment, an assessment must contain the trajectory, dilution, and changes in the oil along the pathway. These items are treated in transport studies, which include winds, water currents, ice movement, mixing and weathering.

Task E (Receptors)

A major incentive for conducting studies of biological populations is to determine which populations, communities, and ecosystems are at risk from either acute or chronic impacts. Estimates of the distribution and abundance, migration, feeding sites, and behavior of populations are among the first studies undertaken to establish potential vulnerability. At a later stage, the locations of the populations at each life-stage and activity are related to predicted paths of petroleum and incidence of disturbance to determine whether risk may exist. Further, the criteria of importance of the species in the environment or to man must be examined to determine which biota deserve studies to assess the significance of the effects from the potential impacts. The species to be considered for study are prioritized in importance within four major groups. These groups are (1) commercial/subsistence/sport usage, (2) rare or endangered species, (3) unique or aesthetic species, and (4) key ecological species. When vulnerability is indicated, detailed site-specific studies will be undertaken to focus on processes, importance in food webs, population dynamics, sensitivity to disturbance, ability to recover from disturbances, mobility, habitat dependence, feeding dependence, and physiological characteristics. The latter involve studies of the direct effects of hydrocarbons, trace elements, and sediment characteristics on the physiology and behavior of target organisms, (Task F). Also used in the design of biological studies is the information obtained in the biological baseline studies on habitat dependence and population dynamics.

Task F (Effects)

Knowledge of the effects of petroleum on marine organisms is an essential ingredient in the environmental assessment process. The studies will attempt to determine the deleterious effects of petroleum exposure and the threshold concentrations causing these effects. The initial studies use acute toxicity exposures in order to better define the more susceptible species and mechanisms, and thus provide input to the design of more realistic studies using chronic exposures levels. The laboratory efforts are addressed in the non-site-specific TDP.

OCSEAP Tasks (Program Objectives) and Subtasks

Task A

What are the existing distribution and concentration of potential contaminants associated with petroleum development?

Subtask A-1

Determine the total petroleum and toxic hydrocarbon components of:
- neuston and floating tar - the water column (soluble and suspended material - selected marine organisms - sea ice and the sea ice-water interface - sediments

Subtask A-2

Determine the seasonal horizontal and vertical distribution of methane, ethane, propane, butane, and relevant olefinic homologies in the water column. Determine the practicality of detecting and monitoring petroleum sources in Alaskan coastal waters through the use of these light hydrocarbons.

Subtask A-3

Determine the total content and chemical species of selected toxic metals, and describe the distribution and concentrations of these contaminants in:

- the water column (soluble and suspended forms)
- selected marine organisms
- bottom sediments, inertitial water, and subsea permafrost
- sea ice and sea ice-water interface

Task B

What are the nature and magnitude of contaminants and environmental disturbances that may be assumed to accompany petroleum exploration and development of the Alaskan continental shelf?

Subtask B-1

Obtain and continually update estimates of the location, nature, and timing of platform, pipeline, and facility development in each lease area.

Subtask B-2

Estimate the quantity and physical and chemical nature of contaminants from each potential source based on projected design characteristics and operating methods, as well as on experience with petroleum development operations in other locations.

Subtask B-3

Estimate the nature and amount of possible environmental disturbance likely to accompany development.

Task C

What hazards does the environment pose to petroleum exploration and development?

Subtask C-1

Determine seismic and tectonic hazards in, and peripheral to, regions proposed for petroleum development.

Subtask C-2

Determine hazards to petroleum exploration and development resulting from surface and near surface faulting.

Subtask C-3

Determine the types and extent of natural seafloor instability.

Subtask C-4

Evaluate areas of seafloor erosion and deposition.

Subtask C-5

Evaluate rates of change in coastal morphology, with particular emphasis on rates and patterns of man-induced changes. Locate areas where coastal morphology is likely to be changed by man's activities and evaluate the effect of these changes.

Subtask C-6

Determine the extent and character of ice-bonded subsea permafrost along the Alaskan coast.

Subtask C-7

Characterize the frequency of occurrence, geographical distribution, and nature of ice gouging phenomena.

Subtask C-8

Determine, map, and interpret the distribution and pore pressures of shallow overpressured sediments.

Subtask C-9

Determine the stress-strain relationships in various types of sea ice encountered along the Alaskan coast to permit calculation of ice forces and loads on structures. Determine the range of forces and extremes of stresses and forces that may be placed on platforms and facilities by ice.

Subtask C-10

Synthesize existing literature to provide analysis of the frequency, intensity, and effects of extreme oceanic events.

Task D

How are contaminant discharges moved through the environment and altered by physical, chemical, and biological processes?

Subtask D-1

Determine circulation patterns and develop the capability to predict the transport of petroleum-related pollutants in offshore regimes.

Subtask D-2

Determine circulation patterns and develop the capability to predict the transport of petroleum-related pollutants into inshore regimes.

Subtask D-3

Conduct theoretical and observational field and laboratory studies required to improve understanding of plume behavior and weathering processes to improve oil spill trajectory and toxicity forecasts.

Subtask D-4

Determine the types and characteristics of bottom sediments including benthos-sedimentary substrate interactions.

Subtask D-5

Characterize bottom sediment dynamics.

Subtask D-6

Characterize physically and chemically suspended particulates, and their influx, transport and deposition. Determine the mechanisms, pathways, and rates of suspended sediment transport including coastal morphological processes. Develop an understanding of oil/sediment interaction processes.

Subtask D-7

Map sea floor topography to support circulation studies and biologic work in spatial variations of populations.

Subtask D-8

Characterize the distribution and nature of the most important sea ice features (leads, ridges, polynyas, etc.) on a seasonal basis and the undersea morphology of sea ice on the Alaskan Continental Shelf.

Subtask D-9

Describe and analyze the dynamic behavior of sea ice (stresses motions, deformations, etc.) and the effects on transport processes of pollutants and on the safety of man-made structures.

Subtask D-10

Determine the possible interaction between ice and oil and other contaminant discharges.

Subtask D-11

Evaluate and quantify the extent and likelihood of transport of oil inland beyond the normal beach line by storm surges.

Task E

What are the biological populations and ecological systems most subject to impact from petroleum exploration and development?

Subtask E-1

Determine the seasonal density distribution, critical habitats, migratory routes, and breeding locales for marine mammals. Identify critical species and sites, particularly in regard to possible effects of oil and gas development.

Subtask E-2

Describe population dynamics and trophic relationships for selected species of marine mammals.

Subtask E-3

Determine the seasonal density distribution, critical habitats, migratory routes, and breeding locales for principal marine bird species. Identify critical species particularly in regard to possible effects of oil and gas development.

Subtask E-4

Describe dynamics and trophic relationships of selected marine bird species at offshore and coastal study sites.

Subtask E-5

Determine the distribution and abundance of certain pelagic and demersal fish. Supplement current fisheries data when necessary. Determine the relative seasonal density distribution, critical habitats, growth and food habits of juvenile pelagic fish.

Subtask E-6

Determine the food dependencies of commonly occurring species of pelagic and demersal fish to establish principal ecological relationships.

Subtask E-7

Determine the distribution, abundance, diversity and productivity of the benthic community.

Subtask E-8

Provide a general description of the intertidal and shallow subtidal habitats.

Subtask E-9

Describe the ecosystem dynamics for littoral biota of the principal shore types with particular emphasis on potential, immediate and long-term impacts of contaminants and disturbances in species population dynamics, community composition, and productivity of the ecosystem.

Subtask E-10

Determine seasonal density distributions of principal species of phytoplankton, zooplankton, and meroplankton.

Subtask E-11

Determine seasonal indices of phytoplankton production, particularly the sea ice flora. Identify pathways of matter (energy) transport between synthesizers and consumers.

Subtask E-12

Determine non-population dependent physiological and population parameters of plankton communities.

Subtask E-13

Identify and characterize critical regions and habitats required by egg and larval stages of fish and shellfish species, especially those of commercial or ecosystem importance.

Subtask E-14

Development of ichthyoplankton key to aid identification of the ichthyoplankton occurring in Alaskan waters.

Subtask E-15

Characterize marine microbiological communities with regard to the normal biota of heterotrophs, chemotrophs, and pathogens.

Subtask E-16

Determine the behavior of heterotrophic micro-organisms, pathogens, and chemotrophs and their response to normal environmental stresses in arctic and subarctic waters.

Subtask E-17

Determine the relationship of living resources to ice environment (including the edge of drifting ice, land fast ice, and inner pack ice), and examine the biological activities (species associations, food habits) under landfast ice on a seasonal basis in the Bering, Chukchi, and Beaufort Seas.

Task F

What are the effects of contaminants and environmental alterations related to OCS oil and gas activities on individual organisms, populations and ecological systems?

Subtask F-1

Review and evaluate the available literature and unpublished data on toxicity of crude oils and crude oil components (including toxic metals) on the basis of species, life stage, temperature at exposure, water source, oil source, geographic source of organisms, and presence of toxic metals.

Subtask F-2

Determine the acute and chronic effects of crude oil and its component fractions, toxic metal components of drilling muds, and other petroleum-associated chemicals on survival, growth, reproduction, and selected physiological and behavioral mechanisms of selected arctic and subarctic organisms.

Subtask F-3

Determine the effects of crude oil on the thermoregulatory mechanism and other functions of marine birds and mammals.

Subtask F-4

Determine by laboratory experiments the potential release of toxic metals from oil-impacted sediments, the occurrence of soluble and non-soluble toxic metals in sediments (with emphasis on organometallic complexes), and the relative importance of these toxic metals on various species in terms of uptake and effects on biota.

Subtask F-5

Determine by laboratory experiment the bioaccumulation and relative effects of petroleum hydrocarbons and other OCS-related contaminants presented through various exposure pathways, including soluble forms, food chain exposure, suspended-particulate-borne contaminants and sediment-absorbed contaminants.

Subtask F-6

Conduct laboratory and field studies to determine recovery rates of selected organisms and ecosystems from perturbations caused by either contamination or other disturbances associated with petroleum development.

Subtask F-7

Determine the types and incidences of diseases presently occurring in fish, shellfish, birds, and mammals for use in (a) evaluating future impacts of petroleum-related activity, and (b) designing experiments to test the effects of contaminant exposure to disease-susceptibility.

Subtask F-8

Determine the potential ecological effects of alternative countermeasures to oil spills.

Subtask F-9

Describe, analyze and verify the ecological community structure and productivity of selected coastal ecosystems with respect to potential impacts of OCS oil and gas development

Subtask F-10

Describe, analyze, and verify the ecological community structure of the ice-front production system with respect to potential impacts of OCS oil and gas development.

Subtask F-11

Describe, analyze and verify the community ecology of coastal detritus systems with respect to OCS development impacts.

3.3.2 PAST SCIENTIFIC ASSESSMENT

3.3.2.1 ENVIRONMENTAL STUDIES

The Alaskan OCS region can be divided into three natural geographic regions: the Arctic Region - the Beaufort and Chukchi Seas; the Bering Sea Region - Norton Sound, Bristol Bay, St. George; and the Pacific Region - the Gulf of Alaska, Lower Cook Inlet, the Alaskan

Peninsula, and the Aleutian Islands. Ice and its temporal fluctuations are the dominant feature governing environmental processes and levels of biological activity in the Arctic region. Physical processes over the extensive shallow Bering Sea shelf are governed by a seasonal ice pack, intrusions of warm Pacific Ocean water and weak, fluctuating circulation patterns. These conditions foster high biological production and make the Bering Sea one of the world's leading fishery regions.

The dominant environmental features in the Pacific region are the high seismic activity throughout the area and the strong cyclonic oceanic circulation along the shelf break with highly variable and weak circulation over a relatively narrow shelf. This region is characterized by a subarctic climate which leaves the waters ice-free with the exception of certain inshore waters such as Cook Inlet. This latter area is a large tidal estuary and has features (such as significant fresh water input, a heavy suspended sediment load, and high turbidity) which differentiate it from the remainder of the Gulf of Alaska. Since each of these three geographic areas has different environmental mechanisms governing the ecological processes, the research emphasis varies from one to the other.

The material to follow will present the major efforts and rationale for past, present, and projected environmental research on the major tasks identified in Chapter 4.4. Studies are described separately within each of the three regions discussed above whenever it is felt that this will add to the clarity of the material. More detailed presentations of the status of knowledge and research priorities for specific lease areas within each of these three regions are given in Chapters 5 and 6.

The Alaska Outer Continental Shelf Environmental Assessment Program (OCSEAP) covers nine lease areas extending from the Northeast Gulf of Alaska to the Beaufort Sea. The program thus focuses on a vast geographic area where environmental working conditions are extremely severe. Because of the harsh environment and the emphasis on open ocean research during the period from 1955 through 1968, less research has been conducted on the Alaska Outer Continental Shelf (OCS) than on any other coastal area of the United States.

The BLM/OCSEAP research effort from 1975 through 1977 was implemented with broad-scale surveys known as reconnaissance studies. These reconnaissance studies have supplied the initial information to define circulation systems, contaminant trajectories, ice hazards, seafloor faults, seismic activity, and areas of sediment instability, needed for selection and design of studies addressing specific sites and environmental processes. They also provided initial data on hydrocarbon and trace metal concentrations and on biological populations, as well as locations of critical habitats and environmental processes. More intensive studies are now required to understand their vulnerability to impingement from oil and gas development.

Contaminants

The OCSEAP chemistry effort began in FY 75 as a program in the NEGOA lease area intended to establish pre-development light and heavy hydrocarbon and trace metal concentrations. In FY 76 the southern Bering and Beaufort Sea areas were added to the program. In FY 77 the chemistry program was further expanded to include the Lower Cook Inlet, Norton Sound and Chukchi Sea lease areas.

The initial programs in the NEGOA and southern Bering Sea involved extensive sampling along carefully designed station grids in an attempt to determine hydrocarbon and trace metal baseline concentrations. The addition of new lease areas to the program as well as large natural and analytical variability resulted in the replacement of the baseline concept with that of a reconnaissance program. This modified program emphasis, employed in the latter part of FY 76 and in FY 77, attempted to provide a broad scale description of potential contaminant levels in the lease areas of concern. Hydrocarbon concentrations observed during the reconnaissance effort in Alaska were generally lower than in other OCS areas elsewhere and reflected the essentially undeveloped nature of the Alaskan coastal zone. Trace metal concentrations in offshore waters were about the same as open ocean mean concentrations. Concentrations in Alaskan coastal waters were not higher than in other coastal OCS areas.

During the planning for FY 78 contaminant studies, it became obvious that continuation of the reconnaissance program would not significantly improve understanding of OCS chemical problems. Therefore, in FY 78 the reconnaissance program was directed toward addressing a few large information gaps, including hydrocarbon and trace metal analyses of Beaufort Sea biota and sediment hydrocarbon analyses in the Kodiak and Norton Sound areas. A significant portion of the FY 78 chemistry program is directed toward process-oriented studies designed to give insight into the processes that control the distribution of hydrocarbons in the Alaskan OCS. Such studies yield information of predictive value and provide a framework for interpreting concentrations. Studies designed for FY 78 will provide information on diel and seasonal variability of hydrocarbon and trace metal contents of water, biota, and sediments of Lower Cook Inlet in relation to either microbial activity and high biologic productivity (Kachemak Bay) or microbial activity and exposure to petroleum production activities (Redoubt Bay). This effort will continue in FY 79.

The first chemistry program review was held in September 1977. The review committee endorsed the concept of process-oriented studies. The committee also questioned the need for continued inclusion of trace metal analysis in the program, since injection of metals from drilling materials or oil was at most a localized problem. The negative results obtained from other research projects seeking metals released from oil-impacted sediments also argued strongly for a cessation of trace metal work. Consequently, trace metal analyses will not be conducted after FY 78.

The FY 79 chemistry program is designed to provide greater understanding of the processes controlling hydrocarbon distribution and weathering. Three major projects are planned:

1. Continuation of the lower Cook Inlet studies initiated in FY 78. These studies will give some insight into the impact of biological activity and petroleum production of hydrocarbon content of water, sediments, and biota.

2. Study of the Norton Sound hydrocarbon seep. The composition of the hydrocarbons escaping from the seep will be determined, and subsequent dispersal and weathering will be documented.

3. Small, contained oil spills will be conducted out-of-doors. These experiments will allow quantification of hydrocarbon weathering processes under nearly natural conditions.

The chemistry program beyond FY 79 will continue to emphasize site-specific field investigations (specific areas of exploration and production activities, hydrocarbon sources such as seeps, spills, and chronic discharge) and field weathering and dispersal studies.

Hazard Assessment

Proper assessment and understanding of environmental hazards are important before and after leasing. Such information is used by the Department of the Interior to determine which OCS areas are more environmentally hazardous than others, to exclude particular tracts from leasing, and to develop appropriate OCS orders, regulations, and stipulations to control the safety of petroleum development on the shelf.

Geologic hazards to petroleum-related operations in the arctic and subarctic Alaska waters center around seismicity, surface and nearsurface faulting, sediment instability, erosion and deposition, subsea permafrost, ice forces and gouging, stratigraphic hazards, and severe meteorological and oceanographic events.

Many of the hazards present in Alaskan lease areas also occur in other shelf areas of the United States. However, in Alaska these problems are unique in terms of both severity and complexity. A knowledge of the nature, frequency, and intensity of severe environmental events is essential since the greatest hazards to production-related structures and activities as well as the greatest effect on the environment will more than likely occur in conjunction with environmental extremes.

The nature of the major environmental hazards to OCS development, and consequently the OCSEAP research emphasis, differs from one OCS region to another. For example, in the Gulf of Alaska seismicity and related events present the dominant natural environmental hazards. In the Bering Sea seismicity is less important, the major risks being associated with faulting, sediment instability, and ice (the latter limited to Norton Sound). In Arctic OCS areas sea ice and sub-sea permafrost present the greatest hazards.

In the planned OCSEAP study sequence the initial approach has been to achieve a broad regional understanding of the geologic, ice, and oceanographic hazards that might affect development. In subsequent studies, the level of detail is increased with the objective of quantifying the particular risks of specific proposed actions. In terms of spatial resolution, the progression is (1) regional reconnaissance of the entire lease area, (2) more detailed studies of the lease area to enable tract hazard evaluations, (3) studies related to hazards in oil transport corridors, and (4) topical studies of processes and causal factors to improve predictive capabilities.

Pacific Region

Earthquakes and related events represent the most serious natural hazard to OCS development in any of the Gulf of Alaska lease areas. Alaska is one of the world's most seismically active regions, with most earthquakes occurring along a narrow arcuate strip extending from Prince William Sound to the western tip of the Aleutian Island. All lease areas proposed for the Gulf of Alaska lie within this zone.

Earthquakes resulting from regional or local uplift, subsidence, or tilting may damage facilities directly and may create secondary impacts, such a tsunamis and sediment failure, which can have catastrophic consequences. In the Alaskan areas, volcano activity, such as that of Mt. Augustine in Cook Inlet, may be of particular local importance. The severity of earthquakes resulting from crustal movement is difficult to predict. The knowedge of deformational character is highly variable; seafloor fault breaks, broad crustal warping, and seismic sea waves have characteristics that commonly are unique to specific areas.

OCSEAP-sponsored seismic studies in the Gulf of Alaska, as in other Alaskan OCS areas, have consisted of two phases: (1) a historical summary of all reported Alaskan earthquake epicenters from the late 19th century to the inception of OCSEAP studies and (2) ongoing specific regional field programs to supplement the historical seismic data base by providing additional information on the locations, magnitudes and recurrence rates of all significant earthquakes and their relationship to active onshore and offshore faulting.

OCSEAP-sponsored seismic field studies in the Gulf began in FY 75 and 76 as supplements to existing studies being funded by other agencies. For example, in the NEGOA, OCSEAP is direcly funding a portion of the seismograph work in an ongoing USGS study employing a land-based network of seismograph stations.

In the Western Gulf of Alaska the OCSEAP effort is a part of a combined CRDA-NOAA study of the siesmotectonics of the Alaska Peninsula and Aleutian chain. OCSEAP funding has permitted the extension of the seismic network to give better coverage of the Gulf of Alaska and Bering Sea continental shelves.

The major objective of the seismic studies program is to determine a probability scale for earthquake hazards with reference to petroleum exploration and development. A requisite for accomplishing this objective is the improvement of the statistical reliability of the existing data base through continuation of present observational programs and use of additional or improved instrumentation, such as ocean bottom seismometers (OBS) and strong-motion accelerometers. In addition to seismic activity are natural hazards resulting from volcanism, faulting, sediment instabilities, and seismic sea waves. In the western Gulf of Alaska volcanism presents a significant environmental hazard. The Aleutian, Kodiak, and lower Cook Inlet lease areas contain a chain of active and potentially active volcanos extending along the Alaska Peninsula. Consequently, volcanism studies have been, and will continue to be, integral parts of the seismic programs in these lease areas. These studies emphasize improved characterization of eruptive styles, ejection composition and ranges of influence, and estimates of recurrence rates. The major objective of the volcanism program is the generation of reliable volcanic risk maps that describe the nature of the hazards associated with particular volcanos, the spatial distribution of these hazards and the probable recurrence rates. An ultimate goal is the development of a geophysical monitoring and warning system, primarily through a strengthening of the existing seismic net. As in the case of seismicity, volcanism is a dynamic phenomenon with major events occurring at large time scales. Therefore, the OCSEAP effort is again guided by the rationale that studies should be of the maximum duration practicable and that future emphasis should be placed on the utilization of additional and more sensitive instrumentation (e.g., OBS units) to improve the capability of making useful predictions with the data base realistically achievable. A shortcoming of the current seismicity/volcanism program is an inadequate level of coordination among seismicity studies performed by different institutions. During FY 78, OCSEAP and the appropriate geological investigators will devise a coordinated plan for instrument calibration and reporting, which will be reflected in the FY 79 field program.

Shallow faulting, sediment instability, and erosion/deposition constitute significant potential threats to safe OCS petroleum development. The Gulf of Alaska is tectonically complex, and numerous faults have been identified, most notably in the NEGOA and Kodiak lease areas. Fewer faults have been found in lower Cook Inlet, and the Aleutian lease area is yet to be investigated. Some of these faults may be active, and displacements can affect man-made structures, such as drilling platforms, drill casings, and pipelines.

Further hazards in the Gulf of Alaska are associated with sediment instability. High rates of sedimentation of fluvial and glacial outwash materials occur along parts of the coast (e.g., the Icy Bay and Copper River Delta regions of NEGOA), producing large, unconsolidated sediment deposits. Some of these deposits have undergone extensive slumping and others have been identified as potentially unstable. Slumping may be triggered by low magnitude earthquakes resulting from fault movement.

The likelihood of sediment failure actually occurring in areas identified as potentally unstable can be evaluated only by studies of the sediment geotechnical properties. For example, slumping that has occurred in an area will result in a sediment mass that is either more stable now as a result of slumping, or less stable, depending on the amount of water incorporated, the degree of consolidation, and style of movement. Knowledge of the geotechnical properties of sediment in critical areas was identified as a major information gap at the geology program review held Jan 31-Feb 3, 1978, in Menlo Park. OCSEAP plans to initiate studies of this type beginning in FY 79.

As decribed earlier in the general hazards study sequence, OCSEAP shelf faulting and sedimentation studies first seek a regional description of potential hazards so that environmental risks can be minimized, either by outright avoidance or by appropriate regulation of facilities. Certain features identified as potentially troublesome during the regional reconnaissance of the lease area are selected for further detailed study. Nominally the reconnaissance phase constitutes about a two-year effort, with focused studies of special problems taking an additional two years (these time estimates are approximate and vary with the lease area size and the specific nature of the hazards identified).

OCSEAP-funded shelf faulting and sedimentation studies in the Gulf of Alaska began in FY 76 in the NEGOA, lower Cook Inlet, and Kodiak lease areas. The NEGOA study, begun the previous year by the USGS, has produced basic information at a tract-specific level on the geologic hazards of the area, including the location of probable active faults, potentially unstable sediments and areas of erosion and deposition on the shelf. This information has had a significant influence on tract selection, stipulations and drilling regulations in NEGOA. The work is being continued in FY 79 in response to BLM's request to gather additional tract-specific hazards information to the west of Kayak Island in preparation for the second NEGOA sale currently scheduled for mid-1980.

Reconnaissance geological and geophysical surveys conducted in 1976 over the outer continental shelves of lower Cook Inlet and Kodiak Island identified, on a regional scale, potential seafloor hazards due to faulting, slumping, erosion, deposition, and large scale bedform movement. Detailed studies of specific problems, such as large fault zones on the Kodiak Shelf, possible weak volcanic sediments in the troughs that cut the Kodiak shelf, and large-scale bedforms in lower Cook Inlet, were begun in 1977 and will continue into FY 79, with the focus on improved mapping and age determinations on surface and near-surface faults on the Kodiak shelf and areas of sediment instability on both the Kodiak and lower Cook Inlet shelves.

Shelf faulting and sedimentation studies have not been conducted in the Aleutian lease area. The January 1977 OCS Planning Schedule showed a December 1980 Aleutian sale date, but by August 1977 this lease area had been removed from the leasing schedule. In FY 78 the level of OCSEAP effort was low in response to the new OCS schedule. It is anticipated that a very modest research program with limited objectives will continue in the Aleutian lease area over the next few years. Only studies with long-term applicability and requiring long lead time are being conducted at this time. Hazards studies are presently restricted to OCSEAP's long-term support of seismicity/ volcanism research in this region. If leasing does not occur before 1982, as is indicated on the current OCS Planning Schedule, initiation of faulting and sedimentation studies in FY 80 will still allow adequate lead time.

Extreme oceanic and meteorological events, such as high wind waves, storm surges, tsunamis, and severe storms, pose hazards to offshore structures, shipping and coastal facilities. OCSEAP-sponsored studies of oceanic and meteorological hazards in the Gulf of Alaska are included in a synthesis of existing data and literature in the form of a climatic atlas of the entire Alaskan coastal region recently completed by the Arctic Environmental Information and Data Center and the National Climatic Center. This atlas summarized the present knowledge of marine and coastal climatology in the Gulf of Alaska, the Bering Sea, and the Beaufort/Chukchi Seas. Information includes statistics (means, extremes and recurrence rates) of such parameters as wind speed, wave height, and storm surges. More detailed studies of severe storm hazards are planned for FY 79 and will include prediction of types and frequencies of extreme storms and storm tracks associated with hindcasts and pack ice response.

Bering Sea

The Bering Sea contains the Bristol Bay and St. George Basin lease areas in its southern part and the Norton Sound area to the north. The June 1975 Proposed OCS Planning Schedule showed a first generation Bristol Bay sale at the end of 1977. On the January 1977 schedule Bristol Bay no longer appeared and on the most recent (August 1977) schedule St. George Basin has also been removed. As a result of the changing leasing priorities and the OCSEAP budget reductions over the last two years, the allocated FY 79 funding levels in St.

George Basin and Bristol Bay are approximately 40 percent and 10 percent of their respective FY 77 values. The funding reduction in Bristol Bay is the largest of any of the Alaskan OCS areas and reflects in part the lack of a substantial geohazards program, which would normally continue to receive strong support even in the face of budget reductions and a postponed leasing schedule.

With the exception of sea ice distribution, there do not appear to be major geologic or oceanographic hazards in Bristol Bay. Seismic activity is low and no tsunamis or strong storm surges have been reported. Bottom faulting and sediment stability investigations have not been undertaken, however. Assuming that the present Proposed OCS Planning Schedule for Bristol Bay is not changed, these studies, along with ice investigations, can be initiated in FY 80 with sufficient lead time to influence decisions to be made in 1982 or beyond.

Earthquakes and faulting are potential hazards to OCS development in St George Basin. Seismicity is being monitored coincidentally with the instrumentation from the Aleutian Islands and Alaskan Peninsula described earlier. To date, however, reliable epicenter location has not been possible, since the region contains only one monitoring station north of the Aleutian Islands. OCSEAP is currently evaluating the necessity and feasibility of additional stations. Reconnaissance level seafloor hazards studies, initiated in FY 76, have confirmed the existence of numerous faults and extensive areas of slope instability near the shelf edge. This work is not being continued in FY 79, the rationale being (1) the low leasing priority, (2) the fact that two years of reconnaissance data will have been synthesized by the end of FY 78, and (3) identified regions of seafloor instability have been located on the continental slope but not within the St. George lease area.

Norton Sound is the only Bering Sea lease area remaining on the August 1977 Proposed OCS Planning Schedule. It is also the last of all the Alaskan lease areas presently scheduled for sale (December 1981). Assuming that this schedule is maintained, the results of FY 79 and FY 80 field studies will be available in time to contribute significantly to the EIS.

Reconnaissance marine geological and geophysical surveys conducted through fiscal year 1976 have identified several potential seafloor hazards in Norton Sound, including surface and nearsurface faults, ice gouging, bottom current scour, and gas-charged sediments. Detailed studies of these phenomena were begun in FY 77 and will continue into 1979. These studies will provide critical information for determining the age of recent faulting, recurrence rates and depth of ice gouging, mobility of large bedforms, and stability of gas-charged sediments.

Complex surface processes of the Yukon-Kuskokwim delta region also pose potential hazards and environmental impact problems to onshore development that may occur there in conjunction with offshore oil and gas activity in the northern Bering Sea. These problems include rapidly shifting coastlines and stream channels, permafrost, major flooding associated with breakup, storm-surge erosion, shorefast ice, faulting, and possible volcanism. By the end of the FY 78 field season, sufficient data on such processes will have been generated to define, for the present need, the general nature and distribution of these hazards and to evaluate their implications for siting of onshore processing and transportation facilities. Efforts in FY 79 will be devoted to final data processing and preparation of reports.

Although a first generation Norton Sound sale is not currently scheduled until the end of 1981, it is possible that the recent discovery by OCSEAP investigators of a major submarine oil seep and substantial gas-charged sediments might stimulate sufficient interest that this schedule will be accelerated. In anticipation of this possibility OCSEAP is timing the geohazards studies so that information at a several-tract level of resolution will be available by the end of CY 1980.

Arctic Region

The nature of environmental hazards is quite different in the Beaufort and Chukchi Seas from any of the other Alaskan lease areas and therefore the direction and scope of OCSEAP studies there is also different. In the Beaufort and Chukchi Seas sea ice and subsea permafrost are of primary importance. These hazards are so severe that leasing has been restricted so far to a narrow coastal area in relatively safe shorefast ice.

The studies start with a general, area-wide description of these risks and hazards and end several years later (but prior to petroleum development) with specific information on the nature, location and frequency of hazards, with a high level of geographic resolution. Studies of the location and seasonal occurrence of ice hazards, mechanical properties of sea ice, ice gouging, the movement of sea ice and the properties and spatial distribution of subsea permafrost fall within the scope of OCSEAP research.

Sea ice problems dominated the hazards program in the Arctic. No proven technology presently exists for exploration, much less production, in the ice-covered waters outside the shorefast ice zone. On the ocean bottom, ice gouging is a serious hazard to pipelines and structures. Some data exist on areas of occurrence and density and depth of gouging, although less is known about the frequency of occurrence, age of the gouges and the forces involved. In the Beaufort Sea several more years of effort are needed to fill these gaps. In the Chukchi Sea, which is no longer on the Proposed OCS Planning Schedule and where no research activity is taking place at present, it will take longer.

Maps of annually occurring ice hazards on a large scale (satellite mapping) have been completed for both the Beaufort and Chukchi Seas but the mapping of smaller-scale features (ridge occurrence and geometrics, floe sizes, leads, etc.) has not gone beyond a fairly broad and cursory classification in both areas. Routine remote-sensing flights by aircraft equipped with side looking airborne radar (SLAR), laser profilometer and cameras must continue to give details of ice features with a greater degree of geographical resolution. On the other hand, a historical look at ice conditions over the last hundred years has been completed.

The major gaps in information, and the ones that are of greatest concern to the petroleum industry and regulatory agencies, are in the area of mechanical properties of sea ice, forces applied by moving ice to structures, and the dynamics of shorefast and pack ice. OCSEAP's efforts in this area are very modest in comparision with the needs for information, particularly for later, offshore leases. While OCSEAP work, in some instances funded jointly with industry, is important and should clearly be continued at the present level until exploration commences, it cannot hope to give answers to even a fraction of the problems that remain to be solved. Most will be solved by the petroleum industry, but OCSEAP's continued involvement is important to safeguard environmental concerns.

In summary, ice hazards in the nearshore area of the present lease sale are being more or less adequately researched by OCSEAP and knowledge of major ice problems, even if it is not very extensive, will exist prior to the joint Federal/State Beaufort sale. The same cannot be said for the pack ice zone outside the present lease area, nor for the area-specific problems in the Chukchi Sea. These can only be tackled in new programs preceding additional lease sales.

Detailed understanding of the horizontal and vertical distribution of permafrost becomes important prior to production, when subsea pipelines have to be installed and drill pipes have to be protected. But it is also important to know some characteristics of subsea permafrost prior to exploration. For example, permafrost poses some limitations to directional drilling (angle drilling can only commence after the permafrost layer has been penetrated vertically). If critical sea floor habitats are to remain undisturbed, a knowledge of the thickness of permafrost is required to determine if directional drilling can reach below the center of these seafloor habitats.

The initial, expensive drilling and coring program carried out by OCSEAP in the Beaufort Sea has been discontinued. Emphasis is now on jetting techniques (a jet of water delivered by a high speed pump, which allows pipes to be installed tens of meters into the sediments) to measure temperature, salinity, sediment types and depth to the ice-bonded interface. Modeling continues using these environmental parameters in a joint program with the National Science Foundation. Shallow seismic data, obtained from industry and by OCSEAP field measurements, is being analyzed to give a picture of the horizontal and vertical distribution of permafrost on a large scale. These activities will continue at the present level beyond the exploration phase in the Beaufort Sea. In the Chukchi Sea very tentative subsea permafrost investigations have been discontinued until a lease sale is announced.

Although less serious than those posed by ice and permafrost, hazards associated with seismicity and sea floor instability also exist in the Arctic. Sea floor instability is important along the shelfbreak in the Beaufort Sea, well outside the present lease area, and has not yet been addressed as a problem. Seismicity is a potential problem east of the present Beaufort Sea lease area, also not yet addressed by OCSEAP, but it has been studied in the Chukchi Sea where seismicity is considerably higher. At the end of FY 79 a general understanding of the seismicity and major fault features around Seward Peninsula and into Kotzebue Sound will have been attained.

TRANSPORT

In an assessment of the potential impact of OCS development on the marine environment, the transport and transformation of petroleum-related contaminants is of key significance. Petroleum or other contaminants introduced into the environment can be transported in the atmosphere, water column and sea ice, acting as an intercoupled system. During the transport process, oil and other contaminants undergo continual physical and chemical change brought about by such processes as evaporation, flocculation, emulsification, weathering, biodegradation, and chemical decomposition.

OCSEAP transport studies are specifically designed to provide data that will enable the Department of the Interior and other agencies to:

- Plan stages and siting of offshore petroleum development to minimize the potential risk to environmentally sensitive areas.

- Provide trajectories, coastal landfall, and impact predictions required for cleanup operations in the event of an oil spill or the introduction of other contaminants, trajectories, coastal landfall, and impact predictions required for cleanup operations.

- Assist in planning the location of long-term environmental monitoring stations in the study area.

Three principal transport (physical) pathways are considered in the OCSEAP effort: water, ice and sediments. Of these, coastal circulation is the dominant transporting mechanism in subarctic regions. However, in the Arctic, ice is expected to provide the most significant pathway for much of the year. Consequently, the transport programs in the Gulf of Alaska and the Beaufort/Chukchi Seas have considerably different emphasis. The relative importance of sediments is currently under investigation. To date, OCSEAP investigators have not included studies of the atmosphere as a direct contaminant pathway, but rather as the principal driving mechanism for oceanic transport.

Pacific Region

Oceanographic investigations in the Gulf of Alaska have been carried out sporadically for the past half century, with an increased intensity during the last twenty years. Most studies have been conducted in the open ocean during summer months. Existing knowledge has been limited to a description of the large-scale circulation patterns, based almost exclusively upon periodic, widely-spaced hydrographic data. Such information does not provide adequate insight into the smaller scale circulation features active on the continental shelf and responsible for the coastal transport of contaminants.

Prior to OCSEAP, no systematic physical oceanographic and meteorological studies had been conducted on the Gulf of Alaska continental shelf. Conspicuously absent were long-term direct measurements of coastal currents and winds. OCSEAP transport investigations in the Gulf of Alaska began in FY 75. These studies were designed to proceed sequentially from a regional description of mesoscale oceanographic and meteorological features to an analytical phase of process studies. The various elements of the investigations have included literature summaries, Lagrangian and Eulerian current measurements, hydrographic station data, remote sensing data, and computer models. Meteorological investigations have concentrated on field observations and computer simulation of coastal wind patterns, which, in Alaska, can differ markedly from synoptic geostrophic winds because of the strong effects of coastal orography and land-sea temperature differences.

As the NEGOA was the first OCS area in Alaska to be selected for oil and gas development, OCSEAP study efforts began there in 1975. Between that time and FY 77, studies were concentrated primarily in NEGOA, with much smaller efforts in the western Gulf and lower Cook Inlet. Leasing in NEGOA occurred in April 1976, with results of OCSEAP transport studies contributing significantly to tract selection. By FY 77 all the previously described transport elements were involved in NEGOA studies.

Since 1977, studies in NEGOA have progressed to a stage where a comprehensive view of the regional oceanography and meteorology is emerging. Areas of probable impingement on the western side of Kayak Island and the entrance to Prince William Sound have been identified through field studies and computer simulation. The NEGOA program in FY 79 and FY 80 will consist of a modest field effort and completion of data analysis for the Kyak Island/Hinchinbrook entrance region, in anticipation of the second NEGOA sale presently scheduled for mid-1980.

FY 77 marked the beginning of the first systematic current measurement program ever conducted around Kodiak Island. These studies were intensified in FY 78 and supplemented with a program of mesoscale surface wind investigations. The FY 78 effort is a part of a larger regional study also containing lower Cook Inlet and the Alaskan Peninsula.

Practically the entire body of existing information on mesoscale oceanic and atmospheric circulation patterns in the Gulf of Alaska, Bering Sea, and Arctic OCS areas has resulted from OCSEAP research. Prior to OCSEAP no such information existed. Studies in the Gulf of Alaska, as elsewhere, have initially focused on offshore areas with a spatial resolution of some tens of kilometers. The rationale for this offshore rather than nearshore initial emphasis is several-fold. First, as mentioned, no previous transport information existed commensurate with the spatial scale at which many OCS development activities will occur. A possible exception is for the Beaufort Sea, where ice conditions are so formidable that practically all OCS activity will occur in the nearshore. Second, mesoscale studies are necessary to identify potential contaminant impingement areas. Third, smaller-scale, nearshore processes are often driven by mesoscale mechanisms; thus offshore studies can provide necessary boundary information for subsequent inshore projects. Fourth, there has been a general lack of nearshore development scenarios to derive criteria to guide the design and placement of appropriate studies. Fifth, considering budgetary constraints and the amount of coastline included in the present lease areas, substantial nearshore investigations must be justified on the basis of either (1) process-oriented studies in select "model systems" whose dynamics may reasonably be extrapolated to other regions; or (2) the coincidence of an important biological community with either planned nearshore development activities or likely impingement established from previous studies.

Most field activity associated with transport studies in the Gulf of Alaska is being terminated at the end of FY 78. The effort in FY 79 will be devoted almost entirely to data analysis, interpretation and synthesis, and continuation of modeling activities. The modeling effort is expected to have progressed sufficiently to be routinely applied, and for the first time it will have the benefit of oil gathering alogorithms and realistic surface wind inputs obtained from other OCSEAP studies.

In FY 79 and beyond, studies of sediments as a contaminant transport mechanism will not focus on obtaining estimates of sediment fluxes, but instead will be directed toward obtaining a more quantitative picture of the processes governing sediment interaction with petroleum. Such field studies will be confined to lower Cook Inlet and Norton Sound, which can be considered to be natural laboratories in that they have both high suspended sediment loads and existing sources of hydrocarbons.

During the second half of FY 78, a major emphasis of the Gulf of Alaska transport studies program will be the beginning of a synthesis of all available OCSEAP information on oceanographic and meteorological circulation patterns and processes. The FY 79 effort will be devoted almost exclusively to this task. The expected product is a single report, prepared through a collaborative effort among investigators of all relevant studies, summarizing what is known about the Gulf of Alaska as a transport system. Initial planning, including specific task assignments, will occur during the May 1978 physical oceanography/meteorology workshop.

Bering Sea Region

For the most part, the history, present status, and projected future of transport studies in the Bering Sea parallel the situation in the Gulf of Alaska. The Bering Sea effort began in Bristol Bay and St. George Basin in FY 75 as a pioneering program to obtain mesoscale hydrographic and long-term moored current meter data.

Prior to this, essentially nothing was known about the energetics and spatial and temporal variability of mesoscale circulation anywhere in the eastern Bering Sea.

A modeling effort was initiated in FY 76 and the field program was intensified during FY 77. At the same time studies were also extended into Norton Sound and the Chukchi Sea. This effort produced a milestone set of data, including beneath-the-ice overwintering, from a current meter array moored for nearly a year. During FY 78, the Norton Sound studies are focused more heavily within the Sound itself, a primary objective being the estimation of residence times within the eastern and western portions of the embayment. In FY 78, field studies were not conducted in the Chukchi Sea by virtue of its removal from the leasing schedule. For the same reason, and the fact that studies were initiated in FY 75, the field effort was sharply curtailed in the southern Bering Sea during FY 78.

OCSEAP does not plan to continue oceanographic field work in the southern Bering Sea during FY 79. The only field work planned for Norton Sound during FY 79 is the initiation of a coastal meteorology study. The lack of a meteorological field program in the Bering Sea is the one significant difference between OCSEAP-supported studies in this area and from those in the Gulf of Alaska. Since neither Bristol Bay nor St. George Basin appear on the August 1977 Proposed OCS Planning Schedule, meteorological field studies in these regions can be postponed.

Because observations conducted by NOAA suggest that the ice edge may play a dominant role in inducing significant mesoscale departures from geostrophic winds deduced from large scale pressure maps, such investigations are needed in Norton Sound. Proposed initiation of these in FY 79 will provide sufficient lead time for the nominal 2 to 3 year study period required to adequately describe the coastal wind field. As for the Gulf of Alaska, virtually the entire transport effort in the Bering Sea during FY 79 will be a synthesis of existing information.

Arctic Region

In FY 75 a modest offshore study program was begun in the Beaufort Sea for the purpose of investigating the hydrographic regime and ocean circulation under the ice of the Beaufort Sea continental shelf. Prior to OCSEAP, no such information existed. By the end of FY 78 sufficient information will be in hand to terminate these studies in the offshore areas for the present and concentrate fully on important problems nearshore. This nearshore oceanography program only began in mid-1977 and must cover large existing information gaps on nearshore circulation and transport of sediments, detritus, nutrients and biota, as well as pollutants. The fluxes of these materials characterize and maintain the biota-rich nearshore environment. Their perturbation by offshore development (causeway construction, gravel pits or mining on islands, gravel island construction, etc.) may have major effects on an important segment of the biota in the Beaufort Sea. The nearshore transport studies are a part of an integrated ecological process study involving most of the OCSEAP disciplines.

The dominance of sea ice in the Beaufort and Chukchi Seas has caused the emphasis on transport studies in these areas to differ in two significant aspects from those in any other lease area. First, there is a considerable effort toward a better understanding of ice motion and oil-retention properties, since the ice itself is likely to be a major transport pathway for much of the year. Second, an emphasis on nearshore oceanography has occurred earlier in the Beaufort Sea than in the other lease areas. One reason for this early emergence of nearshore studies is the fact that overwhelming offshore ice hazards will restrict all OCS development activities to the nearshore region for the foreseeable future. Hence a clearer picture of probable nearshore development scenarios is available for the Arctic than for any other lease area.

In the Chukchi Sea, more was known about the large scale physical oceanographic processes than in the Beaufort Sea. OCSEAP has rounded out the picture for the offshore field studies in FY 78. The FY 79 effort will be devoted to data synthesis to complete the regional circulation picture of the northern Bering Sea and Arctic Ocean. A nearshore program has not yet materialized in the Chukchi Sea and awaits announcement of a lease sale.

Transport of pollutants by ice is more important in the Arctic, but also less well known. Large-scale ice drift trajectories have been studied by OCSEAP in both the Beaufort and Chukchi Seas and have contributed to the known picture of the general ice circulation, although year-to-year variations in this drift provide large excursions from the "normal," expected behavior of the ice. These studies will be replaced in mid-1978 by a more comprehensive new program examining all aspects of the behavior of oil in ice, including the microscale as well as large-scale transport of spilled ice in an ice matrix. This program is expected to continue at least two years.

No specific oil-in-ice program is planned for the Chukchi Sea at present, but results from the Beaufort Sea study can probably be extrapolated to some extent into the Chukchi Sea. Exceptions are the annual ice outbreaks from the Chukchi to the Northern Bering Sea, which are occurrences that do not reflect parallel events in the Beaufort Sea. These outbreaks are important in transporting large volumes of ice, with any pollutants entrapped in the ice very rapidly over long distances. A sea-ice surveillance radar on Bering Strait has tracked these events for a year now and will continue to do so for another year.

BIOLOGICAL POPULATIONS AND ECOLOGICAL SYSTEMS AT RISK

A major incentive for conducting studies of biological populations is to determine which populations, communities, and ecosystems are at risk from either acute or chronic insults. Estimates of the distribution and abundance, migration, feeding sites, and behavior of populations are among the first studies undertaken to establish potential vulnerability. The further criteria of uniqueness, importance to the ecosystem, sensitivity, and aesthetic considerations must be examined in order to define fully and assess the value of a species or community and the consequences of the insult. When vulnerability is indicated, detailed site-specific studies will be undertaken to focus on processes, trophic and populations dynamics, sensitivity to disturbance, habitat dependence, and physiological characteristics. The interrelationships among various components and processes of ecosystems will be increasingly emphasized in site-specific studies.

The first several years of OCSEAP biological studies have generally been concerned with establishing the distribution and abundance of key biological species through "reconnaissance" surveys. For the higher trophic levels these investigations have also had as an objective the identification of critical habitats, migratory routes and principal breeding locations. Much of the required data on abundance, distribution, and timing of important or characteristic species in most lease areas had been obtained by the end of FY 77. Those few reconnaissance studies remaining in FY 78 will not be continued in FY 79. A major shift in emphasis in biological studies away from reconnaissance-level surveys to food web reproductive ecology was initiated in FY 78.

Pacific Region

The shift in emphasis toward process-oriented biological studies is reflected in the design and implementation of two major biological programs in the Gulf of Alaska in FY 78. These studies, to be conducted in the Kodiak and lower Cook Inlet lease areas, will emphasize environmental factors affecting biological populations and communities and the phenology and ecology of selected species. The studies, with at least a three-year duration, will have as a basic objective the description, analysis and verification of the ecological community structure of selected coastal ecosystems with regard to potential impacts of oil and gas development in the Kodiak Archipelago and lower Cook Inlet.

A similar study is in the planning stage for the NEGOA lease area; however, it is not clear at present what level of effort the FY 79 and future budgets will allow.

Bering Sea Region

As in the case of the Chukchi Sea, the OCSEAP support of biological studies in the southern Bering Sea declined sharply between FY 77 and FY 78 as a result of the postponement of sale dates for both Bristol Bay and St. George Basin beyond 1981. However, the importance of the southern Bering Sea as a region of extraordinarily high productivity supporting major fishery resources dictates that a modest level of biological research be continued.

One of the major tasks addressed at the Salishan workshop on the Bering Sea Ecological Processes Study (October 3-6, 1976) was conceptualization of process-oriented studies and initial data needed to develop a modeling approach to most closely fit OCSEAP objectives. Such a scheme should be designed to provide tools for an integrated interpretation of environmental data. In keeping with this approach, an important element of the modest FY 79 program in the southern Bering Sea is the investigation of the feasibility of a multi-component, dynamic, numerical ecosystem model for the region. Preliminary results from this model, developed in FY 76, suggest that most of the qualitative and quantitative dynamics of the marine ecosystem, such as interactions between species, interactions between species and the environment, and the effects of man's actions on species and the ecosystem, can now be studied and quantified. Thus, during FY 79, this project will be continued to incorporate all BLM/OCSEAP generated data into an evaluation of the sensitivity of the eastern Bering Sea ecosystem to perturbations from oil development.

Studies beyond FY 79 will depend partly on the future leasing schedule and partly on how well the ecosystem model performs as an integrative tool during the FY 79 testing phase.

In Norton Sound it is planned that FY 78 reconnaissance level surveys of intertidal and subtidal benthos and for certain species of birds and marine mammals not be continued in FY 79. Emphasis will be placed on synthesis of environmental data on factors affecting biological populations and communities and on the phenology and ecology of selected species. A sound knowledge of the spatial and temporal distribution of major organisms, their migratory pathways, habitat dependence and potential susceptibility to impact is a prerequisite to a thorough understanding of the ecosystem in sufficient appropriate detail and realism to assess impacts of OCS development.

A large amount of avian data has been obtained in Norton Sound and reported by several research units. Broad-scale reconnaissance studies were completed in FY 77, and reproductive ecology and phenology of certain bird species and foraging excursions from major rookeries are being addressed during FY 78. It is planned that these data be used to identify effects of large-scale environmental changes on bird communities and to estimate population density fluxes, biomass changes and bioenergetic demands of important bird species.

Studies on the seasonal distribution and feeding habits of marine mammals in Norton Basin will emphasize the synthesis of data from previous years, especially on the association of mammals with the ice edge and on the spatial and temporal variations in food habits. Field studies will be undertaken in late FY 79 or later only if this synthesis reveals significant information gaps requiring additional work.

Studies to determine pathological conditions and major causes of morbidity and mortality in marine mammals were initiated in this area in FY 78. It is planned that these studies be continued in FY 79.

Arctic Region

The OCSEAP biological effort in the Beaufort Sea began in FY 75. As in other lease areas studies were initially reconnaissance level surveys of distribution and abundance of principal biota. The shift toward specific process studies in geographically limited regions began somewhat sooner in the Beaufort Sea than in the other lease areas. By FY 76 initial planning activities for an interdisciplinary ecological process study in the Simpson Lagoon/Barrier Island system were already underway. Survey studies of distribution and abundance of marine mammals, birds, and fish were essentially completed by the end of FY 77, and in FY 78 the biological studies showed a marked change in direction toward an emphasis of process studies to determine the interdependence of the various biological species and their dependence on habitats and abiotic parameters. Population dynamics, year-to-year variability, life cycles, and food web dependencies received major attention in FY 78. These studies are scheduled to continue through FY 79.

By the proposed lease sale date, adequate survey and process information on biota seem fairly well assured for the purpose of environmental protection during the exploration phase of the nearshore lease tracts. Followup studies demand continued efforts at synthesis of information between 1979 and 1981, prior to development.

In the Chukchi Sea the biological program has progressed more slowly than in other lease areas because of the steady decline in funding level since that region was removed from the sale schedule. The total authorized funding level for FY 79 is about 20 percent of the FY 77 value and biological studies have been de-emphasized accordingly. The FY 76 program in the Chukchi Sea will still be largely in a reconnaissance mode.

By 1980, general information required on certain aspects of the biota will be: survey and process understanding on major bird and mammal populations; littoral zone work on invertebrates, plankton and birds; and some plankton and benthos information on the northern Chukchi. Noticeably absent will be a fisheries survey and inventory, as well as process understanding and coastal habitat knowledge in Kotzebue Sound - Selawik Lakes regions, where the complex shoreline made survey efforts too expensive to undertake in FY 76, when they could have been done.

EFFECTS

The OCSEAP effects program is an ongoing effort, not coupled specifically to the schedule for any particular lease area. The results of the effects studies are used in establishing causal relationships between OCS-related perturbations and physiological or biological change, and form the basis for developing discharge regulations and operating stipulations. In addition, OCSEAP is evaluating biological responses to OCS stresses for their potential usefulness as early warning indicators or monitoring aids in detecting or quantifying environmental change.

OCSEAP initiated the program of effects research at the inception of the lease area studies program. Effects studies to date have consisted mainly of laboratory efforts. In FY 79, however, there will be a substantial shift toward field studies designed (1) to verify or validate laboratory observation under realistic field conditions and (2) to generate data on exposure concentrations and compositions likely to occur under various environmental conditions. The field observations and data are important for improved interpretation of laboratory results. In addition, there will be an extension of the program from its previous focus on the direct effects of petroleum to include studies of other OCS-related perturbations on the marine environment.

3.3.2.2 SOCIOECONOMIC STUDIES

The socioeconomic studies has focused only in two areas in past impact analysis efforts, although the plans are to establish a data base for each of the three geographic regions identified in the study plan. To date archaeology probability studies have been in the Bering Sea, Chukchi Sea, Western Gulf and Beaufort Sea. The lower Cook Inlet area is just under contract which will complete all possible areas surrounding the state.

The impact process that has been developed to evaluate local, regional and statewide impacts due to OCS petroleum development has worked successfully from the beginning. It has been applied to the Arctic region and is currently under contract for completion in the Pacific region.

The impact evaluation process is divided into three parts: preparation of petroleum development scenarios, analysis of statewide and regional impacts, and analysis of local level impacts. The scenarios are the oil and gas development hypotheses driving the impact analysis. Four scenarios of different magnitudes are prepared for each lease sale and these provide a range of potential direct employment and equipment characteristics together with the likely location of both in the region. The statewide/regional analysis focuses on the statewide effects of cumulative and incremental lease sales and the distribution of these effects among certain defined sub-regions of the state. The local level analysis focuses on the direct effects of the lease sale under study on affected communities (defined in their broadest sense) and the cumulative direct impacts from other previous sales, if any previous sales have affected the same community. In addition, at the local level, where community level services are or may potentially be provided by some higher unit of government, the projected change in such services is evaluated relative to the community rather than relative to the service itself or to the providing agency.

With FY 76 and FY 77 monies the program established its management approach, initiated a statewide literature survey, and concentrated on preparing the petroleum development scenarios, community and regional socioeconomic baseline information and impact analysis for the Arctic region. With FY 1978 funding, the program is concentrating on the same impact evaluation process for the Pacific region. Monitoring has begun only to evaluate impacts related to petroleum development scenarios. Very few social, cultural or economic studies have occurred in Alaska and, therefore, existing data are limited. This lack of data requires additional effort to obtain current, accurate information to make an impact assessment.

3.4 PROGRAM ADMINISTRATION

A program of environmental studies is only effective if there is an organizational structure capable of supporting and implementing it. Following is a description of the existing organization with a brief statement of the function of each element.

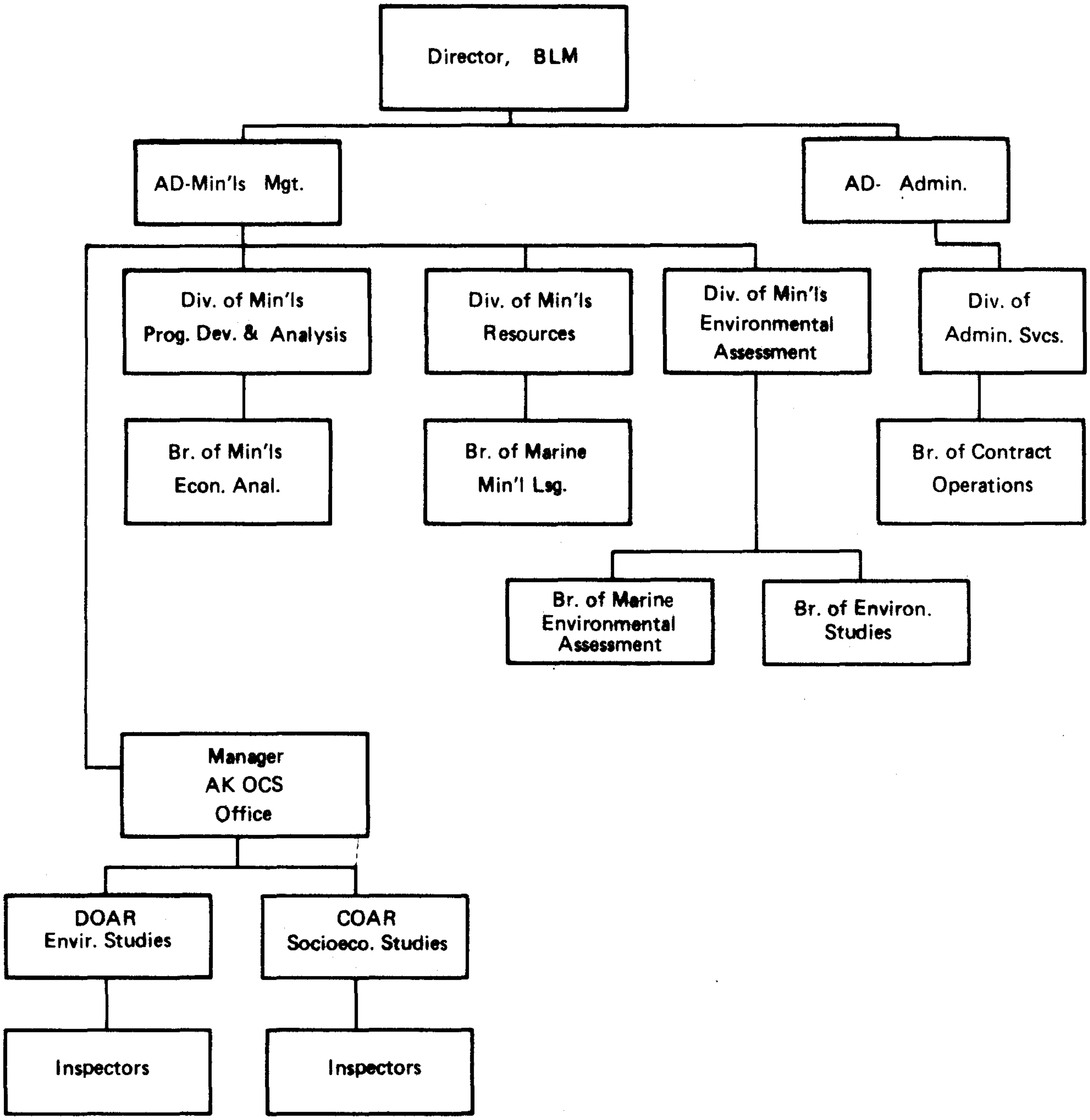
3.4.1 BLM ORGANIZATION

The present BLM organization through which the environmental studies program is administered is shown schematically in Figure 3-2. There are basically two Assistant Directors (AD) who have responsibilities for different aspects of the program: the AD for Minerals Management has direct control over the studies program content and supervision, while the AD for Administration has control over the contracts branch which procures all studies and oversees the administration of contracts.

At the present time studies are being conducted by two separate branches at the Washington Office level: the Branch of Environmental Studies and the Branch of Minerals Economic Analysis (Socioeconomic Studies). Not only are these separate branches, they are under separate Divisions. In addition, each field office has a studies staff to the OCS Manager that is responsible for administering studies at the field level (see Figure 3-2). This staff provides technical interface between the contractors and the contracting officers in Washington: they provide an interface between the environmental assessment staff and the studies program for translation of needs into work statements; and they provide an interface

Figure 3–2

BLM ORGANIZATIONAL STRUCTURE FOR ENTITIES RELATED TO STUDIES MANAGEMENT



for the Washington Office environmental studies staff and the field office for scheduling, regional needs, and current status of projects.

Statements of the responsibilities of the various entities involved in the two studies are given below. These have been extracted, either completely or in excerpt, from the Department of Interior Manual or the BLM Manual. The Branch functions are unofficial statements; not a part of either manual, that were written for internal management use.

- Assistant Director - Minerals Management: responsible for developing and implementing coordinated minerals . . . policy, programs, standards, and technology . . . on the Outer Continental Shelf. Is the line official responsible for supervision of Bureau responsibilities for management of the Outer Continental Shelf. Is responsible . . . preparation and review of statements.

- Chief, Branch of Minerals Economic Analysis: responsible for (1) Identifying OCS socioeconomic study policy needs. (2) Coordinating policy and program within the Washington Office and with other Federal agencies. (3) Providing socioeconomic studies policy guidance to BLM OCS Offices. (4) Identifying programmatic information needs, or modes of information gathering and analysis. (5) Ensuring that data from the socioeconomic studies are readily usable by decision-makers. (6) Coordinating with Branch of Contract Operations (551) in development and issuance of socioeconomic contracting documents.

- Chief, Division of Minerals Environmental Assessment: responsible for Bureau minerals and energy related environmental programs and activities. Gives operational guidance to Bureau (OCS Offices) regarding minerals and energy related environmental activities and programs. Develops and reviews environmental policy, programs, and procedures. . . . Has headquarters office responsibility for preparation, coordination and review of environmental statements. Identifies and coordinates Bureau minerals and energy related study needs. Provides Bureau liaison with research and study activities in other agencies. Coordinates Bureau study contracts related to minerals and energy programs and activities. Develops and provides technical oversight for policies, standards, and procedures relating to issuance and compliance of offshore pipeline rights-of-way.

- Chief, Branch of Marine Environmental Assessment: responsible for (1) Development of minerals related environmental policy for oil and gas leasing, seabed mining, deepwater ports, coral reef protection, pipeline corridors, coastal zones that are within the area of influence of offshore activities and other actions that are within the Bureau's scope of responsibilities; (2) Directing the preparation of environmental statements and other types of environmental analysis; (3) Reviewing environmental statements of other Federal agencies that impact on the coastal and marine environment; (4) Providing marine minerals policy guidance and technical support on environmental matters; (5) Advising the Branch of Environmental Studies and OCS Office of environmental data needs, and for reviewing data gathered in the OCS environmental studies program and assimilation of this data into environmental statements and other decision and lease management procedures.

- Chief, Branch of Environmental Studies: responsible for the technical adequacy of marine environmental research studies related to OCS minerals development, deepwater ports, coral reef protection, pipeline corridors, coastal zones that are influenced by offshore activities. This includes: (1) Identification of research needs; (2) Implementation of studies for gathering data upon which management decisions are based; (3) Insuring high quality of data research programs; (4) Insuring data is usable by decision-makers and available to Bureau personnel and other interested parties. (Does this in coordination with the Branch of Marine Environmental Assessment); Schedules initiation of studies and technical expertise in developing requests for proposals (RFP's), evaluating proposals, and negotiating contracts. Assesses new research techniques, systems, and technologies. Maintains contact for marine environmental research funded by BLM. Maintains liaison with the OCS representatives of other Federal agencies regarding marine research.

- Chief, Branch of Contract Operations: responsible for developing and issuing legally and administratively sufficient contracts for procurement of environmental and socioeconomic data for use by OCS decision-makers. Is also responsible for monitoring contract performance and acceptance of completed contracts.

- Alaska OCS Manager:

    - for the Environmental Studies Program: responsible for implementing requirements as contained in approved interagency agreements. Provides overall guidance and interface with Environmental Research Laboratory Director on matters relating to implementation of the basic agreement and interagency agreements. Provides general overview of work under interagency agreements and Designated Officer's Authorized Representatives (DOAR's) and Principal Investigator's (PI's) activities to insure consistency of interpretation and overall program progress. Provides information regarding most current official leasing status so that studies schedules may be kept responsive to BLM information needs. Under his aegis, the OCSEA documents are reviewed for consistency with other studies, timeliness, technical adequacy, and responsiveness to BLM needs.

  - For the socioeconomic studies program, the manager is responsible for all socioeconomic studies matters within the field office. Provides overall guidance to the direction of the program. Provides general review of work under the contract and/or interagency agreements and the Contracting Officer's Authorized Representative (COAR) activities to insure consistency of interpretation and overall program process. Provides information regarding most current official leasing status so that studies schedules are kept responsive to needs.

- Designated Officer (DO) (Environmental Studies)
  - Coordinates development and negotiation of the Basic Agreement. Coordinates, negotiates, signs and administers interagency agreements. Negotiates modifications as necessary. Assures funds are available. Processes payment. Is primary contact on all legal and business matters relating to the agreements. Coordinates action on any matter which requires modification or official interpretation of the language of the B.A. or I.A.

- Designated Officer's Authorized Representative (DOAR) (Environmental Studies)

  - Monitors performance under the Basic Agreement. Reviews Technical Development Plan (TDP), and assists in negotiation of interagency agreements. As designated by the Designated

Officer (DO), provides technical administration of the I.A.'s, i.e., monitors performance, assures compliance with terms, schedules and specifications, and reviews deliverables. Provides total interface with Outer Continental Shelf Environmental Assessment Program (OCSEAP) Director and Project Managers on I.A.'s. Reports problems, need for changes, etc., to the Designated Officer. Is responsible for commitments made by BLM under I.A.'s.

- Contracting Officer's Authorized Representative (COAR) (Socioeconomic Studies)

  - Monitors performance of the prime contractor and all subcontractors. Reviews technical documents from subcontractors and management documents of the prime contractor. Prepares and reviews Statements of Work (SOW's) and assists in negotiating the Task Orders. As designated by the Contracting Officer, provides technical administration of the Task Orders, i.e., monitors performance, assures compliance with terms, schedules and specifications and reviews deliverables. Reports problems, needs for changes to the contracting officer. Serves as Director, Socioeconomic Studies Program and coordinates with the Environmental Studies Program and the other Division staffs to ensure that Requests for Proposals or SOW's are written in such a way as to insure correct information is obtained. Provides the coordinating link between the socioeconomic studies program and various local, regional, state and federal agencies to assure minimum of overlap of studies.
- Inspectors (Both studies programs)
  - Monitors and inspects work efforts funded with BLM monies including site visits to principal investigators, review of work progress and progress reports. Inspectors report

any unusual problems to the Designated Officer's Authorized Representative (DOAR) or Contracting Officer's Authorized Representative (COAR) and where appropriate, recommend actions to the DOAR (COAR) that may affect the subtasks, research units or tasks orders. Inspectors are authorized by contracting officer.

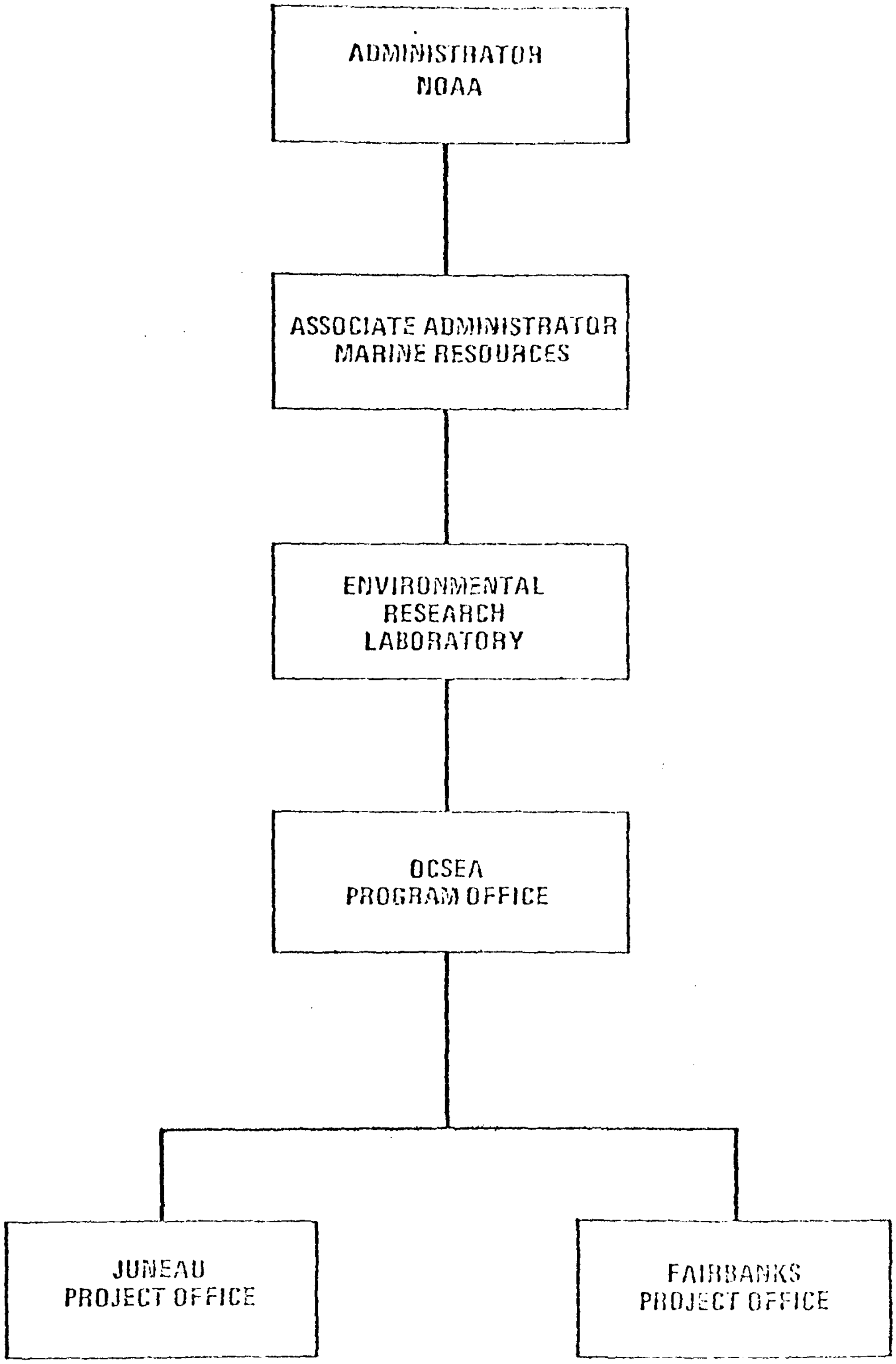
3.4.2 NOAA/OCSEAP PROGRAM MANAGEMENT ORGANIZATION OF ENVIRONMENTAL STUDIES

The NOAA, through Basic Agreement with the BLM, has responsibility for the definition, design and development of the OCS Environmental Studies Program in Alaska and authority for carrying out its implementation with funding by reimbursement from BLM. The organizational structure established to carry out this program is shown in Figure 3-3.

- NOAA Headquarters

In carrying out the NOAA role, the overall program direction and policy guidance for the OCSEAP is the responsibility of the Associate Administrator for Marine Resources (AAMR) with the Associate Administrator for Environmental Monitoring and Prediction (AAEM&P) providing guidance and advice on the design and implementation of applicable portions of monitoring programs. The AAMR will co-sign the Basic Agreement, Interagency Agreements, and any modifications of these documents. He is accountable for commitments made by NOAA pertaining to OCSEAP and will interpret for NOAA any disagreements relating to the Basic or Interagency Agreements. The Chief, Office of Marine Environmental Protection, on the staff of the AAMR, is the point of contact for BLM's Chief, Branch of Environmental Studies.

FIGURE 3-3



NOAA ORGANIZATIONAL STRUCTURE

- NOAA Environmental Research Laboratory Director

    - Direct management responsibility for the supervision of OCSEAP is assigned to the Director of the Environmental Research Laboratories (ERL). In addition, the Director insures that the directives from NOAA Headquarters are carried out. He also provides the necessary administrative support services to OCSEAP. The Director interfaces with the Manager of the Alaska OCS office on matters relating to implementation of the Basic Agreement and Interagency Agreements.

- OCSEA Program Organizational Structure

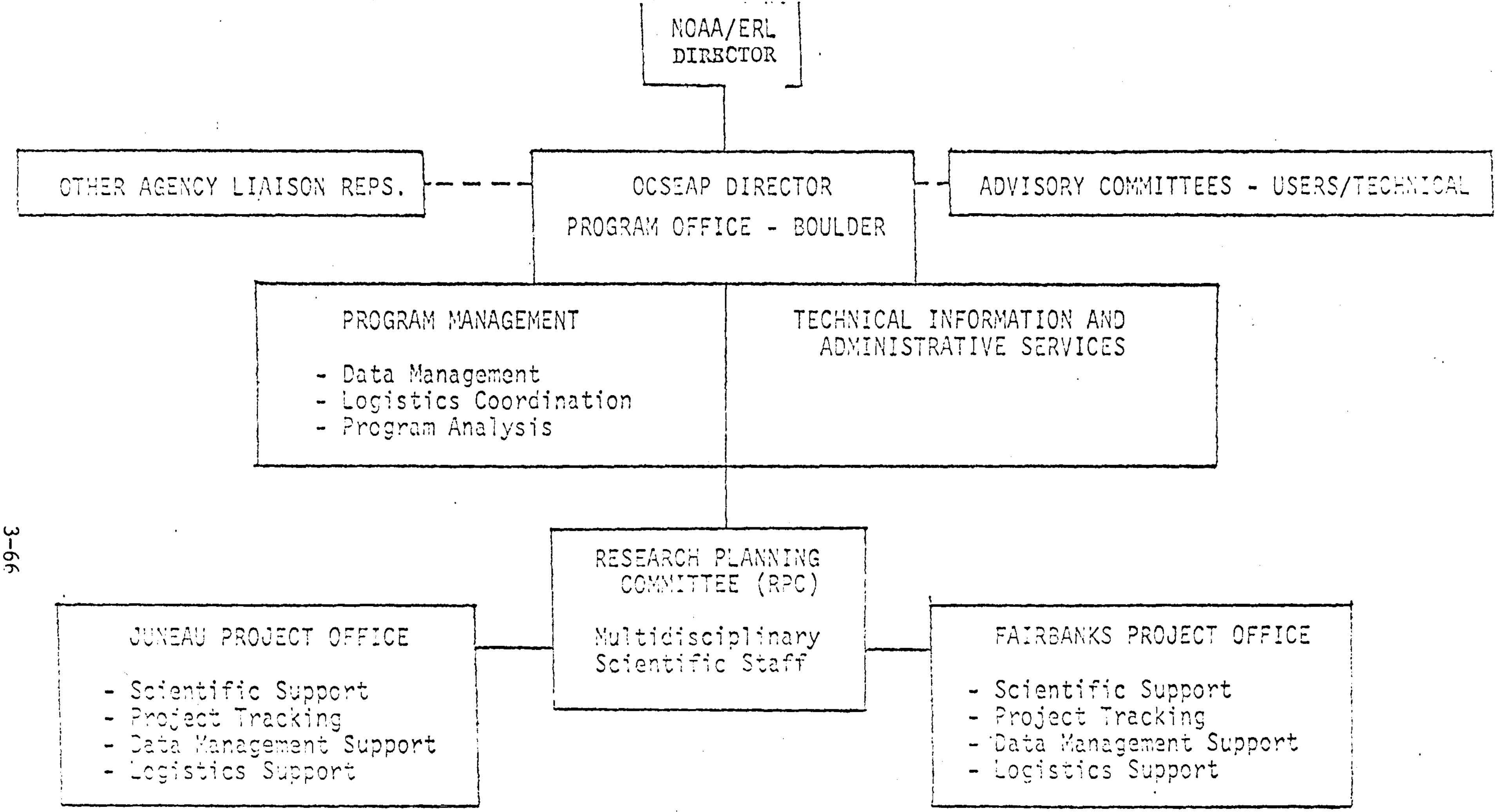
    - An Alaskan OCSEA Program Office has been established within the Environmental Research Laboratories. The organizational structure of the OCSEAP, shown in Figure 3-4 consists of a Program Office, located in Boulder, Colorado, and Project Offices in Juneau and Fairbanks, Alaska.

- OCSEA Program Office

    - The OCSEA Program Office is responsible for overall program development, planning, organization, staffing, direction, control, selection of investigators and coordination. This office is responsible for direct interaction with the BLM-OCS Office in Anchorage in program management and implementation. OCSEAP's major functions include the following:

        1. Specify data, models, maps and information needed for environmental assessment of the Alaskan OCS;

FIGURE 3-4



OCSEAP ORGANIZATIONAL STRUCTURE

2. Prepare annual plans;

3. Negotiate contracts and interagency agreements to carry out the plans;

4. Coordinate research investigations;

5. Determine ship and aircraft schedules and provide logistic support to investigators;

6. Monitor contracts, evaluate performance, and take corrective action if necessary;

7. Schedule and monitor data flow;

8. Combine and integrate the data collected;

9. Derive an understanding of how the environment in a lease area works as a physical-biological system;

10. Prepare and distribute reports;

11. Provide program output for assessments, making timely input for decisions on leasing and development; and

12. Organize, fund, train, equip, and manage Spilled Oil Research Teams.

To insure implementation of these basic management responsibilities, the Program Office is functionally structured as follows:

- OCSEA Program Director

The Program Director's fundamental responsibility is to insure that OCSEAP is developed and implemented as indicated in the PDP and is capable of satisfying the program objectives. He will have the authority and resources as specified in the Basic and Interagency Agreements to direct or redirect activities in accordance with the best interests of the program as it develops and progresses. It is his responsibility to insure that the program and its elements are developed in the most cost-beneficial manner. His responsibility will be to insure that the program will function efficiently and satisfy the requirements to the maximum degree achievable within the constraints of available resources and time. The basic management techniques by which the OCSEA Program Director will plan, monitor, direct and control the program are described in the Sections entitled:

  - Management Plans (Section 6.7)
  - Management Reports (Section 6.8)
  - Management Reviews (Section 6.9)

- Research Planning Committee

The Research Planning Committee (RPC) serves in an advisory capacity to the Program Director. It is composed of an interdisciplinary senior scientific staff which provides the Program Office with the scientific capabilities to identify needs, define objectives, establish scientific requirements and priorities necessary to carry out the program objectives. This group will function as follows:

- Provide the Program Director with interdisciplinary scientific planning support by designing future studies and recommending modification of existing studies or realignment of priorities as the necessary basis for each year's TDP's.

- Define proposed projects in terms of objectives, recommended approach, relationship to other projects (by lease area and discipline), priorities schedule, leasing schedule, resource requirements, deliverables, cost, performance milestones, required R&D, and operational activities.

- Identify and recommend program requirements to achieve program objectives.

- Provide the Program Director with scientific and technical reviews and evaluations of program direction, needs, and accomplishments.

CHAPTER 4

CHAPTER 4. IMPACTS AND ISSUES

4.7 Timing of Data Needs

4.7.1 Pre-exploratory Phase

4.7.2 Exploratory Phase

4.7.3 Production Phase

CHAPTER 4. IMPACTS AND ISSUES

4.1 INTRODUCTION

Chapter 2 identified the sequence of major decision points and milestones involved in OCS development, the objectives of these major decisions, some of the bases on which these decisions are made, and the general level of detail required of the information bases. The actual decision-makers questions for a specific decision and a means of identifying the information needs based on the concerns of resource managers were not yet addressed.

Many of the types of information needs for federal decision-making in resource management are identified by NEPA requirements, which include an environmental statement (ES) whenever the proposed federal action is deemed to significantly affect the quality of the human environment. Federal resource managers (defined as heads of departments and agencies) are required by NEPA to evaluate the impacts of a major Federal action on the human environment, and to "...include those (impacts) that degrade the quality of the environment, and serve short-term, to the disadvantage of long-term, environmental goals." (CEQ Guidelines for Preparation of EIS, 1973, Section 1500.6(b)). The ES focuses on the specific physical/biological and socioeconomic impacts of a proposed action and its alternatives. The ES is not intended to be a justification of the action, nor is it purported to contain all the information needed by a resource manager for any subsequent decisions. Other economic, technical, and political information may be presented in the final decision-making document, commonly called a SID, which, unlike the ES, is generally prepared in a format that allows comparison of all benefits and disbenefits. The bulk of information input is in the ES, however, and it is there that socioeconomic and environmental information should be presented, synthesized, and analyzed to predict the environmental consequences of the proposed actions and its alternatives. A major source of information for this environmental assessment is published literature, which may or may not contain information specific to the impacts.

Although the NEPA requirements for what an ES is supposed to do define certain types of information requirements (short-term use vs. long-term productivity, primary and secondary impacts), any action the size of a proposed lease sale will have a number of general and specific concerns attached to it. These concerns should be addressed before the first critical irreversible decision point is reached. The first critical irreversible decision point in the process is the award of leases, which follows soon after a sale and the decision to proceed with a sale. It is at this time that the resource manager would benefit from having the important concerns answered, and he should insure that the concerns are answered. Sale decision time is an inopportune time to have important, but previously unidentified, concerns raised.

4.2 RESOURCE MANAGEMENT CONSIDERATION

One method of insuring that the important concerns of the resource manager are addressed is earliest possible identification of these concerns and a systematic problem analysis. Concerns can be formulated as questions, problems, issues or several other forms; the subsequent section identifies the major concerns as nine issues and shows the questions asked by decision-makers in their problem analysis. Systematic problem analysis, when the problems are identified early in the leasing process, can effectively structure subsequent activities such as determination of information requirements, information acquisition, application of analytical methodologies, and identification of data gaps and need for additional studies. A strategy for addressing significant issues, which would include a determination of the relative importance of one concern to another, would allow appropriate staging of information acquisition and analysis to conform to level-of-detail needs at decision points throughout the leasing process. Decision-making in OCS leasing is an iterative and cumulative process, one which allows early decisions to be made on general information but which requires information bases to build upon themselves so that highly specific and complete information is available for subsequent decision. Level of detail and reliability of information required at the early decision points are important considerations.

Any resource manager has a set of issues that he must address in order to make sound decisions. Sound decision-making requires: (1) a comprehensible description of the existing situation, i.e., a summary of existing information that bears on the proposed action; (2) a comprehensible description of all options including the proposed action, each with a discussion of the possible consequences and changes to the existing situation that will occur if that course is followed; and (3) an assessment of the possible changes and choice of the most desirable alternative. A set of issues must be developed by a resource manager, with the aid of lower level decision-makers and technical staff, as they relate to these aforementioned requirements of sound decision-making. Developing these issues is facilitated by the extensive experience that DOI has had in OCS leasing and development and the recurring types of decisions in that program, e.g., tract selection, ES, PDOD (SID), and sales. A formal procedure to identify these issues well ahead of critical decisions has not existed in the OCS leasing program. An approach to such a procedure is given here as a method of streamlining information gathering to provide a more responsive and directed decision-making to all administrative and technical levels and at all steps in the leasing and development process.

4.3 SIGNIFICANT QUESTIONS TO BE CONSIDERED

A set of decision-makers questions is presented in Section 4.4 which addressed the range of major multiple use issues of all phases of OCS development from exploration to production platform removal. The questions represent the type and level of questions appropriate for upper level decision-makers and resource managers to assess for importance early in the process leading to a lease sale. Each of the decison-makers (DQ's) questions are broken down into several mid-level questions to indicate how, once a question has been selected as an important concern, technical questions specific information needs then must be identified. Chapter 5 identifies these technical questions and shows the types of studies needed to provide the information needs to answer these questions.

4.4 OCS MULTIPLE USE ISSUES AND DECISION-MAKERS QUESTIONS

The multiple use issues and decision-makers questions were identified by personnel from BLM assessment and studies groups, each OCS field office, and representatives of USGS and FWS. This section indicates the kinds of decision questions that are identified, but it does not imply that the answers to these questions, or the information needs that derive from the questions are well known or even known at all. These decision-makers questions were identified in the "Study Design" bluebook guidelines given to the field offices for design of the regional study plans.

Nine major issues have been identified from which subsequent regional and local issues can be addressed. These include: subsistence life-styles; commercial fishing; recreation; social infrastructure; marine and coastal ecosystems; air and water quality; archaeological and cultural resources; shipping conflicts; and environmental hazards. A set of questions to resolve these issues can be formulated by systematic problem analysis based on perception of the political, economic, and environmental framework.

4.4.1 SUBSISTENCE LIFESTYLES

$DQ_2(1)$: What losses are expected to be sustained by subsistence consumers of living resources as a result of the leasing proposal?

and

Given the answer to $DQ_2(1)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impacts Producing Agents

- Acute and chronic discharges (catastrophic oil spills and extended low level discharges of oil, formation waters, and drilling muds).
- Offshore and onshore OCS related surface and subsurface structures and associated debris.
- Noise produced by OCS activities.

Q1: What are the expected impacts on critical populations and habitats utilized for subsistence living as a result of the above impact producing agents?

Q_2: Given the expected reduction in critical populations and habitats of subsistence species, what investment in mitigating measures should be made through OCS operating orders, special stipulations, EPA regulations and guidelines, and tract deletions?

4.4.2 COMMERCIAL FISHING

$DQ_2(2)$: What economic losses are expected to be sustained by the (1) fishing industry, (2) consumers of fish products, and (3) the regional economy as a result of the leasing proposal?

and

Given the answer to $DQ_2(1)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impacts Producing Agents

- Acute and chronic discharges (catastrophic oil spills and extended low level discharges of oil, formation waters, and drilling muds).

- Offshore OCS related surface and subsurface structures and related debris.

- Tank farms and other onshore structures.

Q_1: What economic losses are expected to be sustained by the fishing industry as a result of the above impact producing agents?

Q_2: Given the expected reduction in supplies of commercial fish, tainting (perceived or real), and other quality changes in fish stocks, what is the expected loss in welfare (consumer surplus) of consumers fish products?

Q_3: Given the economic losses expected to be sustained by the fishing industry and consumers of fish products, what are the expected changes in regional income, employment, and population?*

Q_4: Given the type and magnitude of economic losses resulting from the impact producing agents, what level of investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, EPA Regulations and Guidelines, and tract deletions.

Q_5: What benefits to the commercial fishing industry, consumers of fish products, and the regional economy are expected as a result of the proposal?

Q_6: What is the expected gain to commercial fishermen as a result of offshore structures providing habitats for fish?

4.4.3 RECREATION

$DQ_2(3)$: <u>What economic losses can be expected to be sustained by (1) the recreation industry, (2) recreationists, and (3) the regional economy as a result of the leasing proposal?</u>

and

<u>Given the answer to $DQ_2(2)$ above, what is the socially efficient level of investment in mitigating measures?</u>

<u>Significant Impact Producing Agents</u>

(1) Acute and chronic oil spills.
(2) Onshore OCS related structures.

---

* The effects of these changes on the infrastructure and social fabric of the area are discussed in section 3.2.3.

Q_1: What economic losses are expected to be sustained by the recreation industry as a result of the above impact producing agents?

Q_2: Given the expected reduction in the supply of recreational opportunities or quality changes, what is the expected loss in the welfare (consumer surplus) of recreationists (other than sport fishermen)?

Q_3: Given the epxected reduction in the catch per unit effort of sport fishermen and tainting of fish stocks, what is the expected loss in welfare (consumer surplus) of these recreationists.*

Q_4: Given the economic losses expected to be sustained by the recreation industry and recreationists, what are the expected changes in regional income, employment, and population?**

Q_5: Given the type and magnitude of economic losses resulting from the impact producing agents, what level of investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, and tract deletions?

Q_6: What benefits to recreationists, the recreation industry, and the regional economy are expected as a result of the proposal?

---

* The information needed to determine the expected reduction in the catch per unit effort of sport fishermen and the extent of tainting is discussed in section 3.4.1, Q_1(3).

** The effects of these changes on the infrastructure and social fabric of the area are discussed in section 3.4.4.

4.4.4 INFRASTRUCTURE AND SOCIAL CONFLICTS

$DQ_2(3)$: What welfare losses (consumers' surplus) can be expected due to infrastructure and social stresses generated by the leasing proposal?

and

Given the answer to $DQ_2(3)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impact Producing Agents

(1) Changes in economic activity

Q_1: What welfare losses are expected as a result of infrastructure stresses induced by changes in the coastal zone economic activity?

Q_2: What welfare losses are expected as a result of social stresses* induced by changes in coastal zone economic activity?

Q_3: To what extent are non-socially disruptive changes in cultural patterns and values deemed a significant loss?

Q_4: What is the expected change in unemployment or underemployment of labor and capital due to net change in economic activity induced by the leasing proposal?

---

*Changes in community values as well as social rank and role.

Q_5: Given the type and magnitude of economic losses resulting from the impact producing agents, what level of investment in mitigating measures should be made through OCS Operating Orders and the Coastal Energy Impact Program?

Q_6: What is the expected reduction in economic losses as a result of the investment?

4.4.5 MARINE AND COASTAL ECOSYSTEMS

DQ_2(4A): What changes in the population and habitat of species are expected to interfere with ecological relationships as a result of the leasing proposals?

and

Given the answer to DQ_2(4A) above, what investment in mitigating measures is necessary to bring the risk of interference with ecological relationships to an acceptable level?

Significant Impact Producing Agents

(1) Oil spills and other OCS related discharges.
(2) Offshore and onshore OCS related surface and subsurface structures, associated debris and noise produced by the activities.

Q_1: What are the expected impacts on critical populations and habitats as a result of the above impact producing agents?

Q_2: What is the expected loss in welfare (consumer surplus) resulting from aesthetic degradation?*

---

* Recreation losses due to aesthetic degradation is discussed in section 4.4.2.

Mitigating Measures

Q_3: Given the expected reduction in critical populations and habitats of species, what investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, EPA Regulations and Guidelines, and tract deletions.

Q_4: To what extent will this investment reduce the risk of interference with ecological relationships?

Benefits

Q_5: What reduction in the number of import tanker spills hitting critical populations and habitats can be expected as a result of the proposal?

4.4.6 AIR AND WATER QUALITY

$DQ_2(5)$: What regional welfare losses (consumer surplus) due to degradation of air and water quality can be expected as a result of the leasing proposal?

and

Given the answer to $DQ_2(5)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impacts Producing Agents

(1) Onshore and Offshore Emissions
(2) Onshore effluents

Q_1: What losses in welfare (consumer surplus) can be expected as a result of onshore air quality degradation?

Q_2: What losses in welfare (consumer surplus) can be expected as a result of onshore water quality degradation?

Q_3: Given the extent to which emission standards are expected to be violated, what investment in mitigating measures should be made through OCS Operating Orders, and EPA Regulations and Guidelines to meet these standards?

Q_4: If standards are not violated and emissions are still expected cause a significant welfare loss, what investment in mitigating measures should be made?

4.4.7 ARCHAEOLOGICAL AND CULTURAL RESOURCES

$DQ_2(6)$: What welfare losses due to damage of archaeological and historic resources can be expected as a result of the leasing proposal?

and

Given the answer to $DQ_2(6)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impacts Producing Agents

- Acute oil spills and significant well drilling related discharges (e.g., cuttings and drilling muds).
- Placement of OCS related structures, both offshore and onshore.

Q_1: What welfare losses are expected as a result of archaeological and historic resources being damaged or destroyed by oil spills?

OCS Related Structures (i.e., Offshore and Onshore)

Q_2: What welfare losses are expected as a result of archaeological and historic resources being damaged or destroyed by the placement of OCS structures?

Q_3: Given the expected damage to archeological and historic resources, what level of investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, and tract deletions?

4.4.8 SHIPPING CONFLICTS

$DQ_2(7)$: What economic losses are expected to be sustained by the shipping industry as a result of the leasing proposal?

and

Given the answer to $DQ_2(7)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impacts Producing Agents

- OCS offshore surface structures
- Acute oil spills
- OCS related vessel traffic

Q_1: What economic losses can be expected as a result of collisions between ships and offshore structures?

Q_2: What economic losses can be expected as a result of acute oil spills?

Q_3: What economic losses can be expected as a result of OCS related vessel traffic?

Mitigating Measures

Q_4: Given the type and magnitude of economic losses expected to result from the impact producing agents, what level of investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, EPA Regulations and Guidelines, and tract deletions?

4.4.9 ENVIRONMENTAL HAZARDS

$DQ_2(8)$: What natural environmental hazards are expected to interfere with OCS exploration and development activities as a result of the leasing proposal?

and

Given the answer to $DQ_2(8)$ above, what investment in mitigating measures is necessary to bring the risk of interference with OCS exploration and development to an acceptable level?

Significant Impact Producing Agents

(1) Environmental hazards (geologic, meteorologic, and oceanographic) to OCS related structures and facilities

(2) Biotic behavioral response to OCS related activities

Q_1: What are the environmental hazards both to OCS related activities and induced by OCS activities?

Q_2: What types of biotic interference presents a hazard to OCS related activities?

Q3. What is the effectiveness of various types of mitigating measures in protecting against catastrophies caused by environmental hazards?

4.5 PROBLEM SOLVING FRAMEWORK OF ANALYSIS

In developing a problem solving framework of analysis for decision-makers from which areas of environmental studies can be identified, the following elements must be present:

A. Specification of expected economic losses by each major multiple use conflict.

B. Specification of expected economic losses by each major impact producing agent.

C. Flexibility to accommodate more detailed specification of environmental and/or economic losses and study needs by decision point and region.

4.5.1 Specification of Expected Economic Losses by Major Multiple Use Conflict

Decision-makers need to know the magnitude of economic losses which are expected to be sustained as a result of use conflicts generated by the leasing proposal. They also must know the extent to which these losses are minimized through mitigating measures. These factors will provide information for the estimation of the net social value of the lease sale including an assessment of the losses due to environmental degradation. The nine major decision-makers' questions (DQ_1) with respect to multiple use conflicts in Alaska were given in the preceding Section (4.4).

4.5.2 Specification of Expected Economic Losses by Impact Producing Agent

Specification of economic losses by impact producing agent is necessary for decisions concerning the proper level and type of investment to be made in mitigating measures.

In this context, the decision-makers' questions are:

> What economic losses or welfare are expected to be sustained as a result of the following impact producing agents?
>
> (1) Oil spills and other contaminant discharges.
> (2) OCS related Onshore Structures.
> (3) OCS related Offshore Structures.
> (4) Changes in Economic Activity.
> (5) Air Emissions (Onshore and Offshore).
> (6) Onshore effluents.
> (7) Increased vessel traffic.
>
> and
>
> Given the type and magnitude of these losses resulting from the impact producing agents, what level of investment in mitigating measures should be made through application of OCS Operating Orders, Special Stipulations, EPA Regulations and Guidelines, the Coastal Energy Impact Fund, Rules, and tract deletions?

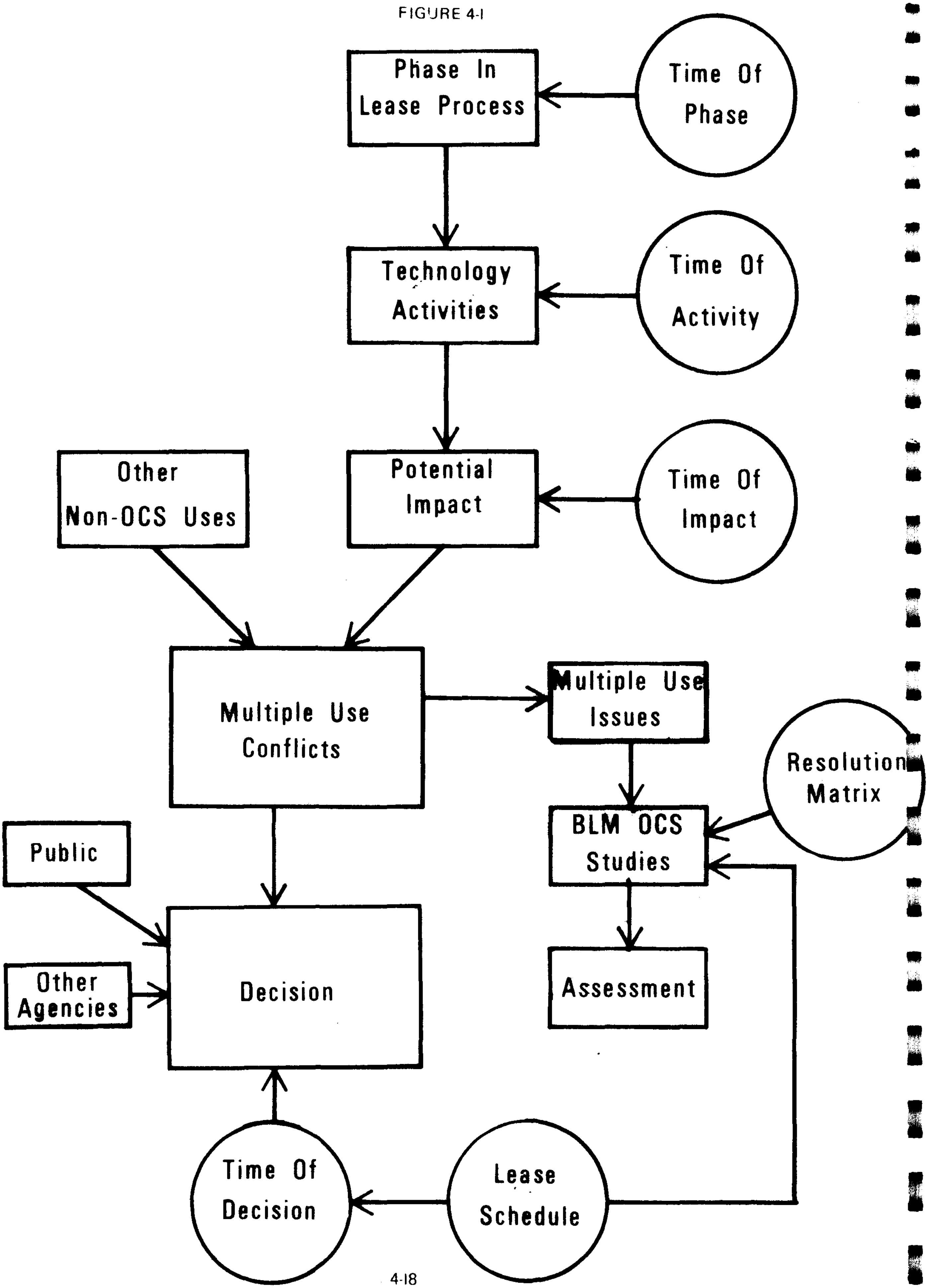
4.5.3 Flexibility to Accommodate Specification of Economic Losses and Information Needs by Decision Points and Region

The importance of various multiple use conflicts $(DQ_2(1)) - (DQ_2(9))$ presented above will not vary by decision point but may change regionally. Conversely, the degree of resolution of information on the major impact producing agents will change by decision point, but will not change regionally. As a result, the problem solving framework of analysis developed must be flexible enough to accommodate these factors. For example, at the time a leasing decision is made in a frontier area, a hypothetical development scenario is used to estimate the expected environmental impacts, and impact producing agents are specified in rather broad terms. Mitigating measures such as Special Stipulations and OCS Operating Orders are often open ended and subject to change.

4.6 TECHNOLOGY, ACTIVITIES, AND IMPACTS

A series of steps that occur in OCS minerals management were identified in Chapter 2. Decisions associated with these various steps control specific activities, technology, or collections of equipment brought into play. Equipment, through its presence or through the by-products of its operation, may cause environmental impacts; for example, a favorable decision to lease "turns-on" technologies (exploratory drilling rigs, seismic surveys, etc.) which are employed to implement the decision. In turn, these create potential impacts on the environment. The subjects appropriate for environmental study are derived from a generic consideration of applicable technologies and their resultant impacts. In turn, the results from the studies, in conjunction with input from other agencies and the public, are used in subsequent decision steps. Figure 4-1 shows this process through a flow diagram.

FIGURE 4-I


Phase In Lease Process
Time Of Phase
Technology Activities
Time Of Activity
Other Non-OCS Uses
Potential Impact
Time Of Impact
Multiple Use Conflicts
Multiple Use Issues
Resolution Matrix
BLM OCS Studies
Public
Other Agencies
Decision
Assessment
Time Of Decision
Lease Schedule

4.6.1 Causes and Potential Effects

Various operational phases of OCS oil and gas development and the associated impacts resulting from those activities are portrayed in Table 4-1. No judgment regarding the relative severity of an impact is reflected, nor is there an attempt to distinguish between the impact agents within a general category: e.g., petroleum hydrocarbons, trace metals, and pathogenic bacteria are all considered "pollutants." Possible impacts arising during a given operational phase are highlighted, so that the full potential range of impacts may be considered. For instance, in the Oil and Gas Exploration Phase, impacts associated with platform emplacement include those derived from the fact that the platform occupies space on the ocean floor, and that its installation will disturb the bottom environment. Thus, the platform may interfere with shipping, fishing, recreation, or military activities, as well as altering a natural habitat. Table 4-1 permits identification of major discrete impacts (column 4). The list of impacts is not intended to be exhaustive, but only to provide an indication of the major multiple effects that are possible. Table 4-2 lists the impacts and the major issue that each impact will affect. The severity of the impact will be a function of the intensity of the activities, their proximity to unique or critical habitats, and the development scenario for the region. Indirect impacts are mainly those which affect man through their direct effect on the environment.

4.7 TIMING OF INFORMATION INPUTS

4.7.1 Pre-exploratory Phase

Prior to the date of sale, information is required to identify areas that should receive special attention due to their unique characteristics, conditions that might be hazardous to OCS develop-

TABLE 4-1

OPERATIONAL PHASE	ACTIVITY/TECHNOLOGY USED	POLLUTANT/AGENT	IMPACTS
1. Geophysical / Geological Evaluation	A. Seismic Surveying	A. Noise from explosives, sparkers, or acoustic sources.	A. Death or impairment of pelagic organisms.
	B. Bottom Sampling (1) Coring (2) Dredging	B. Disturbed sediments.	B. Death or impairment of benthos and infauna.
2. Oil and Gas Exploration	A. Rig fabrication *	A. Location of fabrication facility	A. Waterfront land use competition
		Dredging and filling	disturbed shore environment.
		Fresh water demand	Lowered or polluted water table.
		Emissions/Discharges	Decreased air and water quality.
		Competition for labor	Manpower costs Economic multiplier
	B. Rig Emplacement (1) Positioning	B. Rig location	B. Interference with military, recreation, shipping or fishing activities.
	(2) Anchoring and installation	Disturbed sediments	Death or impairment of benthos and infauna.

* Fabrication of exploratory rigs will probably be done at existing facilities because there is no pressing need to have them constructed in close proximity to exploration drilling, and most construction facilities are under-utilized. Rigs are generally built in one place and towed or sailed to the drilling site, which may lie hundreds or thousands of miles away. Impacts noted are those affecting the existing yards.

OPERATIONAL PHASE	ACTIVITY, TECHNOLOGY USED	POLLUTANT, AGENT	IMPACT
2. Oil and Gas Exploration (Continued)	C. Drilling	C. Drill cuttings, drilling muds and fluids.	C. Death or impairment of benthos or infauna from burial. Death or impairment of pelagic organisms from water quality degradation. Tainting of fish
		Machinery noise	Interference with fishing activities.
	D. Routine Rig Operations	D. Debris, sewage and effluents	D. Interference with dredge fishing. Interference with fishing from water quality degradation.
		Atmospheric discharges	Decreased air quality
	E. Temporary rig Servicing (1) Logistic bases (2) Service craft	E. (Same as 2.A. above)	(Same as 2.A. above)
		Rig location	Interference with fishing.
3. Field Development	A. Platform Fabrication	A. (Same as 2.A. above)	A. (Same as 2.A. above)
	B. Platform Installation	B. (Same as 2.B. above)	B. (Same as 2.B. above)
	C. Drilling	C. (Same as 2.C. above)	C. (Same as 2.C. above)
	D. Completion --installation of "Christmas Tree," riser, and flow lines, and connection of wellhead to flow lines.	D. Oil and petroleum compounds	D. Death or impairment of local organisms from water quality degradation.
		Risers, connections, flow lines	Interference with dredge fishing.

OPERATIONAL PHASE	ACTIVITY/TECHOLOGY	POLLUTANT/AGENT	IMPACTS
3. Field Devlopment. (Continued)	E. Routine Rig Operations	E. (Same as 2.D. above)	E. (Same as 2.D. above)
	F. Platform Servicing (1) Permanent logistic bases (2) Service craft	F. (Same as 2.E. above)	F. (Same as 2.E. above)
4. Production	A. Gathering of Fluids	A. Oil	A. Death or impairment of organisms from water quality degradation.
	B. Separation of oil/water, oil/gas, and gas scrubbing	B. Refinery location	B. Land use competition
		Freshwater Demand	Lowered or polluted water table.
		Emissions/Discharges	Decreased air and water quality.
		Competition for labor	Economic multiplier
	C. Compressing/Pumping	C. Oil	C. Death or impairment of organisms
	D. Workover	D. (Same as 2.C. and 3.D. above)	D. (Same as 2.C. and 3.D. above)
	E. Routine Platform Operations	E. (Same as 2.D. above)	E. (Same as 2.D. above)

OPERATIONAL PHASE	ACTIVITY/TECHNOLOGY USED	POLLUTANT/AGENT	IMPACTS
4. Production (Continued)	F. Improved Recovery (1) Fracturing (2) High Pressure Reinjection (3) Water/Detergent Flooding (4) Polymer Floating (5) Thermal Techniques	F. Chemical residues	F. Death or impairment of organisms from water quality degradation.
5. Transportation and Storage	A. Fabrication of Transportation and/or storage Facilities.	A. *	A. *
	B. Storage Facility Emplacement at sea or ashore[1]	B. Storage facility location	B. Interference with military recreation, shipping, or fishing activities (at sea Land use competition (ashore)
		Oil	Decreased water quality

---

* Fabrication of storage and transportation facilities will probably be done at existing facilities. Impacts associated with this activity are the same as those for any steel fabrication plant.

OPERATIONAL PHASE	ACTIVITY/TECHNOLOGY USED	POLLUTANT/AGENT	IMPACTS
5. Transportation and Storage. (Continued)	C. Transfer to Tankers/Barges	C. Space Conflicts	C. Interference with military, recreation, shipping, or fishing activities.
		Chronic oil discharge from tank cleaning and bilge pumping.	
		Sewage/Effluent discharge	
		Atmospheric discharges	Decreased air quality
		Disposal of debris	Interference with dredge fishing.
	D. Construction and Emplacement of Pumping Facilities	D. Pumping facility location	D. Land use competition
		Competition for labor	Manpower costs Economic multiplier
	E. Routine Tanker/Barge Operations	E. (Same as 5.C. above)	E. (Same as 5.C. above)
	F. Pipeline Fabrication and Emplacement	F. * Disturbed sediments	F. * Death or impairment of benthos or infauna.
		Pipeline location	Interference with dredge fishing. Waterfront land use competition
		Competition for labor	Manpower costs Economic multiplier

---

* Fabrication of pipe will probably be done at existing facilities. Impacts associated with this activity are the same as for those of any steel fabrication plant.

OPERATIONAL PHASE	ACTIVITY/TECHNOLOGY USED	POLLUTANT/AGENT	IMPACT
5. Transportation and Storage (Continued)	G. Pipeline Operations	G. Oil	G. Decreased water quality Death or impairment of organisms Taste tainting Interference with fishing activities from fouled gear.
6. Refining	A. Construction or Expansion	A. Refinery location	A. Land use competition
		Dredging and filling	Disturbed shore environment
		Freshwater demand	Lowered or polluted water table
		Competition for labor	Manpower costs Economic multiplier
	B. Processing	B. Refinery emissions	B. Decreased air and water quality.
		Waste disposal.	

Key: 1 = Direct Impact
2 = Indirect Impact
3 = No Impact
( ) = Issue has impact on activity
*Environmental Impacts to Technology (Issue 8)
is not applicable here

TABLE 3-3
IMPACT ON MAJOR ISSUES

Operational Phase	Activity	Source of Impact	Subsistence Lifestyles	Commercial Fishing	Recreation Tourism	Social Infrastructure	Coastal and Marine Ecosystems	Air and Water Quality	Archaeological Cultural Resources	Shipping Conflicts
Geophysical/ Geological Surveys	Seismic Surveying	Noise	2	2	0	0	1	0	0	0
	Bottom Sampling	Disturbed Sediments	2	2	0	0	1	0	1	0
Oil and Gas Exploration		Rig Emplacement	2	2	0	0	1	0	1	0
		Space Use	1	1	1	0	1	0	1	1
		Gravel Removal	2	2	0	0	1	0	1	0
	Drilling	Muds and Cuttings	2	2	0	0	1	0	0	0
		Noise	2	2	0	0	1	0	0	0
	Routine Operations	Debris	1	1	1	0	2	1	1	1
		Discharges (Effluents)	2	2	2	2	1	1	0	0
		Discharges (Emissions)	0	0	2	2	1	1	0	0
		Structural Collapse	0	2	0	2	1	1	0	2
	Rig Servicing	Space Use	2	2	2	0	0	0	0	1
		Noise	2	2	0	0	1	0	0	0
		Competition for Labor	0	2	0	1	0	0	0	0
Field Development	Rig Emplacement	Disturbed Sediments	2	2	0	0	1	0	1	0
		Space Use	1	1	1	0	1	0	1	1
		Gravel Removal	2	2	0	0	1	0	1	0
	Drilling	Muds and Cuttings	2	2	0	0	1	0	0	0
		Noise	2	2	0	0	1	0	0	0
	Routine Operations	Debris	1	1	1	0	2	1	1	1
		Discharges (Effluents)	2	2	2	2	1	1	0	0
		Discharges (Emissions)	0	0	2	2	1	1	0	0
		Competition for Labor	0	2	0	1	0	0	0	0
		Strucutural Collapse	0	2	0	2	1	1	0	2
	Rig Servicing	Space Use	2	2	2	0	0	0	0	1
		Noise	2	2	0	0	1	0	0	0
Production	Gathering of Fluids	Oil Spill	1	1	1	2	1	1	0	0
	Separation of Oil/Water	Space Use	0	0	1	0	1	0	1	0

			IMPACT ON MAJOR ISSUES							
Operational Phase	Activity	Source of Impact	Subsistence Lifestyles	Commercial Fishing	Recreation Toursim	Social Infrastructure	Coastal and Marine Ecosystems	Air and Water Quality	Archaeological Cultural Resources	Shipping Conflicts
Transportation and Storage	Oil/Gas and Gas Scrubbing	Discharges (Effluents)	2	2	2	2	1	1	2	0
		Discharges (Emissions)	0	0	2	2	1	1	2	0
		Competition for Labor	2	0	1	0	0	0	0	0
	Pumping	Oil Spill	1	1	1	2	1	1	2	0
	Routine Operations	Competition for Labor	0	2	0	1	0	0	0	0
		Noise	2	2	0	0	1	0	0	0
		Debris	1	1	1	0	2	1	1	1
		Discharges (Effluents)	2	2	2	2	1	1	0	0
		Discharges (Emissions)	0	0	2	2	1	1	0	0
		Structural Collapse	0	2	0	2	1	1	0	2
	Rig Servicing	Noise	2	2	0	0	1	0	0	0
		Space Use	0	2	1	1	1	0	1	1
	Transfer to Tankers/Barges	Space Use	2	1	2	0	1	0	1	1
		Oil Spills	1	1	1	2	1	1	0	0
		Effluents	2	2	2	0	2	1	1	1
		Debris	1	1	1	0	2	1	1	1
	Pipeline Operations	Competition for Labor	0	2	0	1	0	0	0	0
		Oil Spill	1	1	1	2	1	1	0	0
		Disturbed Sediments	2	2	0	0	1	0	1	0
		Space Use	2	1	2	0	1	0	1	1
	Storage Facility	Space Use	2	0	1	2	1	0	1	0
		Oil Spill	1	1	1	2	1	1	0	0
		Competition for Labor	0	2	0	1	0	0	0	0
Refining	Construction	Space Use	2	0	1	2	1	0	1	0
		Dredging and Filling	2	0	2	0	1	1	1	0
		Fresh Water Demand	0	2	0	1	1	2	0	0
		Competition for Labor	0	2	0	1	0	0	0	0
		Emissions	2	0	2	2	1	1	0	0
		Effluents	2	0	2	2	1	1	0	0

ment, and areas where possible conflicts of use might arise if development occurred. This information is used in the selection of tracts and in the decisions to place stipulations on particular leases or to modify the OCS operating orders.

Socioeconomic studies are needed to analyze potential impacts and changes likely to occur at the state-wide, regional and local levels. The impact evaluation process is divided into three parts: preparation of petroleum development scenarios, analysis of state-wide and regional impacts and analysis of local level impacts. The scenarios are the oil and gas development hypotheses driving the impact analysis and, therefore, must be completed prior to tract selection to enable the impact analysis to be completed prior to the draft environmental statement.

The state-wide/regional impact analysis should focus on the effects of cumulative and incremental lease sales and the distribution of these effects among certain defined sub-regions of the state. The local analysis should focus on the direct effects of the lease sale under study on effected communities and the cumulative direct impacts from previous sales. These socioeconomic information is used in determining the impacts generated by a specific lease sale, for tract selection and in the decisions to place stipulations on leases.

4.7.2 Exploratory Phase

Following the sale and issuance of a lease, a plan for exploration must be submitted by the lessee and approved by USGS for each lease tract before any exploratory drilling can be initiated on that tract. Drilling is usually initiated within one year, although the actual commencement time may vary between three and eighteen months.

Exploratory drilling can continue intermittently on a tract up to five years or longer, although such drilling on one tract beyond five years would be the exception rather than the rule. A plan for drilling, however, must be submitted within five years of the issuance of the lease, or rights to that tract are forfeited. Exploratory rigs are on a single site for as little as 15 days and as long as 150 days. Usually a single hole is drilled on one site, testing is completed, and the well is either abandoned or capped and left for future completion. The rig is then moved to another site. If there are strong indications of petroleum, additional wells may be drilled to delimit the extent and nature of the reservoir. In a given lease area, the most extensive aspect of the exploratory drilling phase could last for five years or longer. Rig emplacement and initial placement of the well-casing results in only a slight disturbance of the sediments. Few materials are introduced into the environment from this operation. Drill cuttings, formation waters, drilling muds, and fluids resulting from the testing of wells can escape into the environment during the drilling operations. The bulk of these materials, however, are naturally occurring and are diluted quickly by the surrounding currents. Any harmful effect would be expected to be quite localized. Oil-based drilling muds, generally used only in the deeper sections of a well, are required to be taken ashore and disposed of properly. Water-based muds, on the other hand, while often recycled, may be thrown overboard after the removal of oil. EPA regulations currently specify that these muds contain no more than 48 ppm petroleum hydrocarbons when disposal occurs.

The exploratory drilling phase presents fewer possibilities for significant environmental damage or socioeconomic impacts on the communities than the later stages of oil and gas development. Nevertheless, because of the necessity of obtaining data over many years (especially those data used as a benchmark) and the very slight possibility that some environmental and socioeconomic change might result, the benchmark and descriptive data collection programs are required to be underway by the time exploratory drilling commences.

4.7.3 Development Phase

If any area appears to have economically significant quantities of oil and gas, plans are made by industry for development. These plans include the design of a production platform, drilling methods, etc., and must be submitted to USGS for approval. Usually construction of platforms is not begun until sufficient data are available on the field to estimate reserves. The actual design and construction of a production platform averages about two years from the date of order to the date of delivery. The minimum time until delivery can be as short as one year; however, it is generally 3-4 years after a sale before a production platform is placed on a tract.

To assist coastal communities in planning for the impacts of activities during exploration and development, industry is required to submit to the Governor and local jurisdictions information about the exploration and development to be proposed. A development Environmental Statement will be required in frontier areas to aid local and state governments in planning for impacts.

After the platform is set, production wells are drilled to further define the reservoir. Each well generally takes two to four months to complete. Eventually, an average of 15-30 wells are drilled from each platform. During this phase, the drilling of more wells increases the probability of contaminants being introduced into the environment. Thus, it is important to have a large descriptive data base for the OCS environment that can be used as a reference for interpretation of monitoring data collected after these activities are underway. Toxicity data from several years' experiments should also be available to provide essential information for interpreting monitoring data. More extensive information on geological hazards such as seismic risk, engineering properties of sediments, faults, and sediment mobility should be collected and analyzed prior to the time the platform is emplaced so that any changes in operating orders can be made. Thus, the maximum safety of design can be assured. By this time, information on the fate of oil spills should be available, as well as nearshore benchmark data.

4.7.4 Production Phase

Once it is ascertained that located reserves may be recovered economically, planning is begun for the transportation of the oil to shore. In most cases, transport to shore is through pipelines, rather than by barge or tanker. The BLM generally requires that all pipelines in waters shallower than 60 m (200 feet) must be buried. In certain regions, lease stipulations may require all pipelines to be buried when technically and economically feasible to prevent hazards to other OCS operations. The route of the pipeline is determined by many factors such as sediment stability, location of production field, location of onshore facilities, and granting of rights-of-way.

The time between submission of a request for siting a pipeline and the actual pipeline completion is generally two or more years. Frequently, actual production on a specific tract is delayed until sufficient reservoirs in the area are developed to make it profitable to bring a pipeline ashore. Thus, production on a limited scale will most likely not begin until about seven years after the date of sale with peak production for a lease area probably not occurring until ten or fifteen years after sale. Also, during the production phase, some drilling activity on the platforms may result from the necessity to rework existing wells or to drill additional wells.

By the time production begins, several years of benchmark data on the specific tracts must be available as a reference for monitoring possible changes in the surrounding environment. Specific information on those areas proposed as pipeline corridors must also have been collected and analyzed so that sound decisions on permits can be made. Linked with these data should be the capability to predict the fate and effects of pollutants if an accident should occur, so that efficient and effective preventive measures can be taken.

Data needs, as outlined above, are satisfied through the use of historical information, on-going programs and newly initiated programs. These are continuously reviewed, updated and incorporated into the design of future studies, as described elsewhere in this plan.

CHAPTER 5

CHAPTER 5. SCHEDULING OF STUDIES

5.1 DEVELOPMENT OF REGIONAL STUDIES PLANS

Three natural regions exist along the Alaska Outer Continental Shelf. These three regions have been defined as the Pacific, Bering Sea, and Arctic regions of Alaska; within these regions nine lease areas have been identified for potential oil and gas development. As with the regions, each lease area has unique geographic, oceanographic, and ecological features as well as varying socioeconomic considerations. Each lease area also has a different leasing schedule. This results in different sequences of information needs to coincide to the differences in timing of decision steps within the areas.

The multiple use conflicts that arise from potential oil and gas development may be similar within regions or they may differ in importance between lease areas within a region. Hence, even within a regional approach to a studies plan, detailed lease area studies schedules must be developed.

Nine major issues have been identified from which subsequent regional and local issues can be addressed. These issues contain several decision-maker's questions (Chapter 4.4).

Subsequent steps after these sets of questions are identified and prioritized include: the breakdown of each question into component subquestions and types of studies necessary to answer the major question (i.e., as presented in the following subchapter); a determination of what is relevant information; assessment of the information available to answer each component question; assessment of the reliability of available information; identification of needs for, and importance of obtaining, unavailable data; and appropriate analysis of accumulated information. Since all these activities are traceable to the original decision-making question (or a component subquestion), the tasks and energies of lower level decision-makers and technical staff can be better goal-oriented, ES and SID can be significantly streamlined (apparently an emerging objective of CEQ), and, by the incorporation of known state concerns into the original set of questions, unnecessary delays at lease sale and lease award time can be avoided.

The general scheme in which these nine major multiple use issues are broken down into nine specific lease area study schedules is presented in Figure 5-1. Multiple use issues identified by either BLM, other agencies, or the public define a series of information questions that decision-makers can use. The studies staff then identifies the information needs and types of studies necessary to answer these decision-makers' questions. The content of these issues, information questions, and types of studies, is discussed in the three regional plans which follow.

The three regional plans takes these nine general issues and examines their importance and applicability to each region. The regional issues are thus defined. Table 5-1 portrays the judged priorities of these issues for each region. In general, all major issues are applicable to all regions. (Only commercial fishing and shipping conflicts in the Arctic region are presently of little concern.) The regional issues define the regional information needs, and hence, the types of studies necessary within each region.

The lease schedules (Chapter 2) provide the timeframes for which the study needs must be met. The general resolution matrix schedule (Chapter 5) specifies the level of detail of the study information to be provided at each decision step. The lead time necessary to successfully complete the study determines when a study should begin. Lease schedule, resolution schedule, and lead time allow the Alaska OCS staff to prepare the nine lease area study schedules and to determine annual work plans. Each of the environmental and socioeconomic study needs is applied to this process to determine the type and timing of the lease area studies schedules.

Figure 5-1

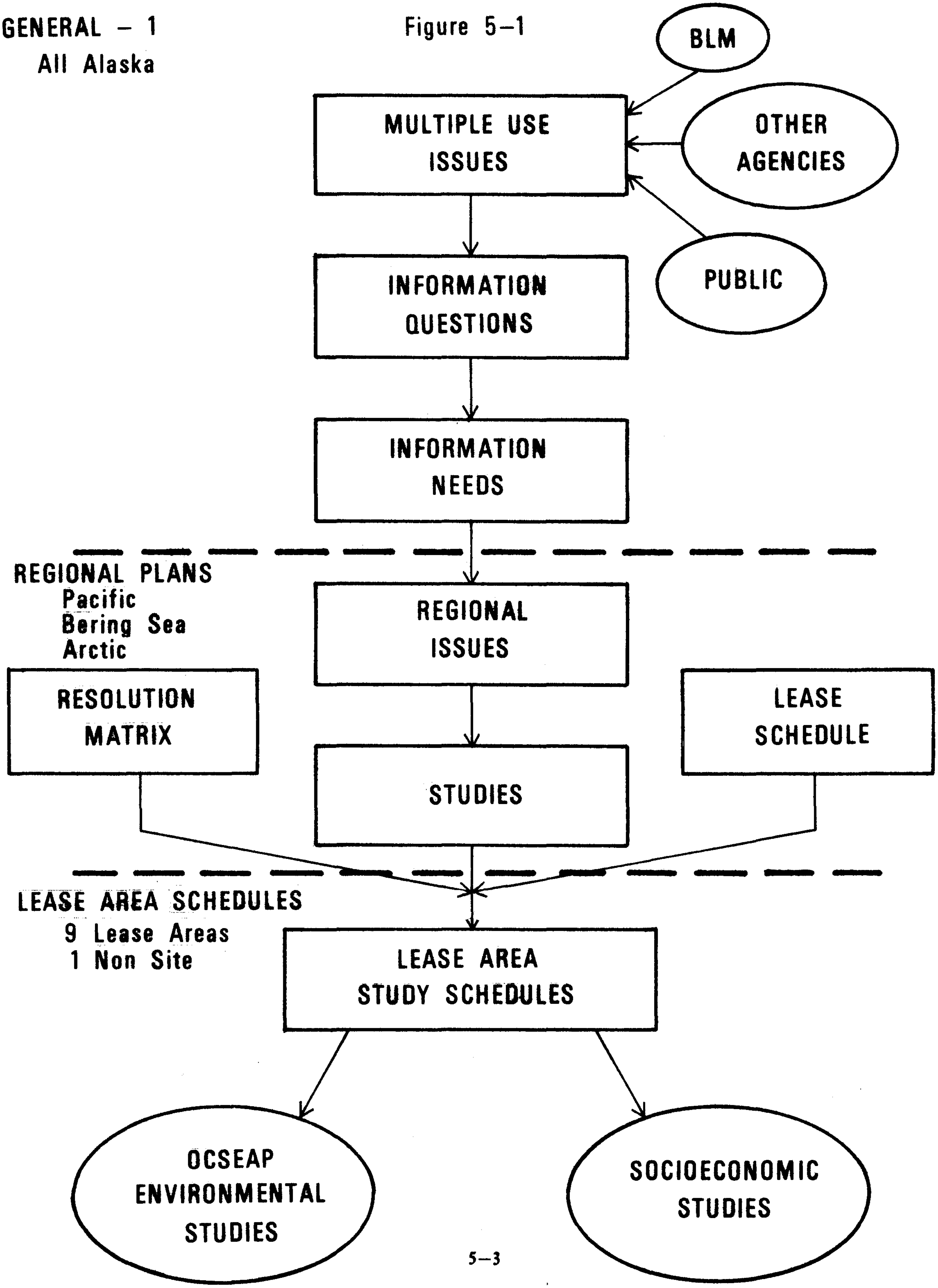

GENERAL - 1
All Alaska
BLM
MULTIPLE USE ISSUES
OTHER AGENCIES
PUBLIC
INFORMATION QUESTIONS
INFORMATION NEEDS
REGIONAL PLANS
Pacific
Bering Sea
Arctic
REGIONAL ISSUES
RESOLUTION MATRIX
LEASE SCHEDULE
STUDIES
LEASE AREA SCHEDULES
9 Lease Areas
1 Non Site
LEASE AREA STUDY SCHEDULES
OCSEAP ENVIRONMENTAL STUDIES
SOCIOECONOMIC STUDIES

TABLE 5-1. PRIORITIES OF MAJOR ISSUES BY ALASKA REGION

ISSUE	REGION		
	PACIFIC	BERING	ARCTIC
1. Subsistence Lifestyles	1	1	1
2. Commercial Fishing	1	1	3
3. Recreation and Tourism	1	2	2
4. Social Infrastructure	1	1	1
5. Marine and Coastal Ecosystems	1	1	1
6. Air and Water Quality	2	2	2
7. Archaeological/Cultural Resources	2	2	2
8. Shipping Conflicts	2	2	3
9. Environmental Hazards	1	2	1

1 = High Priority
2 = Secondary Priority
3 = Low Priority

5.2 REGIONAL ISSUES

Specific issues within the three regions (Pacific, Bering, Arctic) and nine lease areas are given in subsequent tables. These concerns have been identified at public and scientific meetings, from other federal agencies, and in submitted comments certain lease sales. It is clear from an analysis of these specific issues that all are addressing one or more of the activity/impact concerns. Table 5-2 lists a number of concerns identified by agencies and the public at an Alaska Sea-Grant conference in late 1977. These concerns have also been included with the three regional issues list.

The following subsections present the regional study plan for each of the three Alaska OCS regions: Pacific, Bering Sea, and Arctic. In these regional plans the applicable major issues and decision-makers questions are broken down into component technical level questions needed to answer the major questions of each issue. Following the technical questions, types of studies needed to provide information to the questions are identified as listed. The contents of these studies are then presented in more detail following the lists of questions.

From these questions a total of eighty-five (85) different types of studies are identified for the Alaska OCS. Sixty (60) are concerned with the natural environment (environmental studies) and twenty-five (25) are concerned with the human environment (socioeconomic studies). Both contracting division of studies are necessary to answer the nine major resource issues.

In any region each information need is tied to specific decision points. Although the time of these decision points varies with lease schedules, the contents and format remain the same. A general resolution schedule for the identified studies can be developed for a general lease schedule. This general schedule is presented in the following subsection, prior to the list of studies and lease area study schedules for each region (following sections).

TABLE 5-2
GENERAL STATEMENT OF ALASKA ENVIRONMENTAL CONCERNS

Affiliations of Participants

Federal Agencies	13
State and Local Agencies	11
University of Alaska	9
Public Interest	0
Industry	7
Not Specified	8
	48

Pollutants, General

Sources and volumes of pollutants	1
Fate and effects of pollutants	5
Long-term effects of pollutants	9
Early warning (monitoring) systems and risk analysis	8
Estuarine and coastal impacts of pollutants	3
Identification of potential pollutants and likely areas	3
Determine present health of the oceans	2
Physical effects of pollution	1
Anoxic waters	1

Pollutants, Specific

Oil - development	5
transportation	3
spill prevention and clean-up	5
fate and effects	10
long-term (chronic) effects	8
Hydrocarbons	2
Atmospheric pollutants entering sea	1
Pesticides	1
Hydrogen sulfide contaminants	1
Gravel removal	2
Nutrients (including nitrogenous wastes)	2

Ecosystem Studies

Holistic understanding of basic marine ecosystems	3
Effects of fish hatcheries on estuaries and open ocean	1
Inventory of ecosystems and identification of sensitive habitats and species	2
Overfishing	2

Management

Creat a technical/managerial system to reduce or eliminate ocean pollution	1
Program must be international	1
NOAA and other federal agencies must do better if program is to succeed	5
Studies must be process oriented, sustained over extended periods of time	3
Need for fairness and realism in development	2
Necessary balance needs for developing with costs to environment and costs for alternatives	4
Increase awareness and general education regarding estuarine and nearshore problems	2
Develop appropriate standards and controls	6

Suspended solids	2
Toxic industrial wastes	2
Heavy metals	3
Urban runoff	1
Mining	5
Food processing	3
Thermal	1
Wastes (urban, logging camp, etc.)	8
Logging and pulp mill	5
Ocean dumping	1

Unify federal and state standards	2
Convert research results into management decisions	4

5.2.1 Study Resolution and Timing

Table 5-3 summarizes in matrix form the Department of Interior product needs and scheduling necessary in the planning and contracting of the research programs. This matrix contains information denoting the temporal and spatial resolution judged by BLM to satisfy specific product needs at the indicated decision steps.

The matrix is essentially derived from the Jamison Resolution Analysis submitted to the OSESAC by BLM on November 5, 1976, and on considerable subsequent discussion within BLM, and between the BLM and OCSEAP staffs.

A primary objective of the particular format chosen was the quantification of the study timing and the spatial and temporal resolution required by BLM for each of the study types identified later in this section. The analysis that produced Table 5-3 also added an important dimension to the needs specification not contained in the Jamison Resolution analysis, namely, the inclusion of temporal resolution. Due to the complexity of the environmental systems under study, a knowledge of the required temporal resolution of various stages of the decision process is important for optimum resource allocation and design of individual investigations. Table 5-3 contains a generic time axis which can be converted to apply to a specific lease area by the entry of a known date at any one of the decision points. Application to a specific lease area might, however, eliminate the need to address certain of the subtasks (e.g., ice hazards in NEGOA). However, the timing and resolution needs will be the same wherever a subtask is applicable.

TABLE 5-3. GENERAL RESOLUTION SCHEDULE FOR ALASKA OCS STUDIES

STEPS IN DECISION-MAKING PROCESS

TS = Tentative Sale Schedule
CN = Call for Nominations
TT = Tentative Tract Selection
DE = Preparation of ES
FE = Final ES
DS = Draft SID
FS = Final Sale
FT = Final Tract Selection

NS = Notice of Sale
SL = Sale
XP = Exploration Plan
TP = Transportation Plan
DP = Development Plan
PP = Pipeline Permit
LT = Lease Termination

SPATIAL RESOLUTION

0 = Information in hand, literature reviews
1 = Qualitative, area wide, cursory
2 = Semi-quantitative, hundreds of square miles scale or 25 miles of coastline
3 = Quantitative, 3-10 tract scale or 10 miles of coastline
4 = Quantitative, tract specific (2 to 5 mile resolution)
5 = Quantitative, site specific
6 = No spatial resolution (non-site specific)
7 = Refinement of data, no additional resolution
8 = Local, Regional, State Socioeconomic Data

TEMPORAL RESOLUTION

N = No temporal resolution
A = Annual
S = Seasonal

TABLE 5-3
GENERAL RESOLUTION SCHEDULE FOR OCS STUDIES

Types of Studies	-2	-1	0		+1			+2				+3		+4		
		TS	CN	TT	DE	FE	DS	FS	FT	NS	SL	XP	TP	DP	PP	LT
CONTAMINANT RECONNAISANCE																
1. Hydrocarbons			---	---	S2	●	●	●			---	S3				
2. Light Hydrocarbons			---	---	S2	●	●	●			---	S3				
3. Toxic Metals			---	---	S2	●	●	●			---	S3				
4. Air Pollutants			---	---	S2	●	●	●			---	S3				
5. Crude Oil Composition			---	---	N6	●	●	●								
DEVELOPMENT ACTIVITIES																
6. Development Scenario		---	---	N2	N4	●	●	●	●			●				●
7. Production Scenario											---	---	N5	●	●	●
8. Pollution Scenario			---	N2	N4	●	●	●	●		---	---	N5	●	●	
9. Activities/Impacts			---	N2	N4	●	●	●	●		---	---	N5	●	●	●
ENVIRONMENTAL HAZARDS																
10. Seismic Hazards	---	---	N2	N4	●	●	●	●	●	●	---	N7	●	●	●	
11. Volcanic Hazards		---	N2	N4	●	●	●	●	●	●	---	N7	●	●	●	
12. Surface/Near Surface Faults	---	---	N2	N4	●	●	●	●	●	●	---	N7	●	●	●	
13. Seafloor Instability	---	---	N2	N4	●	●	●	●	●	●	---	N7	●	●	●	
14. Erosion and Deposition		---	---	N2	N4	●	●	●	●	●	---	N7	●	●	●	
15. Subsea Permafrost		---	---	N2	N4	●	●	●	●	●	---	N7	●	●	●	
16. Ice Gouging		---	---	N2	N3	●	●	●	●	●	---	N4	●	● ---	N5	
17. Overpressured Sediments	---	---	N2	N3	●	●	●	●	●	●	---	N4	●	●		
18. Subsidence Potentials		---	---	N2	N3	●	●	●	●	●	---	N4	●	●	●	
19. Stratigraphic Unconformities		---	---	N2	N3	●	●	●	●	●	---	N4	●	●	●	
20. Sea Ice Stress - Strain		---	---	---	S2	●	●	●	●	●	---	S3	●	●	●	
21. Sea Ice Size - Force		---	---	---	S2	●	●	●	●	●	---	S4	●	●	●	
22. Extreme Events			---	---	S3	●	●	●	●	●		●	●	●		
23. Tsunamis			---	---	S2	●	●	●		●		●	●	●		
24. Storm Surges			---	---	S3	●	●	●	●	●		●	●	●		
25. Ice Storms/Icing			---	---	S2	●	●	●	●	●		●	●	●		
26. Visibility			---	---	S2	●	●	●	●	●		●	●	●		
TRANSPORT																
27. Offshore/Nearshore Circulation	---	---	S2	S3	●	●	●	●	---	---	---	S4				
28. Offshore/Nearshore Winds	---	---	S2	S3	●	●	●	●	---	---	---	S4				
29. Residence/Flushing Times			---	---	S2	●	●	●	---	---	---	S3				
30. Effluent Dispersion/Mixing			---	---	S3	●	●	●	---	---	---	S4				
31. Emission Dispersion/Mixing			---	---	S3	●	●	●	---	---	---	S4				
32. Oil Trajectories	---	---	---	S3	S4	●	●	●	●	●	---	S5	●	●	●	
33. Oil Slick Dynamics	---	---	---	N2	S4	●	●	●	---	---	---	S5				
34. Bottom Sediments		---	---	---	N3	●	●	●	---	---	---	N4	●	●	●	
35. Basin Morphology		---	---	N4	●	●	●	●	---	---	---	N5	●	●	●	
36. Sea Ice Features	---	---	A2	S2	●	●	●	●	---	---	---	S3				
37. Sea Ice Dynamics		---	---	A2	S2	●	●	●	---	---	---	S3				
38. Oil/Ice Interactions		---	---	---	S2	●	●	●	---	---	---	S3				

Types of Studies	-2 -1	0		+1				+2			+3		+4		
	TS	CN	TT	DE	FE	DS	FS	FT	NS	SL	XP	TP	DP	PP	LT
RECEPTORS															
39. Vulnerable Populations	----	S2	S3	S4	●	●	●	●	●	----	S5	●	●	●	●
40. Life Histories		----	----	S2	●	●	●	●	●	----	S3	●	●	●	●
41. Critical Habitats	----	S2	S3	S4	●	●	●	●	●	----	S5	●	●	●	●
42. Food Web Dependencies	----	----	N0	S2	●	●	●	●	●	----	S3				
43. OCS Structures/Habitats		----	A3	S3	●	●	●								
44. Wetland Ecosystems	----	----	S2	S3	●	●	●						●	●	
45. Microbial Degradation	----	N0	----	S2/N6	●	●	●	●							
46. Ecosystems	----	----	----	S3	●	●	●	●					●	●	
47. Legal Protected Populations/Habitats		----	S5	●	●	●	●	●			●	●	●	●	
EFFECTS															
48. Behavior to Oil	----	----	----	N6	●	●	●	●			●	----	N7	●	
49. Toxicity of Oil	----	----	----	N6	●	●	●						●	●	
50. Sublethal Effects of Oil	----	----	----	N6	●	●	●		●		●	----	N7	●	
51. Combined Effects of Pollutants	----	----	----	N6	●	●	●		●		●	----	N7	●	
52. Toxicity of Muds and Cuttings		----	----	N6	●	●	●	●	●		●	----	N7	●	
53. Effect of Noise	----	----	----	N6	●	●	●	●	●		●	----	N7	●	
54. Tainting	----	----	----	N6	●	●	●		●		●	----	N7	●	
55. Environmental Recovery Rates	----	----	----	N2/S2	●	●	●				----	----	N4/S4	●	
56. Ecosystem Vulnerability Indicies	----	----	----	N6	●	●	●	●	●		●	----	N7	●	
57. Microbial Activity Impacts of Oil	----	----	----	A2	●	●	●				S3				
58. Effects of OCS Structures		----	----	S2	●	●	●	●	●		●	----	S4	●	
59. Effects of OCS Activities		----	----	S2	●	●	●	●	●		●	----	S4	●	
60. Environmental Vulnerability of OCS Structures	----N0----	----	S3	●	●	●	●	●	●	----	S4		●	●	

Types of Studies	-2 -1	0		+1				+2			+3		+4		
	TS	CN	TT	DE	FE	DS	FS	FT	NS	SL	XP	TP	DP	PP	LT
A. Petroleum Development Scenario		----	N2	N3	●	●	●	●				●	----N4	●	
B. Oil Spill Probability Projection		----	N2	N3	●	●	●	●				●	----N5	●	
C. Tanker Spill Probability		----	N2	N3	●	●	●	●				●	----N5	●	
D. Fisheries Location Identification		----	N2	N4	●	●	●	●	●		----	N5		●	●
E. Fish Equipment Loss		----	N2	N4	●	●	●	●	●			●	----N5	●	
F. Fishing Practices		----	N2	N2	●	●	●	●	●			●	----N5	●	●
G. Shipping Activity		----	N2	N3	●	●	●	●	●		----N5	●	----N7	●	
H. Recreational Location Identification		----	N2	N5	●	●	●	●				●	----N7	●	
I. Visual Impact Evaluation		----	----	N3	●	●	●				----	N5	●	●	
J. Submerged Archaeological Location Analysis		----	----	N5	●	●	●	●	●			●	●	●	
K. Terrestrial Archaeological Location Analysis		----	----	N5	●	●	●	●	●			●	●	●	
L. Sociocultural Analysis		----	N1	N8	●	●	●	●				●	----N5	●	
M. Community/Regional Infrastructure Analysis		----	N1	N8	●	●	●	●	●			●	----N5	●	
N. Population Analysis		----	----	N8	●	●	●					●	----N5	●	
O. Employment Analysis		----	----	N8	●	●	●					●	----N5	●	
P. Economic Analysis		----	----	N8	●	●	●	●				●	----N5	●	
Q. Fish Economic Analysis		----	----	N8	●	●	●					●	----N5	●	
R. Recreation Industry Analysis		----	----	N8	●	●	●					●			
S. Recreation User Preference		----	----	N8	●	●	●					●			
T. Fisheries User Preference		----	----	N8	●	●	●					●	----N7		
U. Subsistence Activities		----	N2	N8	●	●	●	●	●			●	----N5	●	
V. Oil Impact on Archaeological Resources		----	----	N6	●	●	●					●			
W. Antiquities Act Impact			----	N8	●	●	●					●			
X. Loss/Benefit Analysis		----	----	N6	●	●	●	●	●			●	----N6	●	
Y. Mitigating Measures Analysis		----	----	N5	●	●	●	●	●			●	----N5	●	

5.2.1.1 Contaminant Reconnaissance

The resolution schedule for OCS studies does not require information on contaminant distributions prior to tract selection. Such information is first required, on a semi-quantitative level, at the time of environmental statement preparation for the primary purpose of providing a broad characterization of potential contaminant levels in the lease areas of concern. As the OCS exploratin phase is reached, somewhat improved spatial resolution is required to update existing information and to obtain a more detailed picture of existing contaminant concentrations in specific areas about to undergo exploration. These latter studies will form the basis for the design of long-term monitoring programs to be undertaken during the development phase. The issue of contaminants in the environment is actually much broader than that addressed by Table 5-3. A considerable number of important questions relating to contaminants are addressed under contaminant transport, since sediment uptake, weathering, and other nonconservative transport processes will determine their final disposition.

5.2.1.2 Development Scenarios

The data required for this task is an important undertaking of BLM. Information on sources of potential contaminants and other environmental disturbances addresses many environmental questions, and it is included for this reason on the Resolution Schedule for OCS Environmental Studies. However, it is provided for the most part by the scenarios funded by the Socioeconomic Studies Contracts (5.2.1.7).

5.2.1.3 Hazards

The resolution schedule indicates the need for semi-quantitative information on almost all hazards at least one year before tract selection. Hence, hazards information beyond the cursory or "in-hand level" can play an important role in the possible elimination of large areas from offer, even before tract selection. By the time of tract selection, hazards information must be upgraded, in general, to a level of resolution addressing individual or small groups of tracts. Considering the nature and the potential severity of the hazards in question, the studies required to produce information to the level of detail shown in Table 5-3 are characterized by long lead times. Hence, the studies may begin more than two years before tract selection requirements are characterized by a general lack of need for temporal resolution (except for ice motion and extreme oceanic events) and a spatial resolution steadily increasing from the semi-quantitative to the site specific some four years after tract selection. It is expected that industry will be heavily involved in providing information at the latter level of resolution.

5.2.1.4 Contaminant Transport

The transport studies can be roughly separated into three main categories: water transport, ice transport, and modification of contaminant concentrations and forms due to various weathering processes. Contaminant trajectories will be primarily determined by water motions in subarctic regions while ice plays a major role in transporting contaminants in the Arctic. In either case, the ultimate fate of most contaminants will be determined by the rates of weathering and interaction with suspended particulates. The water transport resolution requirements indicate a need for semi-quantitative, seasonal information on circulation patterns at least a year before tract selection. Such information can be used, along with other environmental data, to determine the size of the area offered at the call for nominations. At the time of tract selection, aquatic transport information should be available at a level of detail that will allow the identification of potentially adverse circulation features, on a seasonal basis, in areas comprising up to 10 tracts. This level of resolution will also be used in the environmental statement. Tract selection and the preparation of the ES will not necessarily mark the end of the need for information on coastal circulation. Several years after tract selection, seasonal, tract-specific information will be required during exploration to assess the likelihood of impingement of biological resources whose distribution has been established to a comparable level of resolution.

The required levels of detail for ice-related transport generally parallel those discussed above. In the case of ice, however, the tasks are not so clearly separable from those addressing the hazards problem and hence are expected to have a slightly longer duration than circulation studies. It should be noted that at the time of tract selection the required resolution for ice-related transport has increased temporarily but not spatially, emphasizing the importance of seasonal variability in ice conditions.

5.2.1.5 Biota

Estimates of the distribution and abundance, migration, feeding sites and behavior of populations are among the first biological studies undertaken. The locations of the populations at each life-stage and activity are then related to likely contaminant pathways and incidence of disturbance to determine whether risk may exist. This study philosophy is reflected in the required resolution of information needs for vulnerable populations and critical habitats. For example, the resolution requirement for the distribution and abundance of biota at the time of tract selection is comparable to that expected from the transport studies intended to predict impingement. This matching of required levels of detail on a multidisciplinary basis is an important planning consideration throughout the program.

After the biological populations potentially at risk have been established, the information considered in tract selection and in the preparation of the environmental statement, there is no need for additional studies of distribution of abundance of marine biota. Information needs shift focus to longer term studies of trophic relationships and ecosystem dynamics and the potential impacts of contaminants and other disturbances.

5.2.1.6 Effects

Effects studies are characteristically non-site-specific. Experimentation is required to document casual relationships between OCS development and potential changes in the biota or the ecosystem and to quantify the magnitude and reversibility of such changes. The results of effects experimentation are generally applicable to all lease areas in which the test species or habitats occur. The current program has been focused heavily on the lethal and sublethal effects of petroleum exposure in a variety of marine organisms, mainly under laboratory conditions. In FY 79, the program will be extended to include field experiments for verification of laboratory observations and experimentation on OCS perturbations other than the direct effects of petroleum contamination.

The resolution schedule for BLM needs indicates a requirement for best available information on the effects of OCS leasing and development at the time of the ES. This information is an essential part of the assessment of potential environmental impacts of the development. Updates are then required continually when exploration is underway and plans for development are proceeding. since the leasing schedule now calls for lease sales of Alaskan areas at approximately 6-month intervals, a continuous program of effects research is required to ensure significant progress in the understanding of OCS impacts.

5.2.1.7 Socioeconomics

The resolutions schedule indicates the need for socioeconomic information prior to the draft environment statement. Petroleum development scenarios set the stage for the impact analysis and should be completed by tract selection. The impacts derived from the scenarios must be completed for inclusion to the draft environmental statement. Information needed for a state-wide and regional impact basis include population and economy, and transportation systems. At the local level information needs include fishing industry impacts, economic and physical systems, and native and non-native sociocultural systems. Submerged archaeological probability studies also are required for the environmental statement.

5.3 REGIONAL STUDY PLANS

The following subsections detail major issues, the information questions, and the types of studies identified for each OCS region. Within each region lease area studies schedules are then derived.

In addition to the three regional plans, there is a plan for non-site specific types of studies which are also needed to answer the information questions. There is no lease area schedule appropriate to these types of studies, however, an immediate need exists for this information since it is applicable to all lease areas. The non-site specific study schedule is designed to acquire the earliest practical level of information for these study objectives.

5.3.1 Regional Study Example

The following example shows how all the various factors of concern in design of regional studies plans tie together to determine when, where, and why a specific study effort is needed. It also shows how that study could effectively be conducted. It combines the guideline information presented in Chapters 2 and 4 into the framework given in this chapter to produce a type of study. It is essentially a variation of the tabular and matrix approach adopted for each Alaska OCS region.

ISSUE: Impact on rare and endangered species, and unique environment

DECISION TO BE AFFECTED: Tentative scheduling of lease sale - Bering St. George Area

TIMING OF DECISION: middle to late 1979

ACTIVITY/TECHNOLOGY AFFECTED BY DECISION: all or none

DECISION-MAKERS QUESTION: What changes in populations and/or habitats are anticipated to result from the proposed action and how will ecological relationships be affected?

SIGNIFICANT IMPACT PRODUCING AGENTS: all or none

MID-LEVEL QUESTION: What are the impacts on vulnerable, critical or protected habitats?

What are the impacts on vulnerable, critical, or endangered species?

What are the impacts on critical abiotic processes which interrelate biological communities with their habitats?

TECHNICAL QUESTIONS:

Where are the known vulnerable, critical, or protected habitats?

What are their characteristics and why are they so classified?

What are the vulnerable, critical, or endangered species that are known to occur in the area under consideration? When are they located there?

Which of the abiotic processes known to critically interrrelate biological communities could be affected by OCS operations? How?

Based on experiences from other geographic areas, what impacts from oil and gas exploration and development activities can be anticipated to affect either habitats or species known to occur in the area under consideration?

Given a certain level of exploration and development activities, what would the likely impacts be on these elements of the equipment?

DEGREE OF DETAIL: no temporal resolution (N); cursory, lease-area-wide qualitative (0)

TYPE OF STUDY NEEDED: This example was chosen because it represents the beginning of the decision-making process and affords us a look at a different level of problem than has been considered in the previous three examples. What is needed, as discussed in Chapter 2, is information that will permit the decision-maker to make a qualitative judgment about whether the need to explore for oil and gas resources (and possibly, ultimately have to contend with development and production activities) outweighs the potential for environmental damage as it is known presently. The study should, then:

1. Compile and evaluate all available information on: vulnerable, critical, or protected habitats; vulnerable, critical, or endangered species; and critical abiotic processes known to be present or operating in the area.

2. Determine the potential impacts on these factors given certain levels of activity. This will have to be done on the basis of known impacts on similar resources found in similar areas. If little data is available, assumptions should be made based on a best guess.

3. In terms of the estimated oil and gas reserve potential of the area and the potential impacts, determine how the decision to not schedule the area compares with similar decisions being made in other OCS areas.

This type of study will also provide some insight into the strength of available information bases and give some direct guidance for future studies to be conducted regardless of what the outcome of decision to schedule the area is.

5.3.2 Lease Area Studies

Not all information needs listed in Table 5-3 are necessary or applicable to each lease area. This is either because the issues are not of concern to that region (i.e., commercial fishing in the Arctic region) or because certain of the studies are not needed to answering the information question (i.e., ice-gouging hazards in Kodiak). In developing the lease area study schedules in the following section (5.4.1), only those types of studies (information needs) that are applicable to that lease area have been identified.

5.3.2.1 Study Schedules

The following regional plans are the nine lease area-specific study schedules and one nonsite specific study schedule for information needs from FY 78 to FY 81. The lengths of study are shown (blocked areas) for each information need. The study times are scheduled from their lead times to provide the specified detailed information at the specified decision step. This is indicated by the resolution code under the decision step column. Further refinement of data is often needed of subsequent decision steps and this is shown by an increased resolution code later in the schedule.

Each study schedule is thus geared to each specific lease schedule. The schedules then form the planning framework for initiation and funding of research efforts in the Alaska OCS regions. This is the heart of this document.

PACIFIC REGION

5.3.3 Pacific Region Study Plan

There are four lease areas in the Pacific region of the Alaska OCS: Gulf of Alaska, Lower Cook Inlet, Kodiak, and the Aleutians. Sale dates for these lease areas are as follows.

Sale 39.	Gulf of Alaska - August 1976
Sale CI.	Lower Cook Inlet - October 1977
Sale 55.	Gulf of Alaska - June 1980
Sale 46.	Kodiak - October 1980
Sale 60.	Lower Cook Inlet - March 1981

The Aleutian lease area is presently not on a sale schedule.

The Pacific regional plan takes into account the variation in timing of study needs to provide environmental information to decision-makers.

A number of regional sub-issues have been addressed for these lease areas. Table 5-4 lists these regional concerns and indicates by which questions of the major issues they are addressed in the Pacific Regional Plan.

Data in Table 5-5 identifies all of the listed information needs from the preceding questions (both socioeconomic and environmental) and relates these needs to the major decision steps identified in Chapter 2. In addition, the lead time necessary to obtain the data to meet the information needs is given.

Table 5-6 presents the lease area study schedules for the Pacific region.

TABLE 5-4
MAJOR ISSUES

REGIONAL CONCERNS	Subsistence Lifestyles	Commercial Fishing	Recreation Tourism	Social Infrastructure	Coastal and Marine Ecosystems	Air and Water Quality	Archaeological Cultural Resources	Shipping Conflicts	Environmental Hazards
Pacific									
Contribution of Cook Inlet king crab, larvae to the fisheries seaward of Barren Islands	Q_1(1)	Q_1(3)			Q_1(1)				
Impact of oil on juvenile salmon and trout in southeast estuaries	Q_1(2) Q_1(3)	Q_1(1) Q_1(2) Q_1(3)			Q_1(1) Q_1(2) Q_1(1)				
Seabird colony locations and feeding areas					Q_1(1) Q_1(2)				
Marine traffic space conflicts		Q_1(4) Q_1(5)						Q_1(2) Q_1(3) Q_1(4) Q_1(5) Q_2(4) Q_3(1) Q_3(2) Q_3(5)	
Damage to fishing gear from economic shipping traffic thrust on reduced commercial fishing		Q_1(9)		Q_2(1)					
Sensitivity of commercial species to low levels of pollution	Q_1(1) Q_1(2) Q_1(3)	Q_1(1) Q_1(2) Q_1(3)			Q_1(1) Q_1(2) Q_1(3)				
Competition for port facilities		Q_1(9)		Q_1(3)				Q_1(2) Q_2(2) Q_3(1)	
Location of key commercial fish and shellfish habitats	Q_1(1) Q_1(4)	Q_1(1)			Q_1(1)				
Seismic hazards to structures and activities									Q_1(1) Q_1(2) Q_1(3) Q_1(4)

TABLE 5-4
MAJOR ISSUES

REGIONAL CONCERNS	Subsistence Lifestyles	Commercial Fishing	Recreation Tourism	Social Infrastructure	Coastal and Marine Ecosystems	Air and Water Quality	Archaeological Cultural Resources	Shipping Conflicts	Environmental Hazards
Pacific									
Impact of oil and gas development on coastal communities	Q_1(7)			Q_1(1) Q_1(2) Q_1(3) Q_2(1) Q_2(2) Q_4					
Technology to operate in severe weather									Q_1(1) Q_1(2)

5.3.3.1 SUBSISTENCE LIFESTYLES

$DQ_2(1)$: <u>What losses are expected to be sustained by subsistence consumers of living resources as a result of the leasing proposal</u>?

and

<u>Given the answer to $DQ_2(1)$ above, what is the socially efficient level of investment in mitigating measures</u>?

<u>Significant Impacts Producing Agents</u>

- Acute and chronic discharges (catastrophic oil spills and extended low level discharges of oil, formation waters, and drilling muds).

- Offshore and onshore OCS related surface and subsurface structures and associated debris.

- Noise produced by OCS activities.

Q_1: What are the expected impacts on critical populations and habitats utilized for subsistence living as a result of the above impact producing agents?

Acute and Chronic Discharges

Q_1(1): What is the frequency and magnitude of oil spills and other contaminant discharges over the life of the field which are expected to impact critical populations and habitats utilized for subsistence?

Q_1(a): What is the expected size, number, and timing of acute oil spills over the life of the field?

B. Oil spill probability projection.

C. Tanker spill probability.

Q_1(b): What is the expected rate and cumulative amount of small acute spills, chronic spills, and other contaminant discharges (e.g. formation waters, drilling muds, and additives)?

B. Oil spill probability projection.

C. Tanker spill probability.

6. Development scenarios.

7. Production scenarios.

8. Pollution scenarios of types, sources and frequency of discharges, including EPA and State discharge standards.

29. Residence times and flushing of contaminant waters.

30. Expected natural persistence and dispersal mechanisms and rates.

Q_1(c): What are the vulnerable habitats and abiotic processes (i.e. mechanisms of transport, transformation, and transfer which interrelate biologic communities with their habitat) that sustain populations gathered for subsistence?

U. Determination of subsistence resource and hunting areas.

39. Distribution and abundance of subsistence marine mammals, bird, fish, and other species.

41. Determination of critical habitats and habitat dependencies of subsistence species.

42. Principal prey organisms and feeding dependencies of subsistence species.

Q_1(d): What are the principal living resources (marine mammals, bird, fish, etc.) utilized for subsistence and where are they located?

U. Subsistence activity.

39. Distribution and abundance of subsistence species.

41. Location of critical habitats used by above species for breeding, resting, spawning, nursery, moulting, feeding, migration, and congregation.

Q_1(e): What are the expected seasonal trajectories of oil spills and other contaminant discharges?

A. Petroleum development scenarios

7. Production scenarios.

27. Water currents and circulation.

28. Offshore/nearshore wind fields.

30. Effluent dispersion and mixing.

32. Seasonal trajectory models for oil spills and other discharges.

33. Oil slick dynamics.

Q_1(2): What is the expected physiochemical condition of spilled oil at the time it impacts a vulnerable population or habitat utilized for subsistence?

5. Composition of oil.

32. Seasonal acute oil spill trajectories.

33. Weathering and dynamics of oil slicks.

41. Locations of critical habitats.

$Q_1(3)$: Given the answers to $Q_1(1)$ and $Q_1(2)$ above, are the impacts from OCS oil spills and other contaminant discharges expected to reduce significantly the gathering per unit effort on vulnerable populations and habitats utilized for subsistance resulting from: (a) restriction of subsistence use, (b) mortality of subsistence species, (c) displacement of living resources, (d) impact on recruitment, and (e) tainting (whether perceived or real)?

$Q_1(f)$: What natural conditions can be expected to inhibit or promote resumption of subsistence activity given an initial restriction in fishing and hunting use? What is the expected period of closure?

29. Residence time and flushing.

40. Emigration and repopulation rates of subsistence species from other areas.

45. Rates of microbial degradation of oil.

48. Avoidance behavior to oil.

50. Sublethal effects of oil.

54. Tainting, its persistence, and rates of depuration.

55. Persistence of discharge material in water, bottom sediments, and beaches.

Q_1(g): What is the expected behavioral response of subsistence species to the presence of oil?

48. Behavior of subsistence species to acute and chronic oil spills.

Q_1(h): What is the expected effect on the overall resilience and stability of vulnerable populations in terms of growth, survival, and reproduction?

8. Pollution scenarios.

32. Oil spill trajectories.

39. Distribution and abundance of vulnerable subsistence species.

40. Life history and population parameters of vulnerable subsistence species.

50. Sublethal effects of oil on vulnerable subsistence species.

Q_1(i): What are the expected cumulative effects (e.g. biomagnification of contaminants, threshold physiological sensitivities, etc.) on existing populations and habitats from continuous exposure to low level contaminant discharges?

1. Concentration and distribution of hydrocarbons.

3. Concentration and distribution of toxic metals.

8. Pollution scenarios.

49. Toxicity of oil.

50. Sublethal effects of oil.

51. Combined pollutant effects.

52. Toxicity of muds and cuttings.

54. Tainting of subsistence species and bioaccumulation.

Q_1(j): To what extent is taining of subsistence species or other quality changes expected to occur?

1. Concentration and distribution of hydrocarbons.

8. Pollution scenarios.

54. Tainting mechanisms, including exposure time to discharges to produce tainting or other quality changes.

X. Risk analysis of predicted oil concentration and subsistence species populations.

Offshore and Onshore Surface and Subsurface Structures and Related Debris Produced by OCS Activities

Q_1(4): What is the expected alteration to critical populations that support subsistence use or reduction in habitat space due to OCS surgace and subsurface structures?

Q_1(k): Are offshore and onshore related structures and associated construction activities (e.g. cause ways, gravel islands, pipeline burial, and dredged material disposal) expected to interfere significantly with existing subsistence species populations and habitats?

A. Petroleum development scenarios.

Q_1(1): What are the locations of wetlands in the area?

M. Community and regional infrastructure analysis.

9. OCS activities/impacts scenarios.

39. Distribution and abundance of vulnerable subsistance species.

41. Location of critical habitats.

58. Effects of OCS and structures on vulnerable subsistence species populations and critical habitats.

59. Effects of OCS activities on above.

Q_1(m): What are the location of principal species utilized for subsistence.

U. Subsistence resource locations.

Q_1(n): What is the expected number and location of OCS related offshore and onshore structures?

A. Petroleum development scenarios.

Q_1(5): Given the answer to Q_1(4) above, what is the expected reduction in the gathering per unit effort of subsistence hunting and fishing as a result of reduced subsistence species populations?

X. Loss/Benefit analysis.

Noise Produced by OCS Activities

Q_1(6): What is the expected alteration to subsistence species populations or reduction in habitat space due to noise produced by OCS activities?

Q_1(o): What is the expected number and location of OCS related activities that produce noise?

A. Petroleum development scenarios.

$Q_1(p)$: What is the expected behavioral response of vulnerable subsistence species to noise pollution?

53. Avoidance/attraction behavior of subsistence species to noise, including acclimation and disruption of normal behavior.

$Q_1(7)$: What is the expected loss in welfare to those existing on subsistence lifestyles as a result of displacement or reduction in wildlife resources?

X. Loss/benefit analysis.

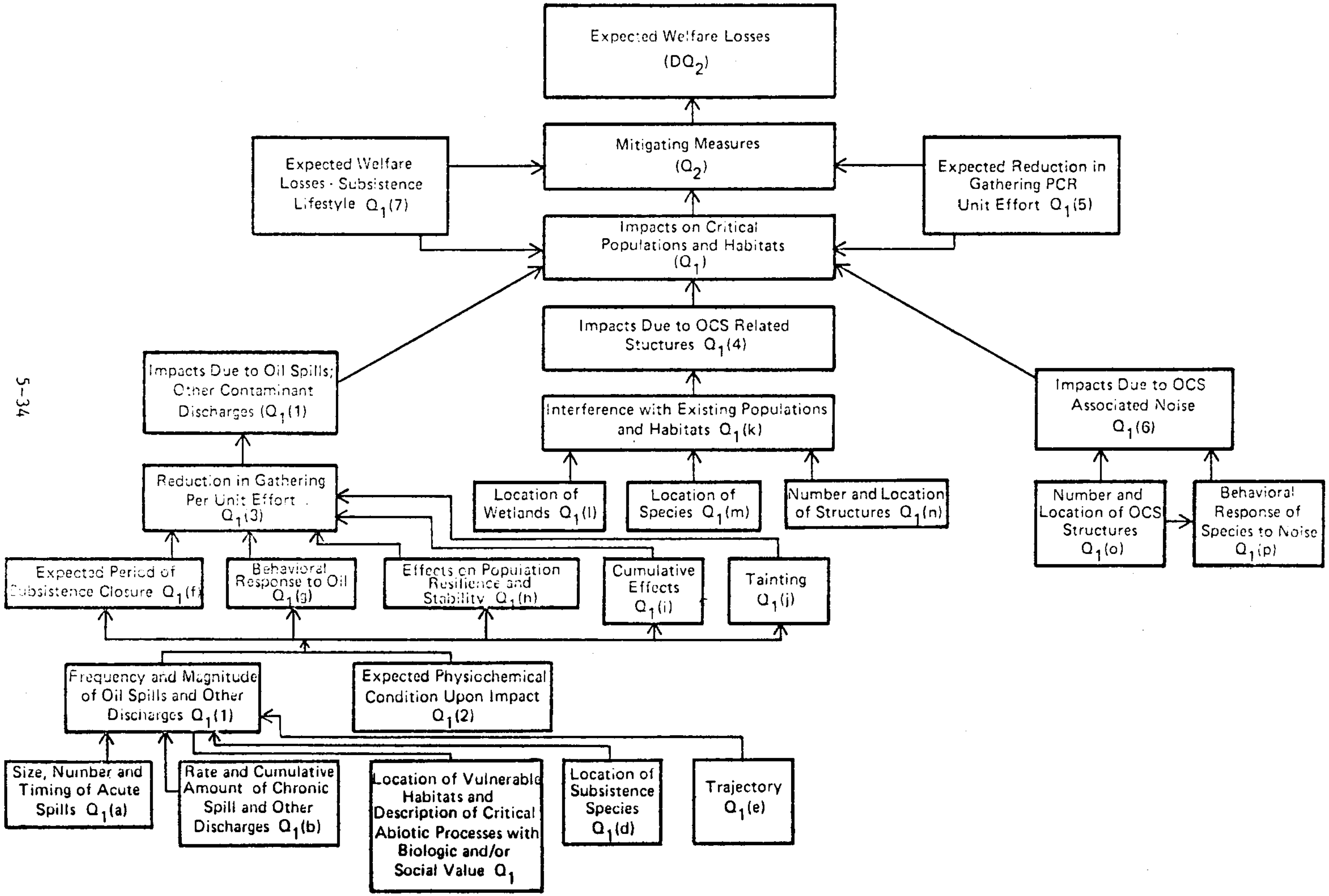
Mitigating Measures

Q_2: Given the expected reduction in critical populations and habitats of subsistence species, what investment in mitigating measures should be made through OCS operating orders, special stipulations, EPA regulations and guidelines, and tract deletions?

Y. Migitating measures analysis.

FIGURE 5-2

SUBSISTENCE LIFESTYLES*



5.3.3.2 COMMERCIAL FISHING

$DQ_2(2)$: What economic losses are expected to be sustained by the (1) fishing industry, (2) consumers of fish products, and (3) the regional economy as a result of the leasing proposal?

and

Given the answer to $DQ_2(1)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impacts Producing Agents

- Acute and chronic discharges (catastrophic oil spills and extended low level discharges of oil, formation waters, and drilling muds).

- Offshore OCS related surface and subsurface structures and related debris.

- Tank farms and other onshore structures.

Q_1: What economic losses are expected to be sustained by the fishing industry as a result of the above impact producing agents?

Acute and Chronic Discharges

$Q_1(1)$: What is the frequency and level of acute and chronic discharges expected to impact commercial fisheries over the life of the field?

$Q_1(a)$: What is the expected size, number, and timing of acute oil spills over the life of the field?

A. Petroleum development scenarios.

B. Oil spill probability projection.

C. Tanker spill probability projection.

Q_1(b): What is the expected cumulative amount and timing of chronic discharges over the life of the field?

A. Petroleum development scenarios.

B. Oil spill probability projection.

C. Tanker spill probability projection.

8. Pollution scenarios with prediction of types, sources and freuqency of chronic discharges, and EPA and state discharge standards.

30. Persistence and dispersion mechanisms of discharges (dispersion model).

Q_1(c): What are the locations of significant commercial fisheries?

D. Fisheries location identification.

39. Distribution and abundance of commercial fisheries.

41. Location of critical habitats of commercial fisheries, including migration routes, feeding areas, and schooling and nursery grounds.

Q_1(d): What are the expected trajectories of acute and chronic discharges?

A. Petroleum development scenarios.

27. Offshore/nearshore circulation.

28. Offshore/nearshore wind fields.

30. Effluent dispersion and mixing.

32. Seasonal trajectory model for acute oil spills.

33. Oil slick dynamics.

Q_1(2): What is the expected physiochemical condition of an acute oil spill at the time it impacts a commercial fishery?

5. Composition of oil.

32. Seasonal acute oil spill trajectory model.

33. Oil slick dynamics, including weathering effects on oil.

41. Location of commercial fisheries.

$Q_1(3)$: Given the answers to $Q_1(1)$ and $Q_2(2)$ above, what is the expected reduction in the catch per unit effort of fishermen and industry revenues or economic rents resulting from; (a) restriction of fishery use, (b) mortality of commercial species, (c) displacement, (d) impact on year classes of fish, and (e) tainting (whether perceived or real)?

$Q_1(e)$: What natural conditions can be expected to inhibit or promote resumption of fishing activity given an initial restriction in fishing use? What is the expected period of closure?

29. Residence times and flushing.

40. Emigration and repopulation rates of fish and shellfish from other areas.

45. Rates of microbial degradation of oil.

54. Tainting and its persistence, including rates of depuration.

55. Environmental recovery rates and persistence of pollutants, including estimate of duration of closure.

$Q_1(f)$: What is the expected behaviorial response of commercial species to the presence of oil?

48. Behavior of fish and shellfish to acute and chronic oil spills.

Q_1(g): What are the expected rates of recruitment and reproduction - including lethal and nonlethal effects in various life stages - of commercial species following an acute oil spill?

40. Natural rates of recruitment and reproduction.

49. Toxic effects of oil on recruitment.

50. Sublethal effects of oil on recruitment and reproduction.

Q_1(h): What are the expected cumulative effects on commercial species from continuous exposure to low level containment discharges?

1. Concentrations of hydrocarbons.

3. Concentrations of toxic metals.

8. Pollution scenarios.

48. Behavior responses to continuous chronic exposure.

54. Bioaccumulation rates at threshold physiological sensitivities, including uptake pathways.

Q_1(i): To what extent is tainting of commercial fish stocks or other quality changes expected to occur?

8. Pollution scenarios.

54. Tainting mechanisms, exposure thresholds, depuration rates.

Offshore Surface and Subsurface Structures and Related Debris

$Q_1(4)$: What is the expected alteration or reduction in fishing space due to surface and subsurface structures?

$Q_1(j)$: What is the expected number and location of surface and subsurface structures?

A. Petroleum development scenarios.

$Q_1(k)$: What are the locations of significant commercial fisheries?

D. Fisheries location identification.

41. Identification of key habitats of commercial fish and shellfish.

$Q_1(l)$: What type of fishing techniques are used?

F. Fishing practices.

$Q_1(5)$: What is the expected economic loss due to torn nets or other damaged fishing equipment?

A. Petroleum development scenarios.

E. Fish equipment loss.

G. Shipping activity.

$Q_1(6)$: Given the answer to $Q_1(4)$ above, what is the expected reduction in the catch per unit effort of fishermen and industry revenues or economic rents?

Q. Fish economic analysis.

X. Loss/Benefit analysis.

Tank Farms and Other Stuctures

$Q_1(7)$: What is the expected alteration of wetlands as a result of tank farms and other onshore structures?

$Q_1(m)$: What is the expected number and location of tank farms and other OCS related structures?

A. Petroleum development scenarios.

$Q_1(n)$: What are the locations of wetlands in the area?

D. Fish location analysis.

M. Commercial regional information analysis.

40. Critical habitats identification in wetland areas.

42. Food web dependencies by fish in wetland areas.

44. Identification of wetlands in area of concern.

Q_1(o): What type and size of alterations are expected to wetlands?

A. Petroleum development scenarios.

9. Activities/impact scenarios for wetlands.

58. Effects of OCS structures to wetlands.

59. Effects of OCS activities to wetlands.

Q_1(8): Given the answer to Q_1(7) above, what is the expected reduction in the catch per unit effort of fishermen and industry revenues or economic rents as a result of reduced commercial fish populations?

G. Shipping.

Q. Fish economic analysis.

X. Loss/Benefit analysis.

Q_1(9): What is the expected alteration or reduction in commercial fishing due to shipping?

$Q_1(p)$: What are the existing impacts on commercial fisheries due to shipping?

E. Fish equipment loss.

G. Shipping activity.

41. Location of significant commercial fishing grounds.

$Q_1(q)$: What are the expected impacts on commercial fisheries due to increased OCS shipping activities?

53. Effects of ship disturbance (noise) on schooling and breeding of commercial fish and shellfish.

59. Effects of turbidity on commercial fish and shellfish.

Q_2: Given the expected reduction in supplies of commercial fish, tainting (perceived or real), and other quality changes in fish stocks, what is the expected loss in welfare (consumer surplus) of consumers fish products?

T. Fisheries user preferences.

Q_3: Given the economic losses expected to be sustained by the fishing industry and consumers of fish products, what are the expected changes in regional income, employment, and population?*

N. Population analysis.

O. Employment analysis.

P. Economic analysis.

Q. Fish economic analysis.

Mitigating Measures

Q_4: Given the type and magnitude of economic losses resulting from the impact producing agents, what level of investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, EPA Regulations and Guidelines, and tract deletions.

Y. Mitigating measure analysis.

Benefits

Q_5: What benefits to the commercial fishing industry, consumers of fish products, and the regional economy are expected as a result of the proposal?

---

* The effects of these changes on the infrastructure and social fabric of the area are discussed in section 3.2.3.

$Q_5(1)$: What reduction in the number of import tankers' spills hitting fisheries (i.e., chronic and acute) can be expected as a result of the proposal?

C. Tankers' spill probability.

$Q_5(2)$: What is the expected savings to commercial fishermen as a result of this expected reduction in oil spills?

X. Loss/benefit analysis.

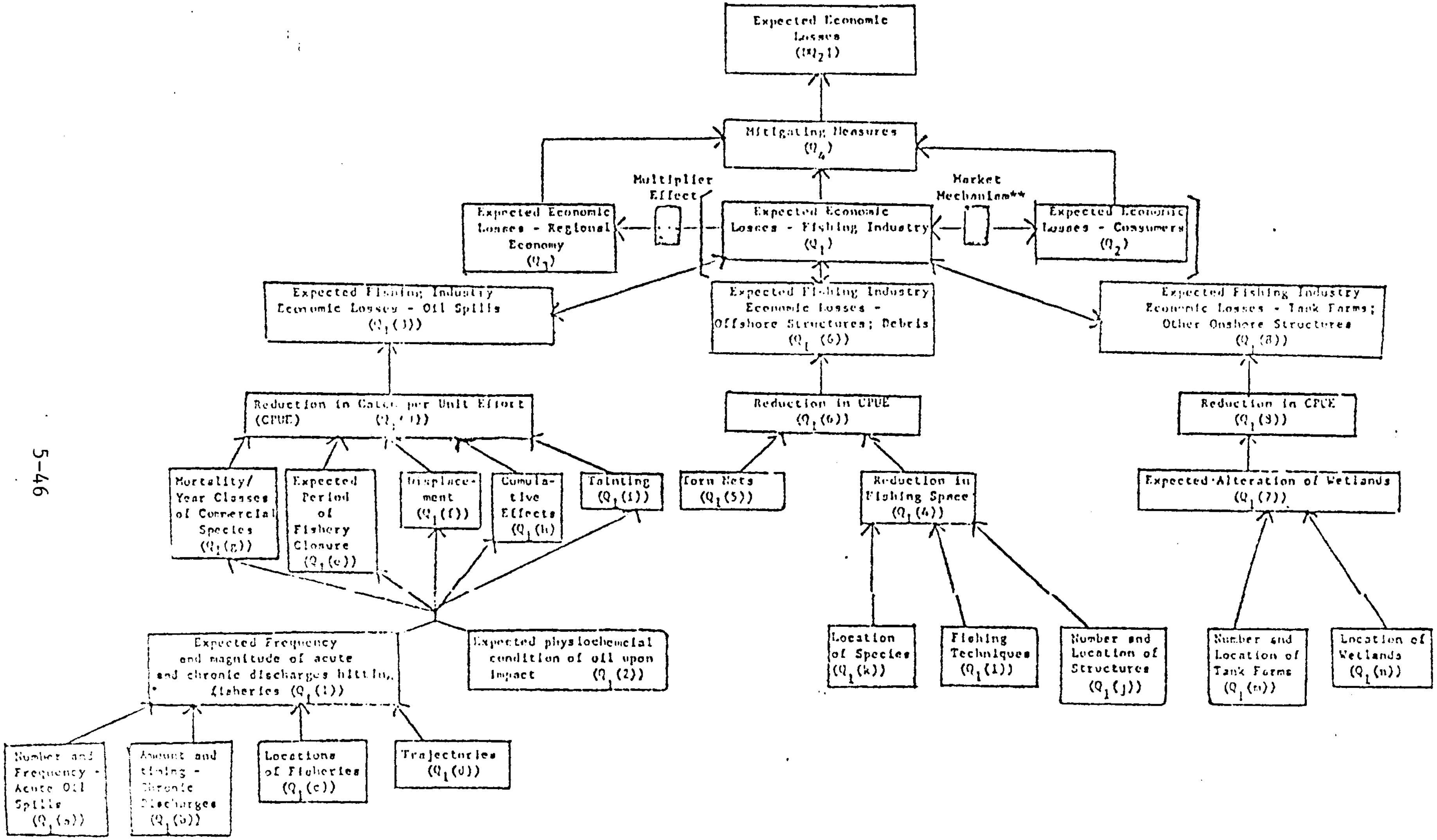
Q_6: What is the expected gain to commercial fishermen as a result of offshore structures providing habitats for fish?

X. Loss/benefit analysis.

43. OCS structures as fish habitats.

FIGURE 5-3

COMMERCIAL FISHING *



** Economic losses will be apportioned between consumers of fish products and the fishing industry depending on the elasticity of market demand as well as possible shifts in the supply and demand functions.

5.3.3.3 RECREATION

$DQ_2(3)$: What economic losses can be expected to be sustained by (1) the recreation industry, (2) recreationists, and (3) the regional economy as a result of the leasing proposal?

and

Given the answer to $DQ_2(2)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impact Producing Agents

(1) Acute and chronic oil spills.
(2) Onshore OCS related structures.

Q_1: What economic losses are expected to be sustained by the recreation industry as a result of the above impact producing agents?

Oil Spills and Onshore OCS Related Structures

$Q_1(1)$: What is the frequency and magnitude of acute and chronic oil spills expected to impact high use recreational areas (beaches and sport fishing locations) over the life of the field?

$Q_1(a)$: What is the expected size, number, and timing of acute oil spills over the life of the field?

B. Oil spill probability projection.

6. Development scenarios.

7. Production scenarios.

8. Statistical history of acute oil spills.

Q_1(b): What is the expected cumulative amount and timing of chronic oil spills over the life of the field?

B. Oil spill probability projection.

6. Development scenarios.

7. Production scenarios.

8. EPA discharge standards, and prediction of types, sources and frequency of chronic discharges.

30. Dispersion mechanisms of discharges (dispersion model); natural dispersal mechanisms and rates expected.

Q_1(c): What are the major beach and sport fishing locations in the area?

H. Recreation locational identification location of major sport fisheries and location of major beaches used for recreation.

Q_1(d): What are the expected seasonal trajectories of acute and chronic oil spills?

6. Development scenarios.

7. Production scenarios.

27. Offshore and nearshore circulation patterns.

28. Offshore and nearshore wind fields.

30. Determination of expected natural dispersion mechanisms and rates.

32. Seasonal trajectory model for acute and chronic oil spills.

33. Oil slick dynamics.

$Q_1(2)$: What is the expected physiochemical condition of an acute oil spill at the time it impacts a recreational area?

H. Location of recreational areas.

5. Composition of Alaska crude oils.

30. Acute oil spill dispersion mechanisms and rates.

32. Seasonal acute oil spill trajectory model.

33. Determination of oil slick dynamics, including weathering effects on oil.

$Q_1(3)$: What is the number and type of onshore structures expected to be constructed in the proximity of recreational areas?

A. Petroleum development scenarios.

H. Location of recreational sites.

$Q_1(4)$: Given the answers to $Q_1(1)$ through $Q_1(3)$ above, what is the expected reduction in industry revenues or economic rents resulting from a restriction of recreation use or the degraded quality of the activity?

$Q_1(e)$: What natural conditions can be expected to inhibit or promote resumption of beach use or sport fishing given an initial restriction in these recreational activities? What is the expected period of closure?

I. Visual impact evaluation.

M. Community regional infrastructure analysis.

S. Recreation user preference.

29. Residence time of waters and flushing rates.

40. Population parameters of emigration, repopulation, of fish and shellfish from other areas.

45. Microbial degradation rates of oil.

54. Rates of depuration of sport fish.

55. Natural recovery rates of beaches and waters, and repeated period of closure.

Q_1(f): What is the expected reduction in beach use or sport fishing as a result of the degraded quality of the activity?

M. Community regional infrastructure analysis.

S. Recreation user preference.

Q_1(g): Will the expected reduction in the supply or quality of beaches and fishing grounds result in the use of other recreation facilities?

M. Community regional infrastructure analysis.

S. Recreation user preference.

Q_1(h): To what extent will revenues expected from expenditures on other recreational activities offset the revenues foregone in the impacted activities?

M. Community regional infrastructure analysis.

R. Recreation industry analysis.

S. Recreation user preference.

Q_2: Given the expected reduction in the supply of recreational opportunities or quality changes, what is the expected loss in the welfare (consumer surplus) of recreationists (other than sport fishermen)?

M. Community regional infrastrucure analysis.

S. Recreation user preference.

Q_3: Given the expected reduction in the catch per unit effort of sport fishermen and tainting of fish stocks, what is the expected loss in welfare (consumer surplus) of these recreationists.*

A. Petroleum development scenarios.

D. Fisheries location identification.

M. Community regional infrastructure analysis.

P. Economic analysis.

S. Recreation user preference.

Q_4: Given the economic losses expected to be sustained by the recreation industry and recreationists, what are the expected changes in regional income, employment, and population?**

M. Community regional infrastrucure analysis.

---

* The information needed to determine the expected reduction in the catch per unit effort of sport fishermen and the extent of tainting is discussed in section 3.4.1, Q_1(3).

** The effects of these changes on the infrastructure and social fabric of the area are discussed in section 3.4.4.

N. Population analysis.

O. Employments analysis.

P. Economic analysis.

Mitigating Measures

Q_5: Given the type and magnitude of economic losses resulting from the impact producing agents, what level of investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, and tract deletions?

Y. Mitigating measures analysis.

Benefits

Q_6: What benefits to recreationists, the recreation industry, and the regional economy are expected as a result of the proposal?

$Q_6(1)$: What is the expected increase in welfare (consumers' surplus) to sport fishermen and the economic rents to the recreation industry as a result of OCS petroleum related structure providing more sport fishing locations?

X. Loss/benefit analysis.

$Q_6(2)$: Given the expected increase in economic rents to the recreation industry as a result of OCS related structures, what is the expected increase with respect to the regional economy?

X. Loss/benefit analysis.

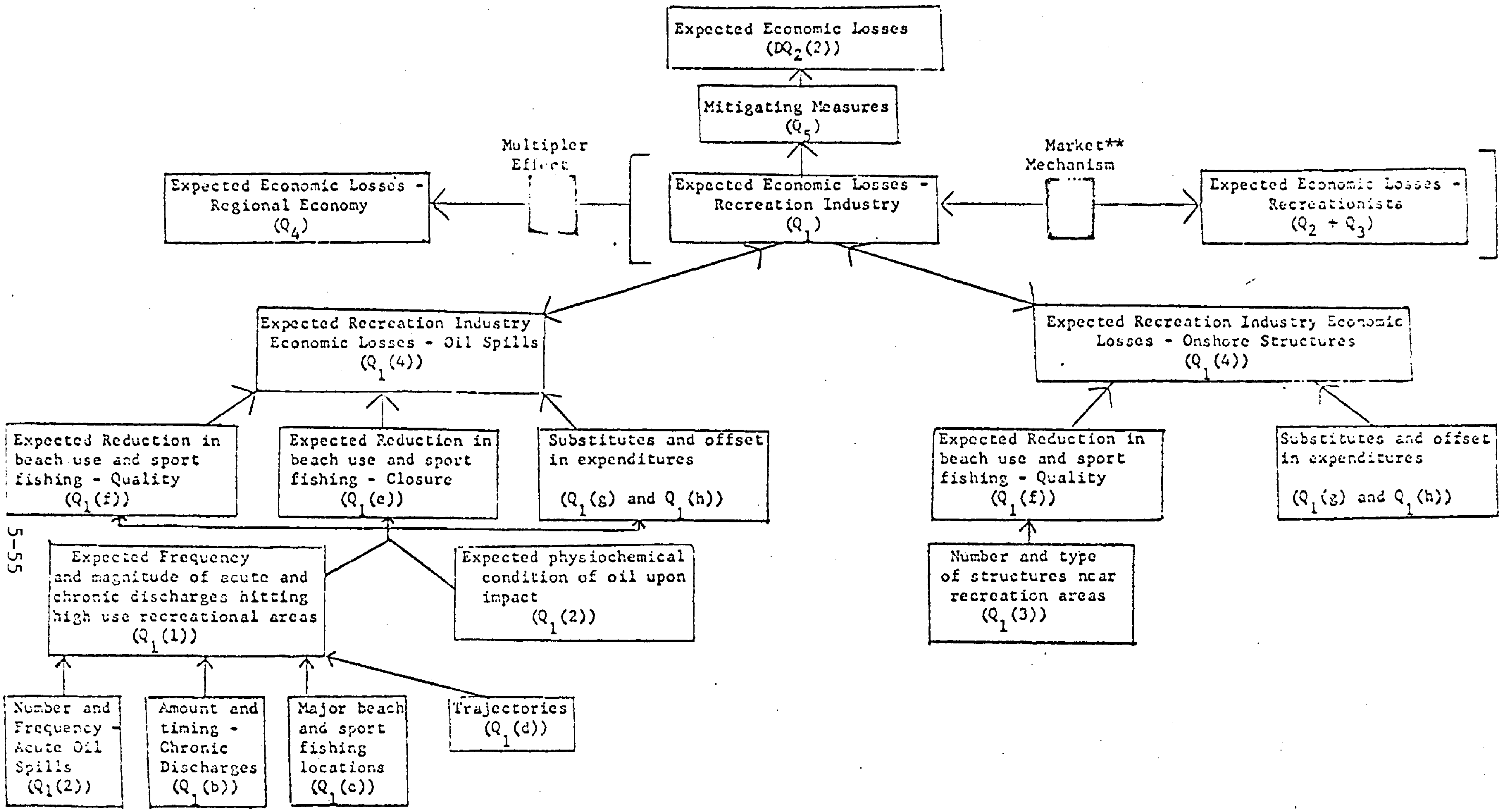
$Q_6(3)$: What reduction in the number of import tanker spills (chronic and major) hitting recreational areas can be expected as a result of the proposal?

C. Tanker spill probability.

$Q_6(4)$: What is the expected savings to recreationists, the recreation industry, and the regional economy as a result of this reduction in oil spills?

X. Loss/benefit analysis.

RECREATION*



** Economic losses will be apportioned between recreationists and the recreation industry depending on the elasticity of market demand as well as possible shifts in the supply and demand functions.

FIGURE 5-4

5.3.3.4 INFRASTRUCTURE AND SOCIAL CONFLICTS

$DQ_2(3)$: What welfare losses (consumers' surplus) can be expected due to infrastructure and social stresses generated by the leasing proposal?

and

Given the answer to $DQ_2(3)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impact Producing Agents

(1) Changes in economic activity

Q_1: What welfare losses are expected as a result of infrastructure stresses induced by changes in the coastal zone economic activity?

$Q_1(1)$: What is the expected increase in population over time as a result of the proposal?

A. Petroleum development scenarios.

N. Population analysis.

$Q_1(2)$: What is the expected increase in demand for social services such as schools, health care, housing, law enforcement, fire protection, water supply, energy supply, solid waste disposal, and sewage?

A. Petroleum development scenarios.

M. Community regional infrastructure

$Q_1(3)$: To what extent is short-term inflationary pressure expected to result from competition for harbor space, marine services, land and capital?

A. Petroleum development scenarios.

D. Fisheries location identification.

M. Community regional infrastructure analysis.

P. Economic analysis.

Q_2: What welfare losses are expected as a result of social stresses* induced by changes in coastal zone economic activity?

P. Economic analysis.

Q. Fish economic analysis.

$Q_2(1)$: What are the expected changes in the economic base of the area?

P. Economic analysis.

Q. Fish economic analysis.

---

* Changes in community values as well as social rank and role.

$Q_2(a)$: To what extent will expected losses to commercial fishermen affect the regional allocation of resources to this industry?

P. Economic analysis.

Q. Fish economic analysis.

$Q_2(b)$: To what extent is competition for harbor space, marine services, land, and capital expected to change the economic base of the area?

A. Petroleum development scenarios.

M. Community regional infrastructure analysis.

P. Economic analysis.

$Q_2(c)$: To what extent will expected losses to the recreation industry affect the regional allocation of resources to this industry?

A. Petroleum development scenarios.

M. Community regional infrastructure analysis.

R. Recreation industry analysis.

$Q_2(d^1)$: What are the expected changes in land use?

M. Community regional infrastructure analysis.

Q_2(d): What is the expected change in population composition as a result of changes in the economic base of the area?

N. Population analysis.

O. Employment analysis.

P. Economic analysis.

Q_2(2): Given the answer to Q_2(1) above, what is the expected effect on social stability (community values, social rank and role, standard of living)?

L. Sociocultural analysis.

Q_3: To what extent are non-socially disruptive changes in cultural patterns and values deemed a significant loss?

L. Sociocultural analysis.

Q_4: What is the expected change in unemployment or underemployment of labor and capital due to net change in economic activity induced by the leasing proposal?

O. Employment analysis.

P. Economic analysis.

Mitigating Measures

Q_5: Given the type and magnitude of economic losses resulting from the impact producing agents, what level of investment in mitigating measures should be made through OCS Operating Orders and the Coastal Energy Impact Program?

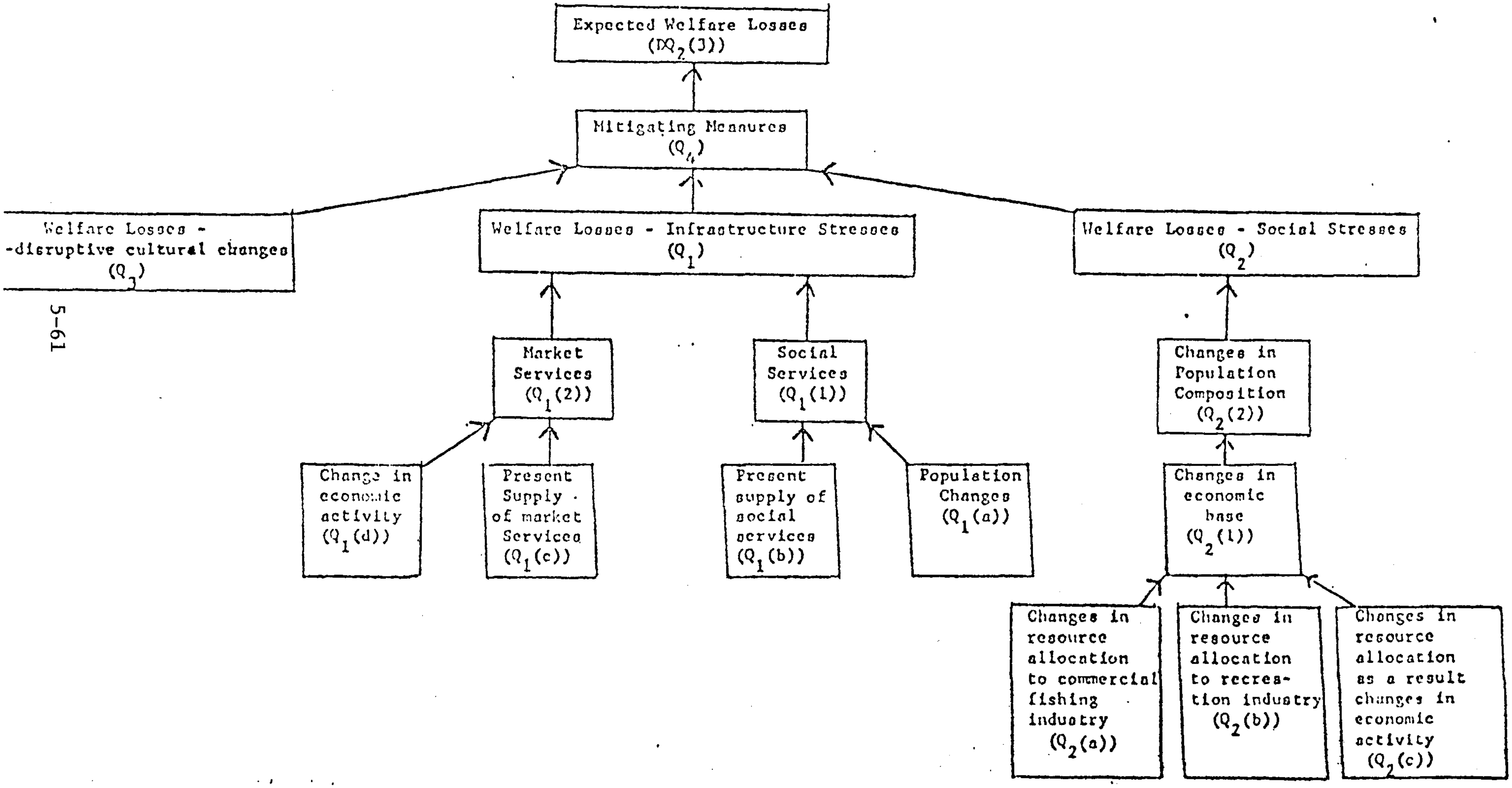
Y. Mitigating measures analysis.

Q_6: What is the expected reduction in economic losses as a result of the investment?

X. Loss/benefit analysis.

FIGURE 5-5

INFRASTRUCTURE AND SOCIAL CONFLICTS*



5.3.3.5 MARINE AND COASTAL ECOSYSTEMS

DQ_2(4A): What changes in the population and habitat of species are expected to interfere with ecological relationships as a result of the leasing proposals?

and

Given the answer to DQ_2(4A) above, what investment in mitigating measures is necessary to bring the risk of interference with ecological relationships to an acceptable level?

Significant Impact Producing Agents

(1) Oil spills and other OCS related discharges.

(2) Offshore and onshore OCS related surface and subsurface structures, associated debris and noise produced by the activities.

Q_1: What are the expected impacts on critical populations and habitats as a result of the above impact producing agents?

Acute and Chronic Discharges

Q_1(1): What is the frequency and magnitude of oil spills and other contaminant discharges which are expected to impact critical populations and habitats over the life of the field?

Q_1(a): What is the expected size, number, and timing of acute oil spills over the life of the field?

A. Petroleum development scenarios.

B. Oil spill probability projection.

7. Production scenarios.

Q_1(b): What is the expected rate and cumulative amount of small acute spills, chronic spills, and other contaminant discharges (e.g. formation waters, drilling muds, and additives)?

A. Petroleum development scenarios.

7. Production scenarios.

8. Pollution scenarios including EPA and State discharge standards and prediction of types, sources and frequency of discharges.

30. Persistence and dispersal mechanisms and rates (persistence/dispersion model); natural persistence and dispersion mechanisms and rates.

Q_1(c): What are the vulnerable habitats and abiotic processes (i.e., mechanisms of transport, transformation, and transfer which interrelate biologic communities with their habitat) that sustain populations with high biologic and social values (e.g., marine sanctuaries, national wildlife refuges, etc.)?

39. Distribution and abundance of species with high biological and/or social values.

41. Location of habitats and habitat dependencies of above species for breeding, resting, spawning, nursery, moulting, feeding, migration, and congregation.

42. Key food web dependencies that sustain populations.

46. Distribution of ecological communities of unique/aesthetic importance and/or of high productivity.

56. Vulnerability of habitats to OCS exploration development and productive activities and accidents.

59. Effects to key ecological processes to OCS exploration, development and production activities and accidents.

Q_1(d): What vulnerable populations have high biologic and social value (e.g. predator - prey relations, <u>endangered</u> or <u>threatened</u> species, corals protected by Secretarial Order, etc.), and where are they located?

41. Distribution and abundance of species with high biological and/or social values.

46. Distribution of ecological communities of unique/aesthetic importance and/or highly productive.

Q_1(e): What are the expected trajectories of oil spills and other contaminant discharges?

6. Development scenarios.

7. Production scenarios.

27. Offshore and nearshore circulation.

28. Offshore and nearshore wind fields.

30. Natural dispersion mechanisms and rates expected.

32. Seasonal trajectory models for oil spills and other discharges.

33. Oil slick dynamics.

Q_1(2): What is the expected physiochemical condition of the oil at the time it impacts a vulnerable population or habitat?

5. Composition of Alaska crude oil.

32. Seasonal acute oil spill trajectories.

33. Determination of oil slick dynamics, including weathering.

39. Locations of vulnerable populations.

41. Locations of critical habitats.

$Q_1(3)$: Given the answers to $Q_1(1)$ and $Q_1(2)$ above, are the impacts from OCS oil spills and other contaminant discharges expected to interfere significantly with existing critical populations and habitats?

$Q_1(f)$: What is the expected behavioral response of vulnerable species to the presence of oil?

48. Avoidance/attraction behaviors of vulnerable species to oil, including disruption of normal behavioral activities by oil.

$Q_1(g)$: What is the expected effect on the overall resilience and stability of vulnerable populations in terms of growth, survival, and reproduction?

8. Pollution scenarios.

32. Oil spill trajectories.

39. Distribution and abundance of vulnerable species.

40. Life history and population parameters of vulnerable species.

50. Sublethal effects of oil on vulnerable species.

Q_1(h): Is the presence of oil expected to destroy or degrade vulnerable habitats so as to preclude their use?

8. Pollution scenarios.

32. Oil spill trajectories.

41. Habitat dependencies of vulnerable species.

41. Locations of critical habitats.

55. Environmental recovery rates of ecosystems.

Q_1(i): What are the expected significant cumulative effects (e.g., biomagnification of contaminants, threshold physiologic sensitivities, etc.) on existing populations and habitats from continuous exposure to low level contaminant discharges?

1. Concentrations of hydrocarbons.

3. Concentrations of toxic metals.

8. Pollution scenarios.

48. Sublethal effects of oil.

49. Toxicity of oil.

51. Combined pollutant effects.

52. Toxicity of muds and cuttings.

54. Tainting of commercial species and bioaccumulation.

Offshore and Onshore Surface and Subsurface Structures Related Debris and Noise Produced by OCS Activities.

$Q_1(4)$: What is the expected alteration to critical populations or reduction in habitat space due to OCS related structures and associated noise.

$Q_1(j)$: What is the expected behavioral response of vulnerable species to noise pollution?

53. Avoidance/attraction behaviors of vulnerable species to noise, including acclimation and noise disruption of normal behavioral activities.

$Q_1(k)$: What is the expected number and location of OCS related offshore and onshore structures?

6. Development scenarios.

7. Production scenarios.

$Q_1(l)$: Are OCS offshore and onshore related structures and associated construction activities (e.g., causeways, gravel islands, pipeline burial, and dredged material disposal) expected to interfere significantly with existing populations and habitats?

9. OCS activities/impacts scenarios.

39. Distribution and abundance of vulnerable species.

41. Locations of critical habitats.

58. Effects of OCS structures on vulnerable populations and critical habitats.

59. Effects of OCS activities on vulnerable populations and critical habitats.

Q_2: What is the expected loss in welfare (consumer surplus) resulting from aesthetic degradation?*

$Q_2(1)$: What is the expected loss in welfare to property owners in the area resulting from visual intrusions or debris washed ashore?

I. Visual impact evaluation.

M. Community/regional infrastrucutre analysis.

P. Economic analysis.

---

* Recreation losses due to aesthetic degradation is discussed in section 4.2.2.

$Q_2(2)$: As a result of oil spills or other impact producing agents which are expected to cause a significant reduction in the populations or habitat of species in the area, what is the expected loss in welfare to those who place significant value on the intrinsic worth of wildlife, marine species, and their habitats?

S. Recreation user preference.

T. Fisheries user preference.

Mitigating Measures

Q_3: Given the expected reduction in critical populations and habitats of species, what investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, EPA Regulations and Guidelines, and tract deletions.

Y. Mitigating measures analysis.

Q_4: To what extent will this investment reduce the risk of interference with ecological relationships?

Y. Mitigating measures analysis.

X. Loss/benefit analysis.

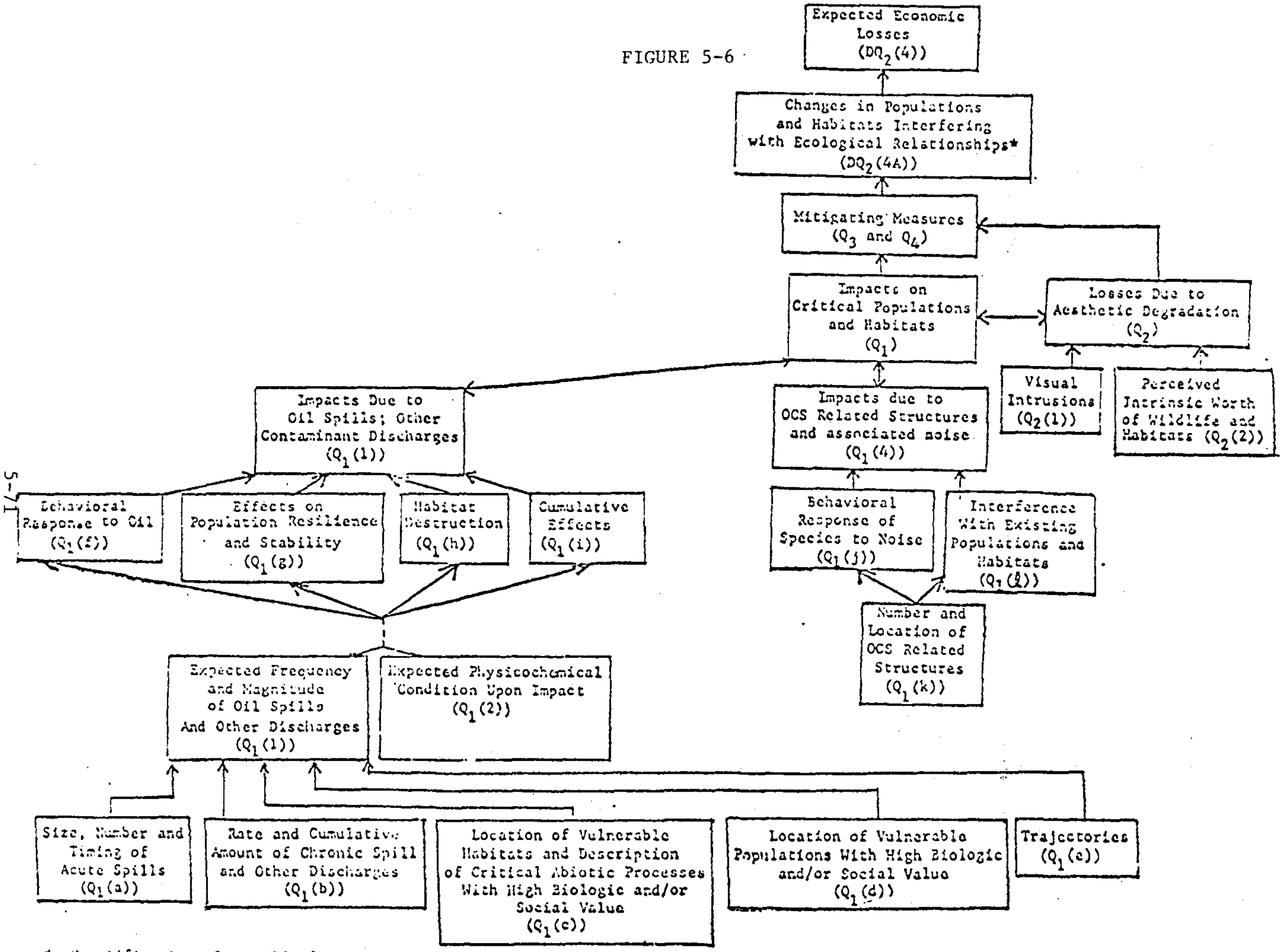
Benefits

Q_5: What reduction in the number of import tanker spills hitting critical populations and habitats can be expected as a result of the proposal?

C. Tanker spill probability.

MARINE AND COASTAL ECOSYSTEMS

FIGURE 5-6



* Quantification of possible losses due to these interferences in dollar terms is presently impossible. Thus, the decisionmaker's question is converted to $DQ_2(4A)$.

5.3.3.6 AIR AND WATER QUALITY

$DQ_2(5)$: What regional welfare losses (consumer surplus) due to degradation of air and water quality can be expected as a result of the leasing proposal?

and

Given the answer to $DQ_2(5)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impacts Producing Agents

(1) Onshore and Offshore Emissions
(2) Onshore effluents

Q_1: What losses in welfare (consumer surplus) can be expected as a result of onshore air quality degradation?

$Q_1(1)$: What is the expected cumulative level of emissions due to gas processing plants, oil transfer operations and offshore emissions?

4. Present sources and levels of emissions.

6. Development scenarios.

7. Production scenarios.

8. Expected types and concentrations of emissions.

31. Persistence and dispersal mechanisms and rates.

$Q_1(2)$: What is the present level of emissions which adversely affect air quality?

4. Types, concentration, and sources of adverse emissions.

31. Persistence and dispersal mechanisms and rates of atmospheric emissions.

$Q_1(3)$: To what extent will these onshore emissions violate emission standards?

4. Present types and levels of adverse emissions.

6. Development scenarios.

7. Production scenarios.

8. Pollution scenarios of expected types, concentrations, and sources of emissions.

31. Expected persistence and dispersal mechanisms and rates.

$Q_1(4)$: If standards are not violated, will the expected increase in the level of emissions still cause a significant welfare loss?

S. Public attitudes, values, and aesthetics.

4. Present types and levels of emissions.

8. Expected types and levels of emissions.

31. Persistence and dispersion mechanisms and rates of emissions.

58. Effects of OCS structures and emissions on visibility and air odors.

$Q_1(5)$: Are any emissions which are not covered by standards expected to result in a significant welfare loss?

S. Public attitudes, values and aesthetics.

4. Present types and levels of non-regulated emissions.

8. Expected types and levels of non-regulated emissions.

31. Dispersion mechanisms and rates.

58. Effects of expected non-regulated emissions on smell and visibility.

$Q_1(6)$: What temporary loss in welfare can be expected to result from short-term increase in emissions caused by adverse meteorological conditions?

22. Types, frequency of occurrence and magnitude of adverse atmospherical effects.

Q_2: What losses in welfare (consumer surplus) can be expected as a result of onshore water quality degradation?

X. Loss/benefit analysis.

$Q_2(1)$: What is the expected cumulative level of effluents due to transportation residuals and industrial and residental wastes?

A. Location of freshwater supplies.

M. Present use of freshwater by industry, population, onshore biota.

1. High molecular weight hydrocarbon distribution.

2. Low molecular weight hydrogen distribution.

3. Toxic metals distribution.

8. Present types, concentrations, and sources of effluents, and expected increases with OCS development.

30. Dispersion mechanisms and rates.

$Q_2(2)$: What is the present level of effluents which adversely affect water quality?

1. High molecular weight hydrogen distribution.

2. Low molecular weight hydrocarbon distribution.

3. Toxic metals distribution.

8. Determination of types, sources, and concentrations of adverse effluents.

30. Dispersal mechanisms and rates.

$Q_2(3)$: To what extent will these effluents violate discharge standards?

4. Adverse effluents.

6. Development scenarios.

7. Production scenarios.

8. Expected types and concentration of adverse effluents; discharge standards.

30. Dispersal mechanisms and rates.

$Q_2(4)$: If standards are not violated, will the expected increase in the level of effluents still cause a significant welfare loss?

S. Expected public attitudes, values and aesthetics.

8. Expected types and levels of effluents.

30. Expected persistence and dispersion mechanisms and rates.

58. Effects of effluents on water clarity and taste.

$Q_2(5)$: Are any effluents which are not covered by standards expected to result in a significant welfare loss?

S. Expected public attitudes, values and aesthetics.

8. Expected types and levels of non-regulated effluents.

30. Expected persistence and dispersal mechanisms and rates.

58. Effects of expected non-regulated effluents on water clarity and taste.

$Q_2(6)$: What temporary loss in welfare can be expected to result from a short-term increase in effluents caused by construction of onshore facilities?

59. Effects of construction related effluents.

9. Frequency, source, and types of construction related effluents.

Mitigating Measures

Q_3: Given the extent to which emission standards are expected to be violated, what investment in mitigating measures should be made through OCS Operating Orders, and EPA Regulations and Guidelines to meet these standards?

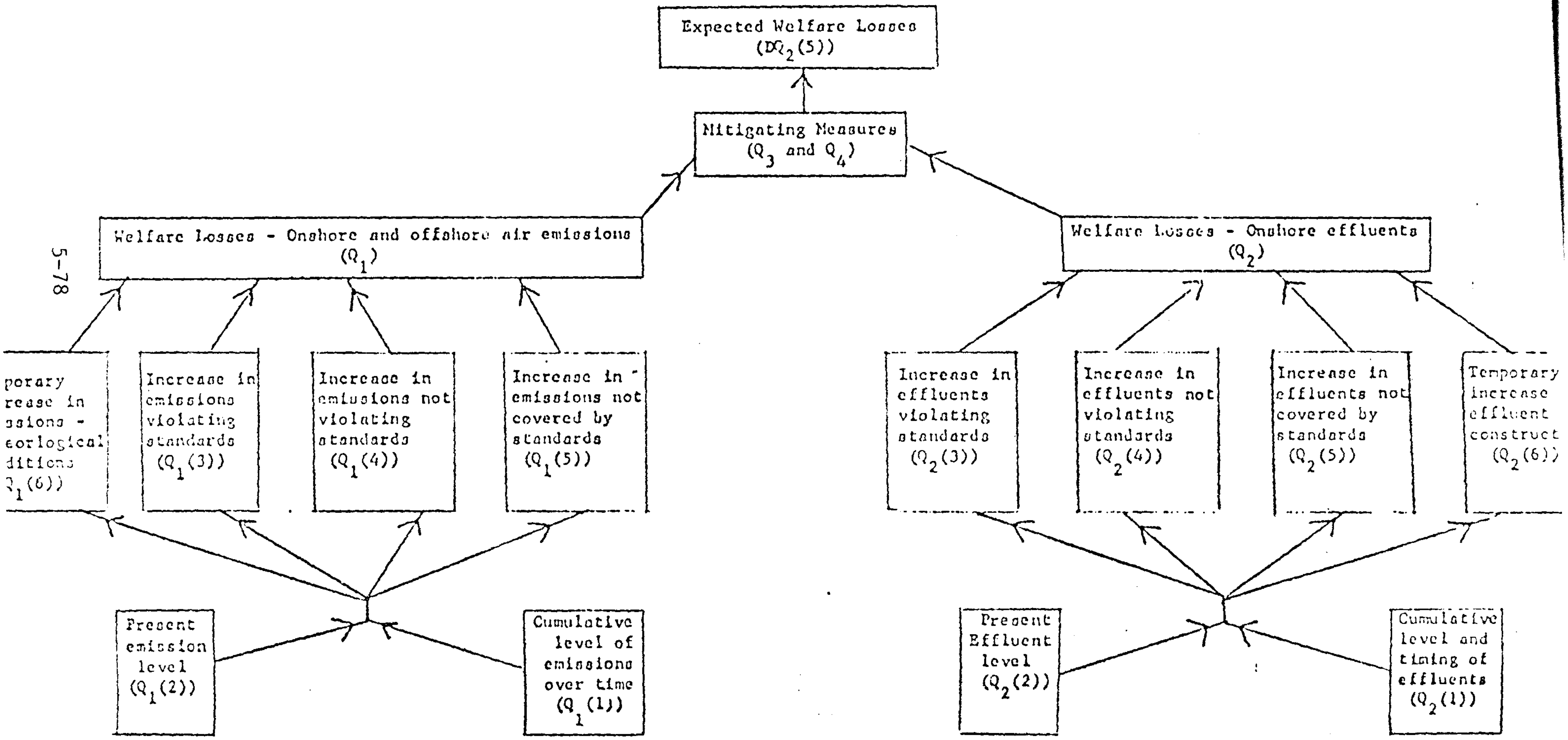
Y. Mitigating measures analysis.

Q_4: If standards are not violated and emissions are still expected cause a significant welfare loss, what investment in mitigating measures should be made?

X. Loss/benefit analysis.

FIGURE 5-7

AIR AND WATER QUALITY*



5.3.3.7 ARCHAEOLOGICAL AND CULTURAL RESOURCES

$DQ_2(6)$: What welfare losses due to damage of archaeological and historic resources can be expected as a result of the leasing proposal?

and

Given the answer to $DQ_2(6)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impacts Producing Agents

- Acute oil spills and significant well drilling related discharges (e.g., cuttings and drilling muds).
- Placement of OCS related structures, both offshore and onshore.

Acute Spills and Significant Discharges

Q_1: What welfare losses are expected as a result of archaeological and historic resources being damaged or destroyed by oil spills?

$Q_1(1)$: What is the frequency and level of acute spills and significant discharges over the life of the field?

$Q_1(a)$: What is the expected size, number, and timing of these discharges over the life of the field?

B. Oil spill probability projection.

6. Resource development scenarios.

7. Production scenarios.

Q_1(b): What are the locations of such resources (e.g., shipwrecks and human habitation sites and relics)?

J. Submerged archaeological locational analysis.

K. Terrestrial archaeological analysis.

35. Mapping survey of seafloor and onshore topography.

35. Mapping survey of onshore areas.

Q_1(c): What are the expected trajectories of such discharges?

6. Development scenarios.

7. Production scenarios.

27. Offshore and nearshore circulation.

28. Offshore and nearshore winds.

30. Natural dispersion mechanisms and rates.

32. Seasonal trajectory model for acute discharge.

33. Oil slick dynamics.

Q_1(2): Given the answer to Q_1(1) above, what is the expected damage to archaeological and historic resources?

V. Oil impacts on archaeological resources.

$Q_1(3)$: What archaeological and historic resources with historic value are protected under provisions of the Antiquities Act?

W. Antiquities Act Impact.

<u>OCS Related Structures (i.e., Offshore and Onshore)</u>

Q_2: What welfare losses are expected as a result of archaeological and historic resources being damaged or destroyed by the placement of OCS structures?

$Q_2(1)$: What is the expected number and location of onshore and offshore OCS structures?

A. Petroleum development scenarios.

7. Production scenarios.

$Q_2(2)$: What are the expected locations of such resources (e.g., shipwrecks and human habitation sites and relics)?

J. Submerged archaeological locational analysis.

35. Mapping survey of seafloor and onshore topography.

$Q_2(3)$: Given the answers to $Q_4(1)$ and $Q_4(2)$ above, what is the expected damage to archeological and historic resources?

A. Petroleum development scenarios.

J. Submerged archaeological locational analysis.

K. Terrestrial areas local analysis.

K. Terrestrial archeological locational analysis.

V. Oil impact on archaeological resources.

Q_2(4): What archeological and historic resources are protected under provisions of the Antiquities Act?

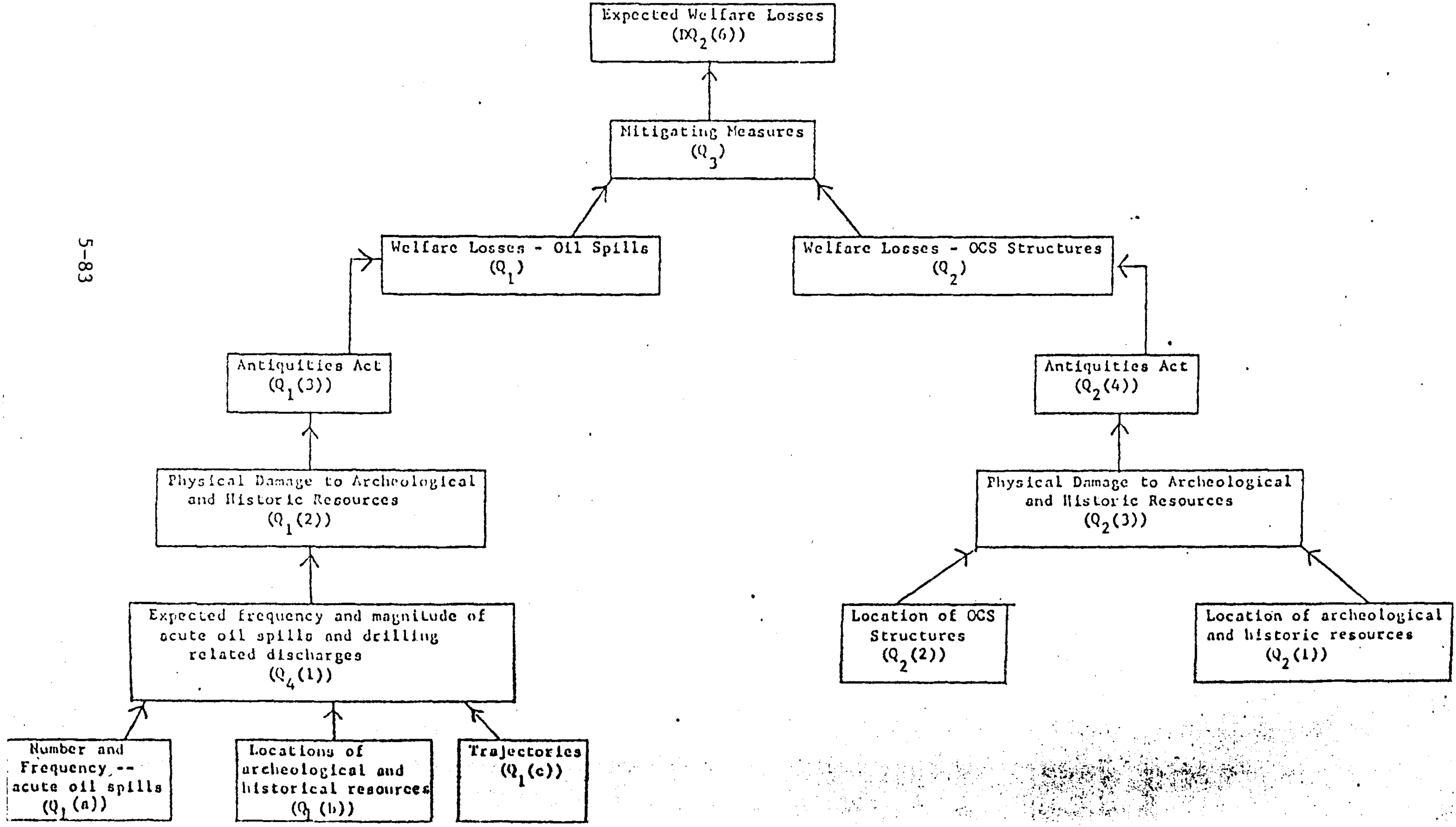
W. Antiquity impacts.

Mitigating Measures

Q_5: Given the expected damage to archeological and historic resources, what level of investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, and tract deletions?

FIGURE. 5-8

ARCHAEOLOGICAL AND HISTORIC RESOURCES*



5.3.3.8 SHIPPING CONFLICTS

$DQ_2(7)$: <u>What economic losses are expected to be sustained by the shipping industry as a result of the leasing proposal?</u>

and

<u>Given the answer to $DQ_2(7)$ above, what is the socially efficient level of investment in mitigating measures?</u>

<u>Significant Impacts Producing Agents</u>

- OCS offshore surface structures
- Acute oil spills
- OCS related vessel traffic

Q_1: What economic losses can be expected as a result of collisions between ships and offshore structures?

$Q_1(1)$: What is the expected number and location of surface structures?

A. Petroleum development scenarios.

$Q_1(2)$: What is the intensity of shipping in the area?

G. Shipping activity.

$Q_1(3)$: Where are the locations of shipping lanes (if any)?

G. Shipping activity.

$Q_1(4)$: What is the historical frequency and magnitude of vessel damage in other areas?

G. Shipping activity.

$Q_1(5)$: Given the answers to $Q_1(1)$ and $Q_1(4)$ above, what is the expected physical damage as a result of offshore structures?

A. Petroleum development scenarios.

G. Shipping activity.

Q_2: What economic losses can be expected as a result of acute oil spills?

$Q_2(1)$: What is the expected size, number and timing of acute oil spills over the life of the field?

A. Petroleum development scenarios.

C. Tanker spill probability.

$Q_2(2)$: What is the intensity of shipping in the area?

G. Shipping activity.

$Q_2(3)$: Where are the locations of shipping lanes (if any)?

G. Shipping activity.

$Q_2(4)$: Given the answer to $Q_1(1)$ - $Q_1(3)$ above, what is the expected damage to hulls soiled by passage through oil spills?

A. Petroleum development scenarios.

B. Oil spill probability.

G. Shipping activity.

$Q_2(5)$: Given the answer to $Q_1(1)$ to $Q_1(3)$ above, what is the expected damage to boiler condenser systems attributable to contaminated feedwater?

B. Oil spill probability.

G. Shipping activity.

Q_3: What economic losses can be expected as a result of OCS related vessel traffic?

$Q_3(1)$: What is the expected size, number and timing of OCS related vessels?

A. Petroleum development scenarios.

G. Shipping activity.

$Q_3(2)$: What is the intensity of shipping in the area?

G. Shipping activity.

$Q_3(3)$: Where are the locations of shipping lanes (if any)?

G. Shipping activity.

$Q_3(4)$: What is the historical frequency and magnitude of damage in other areas?

G. Shipping activity.

$Q_3(5)$: Given the answer to $Q_3(1)$ - $Q_3(4)$ above, what is the expected physical damage as a result of OCS related vessel traffic?

G. Shipping activity.

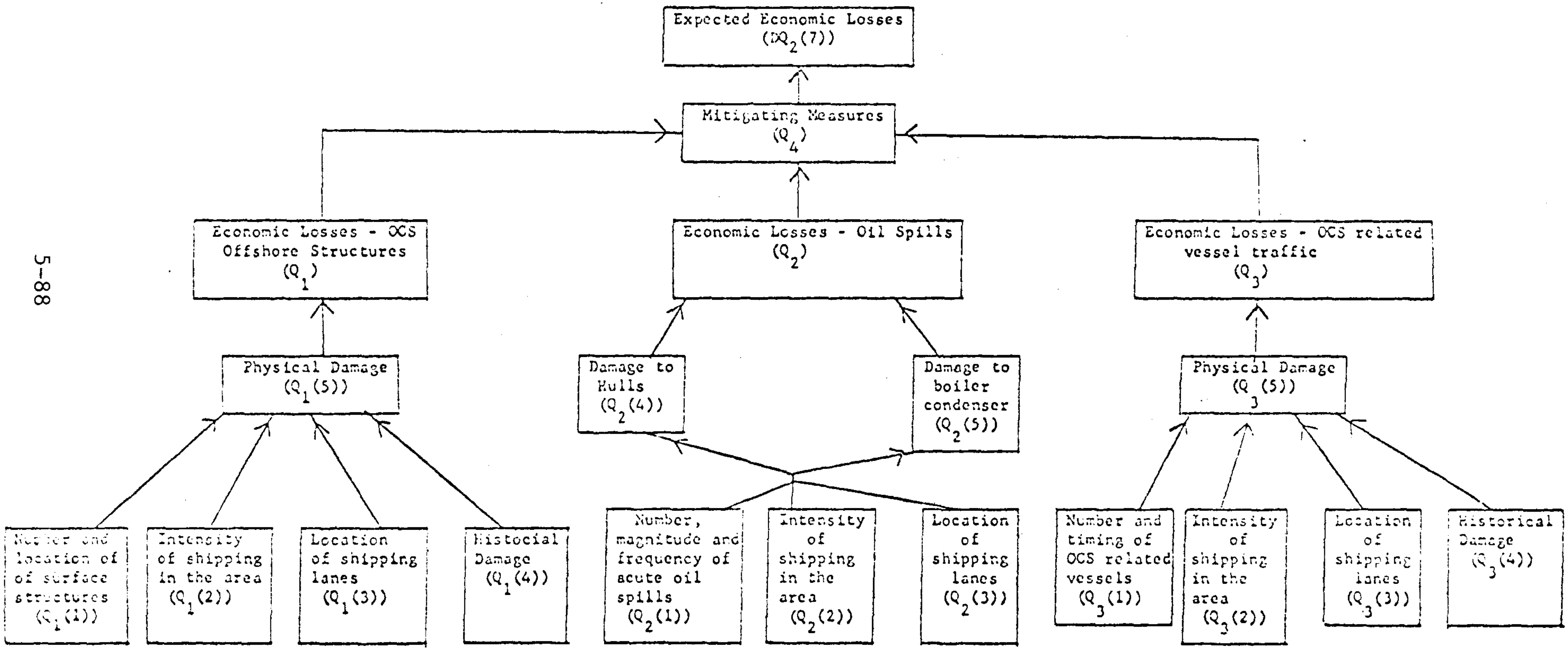
Mitigating Measures

Q_4: Given the type and magnitude of economic losses expected to result from the impact producing agents, what level of investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, EPA Regulations and Guidelines, and tract deletions?

Y. Mitigating measure analysis.

FIGURE 5-9

SHIPPING CONFLICTS*



5.3.3.9 ENVIRONMENTAL HAZARDS

$DQ_2(8)$: What natural environmental hazards are expected to interfere with OCS exploration and development activities as a result of the leasing proposal?

and

Given the answer to $DQ_2(8)$ above, what investment in mitigating measures is necessary to bring the risk of interference with OCS exploration and development to an acceptable level?

Significant Impact Producing Agents

(1) Environmental hazards (geologic, meteorologic, and oceanographic) to OCS related structures and facilities
(2) Biotic behavioral response to OCS related activities

Q1: What are the environmental hazards both to OCS related activities and induced by OCS activities?

$Q_1(1)$: What types of geologic, oceanographic, and meteorological hazards are likely to be encountered in the area?

10. Seismic activity.

11. Volcanic activity.

12. Surface and near-surface faulting.

13. Seafloor instability.

14. Erosion and deposition.

19. Stratigraphic hazards.

22. Extreme oceanographic and meteorological events (e.g. winds, waves, tidal currents).

23. Tsunamis

26. Visibility.

Q_1(2): Where are these hazards most prevalent?

10. Location and depths of earthquake epicenters.

11. Locations of active volcanoes.

12. Locations of surface and near-surface faults.

14. Locations of large scale bedforms.

13. Locations of existing and potential slumps.

17. Distributions and depth of overpressured sediment.

18. Subsidence potentials of sediment strata.

19. Locations and stratigraphy of natural oil seeps and reservoirs.

22. Distribution and frequency of extreme events of winds, waves, and tidal currents.

23. Distributions and probability of Tsunamis.

26. Distribution and frequency of low visibility due to extreme fog, haze, and precipitation.

Q_1(3): What is the magnitude and frequency of physical environmental hazards?

10. Frequency, magnitude, and velocity of strong ground motion.

11. Magnitude and frequency of volcanic eruptions.

11. Areal range of eruptive volcanic fallout, lava flows and Nvees Ardentes.

12. Correlation of faults with earthquake events.

13. Stability of sediments in potential slump areas.

14. Rates of burial and scour in locations undergoing significant erosions and depositions.

14. Rates and direction of large scale bedform movements.

23. Historical shoreline erosions and damage assessment due to Tsunamis.

21. Frequency and magnitude of ice forces from ridging, ice shove, and fast ice displacement vectors on OCS related structures.

$Q_1(4)$: Which OCS related structures and activities are vulnerable to these hazards?

60. Vulnerability of OCS related structures and facilities to environmental hazards.

$Q_1(5)$: Are there any environmental hazards which are expected to be induced or worsened by OCS related activities (e.g., subsidence, aquifer contamination)?

18. Subsidence potential of sediment adjacent to and surrounding resource reservoirs.

Q_2: What types of biotic interference presents a hazard to OCS related activities?

53. Effects of noise on birds.

59. Interference of birds to low flying aircraft.

Q3. What is the effectiveness of various types of mitigating measures in protecting against catastrophies caused by environmental hazards?

$Q_3(1)$: Given the types and magnitudes of existing severity of environmental hazards in the area, what level of investment in mitigating measures should be made through OCS Operating Orders, Stipulations, EPA Regulations and Guidelines, and tract deletions?

Y. Mitigating measures analysis.

$Q_3(2)$: To what extent will this investment reduce the risk of environmental hazards?

X. Loss/benefit analysis.

FIGURE 5-10

ENVIRONMENTAL HAZARDS*

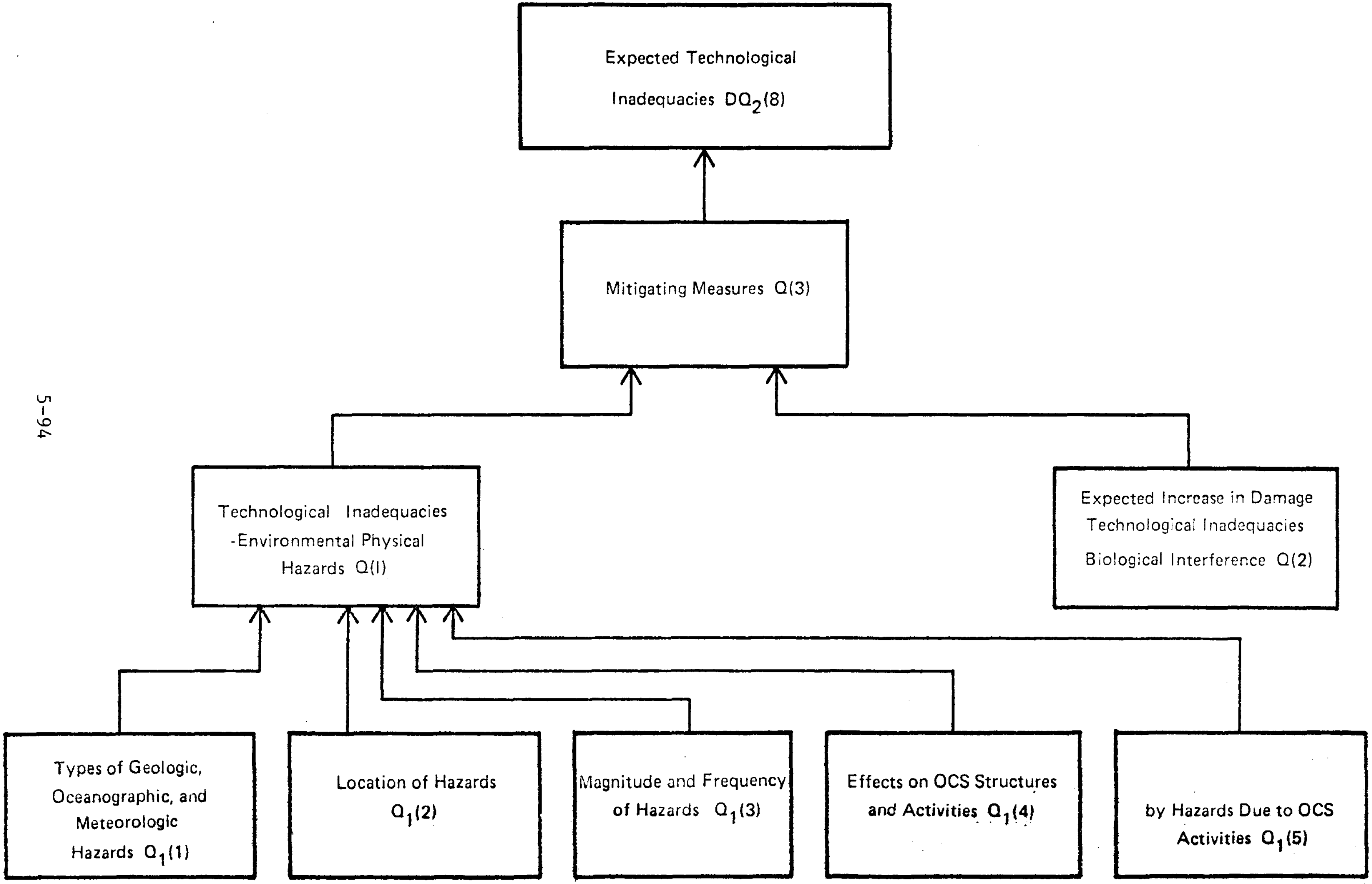


TABLE 5-5

TYPES OF STUDIES IDENTIFIED FOR THE PACIFIC REGION OF THE ALASKA OUTER CONTINENTAL SHELF

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
CONTAMINANT RECONNAISSANCE					
1. Distribution and concentrations of hydrocarbons - in water column - in sediments - in marine organisms - pelagic and beach tar	CF, AWQ SL	Lease Area	EIS, XP	18	A1

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
2. Distribution and concentrations of low molecular weight hydrocarbons in water column	AWQ	Lease Area	EIS	18	A2
3. Distribution and concentrations of toxic metals - in water column - in sediment - in marine organisms	AWQ	Lease Area	EIS	12	A3
4. Distribution and concentrations of atmospheric pollutants - over land - over sea	AWQ	Lease Area	EIS	18	Not Addressed

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
5. Composition of Alaska crude oils - physical characteristics - chemical composition	AWQ	Non-Site	EIS	18	Not Addressed
OCS DEVELOPMENT ACTIVITIES AND IMPACTS					B
6. Development Scenarios - Oil and Gas Resource Estimates - OCS Shipping Activity - Aircraft Traffic - Offshore Structures - Onshore Strucutres - Operating Methods - Available Techology	CF, R, MCE, AWQ, ACR, SL	Lease Area	EIS	24	B1

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- OCS Activity Conflicts					
- Space use conflicts					
- Resource use conflicts					
- Shoreline modification					
7. Production Scenarios	CF, R, MCE, AWQ, ACR, SL	Lease Area	DIS	12	B1
8. Pollution Scenarios	CF, R, MCE, AWQ, ACR, SL	Lease Area	EIS	12	B2
- acute oil spills					
- chronic oil spills					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- chronic discharge of other contaminants					
- atmosphere emissions					
- EPA, State, local discharge regulations					
9. OCS Activities/Impacts Scenarios	CF, R, SL, MCE	Lease Area	EIS	12	B3
- offshore structures space use conflicts					
- onshore structures space use conflicts resource use conflicts change to shoreline					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- pipelines					
- noise					
- contaminants					
- traffic					
ENVIRONMENTAL HAZARDS					C
10. Seismic Hazards	EIT	Lease Area	TS	24	C1
- description and location of epicenters, focal depths					
- seismic risk map of magnitudes, frequencies, and probabilities					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
11. Volcanic Hazards - description and location of active volcanoes - volcanic risk map of eruptions, lava flows, Nuees Ardentes	EIT	Lease Area	TS	18	C1
12. Surface and Near Surface Faulting - description and locations - relationship to seismic activity - relative ages - magnitude and frequency of strong bottom movements	EIT	Lease Area	TS	24	C2

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
13. Seafloor Instability - description of types and extent of potential slumps, other unstable sediment masses - relative instability risk classification - sediment cross section analysis	EIT	Lease Area	TS	24	C3
14. Erosion and Deposition - location, description, and rates of burial and scour	EIT	Lease Area	EIS	24	C4

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- large scale bedform movements - effects of structures on erosion rates					
17. Overpressured Sediments - distribution and depth - pore pressures	EIT	Lease Area	TS	24	C8
18. Subsidence Potentials - location and distribution strategraphy	EIT	Lease Area	EIS	24	Not Addressed

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
19. Stratigraphic Unconformities - locations and distribution of potential reservoir channels through surface fault zones - locations and distributions of natural seeps - stratigraphy of natural seeps	EIT	Lease Area	EIS	24	Not Addressed

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
22. Extreme Events of Wind, Waves, Currents - distribution and frequency of extremes - adverse atmospheric conditions	AWQ, EIT	Lease Area	EIS	12	C10
23. Tsunamis - distribution, frequency of occurrence, probability	EIT	Lease Area	EIS	12	C10

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- height and areal extent of potential inundations of shoreline					
- historical damage assessment					
- correlation to seismic events					
- relationship to glacial calving and shoreline erosion					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
26. Visibility - frequency, extremes of fog, haze, precipitation	EIT	Lease Area	EIS	12	C10
TRANSPORT					
27. Currents and Tide - Lagrangian movements - Eulerian movements - Tidal components - Wind forcing	CF, R, MCE, ACR, SL	Lease Area	TS	24	D1

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
28. Wind Fields - Directions, strengths, frequency - Variations	CF, R, MCE, ACR, SL	Lease Area	TS	24	D1
29. Residence Times and Flushing Characteristics - basins, bays, inlets, both offshore and nearshore	CF, R, MCE, AWQ, SL	Lease Area	EIS	12	Not Addressed

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
30. Dispersion and Mixing of Contaminants - point source discharge - non-point discharge - downstream concentrations - concentration fields - distribution and settling rates of particulates	CF, R, MCE, AWQ ACR, SL	Lease Area	EIS	12	D3
31. Dispersion and Mixing of Atmospheric Pollutants - air stability - concentration fields - transport variability	--	Lease Area	EIS	12	

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
32. Trajectories of Oil Spills - drift card information - centroid trajectories conservation of properties - dynamic trajectories, non-conservative, plume behavoir and weathering	ACR	Lease Area	TS	12	D3
33. Oil Slick Dynamics - plume behavior under shear, spreading, Coriolis force	CF, R, MCE, SL	Non-Site	EIS	24-36	D3

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- weathering rates and changes in composition from - evaporation - solution - emulsification - diffusion - photochemical oxidation - microbial degradation					
34. Bottom Sediment Characteristics - composition, size distribution - areal distribution - consolidation - stratigraphy	CF, MCE, ACR, EIT, SL	Lease Area	EIS	18	D4

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
35. Basin Morphology - seafloor topography - morphology and morphometry of basins, inlets, bays	CF, R, MCE, AWQ, ACR, EIT, SL	Lease Area	TS	12	D7
RECEPTORS					
39. Identification of Vulnerable Populations - distribution, abundance of - commercial/subsistence/sport species - rare endangered species - unique/aesthetic - key ecological species	CF, R, MCE, SL	Lease Area	TS	24	E, 1, 3, 5, 7

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
40. Life History Analyses - population parameters of commercial/subsistence/ sport species	CF, R, MCE, SL	Region	EIS	12	
41. Identification and Location of Critical Habitats and Habitat Dependencies of Vulnerable Populations for: - feeding areas - breeding, nesting, molting, nursing areas - schooling or migration routes of vulnerable species	CF, R, MCE, SL		TS EIS	24	

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
42. Food Web Dependencies - key prey items - availability and selectivity - variability with season, lifestyle - energetics estimates	MCE	Lease Area	EIS	24	E2, 4, 6
43. OCS Structures as Fish Habitats - attraction of fish to structures - changes in population sizes and/or distributions around structures	CF, SL	Non-Site	EIS	12	E5

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
44. Wetland Ecosystems - types, characteristics, distribution - habitat dependencies - vulnerability indices from OCS activities	CF, MCE, SL	Lease Area	TS (shore) EIS (land)	24	E8
45. Microbial Degradation of Hydrocarbons - natural populations of HC utilizers - rates of degradation under natural environmental conditions - rates of degradation under enhanced environmental conditions	MCE	Lease Area-Region	EIS	24	EIS

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
46. Classification of OCS Ecosystems - major ecosystem types and characteristics - distribution - primary components, energy sources, ecosystems process	MCE	Lease Area	EIS	36	Not Addressed
47. Legal Protection of Vulnerable Populations and Critical Habitats - coverage under existing and proposed legislation - regulations, prohibitions, responsibilities	CF, MCE, SL	Region	TS	12	Not Addressed

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task

48. Behavior of Vulnerable Species to Oil
- avoidance behaviors
- activity behavior responses
  - feeding
  - schooling
  - chemoreception
  - mechanoreception
  - migration
- threshold concentrations
- chemicals responsible
	CF, MCE SL	Non-Site	EIS	36	F2

49. Toxicity of Oil - TL50's of key species (arctic and subarctic) 24, 96 hr. - concentrations	CR, MCE,	Non-Site	EIS	24	F2

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- dissolved fractions					
- contaminated sediments					
- surface slicks					
50. Sublethal Effects of Oil	CR, MCE, SL	Non-Site	EIS	36	F2
- threshold concentrations and responses of commercial species					
- respiration/metabolism					
- behavior/chemoreoption					
- fecundity					
- hatching success, molting					
- growth rate and abnormalties					
- diseases susceptibility					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
51. Combined Effects of Pollutants - TL50 changes of oil/toxic metal combinations - sublethal effects at <u>in situ</u> concentrations	MCE	Non-Site	EIS	24	Not Addressed
52. Toxicity of Drilling Muds and Cuttings - TL50 for commercial spp. and larvae	CF, MCE, SL	Non-Site	EIS	12	F2
53. Effects of Noise - noise levels and propagation - thresholds and responses - disruption of behavior	CF, MCE, SL	Non-Site	EIS	12-24	F2

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- avoidance					
- acclimation					
54. Tainting of Commercial Species	CF, R, MCE, SL	Non-Site	EIS	36	F5
- existing level of tainting					
- rates of uptake and depuration					
- sites of tissue accumulation					
- types of compounds stored					
- metabolite dynamics					
- threshold concentrations					
55. Environmental Recovery Rates of Ecosystems	CF, R, MCE, SL	Lease Area	EIS	24-36	F6
a) Persistence of Oil on Shorelines					
- identification of					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
shoreline characteristics influencing recovery rates					
- coastal vulnerability indices					
- targeting of impacts					
b) Persistence of Oil in Sediments	CF, MCE SL	Non-Site Region and/or Lease Area	EIS	24-36	F6
- identification of sediment characteristics influencing recovery rates					
- sediment persistence indices					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
c) Recovery of Oiled Habitats - impacts of oiling on selected habitats - recovery and re-population of oiled habitats - dynamics of recovery processes	CF, MCE, SL	Region	EIS	24-36	F6
56. Ecosystem Vulnerability Indices - locations and classifications of ecosystem types - identification of controlling ecosystem processes - identification of ecosystem process vulnerabilities to oil	CF, MCE, SL	Lease Area	EIS	24-36	F6

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- targeting of impacts - ranking of vulnerability					
57. Effects of Contaminants on Normal Microbial Activity - Changes in populations and activity rates due to contaminants	CF, R, MCE, SL	Region	EIS	24	Not Addressed
58. Effects of Offshore and Onshore Structures - identification and description of potential effects via space use conflicts, resource use conflicts	CF, MCE, ACL, EIT, SL	Non-Site	EIS	EIS	

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
59. Effects of Activities - identification and potential effects - analyses of mitigating measures	CF, MCE, EIT, SL	Non-Site	EIS		
60. Vulnerability of Structures to Environmental Hazards - engineering characteristics and structures - technology scenarios - risk analysis of structure failure	EIT	Non-Site	TS	18	

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
OCS DEVELOPMENT ACTIVITIES					
A. Petroleum Development	CF, R,	Basin &	Basin,	9	PDS
- onshore structures	ACR, SC,	Lease	TS		PAM
- offshore structures	SL, SI	Area	Lease		
- pipelines			Area		
- number and location			DES		
- oil and gas resource estimates					
- economic activity					
- OCS shipping activites					
- aircraft usage					
- technology analysis					
- employment activity					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
B. Oil Spill Probability - size - number - timing - type (chronic, acute) - impact area	CF, R, ACR, ACR, SL	Basin & Lease Area	Basin, TS Lease Area DES	9	PDS
C. Tanker Spill - import tanker - domestic tanker - proportional analysis - spill trajectory	CF, R, SC	Coastal Area	DES	9	PDS

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
DATA BASELINE IDENTIFICATION					
D. Fisheries Location Identification - sales practices - catch and effort - species seasonality	CF, R, SI	Lease Area	TS	12	FI
E. Fish Equipment Loss - probability of net damage - costs of year - changes in fishing patterns/techniques	CF	Lease Area	DES	12	FI MTS

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
F. Fishing Practices	CF	Lease Area	DES	12	FI
- fishing areas					
- fish distribution					
- types and frequency of fishing effort					
- seasonality of effort					
- techniques used					
G. Shipping Activity	CF, SC	Lease Area	DES	12	MTS TS PDS
- current usage and space demands					
- potential demands					
- ports and sea lanes identification					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- capacity identification					
- origin/destination					
- fishing/OCS traffic					
- shipping safety - vessel damage					
- use conflicts					
H. Recreational -	R	Regional	DES	12	RI
Location Identification		Impact			VI
- beach areas		Area			FI
- shell and finfish					MTS
gathering		Lease			LSPS
- catch and effort		Area			
- species					
- seasonality					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
I. Visual Impact Evaluation - evaluate visual resource quality - components of visual environment - impacts on visual quality - economic analysis of impacts	R	Onshore Impact Area Lease Area	DES	12	VI
J. Submerged Archaeological Locational Analysis - chronological placement of still stands	ACR	Lease Area Site	DES	18	AP

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- document preserve of man during late Pleistocene		(Tract) Specific			
- develop probability model					
- apply probability model					
- early man site investigation					
K. Terrestrial Archaeological Locational Analysis	ACR	Regional Impact Area	DES	18	
- document presence of man					
- analysis of prehistoric environment					
- develop probability model					
- apply model					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
STATEWIDE, REGIONAL, LOCAL IMPACTS ASSESSMENT					
L. Sociocultural Analysis - subsistence - brief social history - currently perceived trends - community response capacity - social interaction dynamics - intergroup, intragroup, intrafamily stress	SI SL	Regional Impact Area	DES	18	NSS LSPS RI

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- priorities regarding conservation of values, traditions, original structures - lifestyle impacts - perception/attitudes toward OCS activity					
M. Community/Regional Infrastructure Analysis - current land use patterns/status - development constraints - housing - current community facilities and service	SI, SL	Regional Impact Area	DES	12	LSPS

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- projections of infrastructure needs - projections for land use					
N. Population Analysis - population composition - trends - growth prospects - local, regional, statewide	CF, R, SI	Regional Impact	DES	12	SRPE LSPS
O. Employment Analysis - employment - unemployment - job seasonality - trends and prospects	CF, R, SI	State & Regional Impact Area	DES	12	SRPE LSPS PDS PI

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- occupational skills					
- income levels					
- native/local hire					
P. Economic Analysis	CF, R,	State &	DES	18	SRPE
- econometric modeling	SI	Regional			LSPS
- capital investment		Impact			
- fiscal policy		Area			
- characteristics of growth/decline					
- economic indicators					
- local, regional statewide					
Q. Fish Economic Analysis	CF, SI	Regional	DES	18	FI
- change in fish count by area		Impact			SRPE
		Area			
- value of catch by species					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- change in unit fish costs					
- seasonal price data for processed fish products					
- change in unit costs processing plants					
- employment changes					
- wage/salary data					
R. Recreation Industry Analysis	R, SI	State & Regional Impact Area	DES	12	LSPS RI
- current expenditures					
- current receipts					
- size and structure of industry					
- land use patterns					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task

S. Recreation User Preference
- consumer satisfaction - changed quality
- consumer satisfaction - substitutability of activity/site
- consumer use of area
  - site
  - activity
- visitation characteristics
- welfare value of alternative choices
	R	Regional Impact Area	DES	18	RI

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
T. Fisheries User Preference - consumer satisfaction - changed quality - consumer satisfaction - substitutability - consumer demand for fish products and substitutes	CF	State & Regional Impact Area	DES	18	FI ?
U. Subsistence Activities - location of subsistence fishing, hunting areas - cultural ties to subsistence - presence of subsistence system	SL	Regional Impact Area	DES	12	NSS LSPS

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- economic vs. mixed economy					
- current levels of use					
- projection of future use					
- jurisdictional issues					
V. Oil Impact on Archaeological Resources	ACR	Non-Site Specific	DES	12	
- determine degradation of site's environment					
- effect of oil on radiometric dating techniques					
- physical degradation of artifacts					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
W. Antiquities Act Impact	ACR	Non-Site	DES	12	In house
- legal interpretation of responsibility					
- determine of site significance					
- determine effect					
- impact on repository					
- impact on state inventory systems					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
X. Loss/Benefit Analysis - net economic loss vs net gains - net social loss vs social gains - savings from reduced oil spills	CF, R, SI, SL	State & Regional Impact Area	DES	12	FI, NSS, SRPE, RI, LSPS, VI, TS, POS

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
Y. Mitigating Measures Analysis - impacts producing agents - techniques to control these agents - cost of control techniques - benefit/cost analysis vs impacts	CF, R, SI, ACR, SC, SL	State & Regional Impact Area	DES	12	In house

TABLE 5-6. LEASE AREA STUDY SCHEDULES FOR THE PACIFIC REGION

STEPS IN DECISION-MAKING PROCESS

TS = Tentative Sale Schedule
CN = Call for Nominations
TT = Tentative Tract Selection
DE = Preparation of ES
FE = Final ES
DS = Draft SID
FS = Final Sale
FT = Final Tract Selection

NS = Notice of Sale
SL = Sale
XP = Exploration Plan
TP = Transportation Plan
DP = Development Plan
PP = Pipeline Permit
LT = Lease Termination

SPATIAL RESOLUTION

0 = Information in hand, literature reviews
1 = Qualitative, area wide, cursory
2 = Semi-quantitative, hundreds of square miles scale or 25 miles of coastline
3 = Quantitative, 3-10 tract scale or 10 miles of coastline
4 = Quantitative, tract specific (2 to 5 mile resolution)
5 = Quantitative, site specific
6 = No spatial resolution (non-site specific)
7 = Refinement of data, no additional resolution
8 = Local, Regional, State Socioeconomic Data

TEMPORAL RESOLUTION

N = No temporal resolution
A = Annual
S = Seasonal

TABLE 5-6

PACIFIC REGION STUDIES SCHEDULE FOR NORTHERN GULF OF ALASKA (NEGOA-II)

TYPE OF STUDY	1977	1978	1979	1980	1981	1982
		2 3	4	5,6,8,9	10 11	12
1. HC Baselines			----S2		----S3 MONITORING	
2. LMWHC Baselines			----S2		----S3 MONITORING	
3. Toxic Metals			------------S2		----S3 MONITORING	
4. Atmospheric Pollutants			----S2		----S3 MONITORING	
6. Development Scenarios		N2	-N4			
7. Production Scenarios					--N5	
8. Pollution Scenarios		N2------------	N4		--N5	
9. Activities/Impacts Scen.		N2------------	N4		--N5	
10. Seismic Hazards	N2	N4			---N5	
11. Volcanic Hazards	N2	N4			---N5	
12. Fault Hazards	N2	N4			---N5	
13. Seafloor Instability	N2	N4			---N5	
14. Erosion and Deposition		N2	N4		---N5	
17. Overpressuring	N2	N3			---N4	
18. Subsidence		N2	N3		---N4	
19. Stratigr. Unconformity		N2	N3		---N4	
22. Extreme Meteorology		S3				
23. Tsunamis		S2				
25. Ice Storms		S2				
26. Visibility		S2				
27. Currents and Tides		S3			---S4	
28. Winds		S3			---S4	
29. Flushing		S3			---S4	
30. Effluent Dispersion			S2		---S3	
31. Emission Dispersion			S3		---S4	
32. Oil Trajectories		S3	S4			
34. Sediments			N2			
35. Basin Morphology		N4				
39. Vulnerable Population		A2 S3	---S4		----S5	
40. Life History		NO	------------S2		----S3	
41. Critical Habitats		A2 S3	---S4		----S5	
42. Food Web Dependencies		NO	---S2		----S3	
44. Wetland Ecosystems		S2	---S3			
45. HC Degradation			------------S2			
46. Ecosystem Classification		NO N3	S3			

TABLE 5-6

PACIFIC REGION STUDIES SCHEDULE FOR NORTHERN GULF OF ALASKA (NEGOA-II)

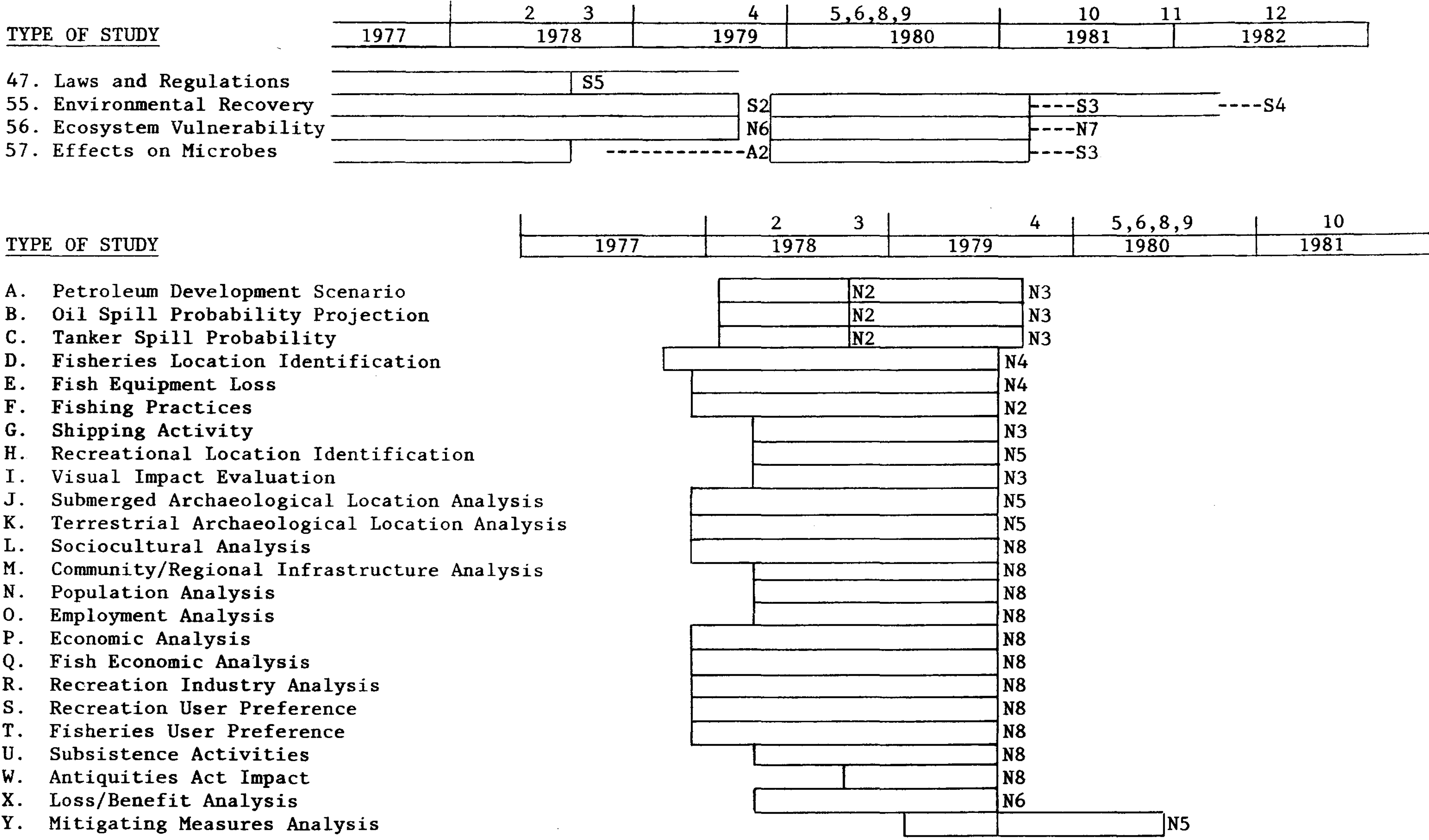


TABLE 5-6
PACIFIC REGION STUDIES SCHEDULE FOR LOWER COOK INLET (LCI)

		(10)	2 3	4	5, 6, 8, 9	10
TYPE OF STUDY	1977	1978	1979	1980	1981	1982
1. HC Baselines	▭	-----S3	MONITORING ⟶	⟶	⟶	⟶
2. LMWHC Baselines	▭	-----S3	MONITORING ⟶	⟶	⟶	⟶
3. Toxic Metals	▭	-----S3	MONITORING ⟶	⟶	⟶	⟶
4. Atmospheric Pollutants	▭	-----S3	MONITORING ⟶	⟶	⟶	⟶
6. Development Scenarios	------------	N4	▭	--N4		
7. Production Scenarios			▭	--N5		
8. Pollution Scenarios	▭	-----N4	▭	--N5/N7		
9. Activities/Impacts Scen.	▭	-----N4	▭	--N5/N7		
10. Seismic Hazards	▭	-----N4	▭	--N7	▭	---N7
11. Volcanic Hazards		N4	▭	--N7	▭	---N7
12. Fault Hazards		N4	▭	--N7	▭	---N7
13. Seafloor Instability		N4	▭	--N7	▭	---N7
14. Erosion and Deposition		N4	▭	--N7	▭	---N7
17. Overpressuring	▭	----N4	▭	--N7	▭	---N7
18. Subsidence	▭	----N4	▭	--N7	▭	---N7
19. Stratigr. Unconformity	▭	----N4	▭	--N7	▭	---N7
22. Extreme Meteorology	▭	----S3	▭	--S7	▭	---S7
23. Tsunamis	▭	----S2	▭	--S7	▭	---S7
25. Ice Storms	▭	----S2	▭	--S7	▭	---S7
26. Visibility	▭	----S2	▭	--S7	▭	---S7
27. Currents and Tides	▭	----S4	▭	--S7	▭	---S7
28. Winds	▭	----S4	▭	--S7	▭	---S7
29. Flushing	▭	----S3	▭	--S7	▭	---S7
30. Effluent Dispersion	▭	----S4	▭	--S7	▭	---S7
31. Emission Dispersion	▭	----S4	▭	--S7	▭	---S7
32. Oil Trajectories	▭	----S5	▭	--S7	▭	---S7
34. Sediments	▭	----N3	▭	--N7	▭	---N7
35. Basin Morphology	▭	----N5	▭	--N7	▭	---N7
39. Vulnerable Population	▭	----S5	▭	--S7	▭	---S7
40. Life History	▭	----S3	▭	--S7	▭	---S7
41. Critical Habitats	▭	----S5	▭	--S7	▭	---S7
42. Food Web Dependencies	▭	----S3	▭	--S7	▭	---S7
44. Wetland Ecosystems	▭	----S3	▭	--S7	▭	---S7
45. HC Degradation	▭	----S2/N6	▭	--S7/N7	▭	---S7
46. Ecosystem Classification	▭	----S3	▭	--S7	▭	---S7

TABLE 5-6
PACIFIC REGION STUDIES SCHEDULE FOR LOWER COOK INLET (LCI)

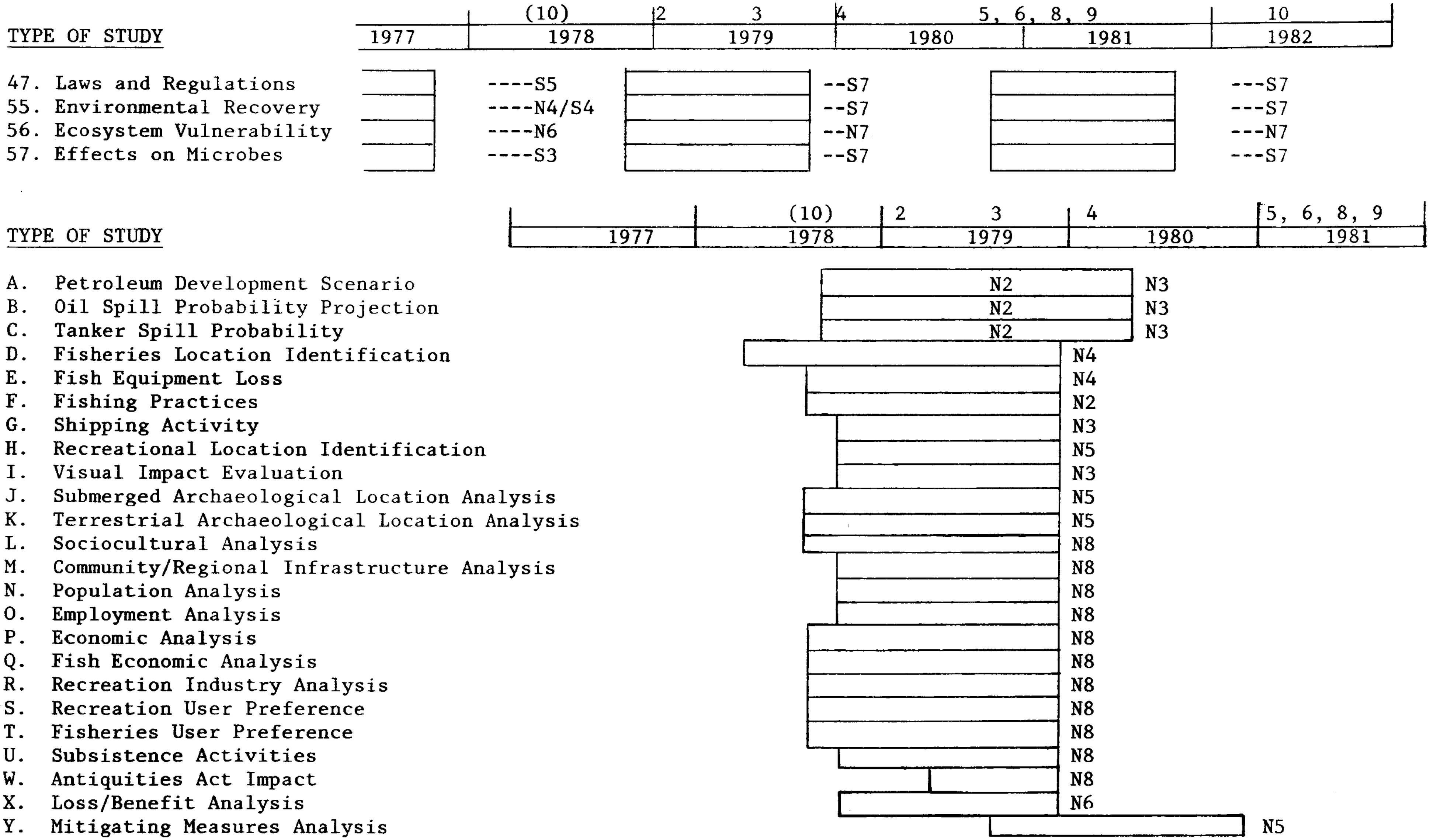


TABLE 5-6
PACIFIC REGION STUDIES SCHEDULE FOR KODIAK

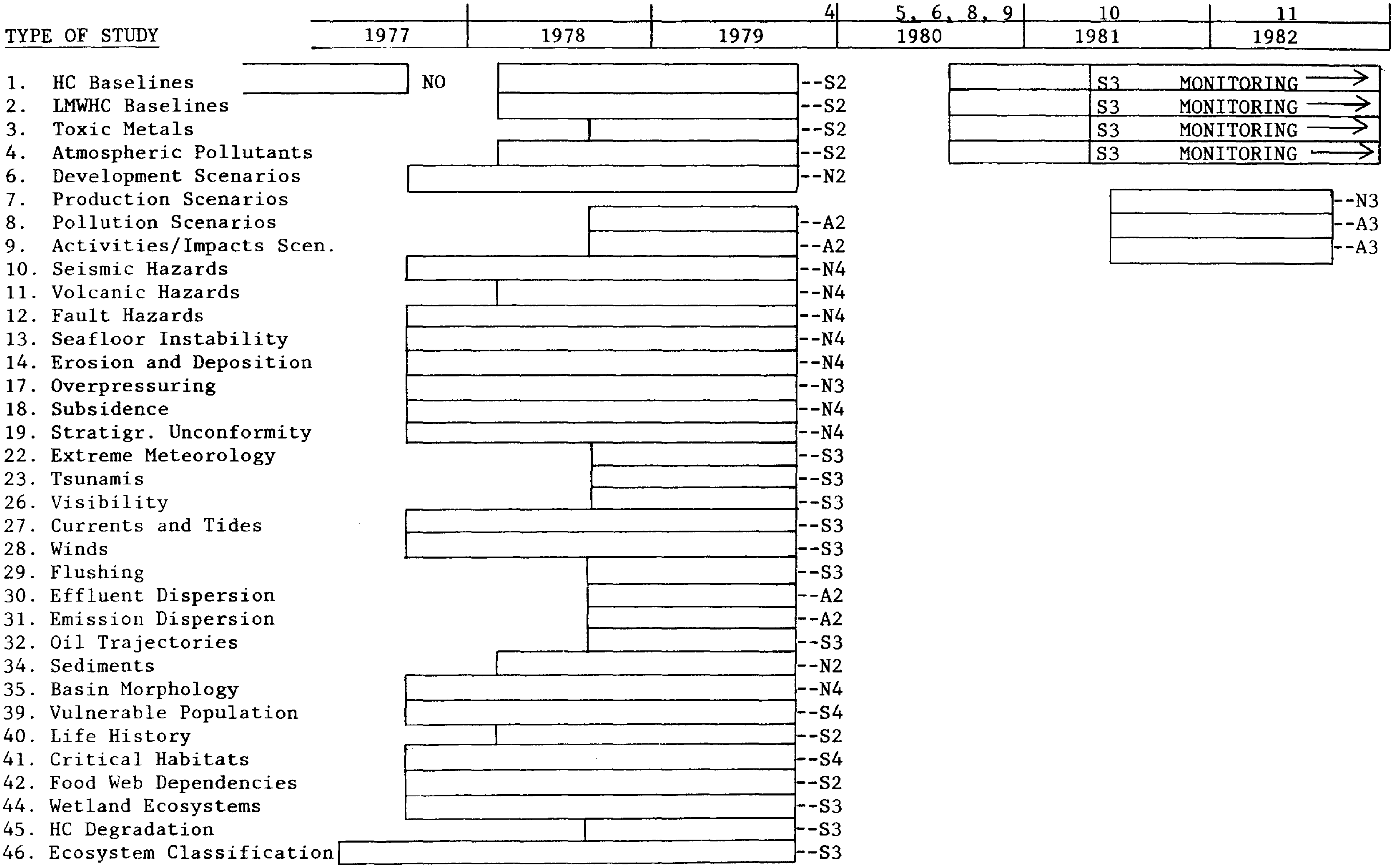
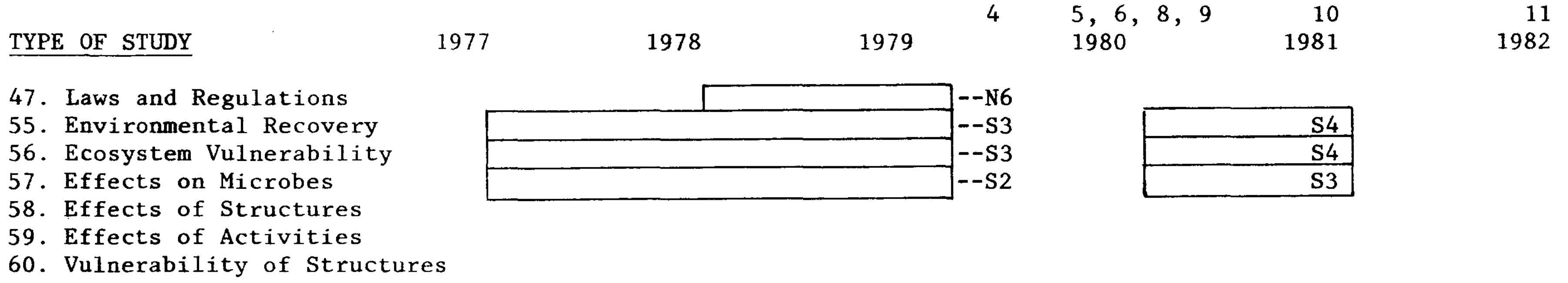


TABLE 5-6
PACIFIC REGION STUDIES SCHEDULE FOR KODIAK



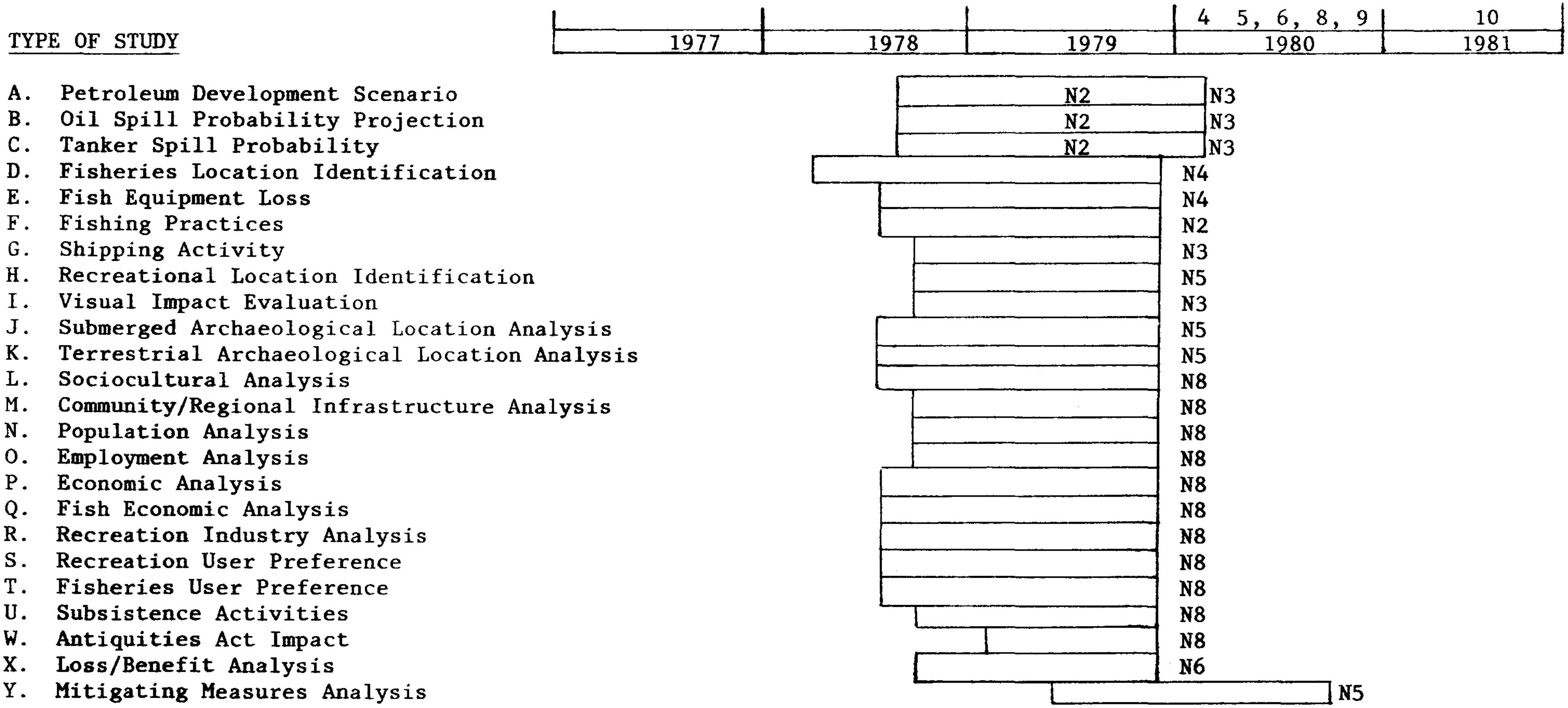


TABLE 5-6
PACIFIC REGION STUDIES SCHEDULE FOR THE ALEUTIANS

TYPE OF STUDY	NO SCHEDULE				
	1978	1979	1980	1981	1982
1. HC Baselines					
2. LMWHC Baselines					
3. Toxic Metals					
4. Atmospheric Pollutants					
6. Development Scenarios					
7. Production Scenarios					
8. Pollution Scenarios					
9. Activities/Impacts Scenarios					
10. Seismic Hazards		NO	N2		
11. Volcanic Hazards		NO	N2		
12. Fault Hazards		NO	N2		
13. Seafloor Instability		NO	N2		
14. Erosion and Deposition		NO	N2		
17. Overpressuring		NO	N2		
18. Subsidence		NO	N2		
19. Stratigr. Unconformity		NO	N2		
22. Extreme Meteorology		NO			
23. Tsunamis		NO			
26. Visibility		NO			
27. Currents and Tides		NO	S2		
28. Winds		NO	S2		
29. Flushing					
30. Effluent Dispersion					
31. Emission Dispersion					
32. Oil Trajectories					
34. Sediments		NO			
35. Basin Morphology		NO	N3		
39. Vulnerable Population	NO	A2	S3		
40. Life History		NO	A2		
41. Critical Habitats	NO	A2	S3		
42. Food Web Dependencies		NO	A2		
44. Wetland Ecosystems		NO	A2		
45. HC Degradation					
46. Ecosystem Classification	NO	A2	S2		

TABLE 5-6
PACIFIC REGION STUDIES SCHEDULE FOR THE ALEUTIANS

TYPE OF STUDY	NO SCHEDULE				
	1978	1979	1980	1981	1982
47. Laws and Regulations					
55. Environmental Recovery	NO	A2			
56. Ecosystem Vulnerability	NO	A2			
57. Effects on Microbes		NO			

TYPE OF STUDY	NO SCHEDULE				
	1977	1978	1979	1980	1981
A. Petroleum Development Scenario					N1
B. Oil Spill Probability Projection					N1
C. Tanker Spill Probability					N1
D. Fisheries Location Identification					N1
E. Fish Equipment Loss					N1
F. Fishing Practices					N1
G. Shipping Activity					N1
H. Recreational Location Identification					
I. Visual Impact Evaluation					
J. Submerged Archaeological Location Analysis			N5		
K. Terrestrial Archaeological Location Analysis					N1
L. Sociocultural Analysis					N1
M. Community/Regional Infrastructure Analysis					N1
N. Population Analysis					N1
O. Employment Analysis					N1
P. Economic Analysis					N1
Q. Fish Economic Analysis					N1
R. Recreation Industry Analysis					
S. Recreation User Preference					
T. Fisheries User Preference					
U. Subsistence Activities					N1
W. Antiquities Act Impact					
X. Loss/Benefit Analysis					
Y. Mitigating Measures Analysis					

TABLE 5-6
PACIFIC REGION STUDIES SCHEDULE - NONSITE

TYPE OF STUDY	NO SCHEDULE				
	1978	1979	1980	1981	1982
5. Crude Oil Composition			N6	UPDATE	
9. Activities/Impacts Scenarios					
33. Oil Dynamics	NO	S3	S4		
43. Structure/Habitats		NO			
45. HC Degradation	NO	N6			
48. Behavior to Oil	NO	N6	N6		
49. Toxicity of Oil	NO	N6	N6		
50. Sublethal Effects	NO	N6	N6		
51. Combined Effects	NO	N6	N6		
52. Toxicity of Metals	NO	N6	N6		
53. Effects of Noise	NO	N6	N6		
54. Tainting	NO	N6	N6		
58. Effects of Structures		NO	N6		
59. Effects of Activities		NO	N6		
60. Vulnerability of Structures		NO	N6		
V. Oil Spill Impact on Archaeological Resources		N6			

BERING SEA REGION

5.3.4 Bering Sea Region Study Plan

The Bering Sea region contains three lease areas: St. George Basin, Bristol Bay, and Norton Sound. Only one of these is presently on the sale schedule.

Sale 57. Bering-Norton - December 1981

The Bering Sea regional plan takes into consideration the lack of specified sale dates in two lease areas. Only reconnaissance type information necessary to lead into a schedule study plan if and when a sale is announced are planned.

A number of important regional concerns have been addressed for this region. Table 5-7 lists these concerns and indicates by which questions with the major issues they are answered in the Bering Sea Regional Plan.

Data in Table 5-8 identifies all of the listed information needs from these preceding questions (both socioeconomic and environmental) and relates these needs to the major decision steps identified in Chapter 2. In addition, the lead time necessary to obtain the data to meet the information needs is given.

The lease area study schedules for the Bering Sea region are given in Table 5-9.

TABLE 5-7
MAJOR ISSUES

REGIONAL CONCERNS	Subsistence Lifestyles	Commercial Fishing	Recreation Tourism	Social Infrastructure	Coastal and Marine Ecosystems	Air and Water Quality	Archaeological Cultural Resources	Shipping Conflicts	Environmental Hazards
Bering Sea									
Location of fishing efforts	$Q_1(1)$ $Q_1(4)$	$Q_1(1)$ $Q_1(2)$ $Q_1(3)$ $Q_1(4)$ $Q_2(2)$			$Q_1(1)$ $Q_1(2)$ $Q_1(3)$ $Q_1(4)$ $Q2(2)$				
Impact of oil on juveniles of commercial species		$Q_1(1)$ $Q_1(2)$ $Q_1(3)$			$Q_1(1)$ $Q_1(2)$ $Q_1(3)$				
Need for marine mammal buffer zone	$Q_1(1)$ $Q_1(2)$ $Q_1(4)$ $Q_1(6)$				$Q_1(4)$				
Recreational boating areas versus oil and gas structures			$Q_1(3)$ $Q_1(4)$	$Q_2(4)$					
Damage to crab pots		$Q_1(5)$ $Q_1(6)$							
Vessel traffic control		$Q_1(9)$			$Q_1(4)$			Q_3	
Location of important commercial species feeding and breeding areas	$Q_1(1)$ $Q_1(4)$	$Q_1(1)$ $Q_1(2)$ $Q_1(4)$ $Q_1(9)$			$Q_1(1)$ $Q_1(2)$ $Q_1(3)$ $Q_1(4)$				
Protection of estuaries from pollution	$Q_1(1)$ $Q_1(2)$ $Q_1(4)$	$Q_1(1)$ $Q_1(2)$ $Q_1(3)$			$Q_1(1)$ $Q_1(2)$ $Q_1(3)$ $Q_1(4)$	$Q_1(1)$ $Q_1(2)$			
Conflict for bottom space seismic hazard		$Q_1(4)$ $Q_1(5)$ $Q_1(6)$			$Q_1(4)$		Q_2		

5.3.4.1 SUBSISTENCE LIFESTYLES

$DQ_2(1)$: What losses are expected to be sustained by subsistence consumers of living resources as a result of the leasing proposal?

and

Given the answer to $DQ_2(1)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impacts Producing Agents

- Acute and chronic discharges (catastrophic oil spills and extended low level discharges of oil, formation waters, and drilling muds).
- Offshore and onshore OCS related surface and subsurface structures and associated debris.
- Noise produced by OCS activities.

Q1: What are the expected impacts on critical populations and habitats utilized for subsistence living as a result of the above impact producing agents?

Acute and Chronic Discharges

Q_1(1): What is the frequency and magnitude of oil spills and other contaminant discharges over the life of the field which are expected to impact critical populations and habitats utilized for subsistence?

Q_1(a): What is the expected size, number, and timing of acute oil spills over the life of the field?

B. Oil spill probability projection.

C. Tanker spill probability.

Q_1(b): What is the expected rate and cumulative amount of small acute spills, chronic spills, and other contaminant discharges (e.g. formation waters, drilling muds, and additives)?

B. Oil spill probability projection.

37. Sea ice dynamics.

38. Oil/ice interaction.

C. Tanker spill probability.

6. Development scenarios.

7. Production scenarios.

8. Types, sources and frequency of discharges, including EPA and State discharge standards.

29. Residence times and flushing.

30. Expected natural persistence and dispersion mechanisms and rates.

34. Bottom sediment characteristics.

36. Sea ice characteristics.

Q_1(c): What are the vulnerable habitats and abiotic processes (i.e. mechanisms of transport, transformation, and transfer which interrelate biologic communities with their habitat) that sustain populations gathered for subsistence?

U. Location of subsistence resource area.

34. Bottom sediments.

36. Sea ice characteristics.

39. Distribution and abundance of subsistence marine mammals, bird, fish, other species.

41. Determination of critical habitats and habitat dependencies.

36. Sea ice characteristics.

34. Bottom sediments.

42. Principal prey organisms of subsistence species.

40. Habitat dependence of subsistence species.

Q_1(d): What are the principal living resources (marine mammals, bird, fish, etc.) utilized for subsistence and where are they located?

U. Subsistence activity.

39. Distribution and abundance of subsistence species.

47. Legal protection of vulnerable populations.

41. Location of critical habitats used by above species for breeding, resting, spawning, nursery, moulting, feeding, migration, and congregation.

Q_1(e): What are the expected seasonal trajectories of oil spills and other contaminant discharges?

A. Petroleum development scenarios

7. Production scenarios.

27. Water currents and circulation.

28. Offshore/nearshore wind fields.

30. Effluent dispersion and mixing.

32. Seasonal trajectory models for oil spills and other discharges.

33. Oil slick dynamics.

38. Oil/ice interaction.

$Q_1(2)$: What is the expected physiochemical condition of spilled oil at the time it impacts a vulnerable population or habitat utilized for subsistence?

5. Composition of oil.

32. Seasonal acute oil spill trajectories.

33. Weathering oil slick dynamics.

41. Location of critical habitats.

$Q_1(3)$: Given the answers to $Q_1(1)$ and $Q_1(2)$ above, are the impacts from OCS oil spills and other contaminant discharges expected to reduce significantly the gathering per unit effort on vulnerable populations and habitats utilized for subsistance resulting from: (a) restriction of subsistence use, (b) mortality of subsistence species, (c) displacement of living resources, (d) impact on recruitment, and (e) tainting (whether perceived or real)?

Q_1(f): What natural conditions can be expected to inhibit or promote resumption of subsistence activity given an initial restriction in fishing and hunting use? What is the expected period of closure?

29. Residence time and flushing.

40. Emigration and repopulation rates of subsistence species from other areas.

40. Sublethal effects of oil.

45. Rates of microbial degradation of oil.

48. Avoidance behavior to oil.

54. Tainting, its persistence, and rates of depuration.

55. Persistence of discharge material in water, bottom sediments, and beaches.

Q_1(g): What is the expected behavioral response of subsistence species to the presence of oil?

48. Behavior of subsistence species to acute and chronic oil spills.

Q_1(h): What is the expected effect on the overall resilience and stability of vulnerable populations in terms of growth, survival, and reproduction?

8. Pollution scenarios.

1. Heavy hydrocarbon distribution.

2. Light hydrocarbon distributions.

39. Distribution and abundance of vulnerable subsistence species.

40. Life history and population parameters of vulnerable subsistence species.

32. Oil spill trajectories.

50. Sublethal effects of oil on vulnerable subsistence species.

Q_1(i): What are the expected cumulative effects (e.g. biomagnification of contaminants, threshold physiological sensitivities, etc.) on existing populations and habitats from continuous exposure to low level contaminant discharges?

8. Pollution scenarios.

1. Heavy hydrocarbon distribution.

2. Light hydrocarbon distribution.

3. Toxic metal distributions.

49. Toxicity of oil.

50. Sublethal effects of oil.

51. Combined pollutant effects.

52. Toxicity of muds and cuttings.

54. Tainting of subsistence species and bioaccumulation.

Q_1(j): To what extent is taining of subsistence species or other quality changes expected to occur?

1. Heavy hydrocarbon distribution.

2. Light hydrocarbon distribution.

8. Pollution scenarios.

54. Tainting mechanisms, including exposure time to discharges to produce tainting or other quality changes.

X. Risk analysis of predicted oil concentration and subsistence species populations.

Offshore and Onshore Surface and Subsurface Structures and Related Debris Produced by OCS Activities

Q_1(4): What is the expected alteration to critical populations that support subsistence use or reduction in habitat space due to OCS surface and subsurface structures?

Q_1(k): Are offshore and onshore related structures and associated construction activities (e.g. cause ways, gravel islands, pipeline burial, and dredged material disposal) expected to interfere significantly with existing subsistence species populations and habitats?

A. Petroleum development scenarios.

Q_1(l): What are the locations of wetlands in the area?

M. Community and regional infrastructure analysis.

9. OCS activities/impacts scenarios.

39. Distribution and abundance of vulnerable subsistance species.

41. Location of critical habitats.

44. Wetland ecosystems.

58. Effects of OCS and structures on vulnerable subsistence species populations and critical habitats.

59. Effects of OCS activities on above.

Q_1(m): What are the location of principal species utilized for subsistence.

U. Subsistence resource locations.

47. Legal protection of vulnerable populations.

Q_1(n): What is the expected number and location of OCS related offshore and onshore structures?

A. Petroleum development scenarios.

Q_1(5): Given the answer to Q_1(4) above, what is the expected reduction in the gathering per unit effort of subsistence hunting and fishing as a result of reduced subsistence species populations?

X. Loss/Benefit analysis.

Noise Produced by OCS Activities

Q_1(6): What is the expected alteration to subsistence species populations or reduction in habitat space due to noise produced by OCS activities?

Q_1(o): What is the expected number and location of OCS related activities that produce noise?

A. Petroleum development scenarios.

Q_1(p): What is the expected behavioral response of vulnerable subsistence species to noise pollution?

53. Avoidance/attraction behavior of subsistence species to noise, including acclimation and disruption of normal behavior.

$Q_1(7)$: What is the expected loss in welfare to those existing on subsistence lifestyles as a result of displacement or reduction in wildlife resources?

X. Loss/benefit analysis.

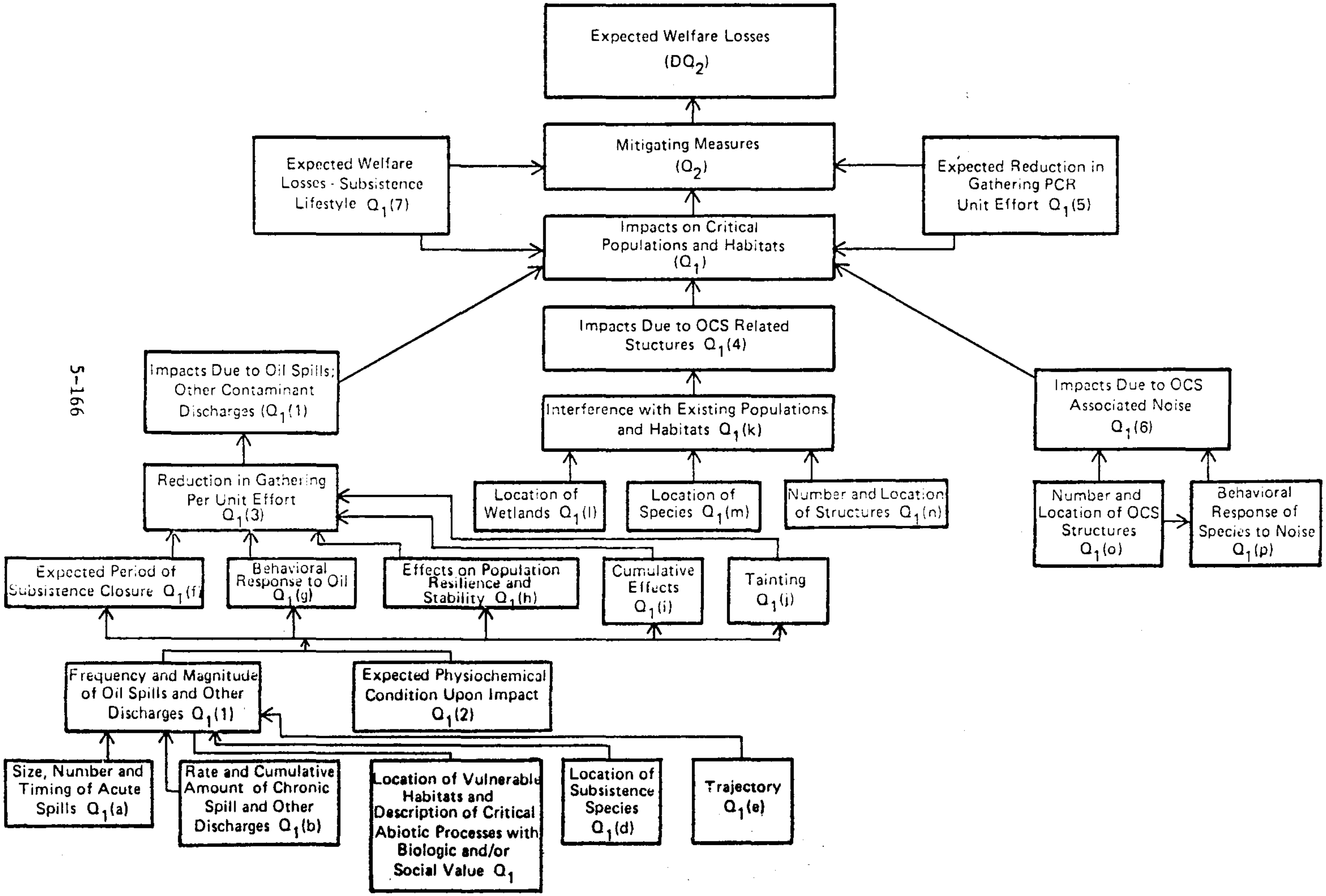
Mitigating Measures

Q_2: Given the expected reduction in critical populations and habitats of subsistence species, what investment in mitigating measures should be made through OCS operating orders, special stipulations, EPA regulations and guidelines, and tract deletions?

Y. Migitating measures analysis.

FIGURE 5-11

SUBSISTENCE LIFESTYLES*



5.3.4.2 COMMERCIAL FISHING

$DQ_2(2)$: What economic losses are expected to be sustained by the (1) fishing industry, (2) consumers of fish products, and (3) the regional economy as a result of the leasing proposal?

and

Given the answer to $DQ_2(1)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impacts Producing Agents

- Acute and chronic discharges (catastrophic oil spills and extended low level discharges of oil, formation waters, and drilling muds).

- Offshore OCS related surface and subsurface structures and related debris.

- Tank farms and other onshore structures.

Q_1: What economic losses are expected to be sustained by the fishing industry as a result of the above impact producing agents?

Acute and Chronic Discharges

$Q_1(1)$: What is the frequency and level of acute and chronic discharges expected to impact commercial fisheries over the life of the field?

$Q_1(a)$: What is the expected size, number, and timing of acute oil spills over the life of the field?

A. Petroleum development scenarios.

B. Oil spill probability projection.

C. Tanker spill probability projection.

Q_1(b): What is the expected cumulative amount and timing of chronic discharges over the life of the field?

A. Petroleum development scenarios.

B. Oil spill probability projection.

C. Tanker spill probability projection.

8. Pollution scenarios with prediction of types, sources and freuqency of chronic discharges, and EPA and state discharge standards.

30. Persistence and dispersion mechanisms of discharges (dispersion model).

Q_1(c): What are the locations of significant commercial fisheries?

D. Fisheries location identification.

39. Distribution and abundance of commercial fisheries.

41. Location of critical habitats of commercial fisheries, including migration routes, feeding areas, and schooling and nursery grounds.

Q_1(d): What are the expected trajectories of acute and chronic discharges?

A. Petroleum development scenarios.

27. Offshore/nearshore circulation.

28. Offshore/nearshore wind fields.

30. Effluent dispersion and mixing.

32. Seasonal trajectory model for acute oil spills.

33. Oil slick dynamics.

Q_1(2): What is the expected physiochemical condition of an acute oil spill at the time it impacts a commercial fishery?

5. Composition of oil.

32. Seasonal acute oil spill trajectory model.

33. Oil slick dynamics, including weathering effects on oil.

41. Location of commercial fisheries.

$Q_1(3)$: Given the answers to $Q_1(1)$ and $Q_2(2)$ above, what is the expected reduction in the catch per unit effort of fishermen and industry revenues or economic rents resulting from; (a) restriction of fishery use, (b) mortality of commercial species, (c) displacement, (d) impact on year classes of fish, and (e) tainting (whether perceived or real)?

$Q_1(e)$: What natural conditions can be expected to inhibit or promote resumption of fishing activity given an initial restriction in fishing use? What is the expected period of closure?

29. Residence times and flushing.

40. Emigration and repopulation rates of fish and shellfish from other areas.

45. Rates of microbial degradation of oil.

54. Tainting and its persistence, including rates of depuration.

55. Environmental recovery rates and persistence of pollutants, including estimate of duration of closure.

$Q_1(f)$: What is the expected behaviorial response of commercial species to the presence of oil?

48. Behavior of fish and shellfish to acute and chronic oil spills.

Q_1(g): What are the expected rates of recruitment and reproduction - including lethal and nonlethal effects in various life stages - of commercial species following an acute oil spill?

40. Natural rates of recruitment and reproduction.

49. Toxic effects of oil on recruitment.

50. Sublethal effects of oil on recruitment and reproduction.

Q_1(h): What are the expected cumulative effects on commercial species from continuous exposure to low level containment discharges?

1. Heavy hydrocarbon distribution.

2. Light hydrocarbon distribution.

3. Concentration of toxic metals.

8. Pollution scenarios.

48. Behavior responses to continuous chronic exposure.

54. Bioaccumulation rates at threshold physiological sensitivities, including uptake pathways.

Q_1(i): To what extent is tainting of commercial fish stocks or other quality changes expected to occur?

8. Pollution scenarios.

54. Tainting mechanisms, exposure thresholds, depuration rates.

Offshore Surface and Subsurface Structures and Related Debris

Q_1(4): What is the expected alteration or reduction in fishing space due to surface and subsurface structures?

Q_1(j): What is the expected number and location of surface and subsurface structures?

A. Petroleum development scenarios.

Q_1(k): What are the locations of significant commercial fisheries?

D. Fisheries location identification.

41. Identification of key habitats of commercial fish and shellfish.

Q_1(l): What type of fishing techniques are used?

F. Fishing practices.

$Q_1(5)$: What is the expected economic loss due to torn nets or other damaged fishing equipment?

A. Petroleum development scenarios.

E. Fish equipment loss.

G. Shipping activity.

$Q_1(6)$: Given the answer to $Q_1(4)$ above, what is the expected reduction in the catch per unit effort of fishermen and industry revenues or economic rents?

Q. Fish economic analysis.

X. Loss/Benefit analysis.

Tank Farms and other Stuctures

$Q_1(7)$: What is the expected alteration of wetlands as a result of tank farms and other onshore structures?

$Q_1(m)$: What is the expected number and location of tank farms and other OCS related structures?

A. Petroleum development scenarios.

$Q_1(n)$: What are the locations of wetlands in the area?

D. Fish location analysis.

M. Commercial regional information analysis.

40. Critical habitats identification in wetland areas.

42. Food web dependencies by fish in wetland areas.

44. Identification of wetlands in area of concern.

Q_1(o): What type and size of alterations are expected to wetlands?

A. Petroleum development scenarios.

9. Activities/impact scenarios for wetlands.

58. Effects of OCS structures to wetlands.

59. Effects of OCS activities to wetlands.

Q_1(8): Given the answer to Q_1(7) above, what is the expected reduction in the catch per unit effort of fishermen and industry revenues or economic rents as a result of reduced commercial fish populations?

G. Shipping.

Q. Fish economic analysis.

X. Loss/Benefit analysis.

$Q_1(9)$: What is the expected alteration or reduction in commercial fishing due to shipping?

$Q_1(p)$: What are the existing impacts on commercial fisheries due to shipping?

E. Fish equipment loss.

G. Shipping activity.

41. Location of significant commercial fishing grounds.

$Q_1(q)$: What are the expected impacts on commercial fisheries due to increased OCS shipping activities?

53. Effects of ship disturbance (noise) on schooling and breeding of commercial fish and shellfish.

59. Effects of turbidity on commercial fish and shellfish.

Q_2: Given the expected reduction in supplies of commercial fish, tainting (perceived or real), and other quality changes in fish stocks, what is the expected loss in welfare (consumer surplus) of consumers fish products?

T. Fisheries user preferences.

Q_3: Given the economic losses expected to be sustained by the fishing industry and consumers of fish products, what are the expected changes in regional income, employment, and population?*

N. Population analysis.

O. Employment analysis.

P. Economic analysis.

Q. Fish economic analysis.

Mitigating Measures

Q_4: Given the type and magnitude of economic losses resulting from the impact producing agents, what level of investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, EPA Regulations and Guidelines, and tract deletions.

Y. Mitigating measure analysis.

Benefits

Q_5: What benefits to the commercial fishing industry, consumers of fish products, and the regional economy are expected as a result of the proposal?

---

* The effects of these changes on the infrastructure and social fabric of the area are discussed in section 3.2.3.

Q_5(1): What reduction in the number of import tankers' spills hitting fisheries (i.e., chronic and acute) can be expected as a result of the proposal?

C. Tankers' spill probability.

Q_5(2): What is the expected savings to commercial fishermen as a result of this expected reduction in oil spills?

X. Loss/benefit analysis.

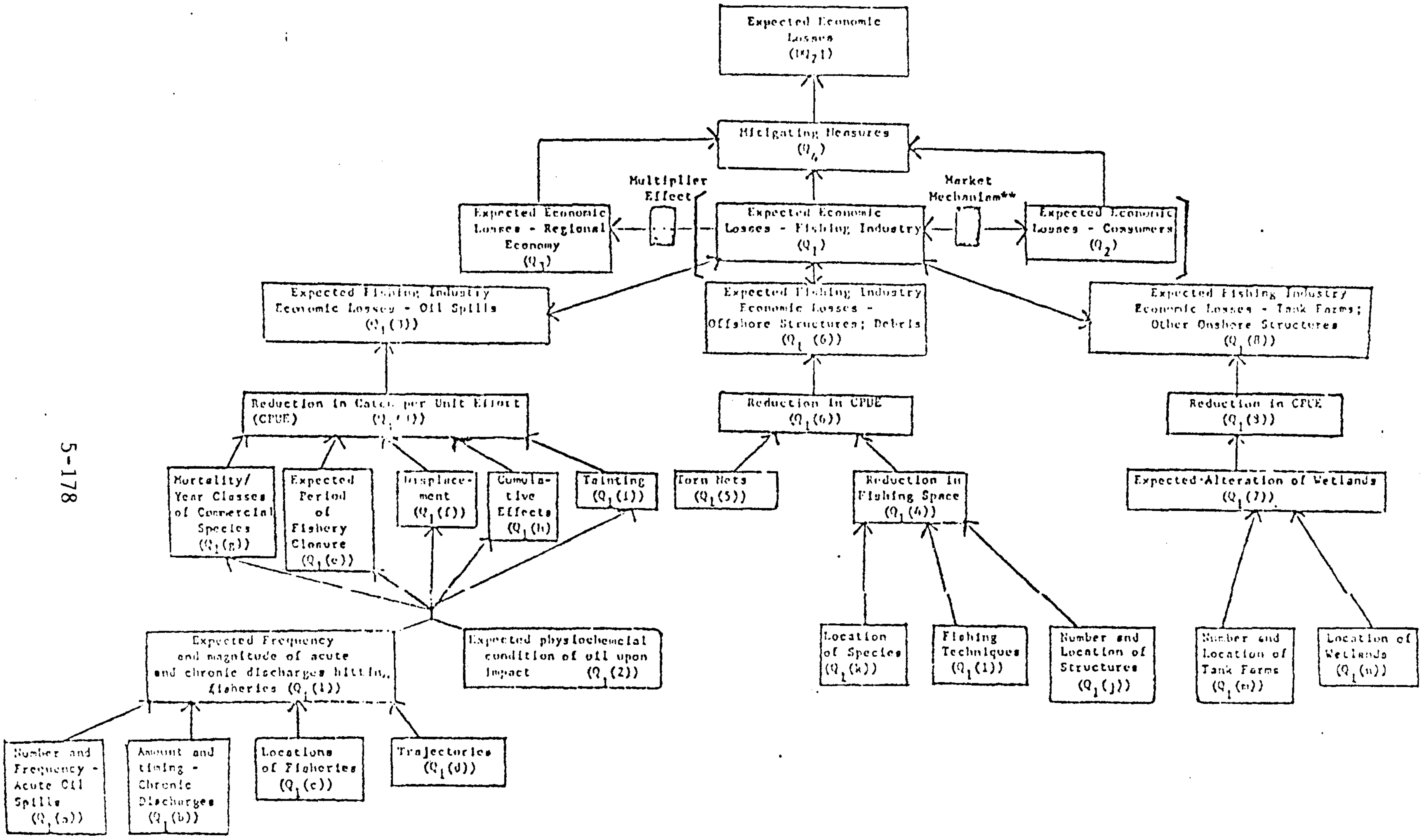
Q_6: What is the expected gain to commercial fishermen as a result of offshore structures providing habitats for fish?

X. Loss/benefit analysis.

43. OCS structures as fish habitats.

FIGURE 5-12

COMMERCIAL FISHING *



** Economic losses will be apportioned between consumers of fish products and the fishing industry depending on the elasticity of market demand as well as possible shifts in the supply and demand functions.

5.3.4.3 RECREATION

$DQ_2(3)$: <u>What economic losses can be expected to be sustained by (1) the recreation industry, (2) recreationists, and (3) the regional economy as a result of the leasing proposal?</u>

and

<u>Given the answer to $DQ_2(2)$ above, what is the socially efficient level of investment in mitigating measures?</u>

Significant Impact Producing Agents

(1) Acute and chronic oil spills.
(2) Onshore OCS related structures.

Q_1: What economic losses are expected to be sustained by the recreation industry as a result of the above impact producing agents?

Oil Spills and Onshore OCS Related Structures

$Q_1(1)$: What is the frequency and magnitude of acute and chronic oil spills expected to impact high use recreational areas (beaches and sport fishing locations) over the life of the field?

$Q_1(a)$: What is the expected size, number, and timing of acute oil spills over the life of the field?

B. Oil spill probability projection.

6. Development scenarios.

7. Production scenarios.

8. Statistical history of acute oil spills.

Q_1(b): What is the expected cumulative amount and timing of chronic oil spills over the life of the field?

B. Oil spill probability projection.

6. Development scenarios.

7. Production scenarios.

8. EPA discharge standards, and prediction of types, sources and frequency of chronic discharges.

30. Dispersion mechanisms of discharges (dispersion model); natural dispersal mechanisms and rates expected.

Q_1(c): What are the major beach and sport fishing locations in the area?

H. Recreation locational identification location of major sport fisheries and location of major beaches used for recreation.

Q_1(d): What are the expected seasonal trajectories of acute and chronic oil spills?

6. Development scenarios.

7. Production scenarios.

27. Offshore and nearshore circulation patterns.

28. Offshore and nearshore wind fields.

30. Determination of expected natural dispersion mechanisms and rates.

32. Seasonal trajectory model for acute and chronic oil spills.

33. Oil slick dynamics.

$Q_1(2)$: What is the expected physiochemical condition of an acute oil spill at the time it impacts a recreational area?

H. Location of recreational areas.

5. Composition of Alaska crude oils.

30. Acute oil spill dispersion mechanisms and rates.

32. Seasonal acute oil spill trajectory model.

33. Determination of oil slick dynamics, including weathering effects on oil.

$Q_1(3)$: What is the number and type of onshore structures expected to be constructed in the proximity of recreational areas?

A. Petroleum development scenarios.

H. Location of recreational sites.

Q_1(4): Given the answers to Q_1(1) through Q_1(3) above, what is the expected reduction in industry revenues or economic rents resulting from a restriction of recreation use or the degraded quality of the activity?

Q_1(e): What natural conditions can be expected to inhibit or promote resumption of beach use or sport fishing given an initial restriction in these recreational activities? What is the expected period of closure?

I. Visual impact evaluation.

M. Community regional infrastructure analysis.

S. Recreation user preference.

29. Residence time of waters and flushing rates.

40. Population parameters of emigration, repopulation, of fish and shellfish from other areas.

45. Microbial degradation rates of oil.

54. Rates of depuration of sport fish.

55. Natural recovery rates of beaches and waters, and repeated period of closure.

Q_1(f): What is the expected reduction in beach use or sport fishing as a result of the degraded quality of the activity?

M. Community regional infrastructure analysis.

S. Recreation user preference.

Q_1(g): Will the expected reduction in the supply or quality of beaches and fishing grounds result in the use of other recreation facilities?

M. Community regional infrastructure analysis.

S. Recreation user preference.

Q_1(h): To what extent will revenues expected from expenditures on other recreational activities offset the revenues foregone in the impacted activities?

M. Community regional infrastructure analysis.

R. Recreation industry analysis.

S. Recreation user preference.

Q_2: Given the expected reduction in the supply of recreational opportunities or quality changes, what is the expected loss in the welfare (consumer surplus) of recreationists (other than sport fishermen)?

M. Community regional infrastrucure analysis.

S. Recreation user preference.

Q_3: Given the epxected reduction in the catch per unit effort of sport fishermen and tainting of fish stocks, what is the expected loss in welfare (consumer surplus) of these recreationists.*

A. Petroleum development scenarios.

D. Fisheries location identification.

M. Community regional infrastructure analysis.

P. Economic analysis.

S. Recreation user preference.

Q_4: Given the economic losses expected to be sustained by the recreation industry and recreationists, what are the expected changes in regional income, employment, and population?**

M. Community regional infrastrucure analysis.

---

* The information needed to determine the expected reduction in the catch per unit effort of sport fishermen and the extent of tainting is discussed in section 3.4.1, Q_1(3).

** The effects of these changes on the infrastructure and social fabric of the area are discussed in section 3.4.4.

N. Population analysis.

O. Employments analysis.

P. Economic analysis.

Mitigating Measures

Q_5: Given the type and magnitude of economic losses resulting from the impact producing agents, what level of investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, and tract deletions?

Y. Mitigating measures analysis.

Benefits

Q_6: What benefits to recreationists, the recreation industry, and the regional economy are expected as a result of the proposal?

$Q_6(1)$: What is the expected increase in welfare (consumers' surplus) to sport fishermen and the economic rents to the recreation industry as a result of OCS petroleum related structure providing more sport fishing locations?

X. Loss/benefit analysis.

$Q_6(2)$: Given the expected increase in economic rents to the recreation industry as a result of OCS related structures, what is the expected increase with respect to the regional economy?

X. Loss/benefit analysis.

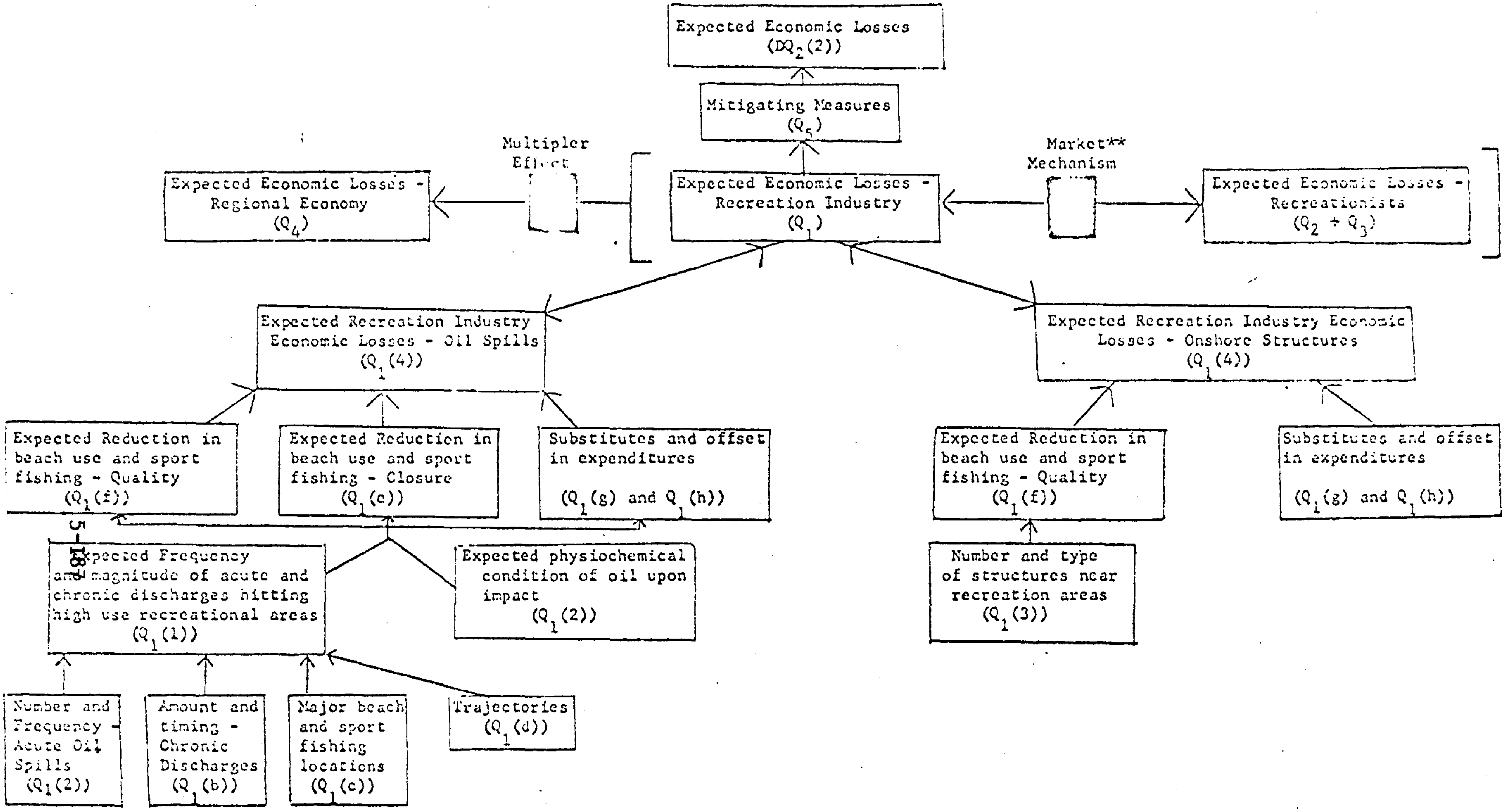
Q_6(3): What reduction in the number of import tanker spills (chronic and major) hitting recreational areas can be expected as a result of the proposal?

C. Tanker spill probability.

Q_6(4): What is the expected savings to recreationists, the recreation industry, and the regional economy as a result of this reduction in oil spills?

X. Loss/benefit analysis.

RECREATION*



** Economic losses will be apportioned between recreationists and the recreation industry depending on the elasticity of market demand as well as possible shifts in the supply and demand functions.

FIGURE 5-13

5.3.4.4 INFRASTRUCTURE AND SOCIAL CONFLICTS

$DQ_2(3)$: What welfare losses (consumers' surplus) can be expected due to infrastructure and social stresses generated by the leasing proposal?

and

Given the answer to $DQ_2(3)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impact Producing Agents

(1) Changes in economic activity

Q_1: What welfare losses are expected as a result of infrastructure stresses induced by changes in the coastal zone economic activity?

$Q_1(1)$: What is the expected increase in population over time as a result of the proposal?

A. Petroleum development scenarios.

N. Population analysis.

$Q_1(2)$: What is the expected increase in demand for social services such as schools, health care, housing, law enforcement, fire protection, water supply, energy supply, solid waste disposal, and sewage?

A. Petroleum development scenarios.

M. Community regional infrastructure

$Q_1(3)$: To what extent is short-term inflationary pressure expected to result from competition for harbor space, marine services, land and capital?

A. Petroleum development scenarios.

D. Fisheries location identification.

M. Community regional infrastructure analysis.

P. Economic analysis.

Q_2: What welfare losses are expected as a result of social stresses* induced by changes in coastal zone economic activity?

P. Economic analysis.

Q. Fish economic analysis.

$Q_2(1)$: What are the expected changes in the economic base of the area?

P. Economic analysis.

Q. Fish economic analysis.

$Q_2(a)$: To what extent will expected losses to commercial fishermen affect the regional allocation of resources to this industry?

---

* Changes in community values as well as social rank and role.

P. Economic analysis.

Q. Fish economic analysis.

Q_2(b): To what extent is competition for harbor space, marine services, land, and capital expected to change the economic base of the area?

A. Petroleum development scenarios.

M. Community regional infrastructure analysis.

P. Economic analysis.

Q_2(c): To what extent will expected losses to the recreation industry affect the regional allocation of resources to this industry?

A. Petroleum development scenarios.

M. Community regional infrastructure analysis.

R. Recreation industry analysis.

Q_2(d^1): What are the expected changes in land use?

M. Community regional infrastructure analysis.

Q_2(d): What is the expected change in population composition as a result of changes in the economic base of the area?

N. Population analysis.

O. Employment analysis.

P. Economic analysis.

$Q_2(2)$: Given the answer to $Q_2(1)$ above, what is the expected effect on social stability (community values, social rank and role, standard of living)?

L. Sociocultural analysis.

Q_3: To what extent are non-socially disruptive changes in cultural patterns and values deemed a significant loss?

L. Sociocultural analysis.

Q_4: What is the expected change in unemployment or underemployment of labor and capital due to net change in economic activity induced by the leasing proposal?

O. Employment analysis.

P. Economic analysis.

Mitigating Measures

Q_5: Given the type and magnitude of economic losses resulting from the impact producing agents, what level of investment in mitigating measures should be made through OCS Operating Orders and the Coastal Energy Impact Program?

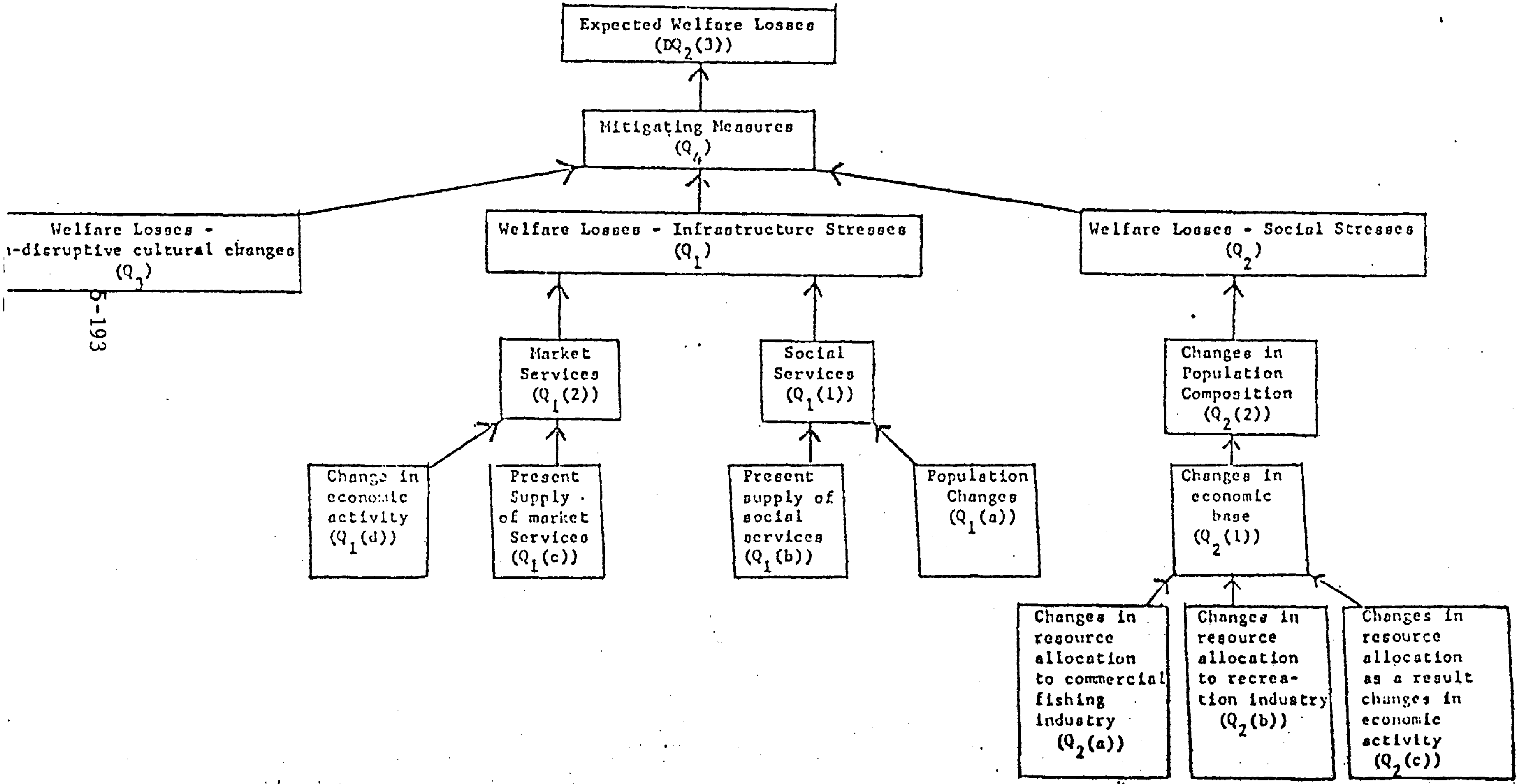
Y. Mitigating measures analysis.

Q_6: What is the expected reduction in economic losses as a result of the investment?

X. Loss/benefit analysis.

FIGURE 5-14

INFRASTRUCTURE AND SOCIAL CONFLICTS*



5.3.4.5 MARINE AND COASTAL ECOSYSTEMS

DQ_2(4A): <u>What changes in the population and habitat of species are expected to interfere with ecological relationships as a result of the leasing proposals?</u>

and

<u>Given the answer to DQ_2(4A) above, what investment in mitigating measures is necessary to bring the risk of interference with ecological relationships to an acceptable level?</u>

Significant Impact Producing Agents

(1) Oil spills and other OCS related discharges.

(2) Offshore and onshore OCS related surface and subsurface structures, associated debris and noise produced by the activities.

Q_1: What are the expected impacts on critical populations and habitats as a result of the above impact producing agents?

Acute and Chronic Discharges

Q_1(1): What is the frequency and magnitude of oil spills and other contaminant discharges which are expected to impact critical populations and habitats over the life of the field?

Q_1(a): What is the expected size, number, and timing of acute oil spills over the life of the field?

A. Petroleum development scenarios.

B. Oil spill probability projection.

7. Production scenarios.

Q_1(b): What is the expected rate and cumulative amount of small acute spills, chronic spills, and other contaminant discharges (e.g. formation waters, drilling muds, and additives)?

A. Petroleum development scenarios.

7. Production scenarios.

8. Pollution scenarios including EPA and State discharge standards and prediction of types, sources and frequency of discharges.

30. Persistence and dispersal mechanisms and rates (persistence/dispersion model); natural persistence and dispersion mechanisms and rates.

Q_1(c): What are the vulnerable habitats and abiotic processes (i.e., mechanisms of transport, transformation, and transfer which interrelate biologic communities with their habitat) that sustain populations with high biologic and social values (e.g., marine sanctuaries, national wildlife refuges, etc.)?

39. Distribution and abundance of species with high biological and/or social values.

41. Location of habitats and habitat dependencies of above species for breeding, resting, spawning, nursery, moulting, feeding, migration, and congregation.

42. Key food web dependencies that sustain populations.

46. Distribution of ecological communities of unique/aesthetic importance and/or of high productivity.

56. Vulnerability of habitats to OCS exploration development and productive activities and accidents.

59. Effects to key ecological processes to OCS exploration, development and production activities and accidents.

Q_1(d): What vulnerable populations have high biologic and social value (e.g. predator - prey relations, endangered or threatened species, corals protected by Secretarial Order, etc.), and where are they located?

41. Distribution and abundance of species with high biological and/or social values.

46. Distribution of ecological communities of unique/aesthetic importance and/or highly productive.

Q_1(e): What are the expected trajectories of oil spills and other contaminant discharges?

6. Development scenarios.

7. Production scenarios.

27. Offshore and nearshore circulation.

28. Offshore and nearshore wind fields.

30. Natural dispersion mechanisms and rates expected.

32. Seasonal trajectory models for oil spills and other discharges.

33. Oil slick dynamics.

38. Oil/ice interactions.

36. Sea ice characteristics.

37. Sea ice dynamics.

Q_1(2): What is the expected physiochemical condition of the oil at the time it impacts a vulnerable population or habitat?

5. Composition of Alaska crude oil.

32. Seasonal acute oil spill trajectories.

33. Determination of oil slick dynamics, including weathering.

39. Locations of vulnerable populations.

41. Locations of critical habitats.

$Q_1(3)$: Given the answers to $Q_1(1)$ and $Q_1(2)$ above, are the impacts from OCS oil spills and other contaminant discharges expected to interfere significantly with existing critical populations and habitats?

$Q_1(f)$: What is the expected behavioral response of vulnerable species to the presence of oil?

48. Avoidance/attraction behaviors of vulnerable species to oil, including disruption of normal behavioral activities by oil.

$Q_1(g)$: What is the expected effect on the overall resilience and stability of vulnerable populations in terms of growth, survival, and reproduction?

1. Heavy hydrocarbon distribution.

2. Light hydrocarbon distribution.

3. Toxic metals distribution

8. Pollution scenarios.

32. Oil spill trajectories.

39. Distribution and abundance of vulnerable species.

40. Life history and population parameters of vulnerable species.

50. Sublethal effects of oil on vulnerable species.

Q_1(h): Is the presence of oil expected to destroy or degrade vulnerable habitats so as to preclude their use?

8. Pollution scenarios.

32. Oil spill trajectories.

41. Locations of critical habitats and habitat dependencies of vulnerable species.

55. Environmental recovery rates of ecosystems.

Q_1(i): What are the expected significant cumulative effects (e.g., biomagnification of contaminants, threshold physiologic sensitivities, etc.) on existing populations and habitats from continuous exposure to low level contaminant discharges?

8. Pollution scenarios.

48. Sublethal effects of oil.

49. Toxicity of oil.

51. Combined pollutant effects.

52. Toxicity of muds and cuttings.

54. Tainting of commercial species and bioaccumulation.

Offshore and Onshore Surface and Subsurface Structures Related Debris and Noise Produced by OCS Activities.

$Q_1(4)$: What is the expected alteration to critical populations or reduction in habitat space due to OCS related structures and associated noise.

$Q_1(j)$: What is the expected behavioral response of vulnerable species to noise pollution?

53. Avoidance/attraction behaviors of vulnerable species to noise, including acclimation and noise disruption of normal behavioral activities.

$Q_1(k)$: What is the expected number and location of OCS related offshore and onshore structures?

6. Development scenarios.

7. Production scenarios.

Q_1(1): Are OCS offshore and onshore related structures and associated construction activities (e.g., causeways, gravel islands, pipeline burial, and dredged material disposal) expected to interfere significantly with existing populations and habitats?

9. OCS activities/impacts scenarios.

39. Distribution and abundance of vulnerable species.

41. Locations of critical habitats.

58. Effects of OCS structures on vulnerable populations and critical habitats.

59. Effects of OCS activities on vulnerable populations and critical habitats.

Q_2: What is the expected loss in welfare (consumer surplus) resulting from aesthetic degradation?*

---

* Recreation losses due to aesthetic degradation is discussed in section 4.2.2.

$Q_2(1)$: What is the expected loss in welfare to property owners in the area resulting from visual intrusions or debris washed ashore?

I. Visual impact evaluation.

M. Community/regional infrastrucutre analysis.

P. Economic analysis.

$Q_2(2)$: As a result of oil spills or other impact producing agents which are expected to cause a significant reduction in the populations or habitat of species in the area, what is the expected loss in welfare to those who place significant value on the intrinsic worth of wildlife, marine species, and their habitats?

S. Recreation user preference.

T. Fisheries user preference.

Mitigating Measures

Q_3: Given the expected reduction in critical populations and habitats of species, what investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, EPA Regulations and Guidelines, and tract deletions.

Y. Mitigating measures analysis.

Q_4: To what extent will this investment reduce the risk of interference with ecological relationships?

Y. Mitigating measures analysis.

X. Loss/benefit analysis.

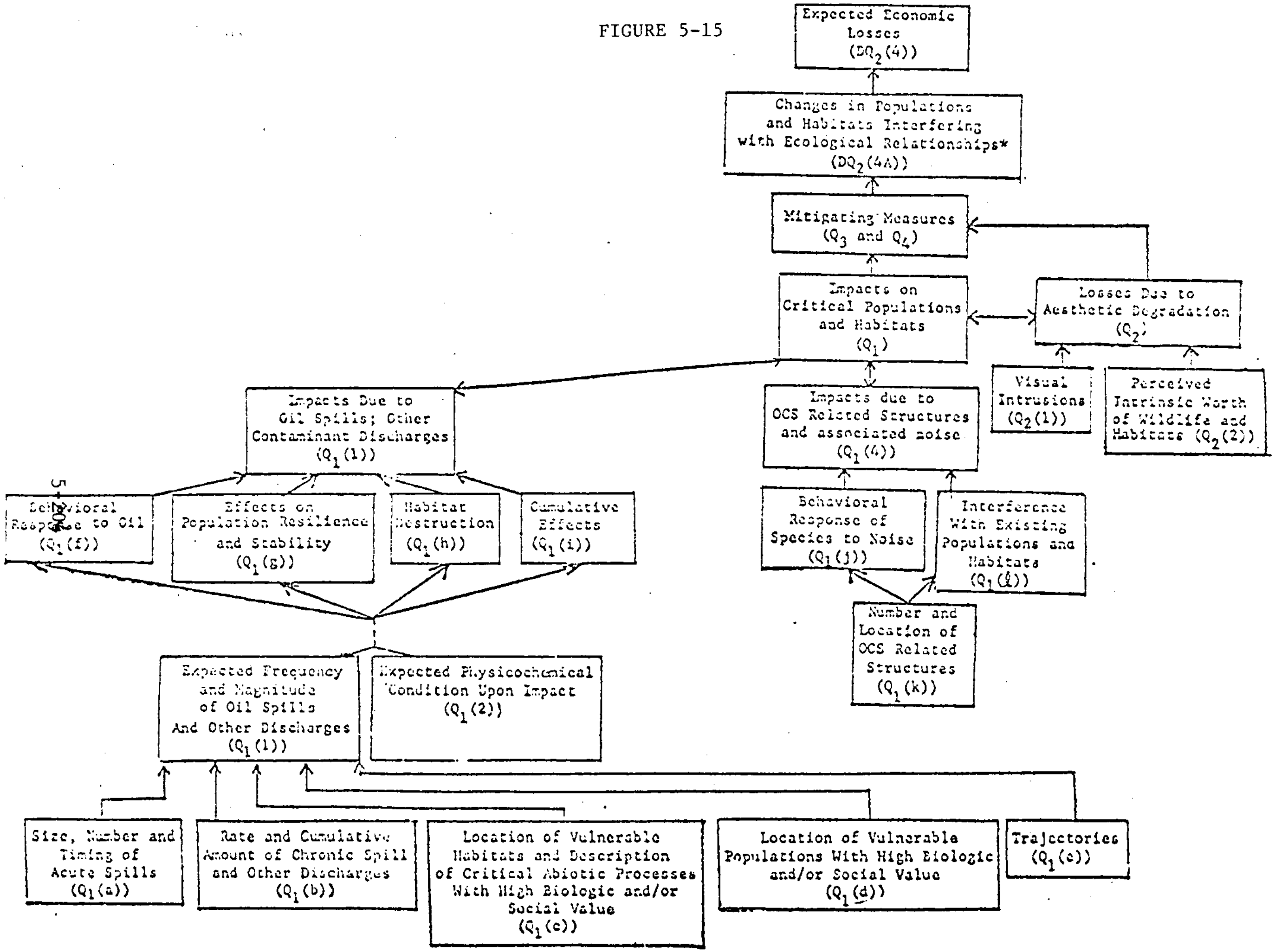
Benefits

Q_5: What reduction in the number of import tanker spills hitting critical populations and habitats can be expected as a result of the proposal?

C. Tanker spill probability.

MARINE AND COASTAL ECOSYSTEMS

FIGURE 5-15



* Quantification of possible losses due to these interferences in dollar terms is presently impossible. Thus, the decisionmaker's question is converted to DQ$_2$(4A).

5.3.4.6 AIR AND WATER QUALITY

$DQ_2(5)$: What regional welfare losses (consumer surplus) due to degradation of air and water quality can be expected as a result of the leasing proposal?

and

Given the answer to $DQ_2(5)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impacts Producing Agents

(1) Onshore and Offshore Emissions

(2) Onshore effluents

Q_1: What losses in welfare (consumer surplus) can be expected as a result of onshore air quality degradation?

$Q_1(1)$: What is the expected cumulative level of emissions due to gas processing plants, oil transfer operations and offshore emissions?

4. Present sources and levels of emissions.

6. Development scenarios.

7. Production scenarios.

8. Expected types and concentrations of emissions.

31. Persistence and dispersal mechanisms and rates.

$Q_1(2)$: What is the present level of emissions which adversely affect air quality?

4. Types, concentration, and sources of adverse emissions.

31. Persistence and dispersal mechanisms and rates of atmospheric emissions.

$Q_1(3)$: To what extent will these onshore emissions violate emission standards?

4. Present types and levels of adverse emissions.

6. Development scenarios.

7. Production scenarios.

8. Expected types, concentrations, and sources of emissions.

31. Expected persistence and dispersal mechanisms and rates.

$Q_1(4)$: If standards are not violated, will the expected increase in the level of emissions still cause a significant welfare loss?

S. Public attitudes, values, and aesthetics.

4. Present types and levels of emissions.

8. Expected types and levels of emissions.

31. Persistence and dispersion mechanisms and rates of emissions.

58. Effects of OCS structures and emissions on visibility and air odors.

Q_1(5): Are any emissions which are not covered by standards expected to result in a significant welfare loss?

4. Present types and levels of non-regulated emissions.

5. Public attitudes, values and aesthetics.

8. Expected types and levels of non-regulated emissions.

31. Dispersion mechanisms and rates.

58. Effects of expected non-regulated emissions on smell and visibility.

Q_1(6): What temporary loss in welfare can be expected to result from short-term increase in emissions caused by adverse meteorological conditions?

22. Types, frequency of occurrence and magnitude of adverse atmospherical effects.

Q_2: What losses in welfare (consumer surplus) can be expected as a result of onshore water quality degradation?

X. Loss/benefit analysis.

$Q_2(1)$: What is the expected cumulative level of effluents due to transportation residuals and industrial and residental wastes?

A. Location of freshwater supplies.

M. Present use of freshwater by industry, population, onshore biota.

8. Present types, concentrations, and sources of effluents, and expected increases with OCS development.

29. Residence times and flushing rates.

30. Dispersion mechanisms and rates.

$Q_2(2)$: What is the present level of effluents which adversely affect water quality?

1. Heavy hydrocarbon distribution.

2. Light hydrocarbon distribution.

3. Toxic metals distribution.

8. Determination of types, sources, and concentrations of adverse effluents.

30. Dispersal mechanisms and rates.

$Q_2(3)$: To what extent will these effluents violate discharge standards?

4. Adverse effluents.

6. Development scenarios.

7. Production scenarios.

8. Expected types and concentration of adverse effluents; discharge standards.

30. Dispersal mechanisms and rates.

$Q_2(4)$: If standards are not violated, will the expected increase in the level of effluents still cause a significant welfare loss?

S. Expected public attitudes, values and aesthetics.

8. Expected types and levels of effluents.

30. Expected persistence and dispersion mechanisms and rates.

58. Effects of effluents on water clarity and taste.

$Q_2(5)$: Are any effluents which are not covered by standards expected to result in a significant welfare loss?

S. Expected public attitudes, values and aesthetics.

8. Expected types and levels of non-regulated effluents.

30. Expected persistence and dispersal mechanisms and rates.

58. Effects of expected non-regulated effluents on water clarity and taste.

Q_2(6): What temporary loss in welfare can be expected to result from a short-term increase in effluents caused by construction of onshore facilities?

59. Effects of construction related effluents.

9. Frequency, source, and types of construction related effluents.

Mitigating Measures

Q_3: Given the extent to which emission standards are expected to be violated, what investment in mitigating measures should be made through OCS Operating Orders, and EPA Regulations and Guidelines to meet these standards?

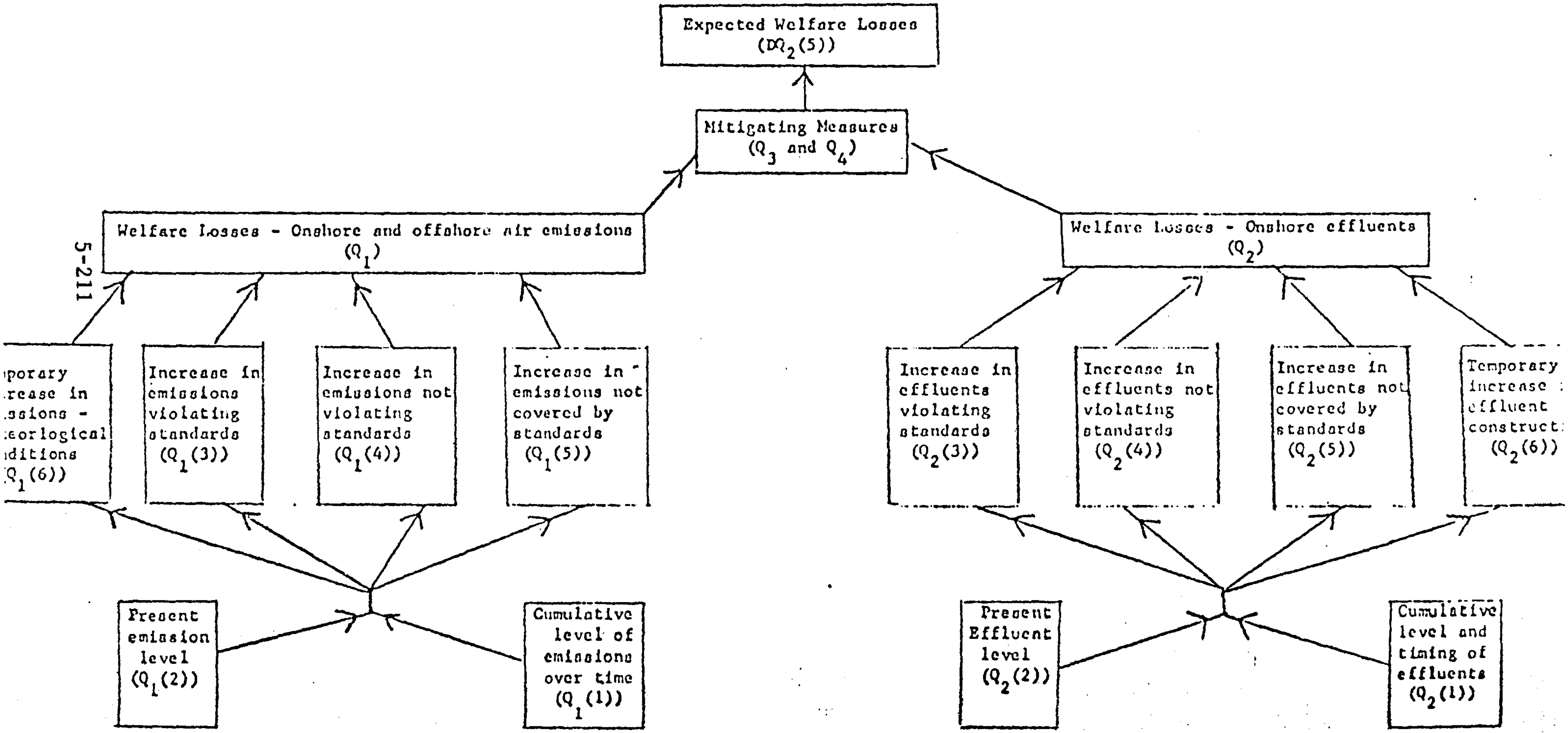
Y. Mitigating measures analysis.

Q_4: If standards are not violated and emissions are still expected cause a significant welfare loss, what investment in mitigating measures should be made?

X. Loss/benefit analysis.

FIGURE 5-16

AIR AND WATER QUALITY*



5.3.4.7 ARCHAEOLOGICAL AND CULTURAL RESOURCES

$DQ_2(6)$: What welfare losses due to damage of archaeological and historic resources can be expected as a result of the leasing proposal?

and

Given the answer to $DQ_2(6)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impacts Producing Agents

- Acute oil spills and significant well drilling related discharges (e.g., cuttings and drilling muds).
- Placement of OCS related structures, both offshore and onshore.

Acute Spills and Significant Discharges

Q_1: What welfare losses are expected as a result of archaeological and historic resources being damaged or destroyed by oil spills?

$Q_1(1)$: What is the frequency and level of acute spills and significant discharges over the life of the field?

$Q_1(a)$: What is the expected size, number, and timing of these discharges over the life of the field?

B. Oil spill probability projection.

6. Resource development scenarios.

7. Production scenarios.

8. Pollution scenarios.

Q_1(b): What are the locations of such resources (e.g., shipwrecks and human habitation sites and relics)?

J. Submerged archaeological locational analysis.

K. Terrestrial archaeological analysis.

35. Mapping survey of seafloor and onshore topography.

Q_1(c): What are the expected trajectories of such discharges?

6. Development scenarios.

7. Production scenarios.

27. Offshore and nearshore circulation.

28. Offshore and nearshore winds.

30. Natural dispersion mechanisms and rates.

32. Seasonal trajectory model for acute discharge.

33. Oil slick dynamics.

Q_1(2): Given the answer to Q_1(1) above, what is the expected damage to archaeological and historic resources?

V. Oil impacts on archaeological resources.

$Q_1(3)$: What archaeological and historic resources with historic value are protected under provisions of the Antiquities Act?

W. Antiquities Act Impact.

OCS Related Structures (i.e., Offshore and Onshore)

Q_2: What welfare losses are expected as a result of archaeological and historic resources being damaged or destroyed by the placement of OCS structures?

$Q_2(1)$: What is the expected number and location of onshore and offshore OCS structures?

A. Petroleum development scenarios.

7. Production scenarios.

$Q_2(2)$: What are the expected locations of such resources (e.g., shipwrecks and human habitation sites and relics)?

J. Submerged archaeological locational analysis.

35. Mapping survey of seafloor and onshore topography.

$Q_2(3)$: Given the answers to $Q_4(1)$ and $Q_4(2)$ above, what is the expected damage to archeological and historic resources?

A. Petroleum development scenarios.

J. Submerged archaeological locational analysis.

K. Terrestrial areas local analysis.

K. Terrestrial archeological locational analysis.

V. Oil impact on archaeological resources.

Q_2(4): What archeological and historic resources are protected under provisions of the Antiquities Act?

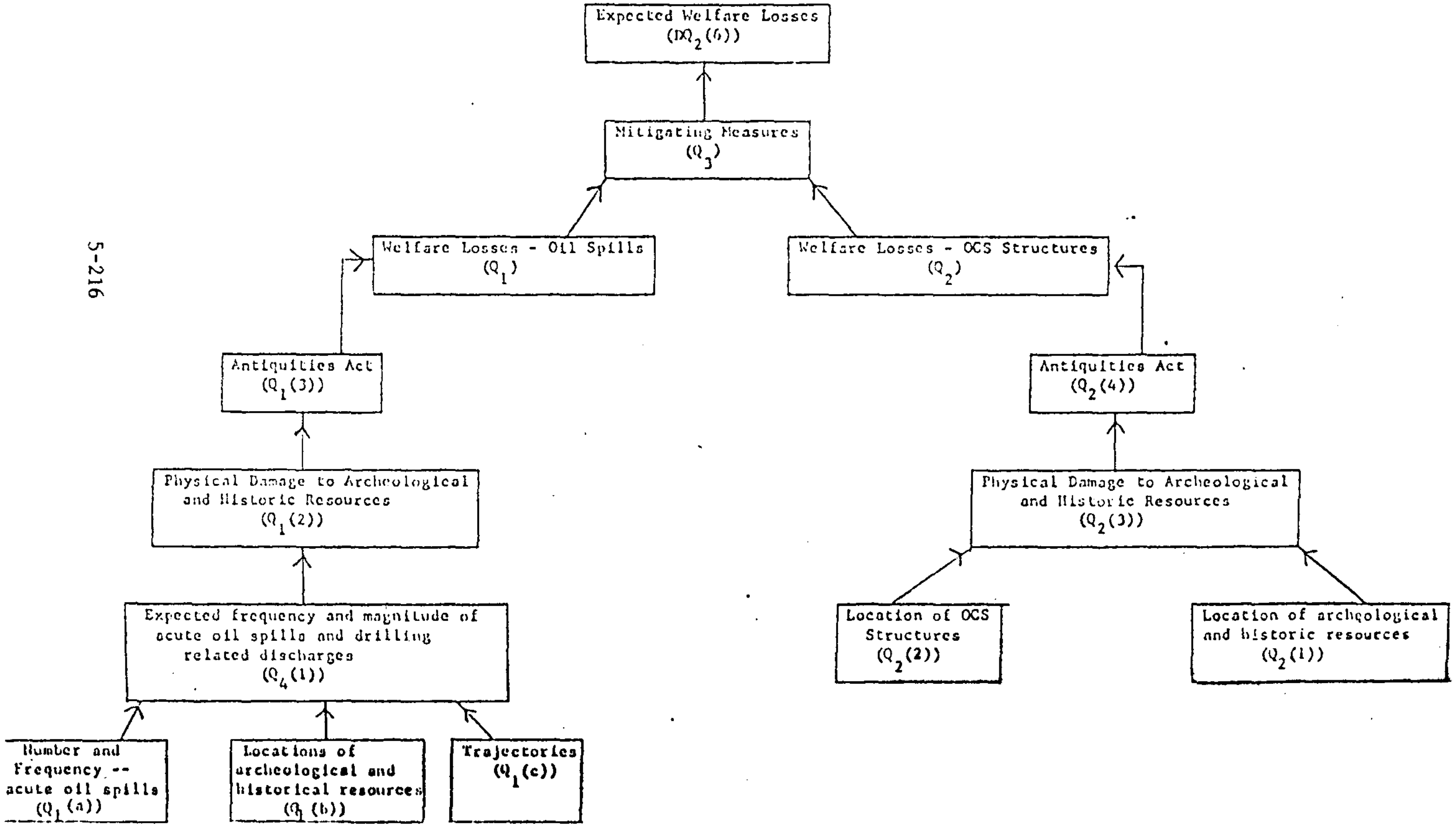
W. Antiquity impacts.

Mitigating Measures

Q_5: Given the expected damage to archeological and historic resources, what level of investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, and tract deletions?

FIGURE 5-17

ARCHAEOLOGICAL AND HISTORIC RESOURCES*



5.3.4.8 SHIPPING CONFLICTS

$DQ_2(7)$: What economic losses are expected to be sustained by the shipping industry as a result of the leasing proposal?

and

Given the answer to $DQ_2(7)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impacts Producing Agents

- OCS offshore surface structures
- Acute oil spills
- OCS related vessel traffic

Q_1: What economic losses can be expected as a result of collisions between ships and offshore structures?

$Q_1(1)$: What is the expected number and location of surface structures?

A. Petroleum development scenarios.

$Q_1(2)$: What is the intensity of shipping in the area?

G. Shipping activity.

$Q_1(3)$: Where are the locations of shipping lanes (if any)?

G. Shipping activity.

$Q_1(4)$: What is the historical frequency and magnitude of vessel damage in other areas?

G. Shipping activity.

$Q_1(5)$: Given the answers to $Q_1(1)$ and $Q_1(4)$ above, what is the expected physical damage as a result of offshore structures?

A. Petroleum development scenarios.

G. Shipping activity.

Q_2: What economic losses can be expected as a result of acute oil spills?

$Q_2(1)$: What is the expected size, number and timing of acute oil spills over the life of the field?

A. Petroleum development scenarios.

C. Tanker spill probability.

$Q_2(2)$: What is the intensity of shipping in the area?

G. Shipping activity.

$Q_2(3)$: Where are the locations of shipping lanes (if any)?

G. Shipping activity.

$Q_2(4)$: Given the answer to $Q_1(1)$ - $Q_1(3)$ above, what is the expected damage to hulls soiled by passage through oil spills?

A. Petroleum development scenarios.

B. Oil spill probability.

G. Shipping activity.

$Q_2(5)$: Given the answer to $Q_1(1)$ to $Q_1(3)$ above, what is the expected damage to boiler condenser systems attributable to contaminated feedwater?

B. Oil spill probability.

G. Shipping activity.

Q_3: What economic losses can be expected as a result of OCS related vessel traffic?

$Q_3(1)$: What is the expected size, number and timing of OCS related vessels?

A. Petroleum development scenarios.

G. Shipping activity.

$Q_3(2)$: What is the intensity of shipping in the area?

G. Shipping activity.

$Q_3(3)$: Where are the locations of shipping lanes (if any)?

G. Shipping activity.

$Q_3(4)$: What is the historical frequency and magnitude of damage in other areas?

G. Shipping activity.

$Q_3(5)$: Given the answer to $Q_3(1)$ - $Q_3(4)$ above, what is the expected physical damage as a result of OCS related vessel traffic?

G. Shipping activity.

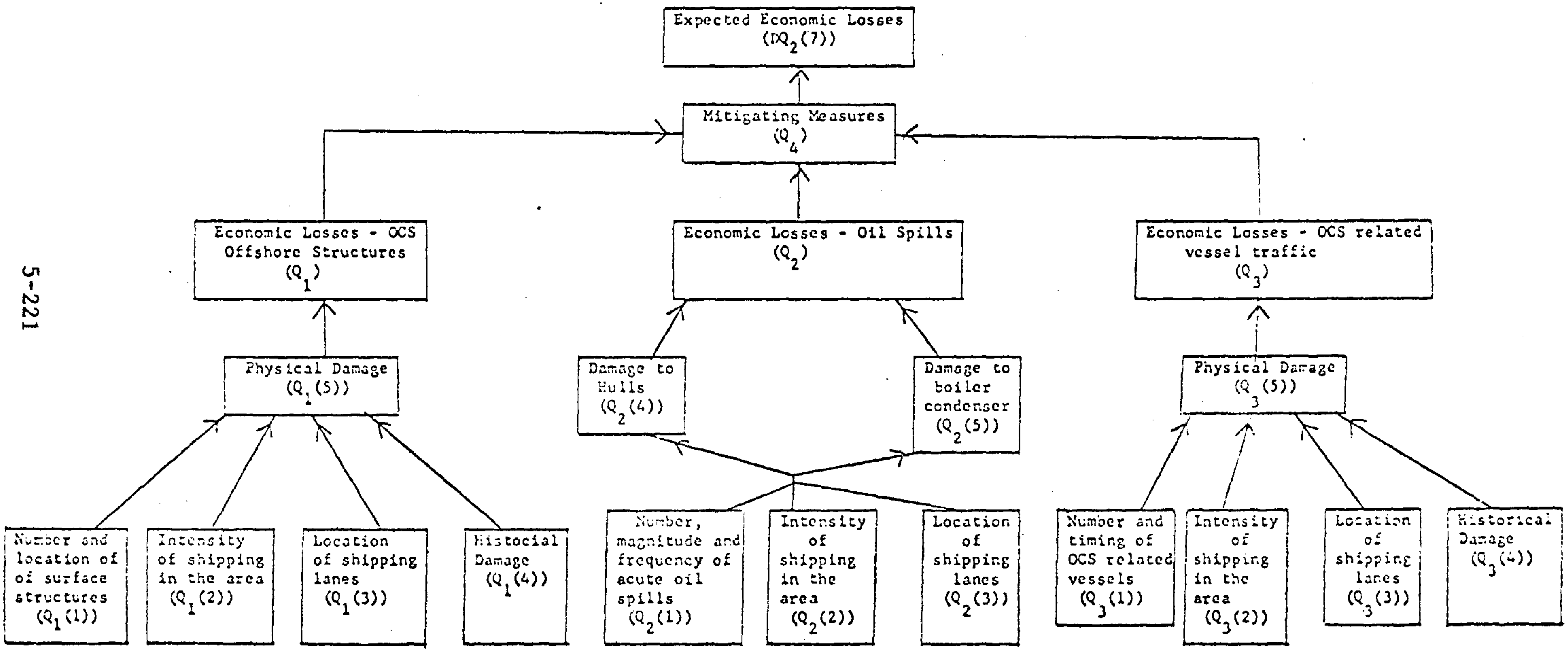
Mitigating Measures

Q_4: Given the type and magnitude of economic losses expected to result from the impact producing agents, what level of investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, EPA Regulations and Guidelines, and tract deletions?

Y. Mitigating measure analysis.

FIGURE 5-18

SHIPPING CONFLICTS*



5.3.4.9 ENVIRONMENTAL HAZARDS

DQ_2(8): What natural environmental hazards are expected to interfere with OCS exploration and development activities as a result of the leasing proposal?

and

Given the answer to DQ_2(8) above, what investment in mitigating measures is necessary to bring the risk of interference with OCS exploration and development to an acceptable level?

Significant Impact Producing Agents

(1) Environmental hazards (geologic, meteorologic, and oceanographic) to OCS related structures and facilities
(2) Biotic behavioral response to OCS related activities

Q 1: What are the environmental hazards both to OCS related activities and induced by OCS activities?

Q_1(1): What types of geologic, oceanographic, and meteorological hazards are likely to be encountered in the area?

10. Seismic activity.

11. Volcanic activity.

12. Surface and near-surface faulting.

13. Seafloor instability.

14. Erosion and deposition.

15. Permafrost.

19. Stratigraphic hazards.

20. Sea ice stress-strain relationships.

21. Sea ice forces.

22. Extreme oceanographic and meteorological events (e.g. winds, waves, tidal currents).

23. Storm surges.

24. Tsunamis

25. Icing of structures.

26. Visibility.

34. Bottom sediment characteristics.

35. Seafloor topography.

Q_1(2): Where are these hazards most prevalent?

10. Location and depths of earthquake epicenters.

11. Locations of active volcanoes.

12. Locations of surface and near-surface faults.

13. Locations of existing and potential slumps.

14. Locations of large scale bedforms.

15. Distribution, depth, and engineering characteristics of subsea permafrost.

16. Ice gouge density, trends, gouge depths and recurrence rates.

17. Distributions and depth of overpressured sediment.

18. Subsidence potentials of sediment strata.

19. Locations and stratigraphy of natural oil seeps and reservoirs.

20. Location and frequency of different types of sea ice.

22. Distribution and frequency of extreme events of winds, waves, and tidal currents.

23. Distributions and probability of Tsunamis.

24. Distribution and frequency of storm surges.

25. Distribution and frequency of extreme ice storms and structure icing.

26. Distribution and frequency of low visibility due to extreme fog, haze, and precipitation.

Q_1(3): What is the magnitude and frequency of physical environmental hazards?

10. Frequency, magnitude, and velocity of strong ground motion.

11. Magnitude and frequency of volcanic eruptions and areal range of eruptive volcanic fallout, lava flows and Nuees Ardentes.

12. Correlation of faults with earthquake events.

13. Stability of sediments in potential slump areas.

14. Rates of burial and scour in locations undergoing significant erosions and depositions, including rates and direction of large scale bedform movements.

20. Frequency and magnitude of ice loads on OCS structures.

23. Historical shoreline erosions and damage assessment due to Tsunamis.

21. Frequency and magnitude of ice forces from ridging, ice shove, and fast ice displacement vectors on OCS related structures.

$Q_1(4)$: Which OCS related structures and activities are vulnerable to these hazards?

60. Vulnerability of OCS related structures and facilities to environmental hazards.

$Q_1(5)$: Are there any environmental hazards which are expected to be induced or worsened by OCS related activities (e.g., subsidence, aquifer contamination)?

18. Subsidence potential of sediment adjacent to and surrounding resource reservoirs.

Q_2: What types of biotic interference presents a hazard to OCS related activities?

53. Effects of noise on birds.

59. Interference of birds to low flying aircraft.

Q3. What is the effectiveness of various types of mitigating measures in protecting against catastrophies caused by environmental hazards?

$Q_3(1)$: Given the types and magnitudes of existing severity of environmental hazards in the area, what level of investment in mitigating measures should be made through OCS Operating Orders, Stipulations, EPA Regulations and Guidelines, and tract deletions?

Y. Mitigating measures analysis.

$Q_3(2)$: To what extent will this investment reduce the risk of environmental hazards?

X. Loss/benefit analysis.

FIGURE 5-19

ENVIRONMENTAL HAZARDS*

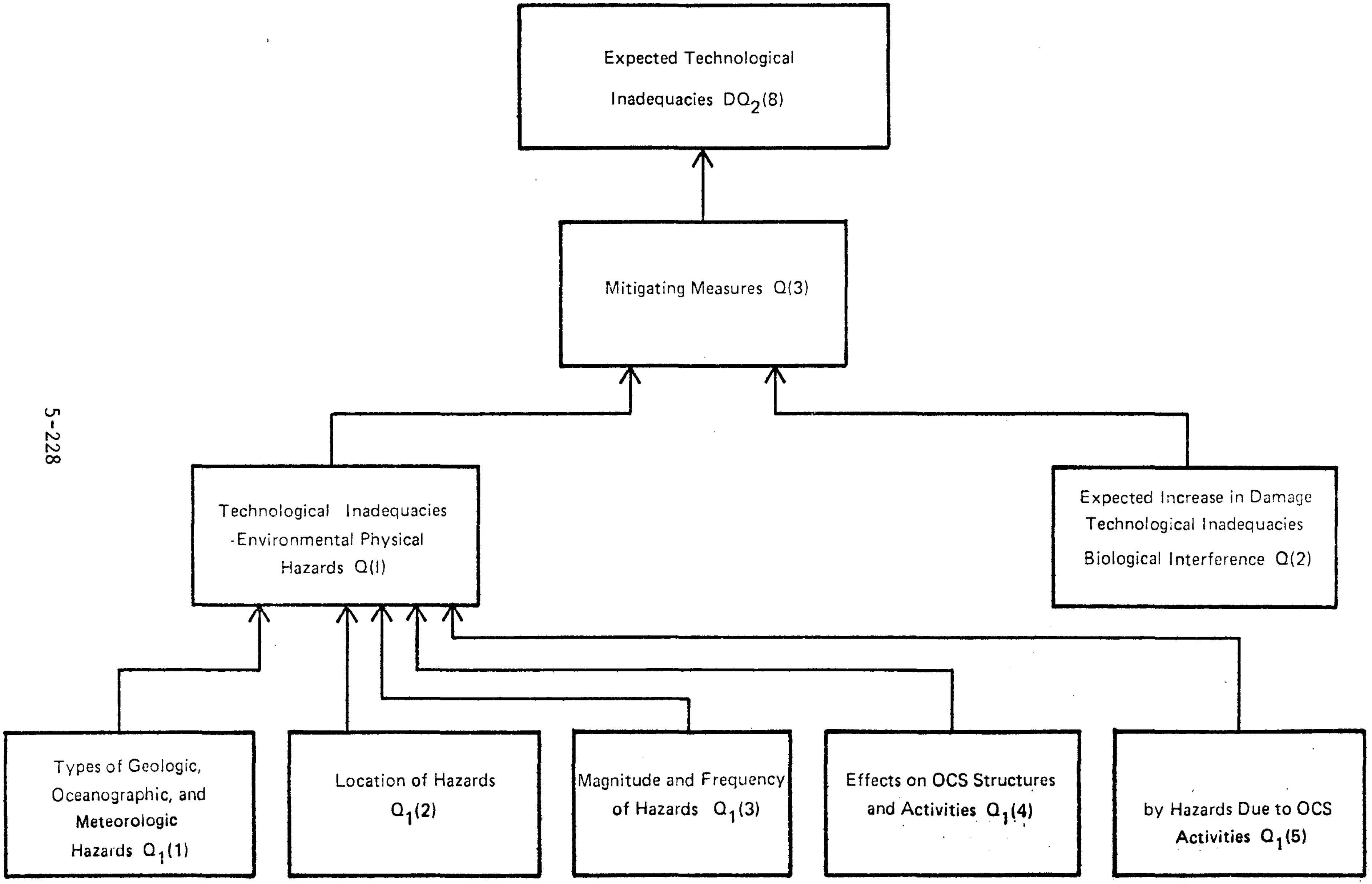


TABLE 5-8

TYPES OF STUDIES IDENTIFIED FOR
THE BERING SEA REGION OF THE ALASKA OUTER CONTINENTAL SHELF

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
CONTAMINANT RECONNAISSANCE					
1. Distribution and concentrations of hydrocarbons - in water column - in sediments - in marine organisms - pelagic and beach tar	CF, AWQ SL, MCE	Lease Area	EIS	18	A1

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
2. Distribution and concentrations of low molecular weight hydrocarbons in water column	AWQ, SL CF, MCE	Lease Area	EIS	18	A2
3. Distribution and concentrations of toxic metals - in water column - in sediment - in marine organisms	AWQ, SL CF, MCE	Lease Area	EIS	12	A3
4. Distribution and concentrations of atmospheric pollutants - over land - over sea	AWQ	Lease Area	EIS	18	Not Addressed

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
5. Composition of Alaska crude oils - physical characteristics - chemical composition	AWQ, SL CF, R, MCE	Non-Site	EIS	18	Not Addressed
OCS DEVELOPMENT ACTIVITIES AND IMPACTS					B
6. Development Scenarios - Oil and Gas Resource Estimates - OCS Shipping Activity - Aircraft Traffic - Offshore Structures - Onshore Strucutres - Operating Methods - Available Techology	CF, R, MCE, AWQ, ACR, SL	Lease Area	EIS	24	B1

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- OCS Activity Conflicts					
- Space use conflicts					
- Resource use conflicts					
- Shoreline modification					
7. Production Scenarios	CF, R, MCE, AWQ, ACR, SL	Lease Area	DIS	12	B1
8. Pollution Scenarios	CF, R, MCE, AWQ, ACR, SL	Lease Area	EIS	12	B2
- acute oil spills					
- chronic oil spills					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- chronic discharge of other contaminants					
- atmosphere emissions					
- EPA, State, local discharge regulations					
9. OCS Activities/Impacts Scenarios	CF, R, SL, MCE	Lease Area	EIS	12	B3
- offshore structures space use conflicts					
- onshore structures space use conflicts resource use conflicts change to shoreline					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- pipelines					
- noise					
- contaminants					
- traffic					
ENVIRONMENTAL HAZARDS					C
10. Seismic Hazards	EIT	Lease Area	TS	24	C1
- description and location of epicenters, focal depths					
- seismic risk map of magnitudes, frequencies, and probabilities					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
11. Volcanic Hazards - description and location of active volcanoes - volcanic risk map of eruptions, lava flows, Nuees Ardentes	EIT	Lease Area	TS	18	C1
12. Surface and Near Surface Faulting - description and locations - relationship to seismic activity - relative ages - magnitude and frequency of strong bottom movements	EIT	Lease Area	TS	24	C2

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
13. Seafloor Instability - description of types and extent of potential slumps, other unstable sediment masses - relative instability risk classification - sediment cross section analysis	EIT	Lease Area	TS	24	C3
14. Erosion and Deposition - location, description, and rates of burial and scour	EIT	Lease Area	EIS	24	C4

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- large scale bedform movements					
- effects of structures on erosion rates					
15. Subsea Permafrost	EIT	Lease Area	EIS	24	C6
- distribution and depth					
- engineering of permafrost characteristics					
- index of strength properties					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
16. Ice Gouging - density - trends - maximum gouge depths - recurrence rates - predictive analysis from ice data	EIT	Lease Area	EIS	24	C7
17. Overpressured Sediments - distribution and depth - pore pressures	EIT	Lease Area	TS	24	C8
18. Subsidence Potentials - location and distribution strategraphy	EIT	Lease Area	EIS	24	Not Addressed

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
19. Stratigraphic Unconformities - locations and distribution of potential reservoir channels through surface fault zones - locations and distributions of natural seeps - stratigraphy of natural seeps	EIT	Lease Area	EIS	24	Not Addressed

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
20. Sea Ice Stress-Strain Relationships - frequency and magnitude of ice loads on structures - seep properties - strength properties	EIT	Lease Area Region	EIS	24	C9
21. Sea Ice Size-Force Relationships - movement forces from ridging and ice shove, - fast ice displacement vectors	EIT	Lease Area	EIS	24	C9

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- mechanisms of force exertion - extreme event analysis					
22. Extreme Events of Wind, Waves, Currents - distribution and frequency of extremes - adverse atmospheric conditions	AWQ, EIT	Lease Area	EIS	12	C10

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
23. Tsunamis - distribution, frequency of occurrence, probability - height and areal extent of potential inundations of shoreline - historical damage assessment - correlation to seismic events - relationship to glacial calving and shoreline erosion	EIT	Lease Area	EIS	12	C10

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
24. Storm Surges - distribution, frequency magnitude - extent of shoreline inundation - causal prediction	EIT	Lease Area	EIS	12	C10
25. Ice Storms and Structure Icing - extremes of temperature and precipitation - frequency of distribution, magnitude	EIT	Lease Area	EIS	12	C10

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
26. Visibility - frequency, extremes of fog, haze, precipitation	EIT	Lease Area	EIS	12	C10
TRANSPORT					
27. Currents and Tide - Lagrangian movements - Eulerian movements - Tidal components - Wind forcing	CF, R, MCE, ACR, SL	Lease Area	TS	24	D1

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
28. Wind Fields - Directions, strengths, frequency - Variations	CF, R, MCE, ACR, SL	Lease Area	TS	24	D1
29. Residence Times and Flushing Characteristics - basins, bays, inlets, both offshore and nearshore	CF, R, MCE, AWQ, SL	Lease Area	EIS	12	Not Addressed

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
30. Dispersion and Mixing of Contaminants - point source discharge - non-point discharge - downstream concentrations - concentration fields - distribution and settling rates of particulates	CF, R, MCE, AWQ ACR, SL	Lease Area	EIS	12	D3
31. Dispersion and Mixing of Atmospheric Pollutants	AWQ	Lease Area	EIS	12	

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
32. Trajectories of Oil Spills - drift card information - centroid trajectories conservation of properties - dynamic trajectories, non-conservative, plume behavoir and weathering	SL, CF, R, MCE, ACR	Lease Area	TS	12	D3
33. Oil Slick Dynamics - plume behavior under shear, spreading, Coriolis force	CF, R, MCE, SL ACR	Non-Site	EIS	24-36	D3

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- weathering rates and changes in composition from - evaporation - solution - emulsification - diffusion - photochemical oxidation - microbial degradation					
34. Bottom Sediment Characteristics - composition, size distribution - areal distribution - consolidation - stratigraphy	CF, MCE, ACR, EIT, SL	Lease Area	EIS	18	D4

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
35. Basin Morphology - seafloor topography - morphology and morphometry of basins, inlets, bays	CF, R, MCE, AWQ, ACR, EIT, SL	Lease Area	TS	12	D7
36. Sea Ice Characteristics - types, sizes, geometrics - frequency and magnitude of occurrence - distribution of major features, especially of hazardous conditions - under ice morphology	EIT, SL MCE	Lease Area	TS	24	D8
37. Sea Ice Dynamics - movements and trajectories - deformation, ridging dynamics - lead formation dynamics	EIT, SL MCE	Lease Area	EIS	24	D9

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
38. Oil/Ice Interactions - incorporation and release of oil from ice - bulk transport	CF, MCE, AWQ, SL	Region	EIS	24	D10
RECEPTORS					
39. Identification of Vulnerable Populations - distribution, abundance of - commercial/subsistence/sport species - rare endangered species - unique/aesthetic - key ecological species	CF, R, MCE, SL	Lease Area	TS	24	E, 1, 3, 5, 7

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
40. Life History Analyses - population parameters of commercial/subsistence/sport species	CF, R, MCE, SL	Region	EIS	12	
41. Identification and Location of Critical Habitats and Habitat Dependencies of Vulnerable Populations for: - feeding areas - breeding, nesting, molting, nursing areas - schooling or migration routes of vulnerable species	CF, R, MCE, SL		TS EIS	24	

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
42. Food Web Dependencies - key prey items - availability and selectivity - variability with season, lifestyle - energetics estimates	MCE, SL CF	Lease Area	EIS	24	E2, 4, 6
43. OCS Structures as Fish Habitats - attraction of fish to structures - changes in population sizes and/or distributions around structures	CF	Non-Site	EIS	12	E5

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
44. Wetland Ecosystems - types, characteristics, distribution - habitat dependencies - vulnerability indices from OCS activities	CF, MCE, SL	Lease Area	TS (shore) EIS (land)	24	E8
45. Microbial Degradation of Hydrocarbons - natural populations of HC utilizers - rates of degradation under natural environmental conditions - rates of degradation under enhanced environmental conditions	MCE, SL, CF, R	Lease Area-Region	EIS	24	EIS

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
46. Classification of OCS Ecosystems - major ecosystem types and characteristics - distribution - primary components, energy sources, ecosystems process	MCE	Lease Area	EIS	36	Not Addressed
47. Legal Protection of Vulnerable Populations and Critical Habitats - coverage under existing and proposed legislation - regulations, prohibitions, responsibilities	CF, MCE, SL	Region	TS	12	Not Addressed

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task

48. Behavior of Vulnerable Species to Oil
- avoidance behaviors
- activity behavior responses
  - feeding
  - schooling
  - chemoreception
  - mechanoreception
  - migration
- threshold concentrations
- chemicals responsible
	CF, MCE SL	Non-Site	EIS	36	F2

49. Toxicity of Oil - TL50's of key species (arctic and subarctic) 24, 96 hr. - concentrations	CF, MCE, SL	Non-Site	EIS	24	F2

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- dissolved fractions					
- contaminated sediments					
- surface slicks					
50. Sublethal Effects of Oil	CF, MCE, SL	Non-Site	EIS	36	F2
- threshold concentrations and responses of commercial species					
- respiration/metabolism					
- behavior/chemoreoption					
- fecundity					
- hatching success, molting					
- growth rate and abnormalties					
- diseases susceptibility					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
51. Combined Effects of Pollutants - TL50 changes of oil/toxic metal combinations - sublethal effects at <u>in situ</u> concentrations	SL, MCE	Non-Site	EIS	24	Not Addressed
52. Toxicity of Drilling Muds and Cuttings - TL50 for commercial spp. and larvae	CF, MCE, SL	Non-Site	EIS	12	F2
53. Effects of Noise - noise levels and propagation - thresholds and responses - disruption of behavior	CF, MCE, SL	Non-Site	EIS	12-24	F2

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- avoidance - acclimation					
54. Tainting of Commercial Species - rates of uptake and depuration - sites of tissue accumulation - types of compounds stored - metabolite dynamics - threshold concentrations	CF, R, MCE, SL	Non-Site	EIS	36	F5
55. Environmental Recovery Rates of Ecosystems a) Persistence of Oil on Shorelines - identification of	CF, R, MCE, SL	Lease Area	EIS	24-36	F6

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
shoreline characteristics influencing recovery rates - coastal vulnerability indices - targeting of impacts					
b) Persistence of Oil in Sediments - identification of sediment characteristics influencing recovery rates - sediment persistence indices	CF, MCE SL	Non-Site Region and/or Lease Area	EIS	24-36	F6

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
c) Recovery of Oiled Habitats - impacts of oiling on selected habitats - recovery and re-population of oiled habitats - dynamics of recovery processes	CF, MCE, SL	Region	EIS	24-36	F6
56. Ecosystem Vulnerability Indices - locations and classifications of ecosystem types - identification of controlling ecosystem processes - identification of ecosystem process vulnerabilities to oil	CF, MCE, SL	Lease Area	EIS	24-36	F6

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- targeting of impacts - ranking of vulnerability					
57. Effects of Contaminants on Normal Microbial Activity - Changes in populations and activity rates due to contaminants	CF, R, MCE, SL	Region	EIS	24	Not Addressed
58. Effects of Offshore and Onshore Structures - identification and description of potential effects via space use conflicts, resource use conflicts	CF, MCE, ACL, AWQ, SL	Non-Site	EIS	EIS	

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
59. Effects of Activities - identification and potential effects - analyses of mitigating measures	CF, MCE, EIT, SL, AWQ	Non-Site	EIS		
60. Vulnerability of Structures to Environmental Hazards - engineering characteristics and structures - technology scenarios - risk analysis of structure failure	EIT	Non-Site	TS	18	

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
OCS DEVELOPMENT ACTIVITIES					
A. Petroleum Development	CF, R,	Basin &	Basin,	9	PDS
- onshore structures	ACR, SC,	Lease	TS		PAM
- offshore structures	SL, SI,	Area	Lease		
- pipelines	MCE, AWQ		Area		
- number and location			DES		
- oil and gas resource estimates					
- economic activity					
- OCS shipping activites					
- aircraft usage					
- technology analysis					
- employment activity					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
B. Oil Spill Probability	CF, R, ACR,	Basin &	Basin,	9	PDS
- size	SC, SL, MCE	Lease	TS		
- number		Area	Lease		
- timing			Area		
- type (chronic, acute)			DES		
- impact area					
C. Tanker Spill	CF, R,	Coastal	DES	9	PDS
- import tanker	SC, SL,	Area			
- domestic tanker	MCE				
- proportional analysis					
- spill trajectory					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
DATA BASELINE IDENTIFICATION					
D. Fisheries Location Identification - sales practices - catch and effort - species seasonality	CF, R, SI	Lease Area	TS	12	FI
E. Fish Equipment Loss - probability of net damage - costs of year - changes in fishing patterns/techniques	CF	Lease Area	DES	12	FI MTS

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
F. Fishing Practices	CF	Lease Area	DES	12	FI
- fishing areas					
- fish distribution					
- types and frequency of fishing effort					
- seasonality of effort					
- techniques used					
G. Shipping Activity	CF, SC	Lease Area	DES	12	MTS TS PDS
- current usage and space demands					
- potential demands					
- ports and sea lanes identification					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- capacity identification					
- origin/destination					
- fishing/OCS traffic					
- shipping safety - vessel damage					
- use conflicts					
H. Recreational -	R	Regional	DES	12	RI
Location Identification		Impact			VI
- beach areas		Area			FI
- shell and finfish					MTS
gathering		Lease			LSPS
- catch and effort		Area			
- species					
- seasonality					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
I. Visual Impact Evaluation - evaluate visual resource quality - components of visual environment - impacts on visual quality - economic analysis of impacts	R, MCE	Onshore Impact Area Lease Area	DES	12	VI
J. Submerged Archaeological Locational Analysis - chronological placement of still stands	ACR	Lease Area Site	DES	18	AP

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- document preserve of man during late Pleistocene - develop probability model - apply probability model - early man site investigation		(Tract) Specific			
K. Terrestrial Archaeological Locational Analysis - document presence of man - analysis of prehistoric environment - develop probability model - apply model	ACR	Regional Impact Area	DES	18	

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
STATEWIDE, REGIONAL, LOCAL IMPACTS ASSESSMENT					
L. Sociocultural Analysis	SI	Regional	DES	18	NSS
- subsistence	SL	Impact			LSPS
- brief social history		Area			RI
- currently perceived trends					
- community response capacity					
- social interaction dynamics					
- intergroup, intragroup, intrafamily stress					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- priorities regarding conservation of values, traditions, original structures - lifestyle impacts - perception/attitudes toward OCS activity					
M. Community/Regional Infrastructure Analysis - current land use patterns/status - development constraints - housing - current community facilities and service	SI, SL, R, MCE, AWQ	Regional Impact Area	DES	12	LSPS

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- projections of infrastructure needs - projections for land use					
N. Population Analysis - population composition - trends - growth prospects - local, regional, statewide	CF, R, SI	Regional Impact	DES	12	SRPE LSPS
O. Employment Analysis - employment - unemployment - job seasonality - trends and prospects	CF, R, SI	State & Regional Impact Area	DES	12	SRPE LSPS PDS PI

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- occupational skills - income levels - native/local hire					
P. Economic Analysis - econometric modeling - capital investment - fiscal policy - characteristics of growth/decline - economic indicators - local, regional statewide	CF, R, SI, MCE	State & Regional Impact Area	DES	18	SRPE LSPS
Q. Fish Economic Analysis - change in fish count by area - value of catch by species	CF, SI	Regional Impact Area	DES	18	FI SRPE

Types of Studis	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- change in unit fish costs - seasonal price data for processed fish products - change in unit costs processing plants - employment changes - wage/salary data					
R. Recreation Industry Analysis - current expenditures - current receipts - size and structure of industry - land use patterns	R, SI	State & Regional Impact Area	DES	12	LSPS RI

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task

S. Recreation User Preference
- consumer satisfaction - changed quality
- consumer satisfaction - substitutability of activity/site
- consumer use of area
  - site
  - activity
- visitation characteristics
- welfare value of alternative choices
	R, MCE, AWQ	Regional Impact Area	DES	18	RI

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
T. Fisheries User Preference - consumer satisfaction - changed quality - consumer satisfaction - substitutability - consumer demand for fish products and substitutes	CF, MCE	State & Regional Impact Area	DES	18	FI ?
U. Subsistence Activities - location of subsistence fishing, hunting areas - cultural ties to subsistence - presence of subsistence system	SL	Regional Impact Area	DES	12	NSS LSPS

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- economic vs mixed economy					
- current levels of use					
- projection of future use					
- jurisdictional issues					
V. Oil Impact on Archaeological Resources	ACR	Non-Site Specific	DES	12	
- determine degradation of site's environment					
- effect of oil on radiometric dating techniques					
- physical degradation of artifacts					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
W. Antiquities Act Impact - legal interpretation of responsibility - determine of site significance - determine effect - impact on repository - impact on state inventory systems	ACR	Non-Site	DES	12	In house

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
X. Loss/Benefit Analysis - net economic loss vs net gains - net social loss vs. social gains - savings from reduced oil spills	CF, R, SI, SL, MCE, AWQ, EIT	State & Regional Impact Area	DES	12	FI, NSS, SRPE, RI, LSPS, VI, TS, POS

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
Y. Mitigating Measures Analysis - impacts producing agents - techniques to control these agents - cost of control techniques - benefit/cost analysis vs impacts	CF, R, SI, ACR, SC, SL, MCE, AWQ, EIT	State & Regional Impact Area	DES	12	In house

TABLE 5-9. LEASE AREA STUDY SCHEDULES FOR THE BERING SEA REGION

STEPS IN DECISION-MAKING PROCESS

TS = Tentative Sale Schedule
CN = Call for Nominations
TT = Tentative Tract Selection
DE = Preparation of ES
FE = Final ES
DS = Draft SID
FS = Final Sale
FT = Final Tract Selection

NS = Notice of Sale
SL = Sale
XP = Exploration Plan
TP = Transportation Plan
DP = Development Plan
PP = Pipeline Permit
LT = Lease Termination

SPATIAL RESOLUTION

0 = Information in hand, literature reviews
1 = Qualitative, area wide, cursory
2 = Semi-quantitative, hundreds of square miles scale or 25 miles of coastline
3 = Quantitative, 3-10 tract scale or 10 miles of coastline
4 = Quantitative, tract specific (2 to 5 mile resolution)
5 = Quantitative, site specific
6 = No spatial resolution (non-site specific)
7 = Refinement of data, no additional resolution
8 = Local, Regional, State Socioeconomic Data

TEMPORAL RESOLUTION

N = No temporal resolution   A = Annual   S = Seasonal

TABLE 5-9
BERING SEA REGION STUDIES SCHEDULE FOR ST. GEORGE

		NO	SCHEDULE		
TYPE OF STUDY	1978	1979	1980	1981	1982
1. HC Baselines					
2. LMWHC Baselines					
3. Toxic Metals					
4. Atmospheric Pollutants					
6. Development Scenarios					
7. Production Scenarios					
8. Pollution Scenarios					
9. Activities/Impacts Scenarios					
10. Seismic Hazards		NO	N2		
11. Volcanic Hazards		NO	N2		
12. Fault Hazards		NO	N2		
13. Seafloor Instability		NO	N2		
14. Erosion and Deposition		NO	N2		
17. Overpressuring		NO	N2		
18. Subsidence		NO	N2		
19. Stratigr. Unconformity		NO	N2		
22. Extreme Meteorology		NO			
23. Tsunamis		NO			
26. Visibility		NO			
27. Currents and Tides		NO	S2		
28. Winds		NO	S2		
29. Flushing					
30. Effluent Dispersion					
31. Emission Dispersion					
32. Oil Trajectories					
34. Sediments		NO			
35. Basin Morphology		NO	N3		
39. Vulnerable Population	NO	A2	S3		
40. Life History		NO	A2		
41. Critical Habitats	NO	A2	S3		
42. Food Web Dependencies		NO	A2		
44. Wetland Ecosystems		NO	A2		
45. HC Degradation					
46. Ecosystem Classification	NO	A2	S2		

TABLE 5-9
BERING SEA REGION STUDIES SCHEDULE FOR ST. GEORGE

TYPE OF STUDY		NO	SCHEDULE		
	1978	1979	1980	1981	1982
47. Laws and Regulations					
55. Environmental Recovery	NO	A2			
56. Ecosystem Vulnerability	NO	A2			
57. Effects on Microbes		NO			

TYPE OF STUDY		NO	SCHEDULE		
	1978	1979	1980	1981	1982
A. Petroleum Development Scenario				N1	
B. Oil Spill Probability Projection				N1	
C. Tanker Spill Probability				N1	
D. Fisheries Location Identification					N1
E. Fish Equipment Loss					N1
F. Fishing Practices					N1
G. Shipping Activity					N1
H. Recreational Location Identification					
I. Visual Impact Evaluation					
J. Submerged Archaeological Location Analysis			N5		
K. Terrestrial Archaeological Location Analysis					
L. Sociocultural Analysis					N1
M. Community/Regional Infrastructure Analysis					N1
N. Population Analysis					N1
O. Employment Analysis					N1
P. Economic Analysis					N1
Q. Fish Economic Analysis					N1
R. Recreation Industry Analysis					
S. Recreation User Preference					
T. Fisheries User Preference					
U. Subsistence Activities					N1
W. Antiquities Act Impact					
X. Loss/Benefit Analysis					
Y. Mitigating Measures Analysis					

TABLE 5-9
BERING SEA REGION STUDIES SCHEDULE FOR BRISTOL BAY

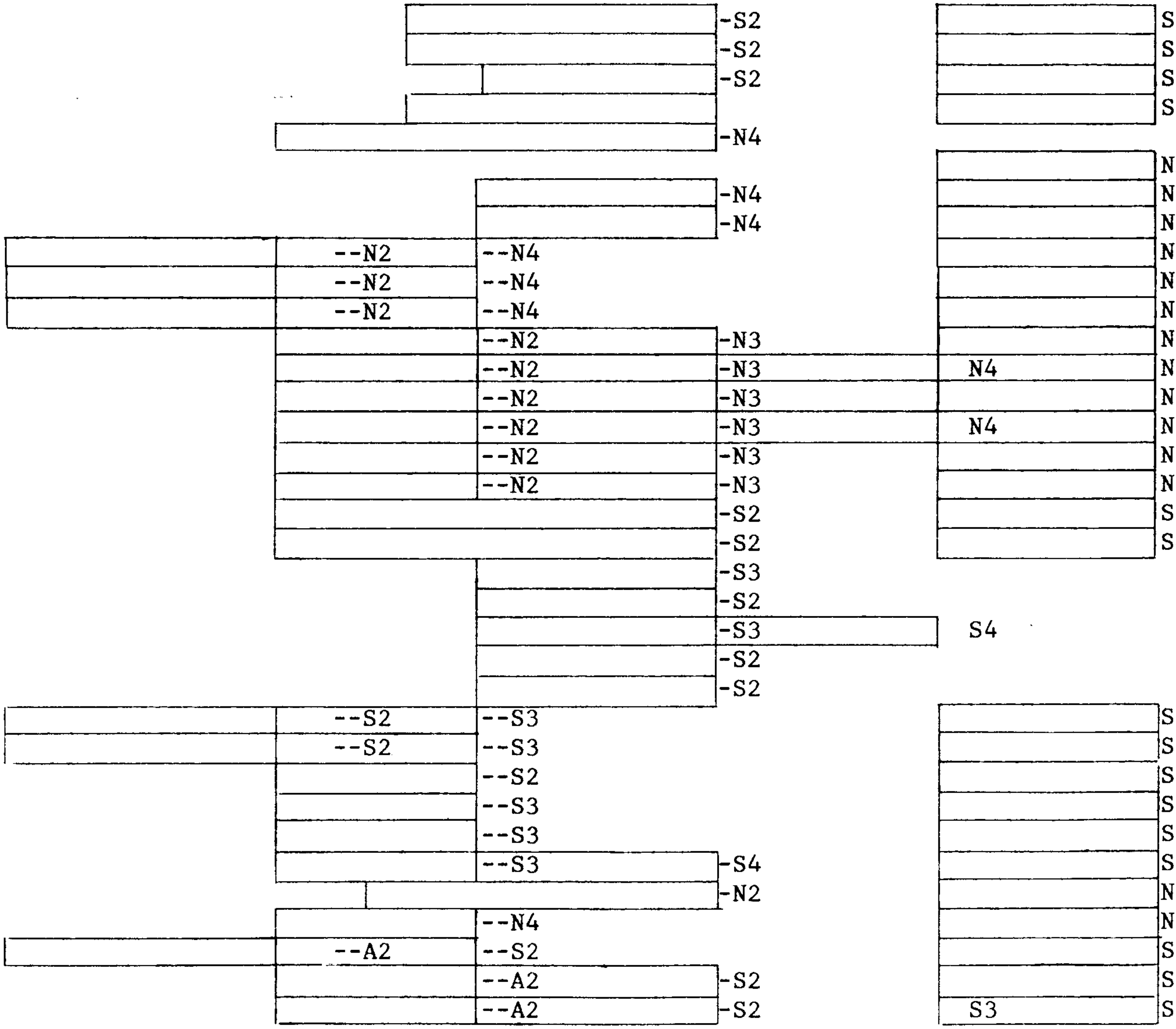
TYPE OF STUDY	1978	1979	1980	1981	1982
		NO SCHEDULE			
1. HC Baselines					
2. LMWHC Baselines					
3. Toxic Metals					
4. Atmospheric Pollutants					
6. Development Scenarios					
7. Production Scenarios					
8. Pollution Scenarios					
9. Activities/Impacts Scenarios					
10. Seismic Hazards		NO	N2		
11. Volcanic Hazards		NO	N2		
12. Fault Hazards		NO	N2		
13. Seafloor Instability		NO	N2		
14. Erosion and Deposition		NO	N2		
17. Overpressuring		NO	N2		
18. Subsidence		NO	N2		
19. Stratigr. Unconformity		NO	N2		
20. Ice Stress - Strain		NO			
21. Sea Ice Forces		NO			
22. Extreme Meteorology		NO			
23. Tsunamis		NO			
24. Storm Surges		NO			
25. Ice Storms		NO			
26. Visibility		NO			
27. Currents and Tides		NO	S2		
28. Winds		NO	S2		
29. Flushing					
30. Effluent Dispersion					
31. Emission Dispersion					
32. Oil Trajectories					
34. Sediments		NO			
35. Basin Morphology		NO	N3		
36. Sea Ice Characteristics	NO	S2			
37. Sea Ice Dynamics	NO	S2			
38. Oil/Ice Interactions		NO			
39. Vulnerable Population	NO	A2	S3		

TABLE 5-9
BERING SEA REGION STUDIES SCHEDULE FOR BRISTOL BAY

TYPE OF STUDY		NO	SCHEDULE		
	1978	1979	1980	1981	1982
40. Life History		NO	A2		
41. Critical Habitats	NO	A2	S3		
42. Food Web Dependencies		NO	A2		
44. Wetland Ecosystems		NO	A2		
45. HC Degradation					
46. Ecosystem Classification	NO	A2	S2		
47. Laws and Regulations					
55. Environmental Recovery	NO	A2			
56. Ecosystem Vulnerability	NO	A2			
57. Effects on Microbes		NO			

TYPE OF STUDY		NO	SCDEDULE		
	1977	1978	1979	1980	1981
A. Petroleum Development Scenario					N1
B. Oil Spill Probability Projection					N1
C. Tanker Spill Probability					N1
D. Fisheries Location Identification					N1
E. Fish Equipment Loss					N1
F. Fishing Practices					N1
G. Shipping Activity					N1
H. Recreational Location Identification					
I. Visual Impact Evaluation					
J. Submerged Archaeological Location Analysis					N5
K. Terrestrial Archaeological Location Analysis					
L. Sociocultural Analysis					N1
M. Community/Regional Infrastructure Analysis					N1
N. Population Analysis					N1
O. Employment Analysis					N1
P. Economic Analysis					N1
Q. Fish Economic Analysis					N1
R. Recreation Industry Analysis					
S. Recreation User Preference					
T. Fisheries User Preference					
U. Subsistence Activities					N1
V. Oil Impact on Archaeological Resources					
W. Antiquities Act Impact					
X. Loss/Benefit Analysis					
Y. Mitigating Measures Analysis					

TABLE 5-9
BERING SEA REGION STUDIES SCHEDULE FOR NORTON SOUND



TYPE OF STUDY	1978	1979	1980	1981	1982
		2	3 4	5,6,7,8,9	10
1. HC Baselines			-S2		S3
2. LMWHC Baselines			-S2		S3
3. Toxic Metals			-S2		S3
4. Atmospheric Pollutants					S3
6. Development Scenarios			-N4		
7. Production Scenarios					N5
8. Pollution Scenarios			-N4		N5
9. Activities/Impacts Scenarios			-N4		N5
10. Seismic Hazards		--N2	--N4		N7
12. Fault Hazards		--N2	--N4		N7
13. Seafloor Instability		--N2	--N4		N7
14. Erosion and Deposition			--N2 -N3		N7
15. Permafrost			--N2 -N3	N4	N7
16. Ice Gouging			--N2 -N3		N4
17. Overpressuring			--N2 -N3	N4	N7
18. Subsidence			--N2 -N3		N4
19. Stratigr. Unconformity			--N2 -N3		N4
20. Ice Stress-Strain			-S2		S3
21. Sea Ice Forces			-S2		S4
22. Extreme Meteorology			-S3		
23. Tsunamis			-S2		
24. Storm Surges			-S3	S4	
25. Ice Storms			-S2		
26. Visibility			-S2		
27. Currents and Tides		--S2	--S3		S4
28. Winds		--S2	--S3		S4
29. Flushing			--S2		S3
30. Effluent Dispersion			--S3		S4
31. Emission Dispersion			--S3		S4
32. Oil Trajectories			--S3 -S4		S5
34. Sediments			-N2		N3
35. Basin Morphology			--N4		N5
36. Sea Ice Characteristics		--A2	--S2		S3
37. Sea Ice Dynamics			--A2 -S2		S3
38. Oil/Ice Interactions			--A2 -S2	S3	S4

TABLE 5-9
BERING SEA REGION STUDIES SCHEDULE FOR NORTON SOUND

TYPE OF STUDY	1978	1979	1980	1981	1982	
		2	3	4 5,6,7,8,9	10	
39. Vulnerable Population		--A2	--S3	-S4		S5
40. Life History			--A2	-S2		S3
41. Critical Habitats		--A2	--S3	-S4		S5
42. Food Web Dependencies			--NO	-S2		S3
44. Wetland Ecosystems			--S2	-S3		
45. HC Degradation			--NO	-S2/N6		
46. Ecosystem Classification		--NO	--N3	-S3		
47. Laws and Regulations			--S4	-S5		
55. Environmental Recovery				-S2		S3
56. Ecosystem Vulnerability				-N6		N7
57. Effects on Microbes				-A2	S2	S3

TYPE OF STUDY	1977	1978	1979	1980	1981	
			2	3 4	5,6,7,8,9	
A. Petroleum Development Scenario				N2		N3
B. Oil Spill Probability Projection				N2		N3
C. Tanker Spill Probability				N2		N3
D. Fisheries Location Identification						N4
E. Fish Equipment Loss						N4
F. Fishing Practices						N2
G. Shipping Activity						N3
H. Recreational Location Identification						N5
I. Visual Impact Evaluation						N3
J. Submerged Archaeological Location Analysis						N5
K. Terrestrial Archaeological Location Analysis						N5
L. Sociocultural Analysis						N8
M. Community/Regional Infrastructure Analysis						N8
N. Population Analysis						N8
O. Employment Analysis						N8
P. Economic Analysis						N8
Q. Fish Economic Analysis						N8
R. Recreation Industry Analysis						N8
S. Recreation User Preference						N8
T. Fisheries User Preference						N8
U. Subsistence Activities						
W. Antiquities Act Impact						N8
X. Loss/Benefit Analysis						N6
Y. Mitigating Measures Analysis						N5

TABLE 5-9
BERING SEA STUDIES SCHEDULE - NONSITE

TYPE OF STUDY	NO SCHEDULE				
	1978	1979	1980	1981	1982
5. Crude Oil Composition			N6	UPDATE	
9. Activities/Impacts Scenarios					
33. Oil Dynamics	NO	S3	S4		
43. Structure/Habitats		NO			
45. HC Degradation	NO	N6			
48. Behavior to Oil	NO	N6	N6		
49. Toxicity of Oil	NO	N6	N6		
50. Sublethal Effects	NO	N6	N6		
51. Combined Effects	NO	N6	N6		
52. Toxicity of Metals	NO	N6	N6		
53. Effects of Noise	NO	N6	N6		
54. Tainting	NO	N6	N6		
58. Effects of Structures		NO	N6		
59. Effects of Activities		NO	N6		
60. Vulnerability of Structures		NO	N6		
V. Oil Spill Impact on Archaeological Resources		N6			

ARCTIC REGION

5.3.5 Arctic Region Study Plan

There are two lease areas in the Arctic region of the Alaska OCS: Beaufort Sea and Chukchi Sea. Only the Beaufort Sea lease area is currently scheduled for a sale.

Federal/State Beaufort - December 1979

The Arctic Regional Plan takes into account the similarities between these two lease areas and provides a scheduling of study results to fill information needs for both lease areas.

Numerous regional concerns have been expressed for oil and gas development in the Arctic. Table 5-10 lists these concerns and shows by which questions of the major issues they are addressed in the Arctic Regional Plan.

Two major issues are not applicable to the Arctic and are not addressed in the regional plan. They are commercial fishing and shipping conflicts.

Data in Table 5-11 identifies all of the listed information needs from these preceding questions (both socioeconomic and environmental) and relates these needs to the major decision steps identified in Chapter 2. In addition, the lead time necessary to obtain the data to meet the information needs is given.

The lease area study schedules for the Arctic region are shown in Table 5-12.

TABLE 5-10
MAJOR ISSUES

REGIONAL CONCERNS	Subsistence Lifestyles	Commercial Fishing	Recreation Tourism	Social Infrastructure	Coastal and Marine Ecosystems	Air and Water Quality	Archaeological Cultural Resources	Shipping Conflicts	Environmental Hazards
Arctic									
Restriction of summer oil and gas activity to protect migrators	$Q_1(1)$				$Q_1(1)$ $Q_1(2)$ $Q_1(3)$ $Q_1(4)$				
Identification of Cross Island, Simpson Lagoon and Narwhal Island as possible critical habitats	$Q_1(1)$				$Q_1(1)$				
Determination of degree of environmental sensitivity to perturbation	$Q_1(1)$ $Q_1(2)$ $Q_1(3)$ $Q_1(4)$ $Q_1(6)$				Q_1				
Concern for gravel supply and freshwater withdrawal	$Q_1(4)$				$Q_1(4)$	Q_2			
Determination of unique habitats especially barrier islands					$Q_1(1)$				
Bowhead whale and grey whale effect	Q_1 $Q_1(1)$ $Q_1(2)$ $Q_1(3)$ $Q_1(4)$ $Q_1(5)$ $Q_1(6)$ $Q_1(7)$				$Q_1(1)$ $Q_1(2)$ $Q_1(3)$ $Q_1(4)$				
Effect of ice on structures									Q_1
Oil spills in ice	$Q_1(1)$ $Q_1(2)$				$Q_1(1)$ $Q_1(2)$ $Q_1(3)$	Q_2			
Ice gouging on pipelines and wells									$Q_1(4)$

TABLE 5-10
MAJOR ISSUES

REGIONAL CONCERNS Arctic	Subsistence Lifestyles	Commercial Fishing	Recreation Tourism	Social Infrastructure	Coastal and Marine Ecosystems	Air and Water Quality	Archaeological Cultural Resources	Shipping Conflicts	Environmental Hazards
Effect on subsistence lifestyles	Q_1(7)			Q_2(2) Q_3					
Effect on subsistence species	Q_1			Q_1					
Effect on local economy	Q_1(7)			Q_1(2) Q_2 Q_2(d)	Q_2				
Clean-up and long term effects of spilled oil					Q_1		Q_1		
Protection of cultural and archeological sites				Q_1(2) Q_2(d			Q_1 Q_2		
Types of mitigating measures to protect socioeconomic styles				Q_3 Q_4	Q_3 Q_4				
Lack of technology to work in ice environment									Q_1(4)
Effects of chronic discharges	Q_1(3)				Q_1	Q_1 Q_2	Q_1 Q_2		
Melting by pipelines in permafrost									Q_1(2)
Feasibility of ice islands					Q_1(4)				Q_1(4)
Dynamics and hazards of ice									Q_1(2) Q_1(3) Q_1(4)
Shallow gas pocket hazards									Q_1(2) Q_1(3) Q_1(4)
Effect of causeways	Q_1(4)				Q_1(4)	Q_1(1)			

5.3.5.1 SUBSISTENCE LIFESTYLES

$DQ_2(1)$: <u>What losses are expected to be sustained by subsistence consumers of living resources as a result of the leasing proposal</u>?

and

<u>Given the answer to $DQ_2(1)$ above, what is the socially efficient level of investment in mitigating measures</u>?

Significant Impacts Producing Agents

- Acute and chronic discharges (catastrophic oil spills and extended low level discharges of oil, formation waters, and drilling muds).
- Offshore and onshore OCS related surface and subsurface structures and associated debris.
- Noise produced by OCS activities.

Q1: What are the expected impacts on critical populations and habitats utilized for subsistence living as a result of the above impact producing agents?

Acute and Chronic Discharges

$Q_1(1)$: What is the frequency and magnitude of oil spills and other contaminant discharges over the life of the field which are expected to impact critical populations and habitats utilized for subsistence?

Q_1(a): What is the expected size, number, and timing of acute oil spills over the life of the field?

B. Oil spill probability projection.

C. Tanker spill probability.

Q_1(b): What is the expected rate and cumulative amount of small acute spills, chronic spills, and other contaminant discharges (e.g. formation waters, drilling muds, and additives)?

B. Oil spill probability projection.

37. Sea ice dynamics.

38. Oil/ice interactions.

C. Tanker spill probability.

6. Development scenarios.

7. Production scenarios.

8. EPA and State discharge standards.

8. Types, sources and frequency of discharges.

29. Residence times and flushing.

34. Bottom sediment characteristics.

36. Sea ice characteristics.

30. Persistence and dispersal mechanisms and rates.

30. Expected natural persistence and dispersion mechanisms and rates.

Q_1(c): What are the vulnerable habitats and abiotic processes (i.e. mechanisms of transport, transformation, and transfer which interrelate biologic communities with their habitat) that sustain populations gathered for subsistence?

U. Determination of subsistence resource area.

U. Locations of hunting areas.

39. Distribution and abundance of subsistence marine mammals, bird, fish, other species.

41. Determination of critical habitats and habitat dependencies.

36. Sea ice characteristics.

34. Bottom sediments.

42. Principal prey organisms of subsistence species.

40. Habitat dependence of subsistence species.

Q_1(d): What are the principal living resources (marine mammals, bird, fish, etc.) utilized for subsistence and where are they located?

U. Subsistence activity.

39. Distribution and abundance of subsistence species.

47. Legal protection of vulnerable populations.

41. Location of critical habitats used by above species for breeding, resting, spawning, nursery, moulting, feeding, migration, and congregation.

Q_1(e): What are the expected seasonal trajectories of oil spills and other contaminant discharges?

A. Petroleum development scenarios

7. Production scenarios.

27. Water currents and circulation.

28. Offshore/nearshore wind fields.

36. Sea ice characteristics.

37. Sea ice dynamics.

30. Effluent dispersion and mixing.

32. Seasonal trajectory models for oil spills and other discharges.

33. Oil slick dynamics.

38. Oil/ice interactions.

Q_1(2): What is the expected physiochemical condition of spilled oil at the time it impacts a vulnerable population or habitat utilized for subsistence?

5. Composition of oil.

32. Seasonal acute oil spill trajectories.

33. Weathering oil slick dynamics.

41. Location of critical habitats.

44. Wetlands ecosystems.

Q_1(3): Given the answers to Q_1(1) and Q_1(2) above, are the impacts from OCS oil spills and other contaminant discharges expected to reduce significantly the gathering per unit effort on vulnerable populations and habitats utilized for subsistance resulting from: (a) restriction of subsistence use, (b) mortality of subsistence species, (c) displacement of living resources, (d) impact on recruitment, and (e) tainting (whether perceived or real)?

Q_1(f): What natural conditions can be expected to inhibit or promote resumption of subsistence activity given an initial restriction in fishing and hunting use? What is the expected period of closure?

29. Residence time and flushing.

40. Emigration and repopulation rates of subsistence species from other areas.

40. Sublethal effects of oil.

45. Rates of microbial degradation of oil.

48. Avoidance behavior to oil.

54. Tainting, its persistence, and rates of depuration.

55. Persistence of discharge material in water, bottom sediments, and beaches.

Q_1(g): What is the expected behavioral response of subsistence species to the presence of oil?

48. Behavior of subsistence species to acute and chronic oil spills.

Q_1(h): What is the expected effect on the overall resilience and stability of vulnerable populations in terms of growth, survival, and reproduction?

8. Pollution scenarios.

1, 2. Hydrocarbon distribution.

39. Distribution and abundance of vulnerable subsistence species.

40. Life history and population parameters of vulnerable subsistence species.

32. Oil spill trajectories.

50. Sublethal effects of oil on vulnerable subsistence species.

Q_1(i): What are the expected cumulative effects (e.g. biomagnification of contaminants, threshold physiological sensitivities, etc.) on existing populations and habitats from continuous exposure to low level contaminant discharges?

8. Pollution scenarios.

1,2. Hydrocarbon distribution.

49. Toxicity of oil.

50. Sublethal effects of oil.

51. Combined pollutant effects.

52. Toxicity of muds and cuttings.

54. Tainting of subsistence species and bioaccumulation.

Q_1(j): To what extent is taining of subsistence species or other quality changes expected to occur?

1,2. Hydrocarbon distribution.

8. Pollution scenarios.

54. Tainting mechanisms, including exposure time to discharges to produce tainting or other quality changes.

X. Risk analysis of predicted oil concentration and subsistence species populations.

Offshore and Onshore Surface and Subsurface Structures and Related Debris Produced by OCS Activities

Q_1(4): What is the expected alteration to critical populations that support subsistence use or reduction in habitat space due to OCS surface and subsurface structures?

$Q_1(k)$: Are offshore and onshore related structures and associated construction activities (e.g. cause ways, gravel islands, pipeline burial, and dredged material disposal) expected to interfere significantly with existing subsistence species populations and habitats?

A. Petroleum development scenarios.

$Q_1(l)$: What are the locations of wetlands in the area?

M. Community and regional infrastructure analysis.

9. OCS activities/impacts scenarios.

39. Distribution and abundance of vulnerable subsistance species.

41. Location of critical habitats.

44. Wetland ecosystems.

58. Effects of OCS and structures on vulnerable subsistence species populations and critical habitats.

59. Effects of OCS activities on above.

$Q_1(m)$: What are the location of principal species utilized for subsistence.

U. Subsistence resource locations.

47. Legal protection of vulnerable populations.

Q_1(n): What is the expected number and location of OCS related offshore and onshore structures?

A. Petroleum development scenarios.

Q_1(5): Given the answer to Q_1(4) above, what is the expected reduction in the gathering per unit effort of subsistence hunting and fishing as a result of reduced subsistence species populations?

X. Loss/Benefit analysis.

Noise Produced by OCS Activities

Q_1(6): What is the expected alteration to subsistence species populations or reduction in habitat space due to noise produced by OCS activities?

Q_1(o): What is the expected number and location of OCS related activities that produce noise?

A. Petroleum development scenarios.

Q_1(p): What is the expected behavioral response of vulnerable subsistence species to noise pollution?

53. Avoidance/attraction behavior of subsistence species to noise, including acclimation and disruption of normal behavior.

$Q_1(7)$: What is the expected loss in welfare to those existing on subsistence lifestyles as a result of displacement or reduction in wildlife resources?

X. Loss/benefit analysis.

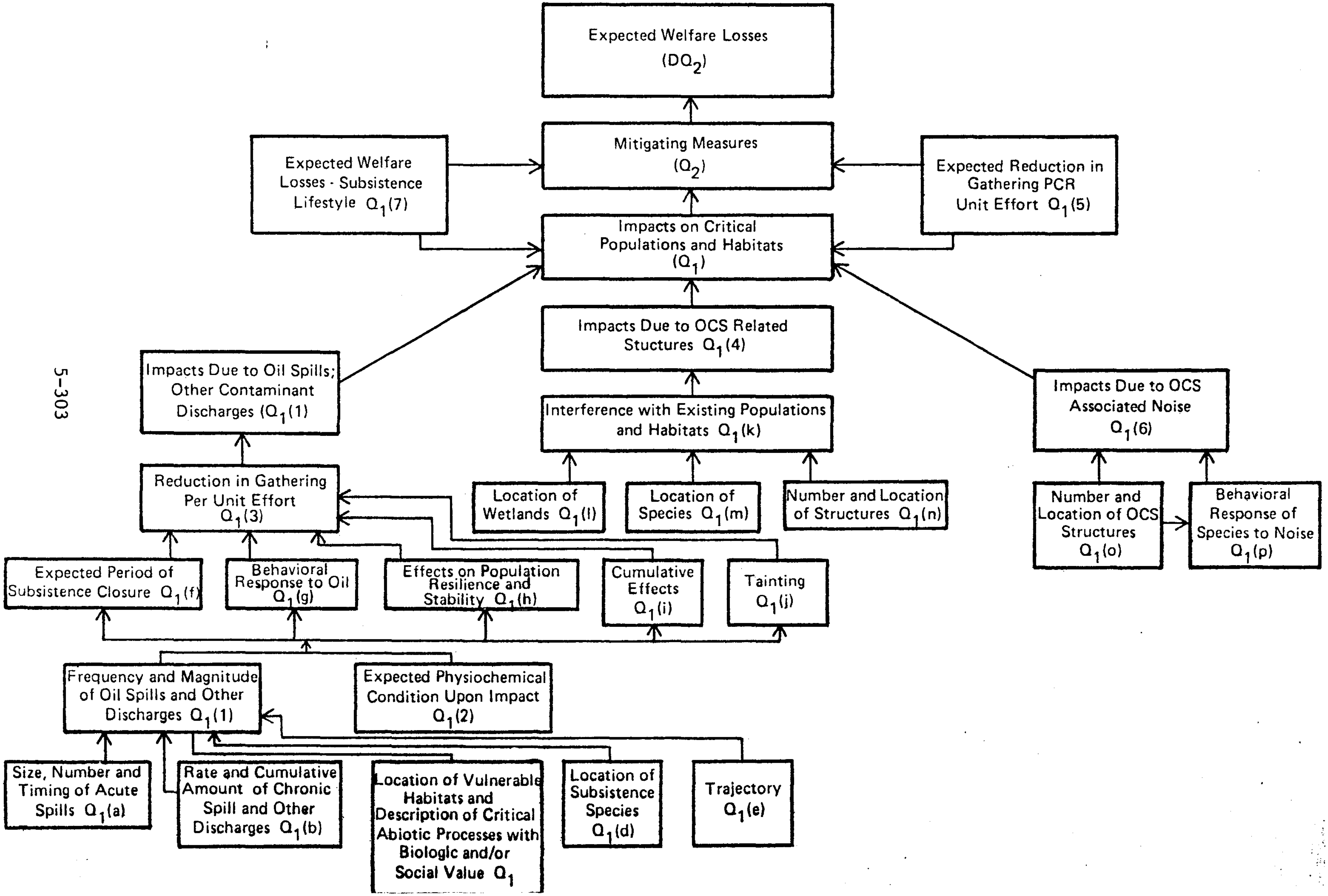
Mitigating Measures

Q_2: Given the expected reduction in critical populations and habitats of subsistence species, what investment in mitigating measures should be made through OCS operating orders, special stipulations, EPA regulations and guidelines, and tract deletions?

Y. Migitating measures analysis.

FIGURE 5-20

SUBSISTENCE LIFESTYLES*



5.3.5.2 RECREATION

$DQ_2(3)$: <u>What economic losses can be expected to be sustained by (1) the recreation industry, (2) recreationists, and (3) the regional economy as a result of the leasing proposal?</u>

and

<u>Given the answer to $DQ_2(2)$ above, what is the socially efficient level of investment in mitigating measures?</u>

<u>Significant Impact Producing Agents</u>

(1) Acute and chronic oil spills.
(2) Onshore OCS related structures.

Q_1: What economic losses are expected to be sustained by the recreation industry as a result of the above impact producing agents?

<u>Oil Spills and Onshore OCS Related Structures</u>

$Q_1(1)$: What is the frequency and magnitude of acute and chronic oil spills expected to impact high use recreational areas over the life of the field?

$Q_1(a)$: What is the expected size, number, and timing of acute oil spills over the life of the field?

B. Oil spill probability projection.

6. Development scenarios.

7. Production scenarios.

8. Statistical history of acute oil spills.

Q_1(b): What is the expected cumulative amount and timing of chronic oil spills over the life of the field?

B. Oil spill probability projection.

6. Development scenarios.

7. Production scenarios.

8. EPA discharge standards, and prediction of types, sources and frequency of chronic discharges.

30. Dispersion mechanisms of discharges (dispersion model); natural dispersal mechanisms and rates expected.

Q_1(c): What are the expected seasonal trajectories of acute and chronic oil spills?

6. Development scenarios.

7. Production scenarios.

27. Offshore and nearshore circulation patterns.

28. Offshore and nearshore wind fields.

30. Determination of expected natural dispersion mechanisms and rates.

32. Seasonal trajectory model for acute and chronic oil spills.

33. Oil slick dynamics.

Q_1(2): What is the number and type of onshore structures expected to be constructed in the proximity of recreational areas?

A. Petroleum development scenarios.

H. Location of recreational sites.

Q_1(3): Given the answers to Q_1(1) through Q_1(3) above, what is the expected reduction in industry revenues or economic rents resulting from a restriction of recreation use or the degraded quality of the activity?

Q_1(d): What is the expected reduction in beach use as a result of the degraded quality of the activity?

M. Community regional infrastructure analysis.

S. Recreation user preference.

Q_1(e): Will the expected reduction in the supply or quality of beaches result in the use of other recreation facilities?

M. Community regional infrastructure analysis.

S. Recreation user preference.

Q_1(f): To what extent will revenues expected from expenditures on other recreational activities offset the revenues foregone in the impacted activities?

M. Community regional infrastructure analysis.

R. Recreation industry analysis.

S. Recreation user preference.

Q_2: Given the expected reduction in the supply of recreational opportunities or quality changes, what is the expected loss in the welfare (consumer surplus) of recreationists (other than sport fishermen)?

M. Community regional infrastrucure analysis.

S. Recreation user preference.

Q_3: Given the economic losses expected to be sustained by the recreation industry and recreationists, what are the expected changes in regional income, employment, and population?*

M. Community regional infrastrucure analysis.

---

* The effects of these changes on the infrastructure and social fabric of the area are discussed in section 3.4.4.

N. Population analysis.

O. Employments analysis.

P. Economic analysis.

Mitigating Measures

Q_4: Given the type and magnitude of economic losses resulting from the impact producing agents, what level of investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, and tract deletions?

Y. Mitigating measures analysis.

Benefits

Q_5: What benefits to recreationists, the recreation industry, and the regional economy are expected as a result of the proposal?

$Q_5(1)$: Given the expected increase in economic rents to the recreation industry as a result of OCS related structures, what is the expected increase with respect to the regional economy?

X. Loss/benefit analysis.

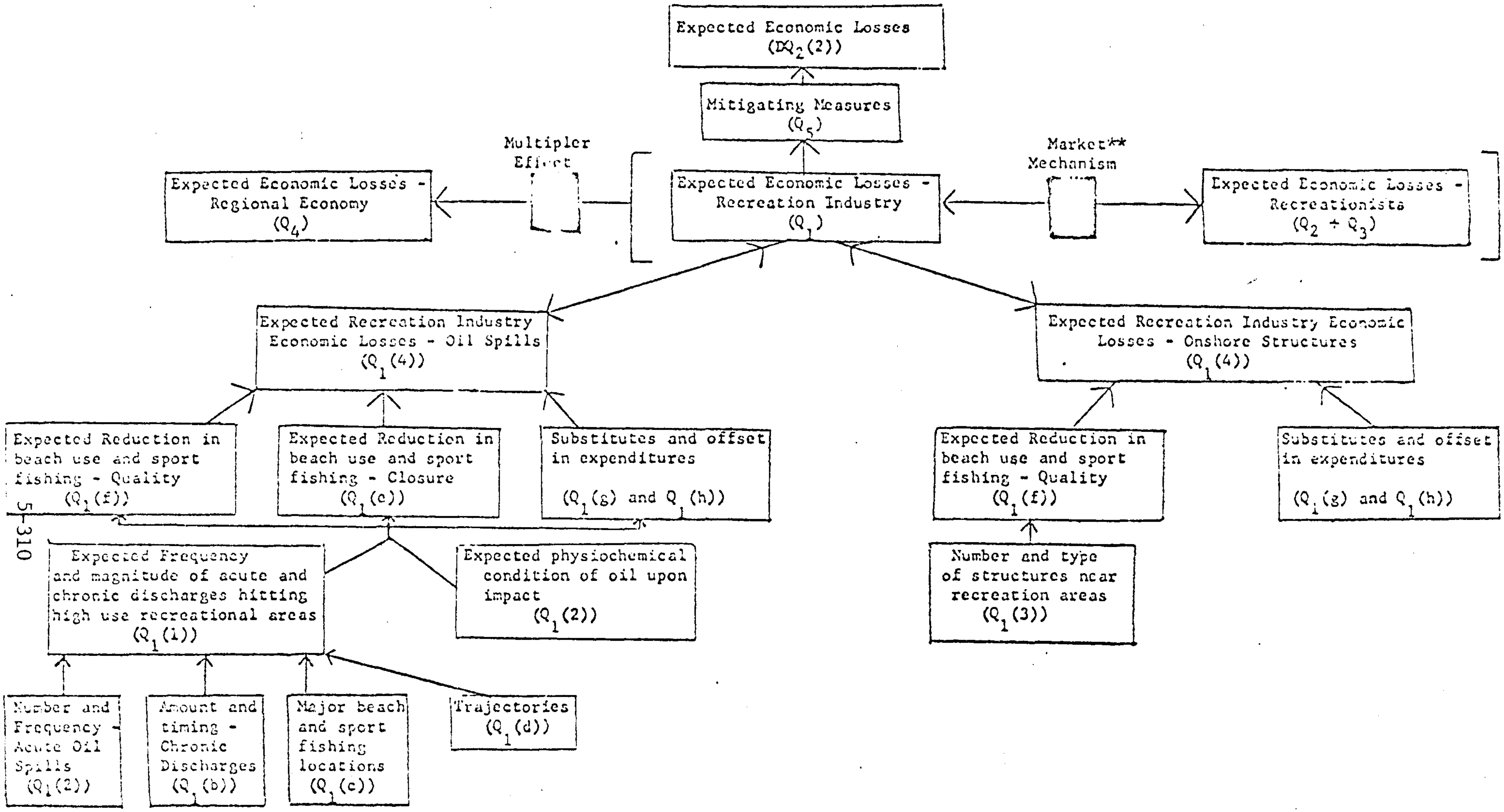
$Q_5(2)$: What reduction in the number of import tanker spills (chronic and major) hitting recreational areas can be expected as a result of the proposal?

C. Tanker spill probability.

$Q_5(3)$: What is the expected savings to recreationists, the recreation industry, and the regional economy as a result of this reduction in oil spills?

X. Loss/benefit analysis.

RECREATION*



** Economic losses will be apportioned between recreationists and the recreation industry depending on the elasticity of market demand as well as possible shifts in the supply and demand functions.

FIGURE 5-21

5.3.5.3 INFRASTRUCTURE AND SOCIAL CONFLICTS

$DQ_2(3)$: What welfare losses (consumers' surplus) can be expected due to infrastructure and social stresses generated by the leasing proposal?

and

Given the answer to $DQ_2(3)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impact Producing Agents

(1) Changes in economic activity

Q_1: What welfare losses are expected as a result of infrastructure stresses induced by changes in the coastal zone economic activity?

$Q_1(1)$: What is the expected increase in population over time as a result of the proposal?

A. Petroleum development scenarios.

N. Population analysis.

$Q_1(2)$: What is the expected increase in demand for social services such as schools, health care, housing, law enforcement, fire protection, water supply, energy supply, solid waste disposal, and sewage?

A. Petroleum development scenarios.

M. Community regional infrastructure

$Q_1(3)$: To what extent is short-term inflationary pressure expected to result from competition for marine services, land and capital?

A. Petroleum development scenarios.

M. Community regional infrastructure analysis.

P. Economic analysis.

Q_2: What welfare losses are expected as a result of social stresses* induced by changes in coastal zone economic activity?

P. Economic analysis.

$Q_2(1)$: What are the expected changes in the economic base of the area?

P. Economic analysis.

$Q_2(a)$: To what extent is competition for harbor space, marine services, land, and capital expected to change the economic base of the area?

A. Petroleum development scenarios.

---

* Changes in community values as well as social rank and role.

M. Community regional infrastructure analysis.

P. Economic analysis.

Q_2(b): To what extent will expected losses to the recreation industry affect the regional allocation of resources to this industry?

A. Petroleum development scenarios.

M. Community regional infrastructure analysis.

R. Recreation industry analysis.

Q_2(d): What are the expected changes in land use?

M. Community regional infrastructure analysis.

Q_2(d): What is the expected change in population composition as a result of changes in the economic base of the area?

N. Population analysis.

O. Employment analysis.

P. Economic analysis.

Q_2(2): Given the answer to Q_2(1) above, what is the expected effect on social stability (community values, social rank and role, standard of living)?

L. Sociocultural analysis.

Q_3: To what extent are non-socially disruptive changes in cultural patterns and values deemed a significant loss?

L. Sociocultural analysis.

Q_4: What is the expected change in unemployment or underemployment of labor and capital due to net change in economic activity induced by the leasing proposal?

O. Employment analysis.

P. Economic analysis.

Mitigating Measures

Q_5: Given the type and magnitude of economic losses resulting from the impact producing agents, what level of investment in mitigating measures should be made through OCS Operating Orders and the Coastal Energy Impact Program?

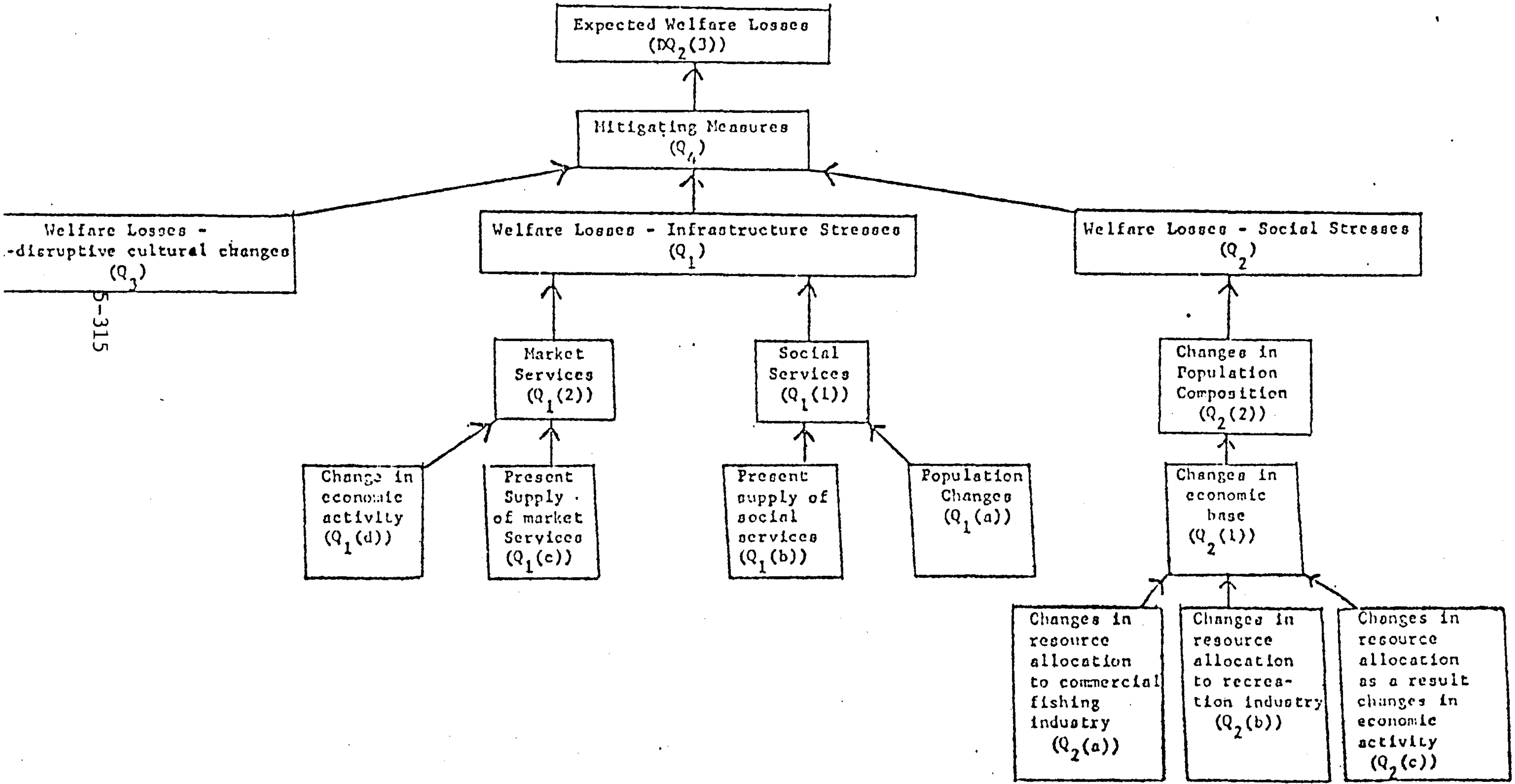
Y. Mitigating measures analysis.

Q_6: What is the expected reduction in economic losses as a result of the investment?

X. Loss/benefit analysis.

FIGURE 5-22

INFRASTRUCTURE AND SOCIAL CONFLICTS*



5.3.5.4 MARINE AND COASTAL ECOSYSTEMS

DQ_2(4A): What changes in the population and habitat of species are expected to interfere with ecological relationships as a result of the leasing proposals?

and

Given the answer to DQ_2(4A) above, what investment in mitigating measures is necessary to bring the risk of interference with ecological relationships to an acceptable level?

Significant Impact Producing Agents

(1) Oil spills and other OCS related discharges.

(2) Offshore and onshore OCS related surface and subsurface structures, associated debris and noise produced by the activities.

Q_1: What are the expected impacts on critical populations and habitats as a result of the above impact producing agents?

Acute and Chronic Discharges

Q_1(1): What is the frequency and magnitude of oil spills and other contaminant discharges which are expected to impact critical populations and habitats over the life of the field?

Q_1(a): What is the expected size, number, and timing of acute oil spills over the life of the field?

A. Petroleum development scenarios.

B. Oil spill probability projection.

7. Production scenarios.

Q_1(b): What is the expected rate and cumulative amount of small acute spills, chronic spills, and other contaminant discharges (e.g. formation waters, drilling muds, and additives)?

A. Petroleum development scenarios.

7. Production scenarios.

1. Hydrocarbon distribution.

8. Pollution scenarios including EPA and State discharge standards and prediction of types, sources and frequency of discharges.

30. Persistence and dispersal mechanisms and rates (persistence/dispersion model); natural persistence and dispersion mechanisms and rates.

37. Sea ice dynamics.

Q_1(c): What are the vulnerable habitats and abiotic processes (i.e., mechanisms of transport, transformation, and transfer which interrelate biologic communities with their habitat) that sustain populations with high biologic and social values (e.g., marine sanctuaries, national wildlife refuges, etc.)?

39. Distribution and abundance of species with high biological and/or social values.

41. Location of habitats and habitat dependencies of above species for breeding, resting, spawning, nursery, moulting, feeding, migration, and congregation.

42, 46. Key food web dependencies that sustain populations.

46. Distribution of ecological communities of unique/aesthetic importance and/or of high productivity.

46. Key abiotic processes sustaining populations of high biological and social values.

56. Vulnerability of habitats to OCS exploration development and productive activities and accidents.

59. Effects to key ecological processes to OCS exploration, development and production activities and accidents.

Q_1(d): What vulnerable populations have high biologic and social value (e.g. predator - prey relations,

<u>endangered</u> or <u>threatened</u> species, corals protected by Secretarial Order, etc.), and where are they located?

41. Distribution and abundance of species with high biological and/or social values.

46. Distribution of ecological communities of unique/aesthetic importance and/or highly productive.

Q_1(e): What are the expected trajectories of oil spills and other contaminant discharges?

6. Development scenarios.

7. Production scenarios.

27. Offshore and nearshore circulation.

28. Offshore and nearshore wind fields.

30. Natural dispersion mechanisms and rates expected.

32. Seasonal trajectory models for oil spills and other discharges.

33. Oil slick dynamics.

38. Oil/ice interaction.

36. Sea ice characteristics.

37. Sea ice dynamics.

Q_1(2): What is the expected physiochemical condition of the oil at the time it impacts a vulnerable population or habitat?

5. Composition of Alaska crude oil.

32. Seasonal acute oil spill trajectories.

33. Determination of oil slick dynamics, including weathering.

39. Locations of vulnerable populations.

41. Locations of critical habitats.

Q_1(3): Given the answers to Q_1(1) and Q_1(2) above, are the impacts from OCS oil spills and other contaminant discharges expected to interfere significantly with existing critical populations and habitats?

Q_1(f): What is the expected behavioral response of vulnerable species to the presence of oil?

48. Avoidance/attraction behaviors of vulnerable species to oil, including disruption of normal behavioral activities by oil.

Q_1(g): What is the expected effect on the overall resilience and stability of vulnerable populations in terms of growth, survival, and reproduction?

1, 2. Hydrocarbon distribution.

3. Toxic metals distribution.

8. Pollution scenarios.

32. Oil spill trajectories.

39. Distribution and abundance of vulnerable species.

40. Life history and population parameters of vulnerable species.

50. Sublethal effects of oil on vulnerable species.

Q_1(h): Is the presence of oil expected to destroy or degrade vulnerable habitats so as to preclude their use?

8. Pollution scenarios.

32. Oil spill trajectories.

41. Habitat dependencies of vulnerable species.

41. Locations of critical habitats.

55. Environmental recovery rates of ecosystems.

Q_1(i): What are the expected significant cumulative effects (e.g., biomagnification of contaminants, threshold physiologic sensitivities, etc.) on existing populations and habitats from continuous exposure to low level contaminant discharges?

8. Pollution scenarios.

48. Sublethal effects of oil.

49. Toxicity of oil.

51. Combined pollutant effects.

52. Toxicity of muds and cuttings.

54. Tainting of commercial species and bioaccumulation.

Offshore and Onshore Surface and Subsurface Structures Related Debris and Noise Produced by OCS Activities.

Q_1(4): What is the expected alteration to critical populations or reduction in habitat space due to OCS related structures and associated noise.

Q_1(j): What is the expected behavioral response of vulnerable species to noise pollution?

53. Avoidance/attraction behaviors of vulnerable species to noise, including acclimation and noise disruption of normal behavioral activities.

Q_1(k): What is the expected number and location of OCS related offshore and onshore structures?

6. Development scenarios.

7. Production scenarios.

Q_1(l): Are OCS offshore and onshore related structures and associated construction activities (e.g., causeways, gravel islands, pipeline burial, and dredged material disposal) expected to interfere significantly with existing populations and habitats?

9. OCS activities/impacts scenarios.

39. Distribution and abundance of vulnerable species.

41. Locations of critical habitats.

58. Effects of OCS structures on vulnerable populations and critical habitats.

59. Effects of OCS activities on vulnerable populations and critical habitats.

Q_2: What is the expected loss in welfare (consumer surplus) resulting from aesthetic degradation?*

$Q_2(1)$: What is the expected loss in welfare to property owners in the area resulting from visual intrusions or debris washed ashore?

I. Visual impact evaluation.

M. Community/regional infrastrucutre analysis.

P. Economic analysis.

$Q_2(2)$: As a result of oil spills or other impact producing agents which are expected to cause a significant reduction in the populations or habitat of species in the area, what is the expected loss in welfare to those who place significant value on the intrinsic worth of wildlife, marine species, and their habitats?

S. Recreation user preference.

T. Fisheries user preference.

---

* Recreation losses due to aesthetic degradation is discussed in section 4.2.2.

Mitigating Measures

Q_3: Given the expected reduction in critical populations and habitats of species, what investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, EPA Regulations and Guidelines, and tract deletions.

Y. Mitigating measures analysis.

Q_4: To what extent will this investment reduce the risk of interference with ecological relationships?

Y. Mitigating measures analysis.

X. Loss/benefit analysis.

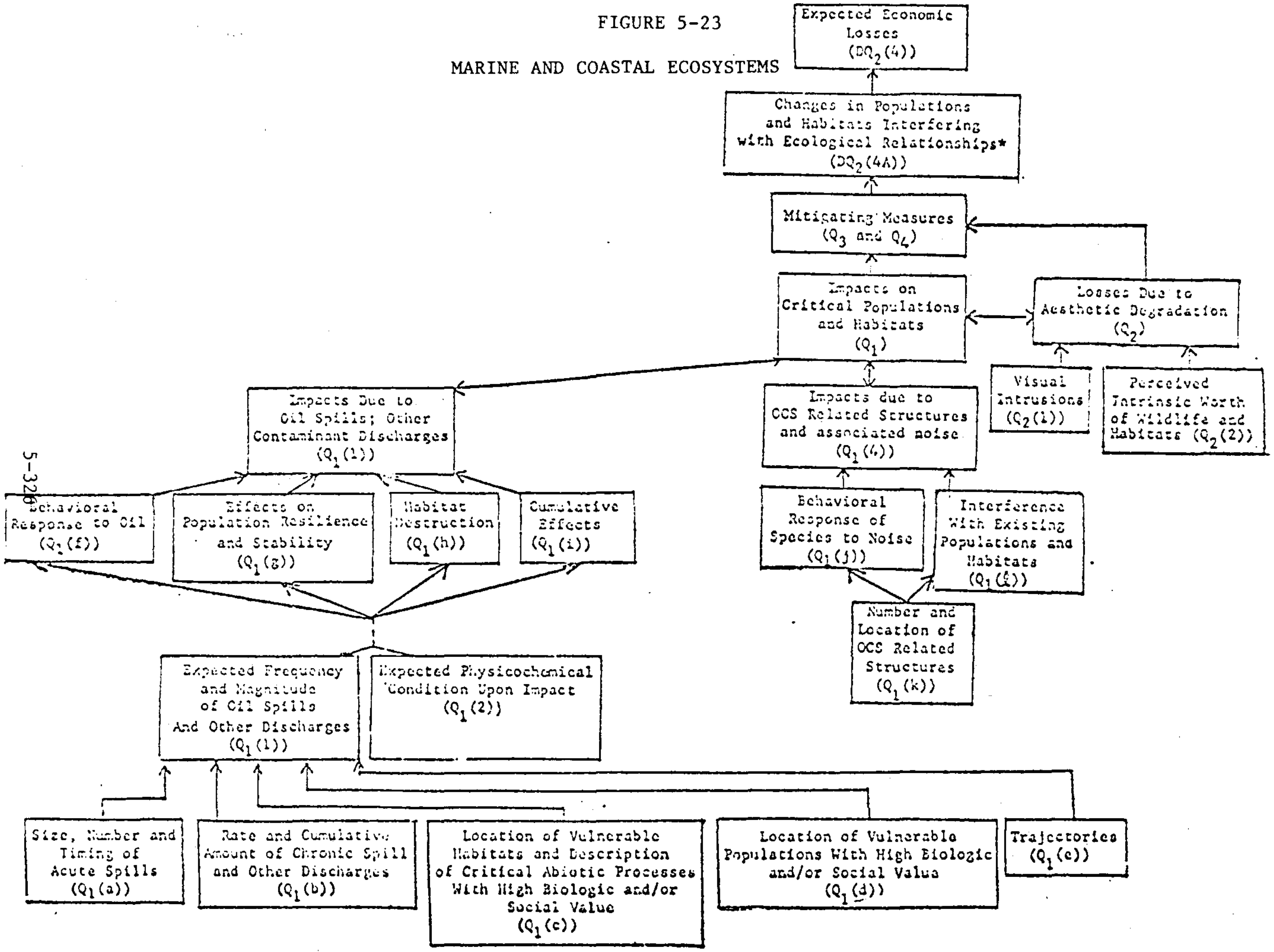
Benefits

Q_5: What reduction in the number of import tanker spills hitting critical populations and habitats can be expected as a result of the proposal?

C. Tanker spill probability.

FIGURE 5-23

MARINE AND COASTAL ECOSYSTEMS



* Quantification of possible losses due to these interferences in dollar terms is presently impossible. Thus, the decisionmaker's question is converted to $DQ_2(4A)$.

5.3.5.5 AIR AND WATER QUALITY

$DQ_2(5)$: <u>What regional welfare losses (consumer surplus) due to degradation of air and water quality can be expected as a result of the leasing proposal?</u>

and

<u>Given the answer to $DQ_2(5)$ above, what is the socially efficient level of investment in mitigating measures?</u>

<u>Significant Impacts Producing Agents</u>

(1) Onshore and Offshore Emissions
(2) Onshore effluents

Q_1: What losses in welfare (consumer surplus) can be expected as a result of onshore air quality degradation?

$Q_1(1)$: What is the expected cumulative level of emissions due to gas processing plants, oil transfer operations and offshore emissions?

4. Present sources and levels of emissions.

6. Development scenarios.

7. Production scenarios.

8. Expected types and concentrations of emissions.

31. Persistence and dispersal mechanisms and rates.

$Q_1(2)$: What is the present level of emissions which adversely affect air quality?

4. Types, concentration, and sources of adverse emissions.

31. Persistence and dispersal mechanisms and rates of atmospheric emissions.

$Q_1(3)$: To what extent will these onshore emissions violate emission standards?

4. Present types and levels of adverse emissions.

6. Development scenarios.

7. Production scenarios.

8. Expected types, concentrations, and sources of emissions.

31. Expected persistence and dispersal mechanisms and rates.

$Q_1(4)$: If standards are not violated, will the expected increase in the level of emissions still cause a significant welfare loss?

S. Public attitudes, values, and aesthetics.

4. Present types and levels of emissions.

8. Expected types and levels of emissions.

31. Persistence and dispersion mechanisms and rates of emissions.

58. Effects of OCS structures and emissions on visibility and air odors.

$Q_1(5)$: Are any emissions which are not covered by standards expected to result in a significant welfare loss?

4. Present types and levels of non-regulated emissions.

5. Public attitudes, values and aesthetics.

8. Expected types and levels of non-regulated emissions.

31. Dispersion mechanisms and rates.

58. Effects of expected non-regulated emissions on smell and visibility.

$Q_1(6)$: What temporary loss in welfare can be expected to result from short-term increase in emissions caused by adverse meteorological conditions?

22. Types, frequency of occurrence and magnitude of adverse atmospherical effects.

Q_2: What losses in welfare (consumer surplus) can be expected as a result of onshore water quality degradation?

X. Loss/benefit analysis.

$Q_2(1)$: What is the expected cumulative level of effluents due to transportation residuals and industrial and residental wastes?

A. Location of freshwater supplies.

M. Present use of freshwater by industry, population, onshore biota.

1, 2, 3, 8. Present types, concentrations, and sources of effluents, and expected increases with OCS development.

30. Dispersion mechanisms and rates.

$Q_2(2)$: What is the present level of effluents which adversely affect water quality?

1, 2, 3, 8. Determination of types, sources, and concentrations of adverse effluents.

30. Dispersal mechanisms and rates.

$Q_2(3)$: To what extent will these effluents violate discharge standards?

4. Adverse effluents.

6. Development scenarios.

7. Production scenarios.

1, 2, 3, 8. Expected types and concentration of adverse effluents; discharge standards.

30. Dispersal mechanisms and rates.

$Q_2(4)$: If standards are not violated, will the expected increase in the level of effluents still cause a significant welfare loss?

S. Expected public attitudes, values and aesthetics.

1, 2, 3, 8. Expected types and levels of effluents.

30. Expected persistence and dispersion mechanisms and rates.

58. Effects of effluents on water clarity and taste.

$Q_2(5)$: Are any effluents which are not covered by standards expected to result in a significant welfare loss?

S. Expected public attitudes, values and aesthetics.

3, 8. Expected types and levels of non-regulated effluents.

30. Expected persistence and dispersal mechanisms and rates.

58. Effects of expected non-regulated effluents on water clarity and taste.

$Q_2(6)$: What temporary loss in welfare can be expected to result from a short-term increase in effluents caused by construction of onshore facilities?

59. Effects of construction related effluents.

9. Frequency, source, and types of construction related effluents.

Mitigating Measures

Q_3: Given the extent to which emission standards are expected to be violated, what investment in mitigating measures should be made through OCS Operating Orders, and EPA Regulations and Guidelines to meet these standards?

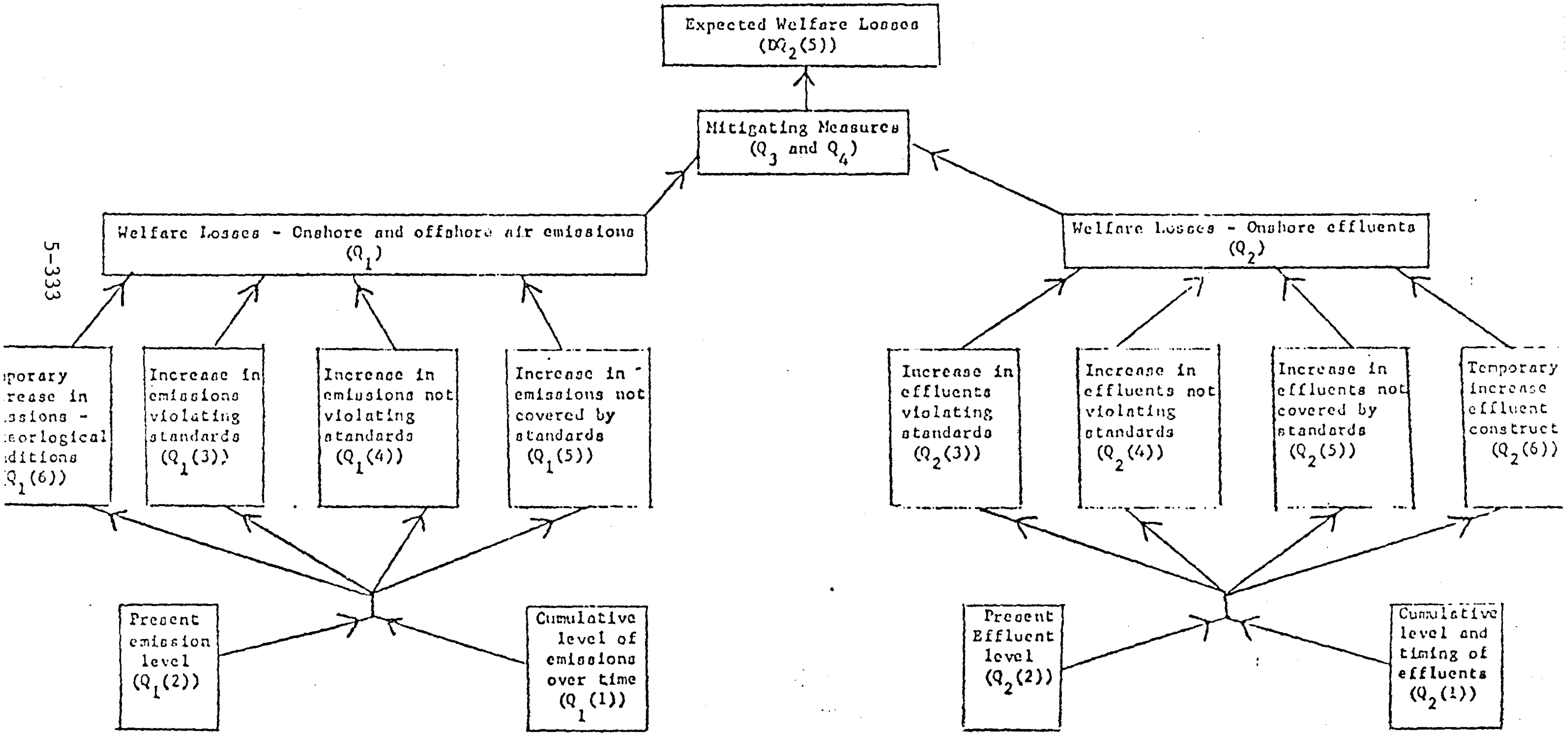
Y. Mitigating measures analysis.

Q_4: If standards are not violated and emissions are still expected cause a significant welfare loss, what investment in mitigating measures should be made?

X. Loss/benefit analysis.

FIGURE 5-24

AIR AND WATER QUALITY*



5.3.5.6 ARCHAEOLOGICAL AND CULTURAL RESOURCES

$DQ_2(6)$: What welfare losses due to damage of archaeological and historic resources can be expected as a result of the leasing proposal?

and

Given the answer to $DQ_2(6)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impacts Producing Agents

- Acute oil spills and significant well drilling related discharges (e.g., cuttings and drilling muds).
- Placement of OCS related structures, both offshore and onshore.

Acute Spills and Significant Discharges

Q_1: What welfare losses are expected as a result of archaeological and historic resources being damaged or destroyed by oil spills?

$Q_1(1)$: What is the frequency and level of acute spills and significant discharges over the life of the field?

$Q_1(a)$: What is the expected size, number, and timing of these discharges over the life of the field?

B. Oil spill probability projection.

6. Resource development scenarios.

7. Production scenarios.

Q_1(b): What are the locations of such resources (e.g., shipwrecks and human habitation sites and relics)?

J. Submerged archaeological locational analysis.

K. Terrestrial archaeological analysis.

35. Mapping survey of seafloor and onshore topography.

35. Mapping survey of onshore areas.

Q_1(c): What are the expected trajectories of such discharges?

6. Development scenarios.

7. Production scenarios.

27. Offshore and nearshore circulation.

28. Offshore and nearshore winds.

30. Natural dispersion mechanisms and rates.

32. Seasonal trajectory model for acute discharge.

33. Oil slick dynamics.

Q_1(2): Given the answer to Q_1(1) above, what is the expected damage to archaeological and historic resources?

V. Oil impacts on archaeological resources.

$Q_1(3)$: What archaeological and historic resources with historic value are protected under provisions of the Antiquities Act?

W. Antiquities Act Impact.

OCS Related Structures (i.e., Offshore and Onshore)

Q_2: What welfare losses are expected as a result of archaeological and historic resources being damaged or destroyed by the placement of OCS structures?

$Q_2(1)$: What is the expected number and location of onshore and offshore OCS structures?

A. Petroleum development scenarios.

7. Production scenarios.

$Q_2(2)$: What are the expected locations of such resources (e.g., shipwrecks and human habitation sites and relics)?

J. Submerged archaeological locational analysis.

35. Mapping survey of seafloor and onshore topography.

$Q_2(3)$: Given the answers to $Q_4(1)$ and $Q_4(2)$ above, what is the expected damage to archeological and historic resources?

A. Petroleum development scenarios.

J. Submerged archaeological locational analysis.

K. Terrestrial areas local analysis.

K. Terrestrial archeological locational analysis.

V. Oil impact on archaeological resources.

Q_2(4): What archeological and historic resources are protected under provisions of the Antiquities Act?

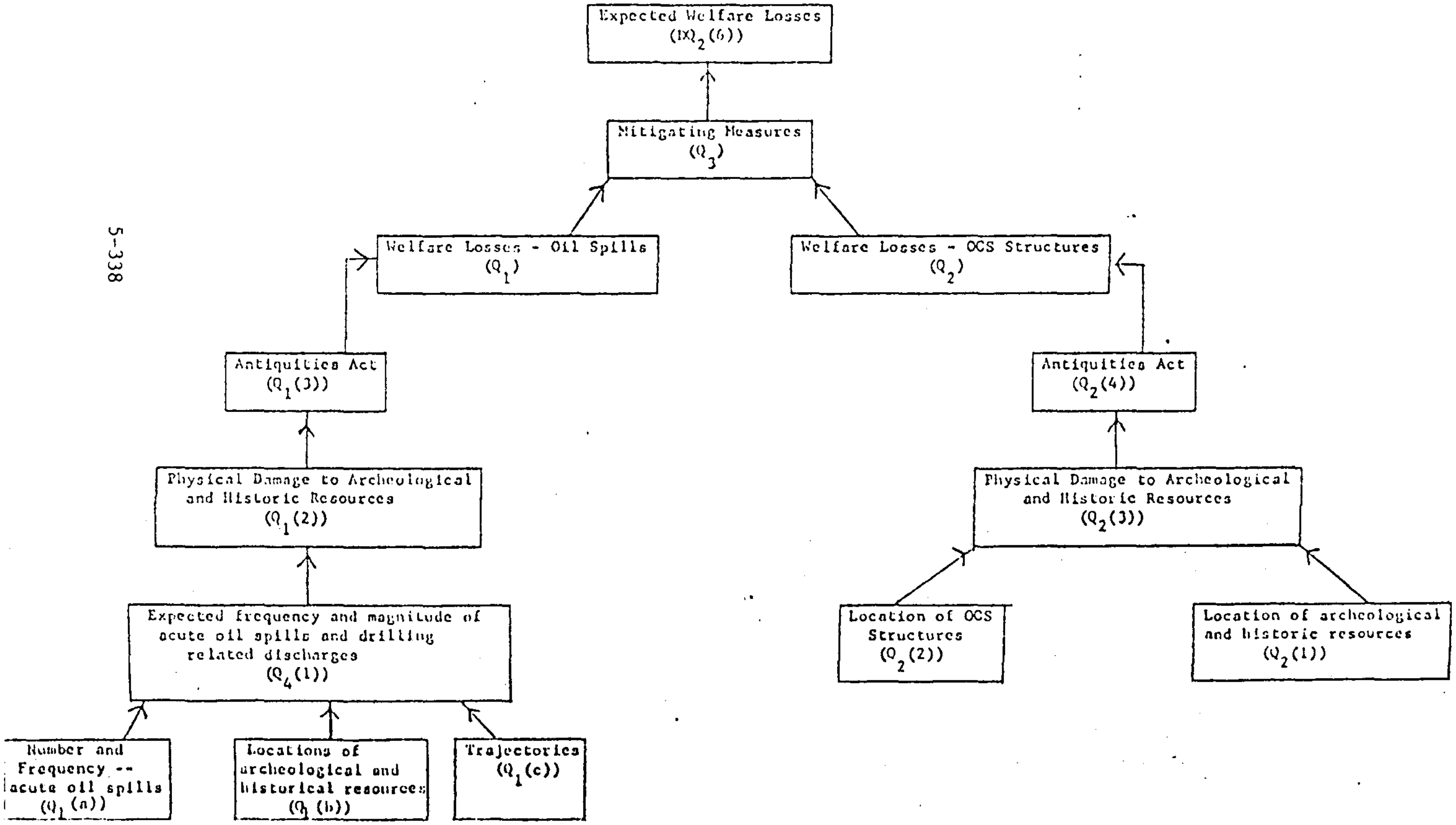
W. Antiquity impacts.

Mitigating Measures

Q_5: Given the expected damage to archeological and historic resources, what level of investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, and tract deletions?

FIGURE 5-25

ARCHAEOLOGICAL AND HISTORIC RESOURCES*



5.3.5.7 SHIPPING CONFLICTS

$DQ_2(7)$: What economic losses are expected to be sustained by the shipping industry as a result of the leasing proposal?

and

Given the answer to $DQ_2(7)$ above, what is the socially efficient level of investment in mitigating measures?

Significant Impacts Producing Agents

- OCS offshore surface structures
- Acute oil spills
- OCS related vessel traffic

Q_1: What economic losses can be expected as a result of collisions between ships and offshore structures?

$Q_1(1)$: What is the expected number and location of surface structures?

A. Petroleum development scenarios.

$Q_1(2)$: What is the intensity of shipping in the area?

G. Shipping activity.

$Q_1(3)$: Where are the locations of shipping lanes (if any)?

G. Shipping activity.

$Q_1(4)$: What is the historical frequency and magnitude of vessel damage in other areas?

G. Shipping activity.

$Q_1(5)$: Given the answers to $Q_1(1)$ and $Q_1(4)$ above, what is the expected physical damage as a result of offshore structures?

A. Petroleum development scenarios.

G. Shipping activity.

Q_2: What economic losses can be expected as a result of acute oil spills?

$Q_2(1)$: What is the expected size, number and timing of acute oil spills over the life of the field?

A. Petroleum development scenarios.

C. Tanker spill probability.

$Q_2(2)$: What is the intensity of shipping in the area?

G. Shipping activity.

$Q_2(3)$: Where are the locations of shipping lanes (if any)?

G. Shipping activity.

$Q_2(4)$: Given the answer to $Q_1(1)$ - $Q_1(3)$ above, what is the expected damage to hulls soiled by passage through oil spills?

A. Petroleum development scenarios.

B. Oil spill probability.

G. Shipping activity.

$Q_2(5)$: Given the answer to $Q_1(1)$ to $Q_1(3)$ above, what is the expected damage to boiler condenser systems attributable to contaminated feedwater?

B. Oil spill probability.

G. Shipping activity.

Q_3: What economic losses can be expected as a result of OCS related vessel traffic?

$Q_3(1)$: What is the expected size, number and timing of OCS related vessels?

A. Petroleum development scenarios.

G. Shipping activity.

$Q_3(2)$: What is the intensity of shipping in the area?

G. Shipping activity.

$Q_3(3)$: Where are the locations of shipping lanes (if any)?

G. Shipping activity.

$Q_3(4)$: What is the historical frequency and magnitude of damage in other areas?

G. Shipping activity.

$Q_3(5)$: Given the answer to $Q_3(1)$ - $Q_3(4)$ above, what is the expected physical damage as a result of OCS related vessel traffic?

G. Shipping activity.

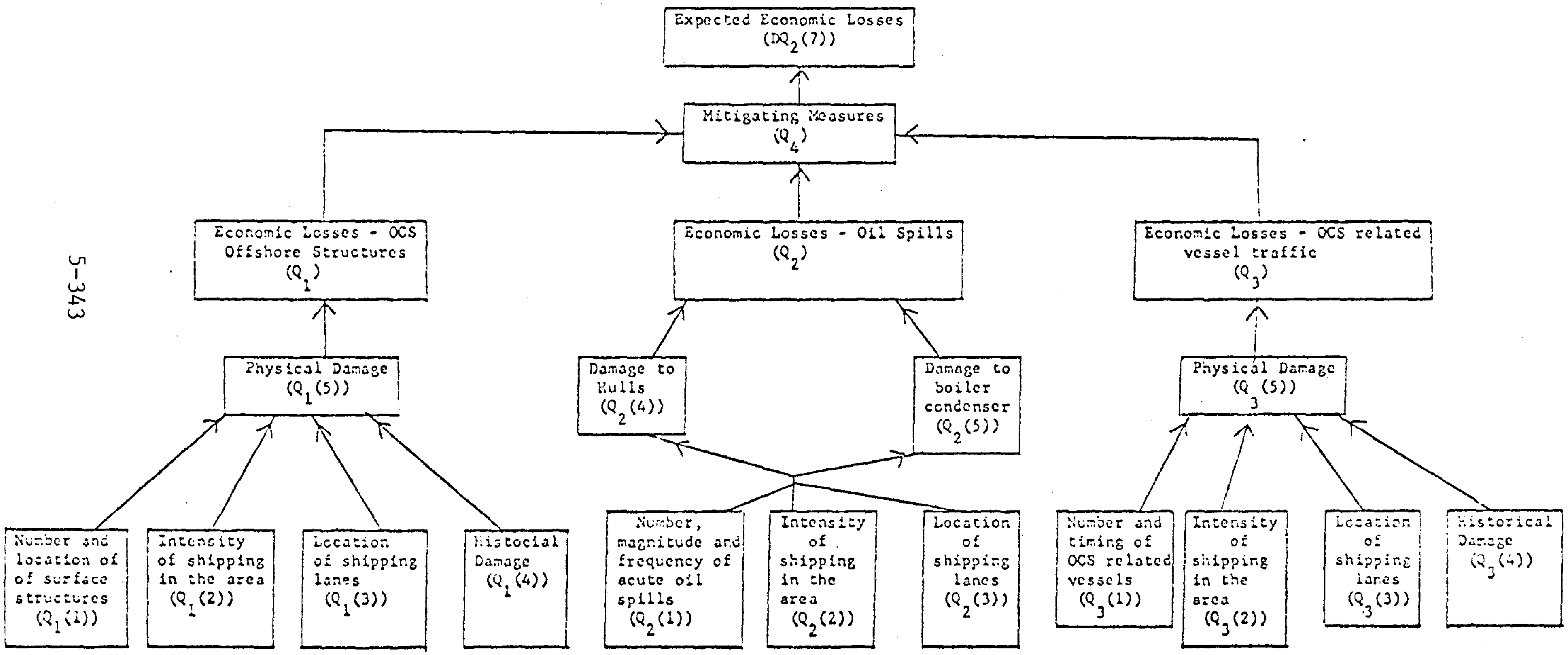
Mitigating Measures

Q_4: Given the type and magnitude of economic losses expected to result from the impact producing agents, what level of investment in mitigating measures should be made through OCS Operating Orders, Special Stipulations, EPA Regulations and Guidelines, and tract deletions?

Y. Mitigating measure analysis.

FIGURE 5-26

SHIPPING CONFLICTS*



5.3.5.8 ENVIRONMENTAL HAZARDS

$DQ_2(8)$: What natural environmental hazards are expected to interfere with OCS exploration and development activities as a result of the leasing proposal?

and

Given the answer to $DQ_2(8)$ above, what investment in mitigating measures is necessary to bring the risk of interference with OCS exploration and development to an acceptable level?

Significant Impact Producing Agents

(1) Environmental hazards (geologic, meteorologic, and oceanographic) to OCS related structures and facilities

(2) Biotic behavioral response to OCS related activities

Q_1: What are the environmental hazards both to OCS related activities and induced by OCS activities?

$Q_1(1)$: What types of geologic, oceanographic, and meteorological hazards are likely to be encountered in the area?

12. Surface and near-surface faulting.

13. Seafloor instability.

14. Erosion and deposition.

15. Permafrost.

19. Stratigraphic hazards.

20. Sea ice stress-strain relationships.

21. Sea ice forces.

22. Extreme oceanographic and meteorological events (e.g. winds, waves, tidal currents).

23. Storm surges.

25. Icing of structures.

26. Visibility.

Q_1(2): Where are these hazards most prevalent?

12. Locations of surface and near-surface faults.

14. Locations of large scale bedforms.

13. Locations of existing and potential slumps.

15. Distribution, depth, and engineering characteristics of subsea permafrost.

16. Ice gouge density, trends, gouge depths and recurrence rates.

17. Distributions and depth of overpressured sediment.

18. Subsidence potentials of sediment strata.

19. Locations and stratigraphy of natural oil seeps and reservoirs.

20. Location and frequency of different types of sea ice.

22. Distribution and frequency of extreme events of winds, waves, and tidal currents.

24. Distribution and frequency of storm surges.

25. Distribution and frequency of extreme ice storms and structure icing.

26. Distribution and frequency of low visibility due to extreme fog, haze, and precipitation.

Q_1(3): What is the magnitude and frequency of physical environmental hazards?

12. Correlation of faults with earthquake events.

13. Stability of sediments in potential slump areas.

14. Rates of burial and scour in locations undergoing significant erosions and depositions.

14. Rates and direction of large scale bedform movements.

20. Frequency and magnitude of ice loads on OCS structures.

23. Historical shoreline erosions and damage assessment due to Tsunamis.

21. Frequency and magnitude of ice forces from ridging, ice shove, and fast ice displacement vectors on OCS related structures.

$Q_1(4)$: Which OCS related structures and activities are vulnerable to these hazards?

60. Vulnerability of OCS related structures and facilities to environmental hazards.

$Q_1(5)$: Are there any environmental hazards which are expected to be induced or worsened by OCS related activities (e.g., subsidence, aquifer contamination)?

18. Subsidence potential of sediment adjacent to and surrounding resource reservoirs.

Q_2: What types of biotic interference presents a hazard to OCS related activities?

53. Effects of noise on birds.

59. Interference of birds to low flying aircraft.

Q3. What is the effectiveness of various types of mitigating measures in protecting against catastrophies caused by environmental hazards?

$Q_3(1)$: Given the types and magnitudes of existing severity of environmental hazards in the area, what level of investment in mitigating measures should be made through OCS Operating Orders, Stipulations, EPA Regulations and Guidelines, and tract deletions?

Y. Mitigating measures analysis.

$Q_3(2)$: To what extent will this investment reduce the risk of environmental hazards?

X. Loss/benefit analysis.

FIGURE 5-27

ENVIRONMENTAL HAZARDS*

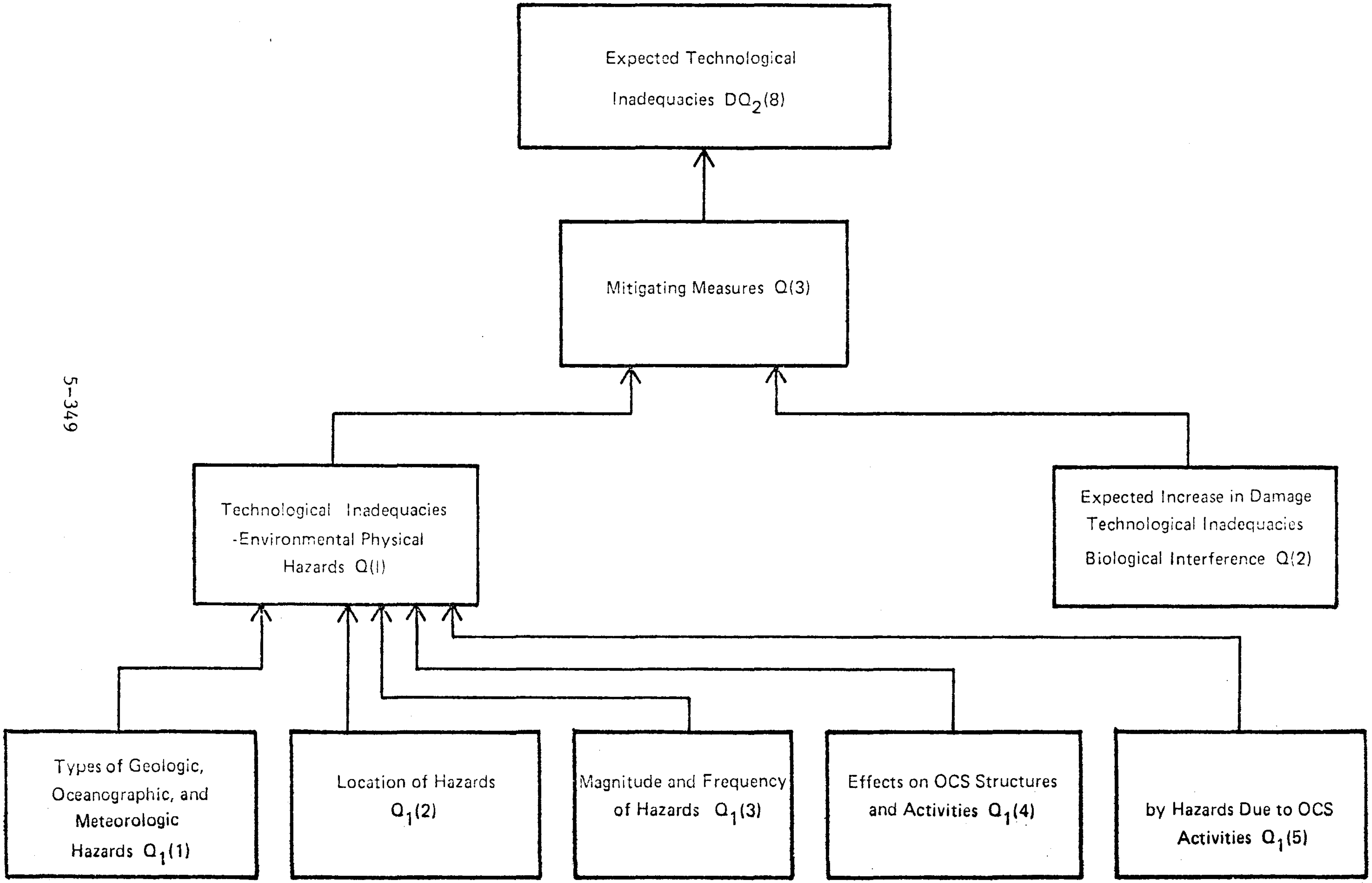


TABLE 5-11

TYPES OF STUDIES IDENTIFIED FOR ARCTIC REGION OF THE ALASKA OUTER CONTINENTAL SHELF

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
CONTAMINANT RECONNAISSANCE					
1. Distribution and concentrations of hydrocarbons - in water column - in sediments - in marine organisms - pelagic and beach tar	CF, AWQ SL, MCE	Lease Area	EIS	18	A1

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
2. Distribution and concentrations of low molecular weight hydrocarbons in water column	AWQ, SL, CF, MCE	Lease Area	EIS	18	A2
3. Distribution and concentrations of toxic metals - in water column - in sediment - in marine organisms	AWQ, SL CF, MCE	Lease Area	EIS	12	A3
4. Distribution and concentrations of atmospheric pollutants - over land - over sea	AWQ	Lease Area	EIS	18	Not Addressed

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
5. Composition of Alaska crude oils - physical characteristics - chemical composition	AWQ, SL, CF, R, MCE	Non-Site	EIS	18	Not Addressed
OCS DEVELOPMENT ACTIVITIES AND IMPACTS					B
6. Development Scenarios - Oil and Gas Resource Estimates - OCS Shipping Activity - Aircraft Traffic - Offshore Structures - Onshore Strucutres - Operating Methods - Available Techology	CF, R, MCE, AWQ, ACR, SL	Lease Area	EIS	24	B1

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- OCS Activity Conflicts					
- Space use conflicts					
- Resource use conflicts					
- Shoreline modification					
7. Production Scenarios	CF, R, MCE, AWQ, ACR, SL	Lease Area	DIS	12	B1
8. Pollution Scenarios - acute oil spills - chronic oil spills	CF, R, MCE, AWQ, ACR, SL	Lease Area	EIS	12	B2

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- chronic discharge of other contaminants					
- atmosphere emissions					
- EPA, State, local discharge regulations					
9. OCS Activities/Impacts Scenarios	CF, R, SL, MCE, AWQ	Lease Area	EIS	12	B3
- offshore structures space use conflicts					
- onshore structures space use conflicts resource use conflicts change to shoreline					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- pipelines					
- noise					
- contaminants					
- traffic					
ENVIRONMENTAL HAZARDS					C
12. Surface and Near Surface Faulting	EIT	Lease Area	TS	24	C2
- description and locations					
- relationship to seismic activity					
- relative ages					
- magnitude and frequency of strong bottom movements					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
13. Seafloor Instability - description of types and extent of potential slumps, other unstable sediment masses - relative instability risk classification - sediment cross section analysis	EIT	Lease Area	TS	24	C3
14. Erosion and Deposition - location, description, and rates of burial and scour	EIT	Lease Area	EIS	24	C4

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- large scale bedform movements					
- effects of structures on erosion rates					
15. Subsea Permafrost	EIT	Lease Area	EIS	24	C6
- distribution and depth					
- engineering of permafrost characteristics					
- index of strength properties					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
16. Ice Gouging - density - trends - maximum gouge depths - recurrence rates - predictive analysis from ice data	EIT	Lease Area	EIS	24	C7
17. Overpressured Sediments - distribution and depth - pore pressures	EIT	Lease Area	TS	24	C8
18. Subsidence Potentials - location and distribution strategraphy	EIT	Lease Area	EIS	24	Not Addressed

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
19. Stratigraphic Unconformities - locations and distribution of potential reservoir channels through surface fault zones - locations and distributions of natural seeps - stratigraphy of natural seeps	EIT	Lease Area	EIS	24	Not Addressed

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
20. Sea Ice Stress-Strain Relationships - frequency and magnitude of ice loads on structures - seep properties - strength properties	EIT	Lease Area Region	EIS	24	C9
21. Sea Ice Size-Force Relationships - movement forces from ridging and ice shove, - fast ice displacement vectors	EIT	Lease Area	EIS	24	C9

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- mechanisms of force exertion					
- extreme event analysis					
22. Extreme Events of Wind, Waves, Currents	AWQ, EIT	Lease Area	EIS	12	C10
- distribution and frequency of extremes					
- adverse atmospheric conditions					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
24. Storm Surges - distribution, frequency magnitude - extent of shoreline inundation - causal prediction	EIT	Lease Area	EIS	12	C10
25. Ice Storms and Structure Icing - extremes of temperature and precipitation - frequency of distribution, magnitude	EIT	Lease Area	EIS	12	C10

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
26. Visibility - frequency, extremes of fog, haze, precipitation	EIT	Lease Area	EIS	12	C10
TRANSPORT					
27. Currents and Tide - Lagrangian movements - Eulerian movements - Tidal components - Wind forcing	CF, R, MCE, ACR, SL	Lease Area	TS	24	D1

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
28. Wind Fields - Directions, strengths, frequency - Variations	CF, R, MCE, ACR, SL	Lease Area	TS	24	D1
29. Residence Times and Flushing Characteristics - basins, bays, inlets, both offshore and nearshore	CF, R, MCE, AWQ, SL	Lease Area	EIS	12	Not Addressed

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
30. Dispersion and Mixing of Contaminants - point source discharge - non-point discharge - downstream concentrations - concentration fields - distribution and settling rates of particulates	CF, R, MCE, AWQ ACR, SL	Lease Area	EIS	12	D3
31. Dispersion and Mixing of Atmospheric Pollutants	AWQ	Lease Area	EIS	12	

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
32. Trajectories of Oil Spills - drift card information - centroid trajectories conservation of properties - dynamic trajectories, non-conservative, plume behavoir and weathering	ACR, SL, CF, R, MCE	Lease Area	TS	12	D3
33. Oil Slick Dynamics - plume behavior under shear, spreading, Coriolis force	CF, R, MCE, SL, ACR	Non-Site	EIS	24-36	D3

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- weathering rates and changes in composition from - evaporation - solution - emulsification - diffusion - photochemical oxidation - microbial degradation					
34. Bottom Sediment Characteristics - composition, size distribution - areal distribution - consolidation - stratigraphy	CF, MCE, ACR, EIT, SL	Lease Area	EIS	18	D4

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
35. Basin Morphology - seafloor topography - morphology and morphometry of basins, inlets, bays	CF, R, MCE, AWQ, ACR, EIT, SL	Lease Area	TS	12	D7
36. Sea Ice Characteristics - types, sizes, geometrics - frequency and magnitude of occurrence - distribution of major features, especially of hazardous conditions - under ice morphology	SL, MCE	Lease Area	TS	24	D8
37. Sea Ice Dynamics - movements and trajectories - deformation, ridging dynamics - lead formation dynamics	SL, MCE	Lease Area	EIS	24	D9

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
38. Oil/Ice Interactions - incorporation and release of oil from ice - bulk transport	CF, MCE, AWQ, SL	Region	EIS	24	D10
RECEPTORS					
39. Identification of Vulnerable Populations - distribution, abundance of - commercial/subsistence/sport species - rare endangered species - unique/aesthetic - key ecological species	CF, R, MCE, SL	Lease Area	TS	24	E, 1, 3, 5, 7

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
40. Life History Analyses - population parameters of commercial/subsistence/sport species	CF, R, MCE, SL	Region	EIS	12	
41. Identification and Location of Critical Habitats and Habitat Dependencies of Vulnerable Populations for: - feeding areas - breeding, nesting, molting, nursing areas - schooling or migration routes of vulnerable species	CF, R, MCE, SL		TS EIS	24	

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
42. Food Web Dependencies - key prey items - availability and selectivity - variability with season, lifestyle - energetics estimates	SL, MCE, CF	Lease Area	EIS	24	E2, 4, 6
44. Wetland Ecosystems - types, characteristics, distribution - habitat dependencies - vulnerability indices from OCS activities	CF, MCE, SL	Lease Area	TS (shore) EIS (land)	24	E8

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
45. Microbial Degradation of Hydrocarbons - natural populations of HC utilizers - rates of degradation under natural environmental conditions - rates of degradation under enhanced environmental conditions	SL, MCE, CF, R	Lease Area-Region	EIS	24	EIS

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
46. Classification of OCS Ecosystems - major ecosystem types and characteristics - distribution - primary components, energy sources, ecosystems process	MCE	Lease Area	EIS	36	Not Addressed
47. Legal Protection of Vulnerable Populations and Critical Habitats - coverage under existing and proposed legislation - regulations, prohibitions, responsibilities	CF, MCE, SL	Region	TS	12	Not Addressed

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task

48. Behavior of Vulnerable Species to Oil
- avoidance behaviors
- activity behavior responses
  - feeding
  - schooling
  - chemoreception
  - mechanoreception
  - migration
- threshold concentrations
- chemicals responsible
	CF, MCE SL	Non-Site	EIS	36	F2

49. Toxicity of Oil - TL50's of key species (arctic and subarctic) 24, 96 hr. - concentrations	CF, MCE, SL	Non-Site	EIS	24	F2

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- dissolved fractions					
- contaminated sediments					
- surface slicks					
50. Sublethal Effects of Oil	CF, MCE, SL	Non-Site	EIS	36	F2
- threshold concentrations and responses of commercial species					
- respiration/metabolism					
- behavior/chemoreoption					
- fecundity					
- hatching success, molting					
- growth rate and abnormalties					
- diseases susceptibility					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
51. Combined Effects of Pollutants - TL50 changes of oil/toxic metal combinations - sublethal effects at <u>in situ</u> concentrations	SL, MCE	Non-Site	EIS	24	Not Addressed
52. Toxicity of Drilling Muds and Cuttings - TL50 for commercial spp. and larvae	CF, MCE, SL	Non-Site	EIS	12	F2
53. Effects of Noise - noise levels and propagation - thresholds and responses - disruption of behavior	CF, MCE, SL	Non-Site	EIS	12-24	F2

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- avoidance - acclimation					
54. Tainting of Commercial Species - rates of uptake and depuration - sites of tissue accumulation - types of compounds stored - metabolite dynamics - threshold concentrations	CF, R, MCE, SL	Non-Site	EIS	36	F5
55. Environmental Recovery Rates of Ecosystems a) Persistence of Oil on Shorelines - identification of	CF, R, MCE, SL	Lease Area	EIS	24-36	F6

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
shoreline characteristics influencing recovery rates - coastal vulnerability indices - targeting of impacts					
b) Persistence of Oil in Sediments - identification of sediment characteristics influencing recovery rates - sediment persistence indices	CF, MCE SL	Non-Site Region and/or Lease Area	EIS	24-36	F6

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
c) Recovery of Oiled Habitats - impacts of oiling on selected habitats - recovery and re-population of oiled habitats - dynamics of recovery processes	CF, MCE, SL	Region	EIS	24-36	F6
56. Ecosystem Vulnerability Indices - locations and classifications of ecosystem types - identification of controlling ecosystem processes - identification of ecosystem process vulnerabilities to oil	CF, MCE, SL	Lease Area	EIS	24-36	F6

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- targeting of impacts - ranking of vulnerability					
57. Effects of Contaminants on Normal Microbial Activity - Changes in populations and activity rates due to contaminants	CF, R, MCE, SL	Region	EIS	24	Not Addressed
58. Effects of Offshore and Onshore Structures - identification and description of potential effects via space use conflicts, resource use conflicts	CF, MCE, ACL, EIT, SL, AWQ	Non-Site	EIS	EIS	

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
59. Effects of Activities - identification and potential effects - analyses of mitigating measures	CF, MCE, EIT, SL, AWQ	Non-Site	EIS		
60. Vulnerability of Structures to Environmental Hazards - engineering characteristics and structures - technology scenarios - risk analysis of structure failure	EIT	Non-Site	TS	18	

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
OCS DEVELOPMENT ACTIVITIES					
A. Petroleum Development	CF, R,	Basin &	Basin,	9	PDS
- onshore structures	ACR, SC,	Lease	TS		PAM
- offshore structures	SL, SI,	Area	Lease		
- pipelines	MCE, AWQ		Area		
- number and location			DES		
- oil and gas resource estimates					
- economic activity					
- OCS shipping activites					
- aircraft usage					
- technology analysis					
- employment activity					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
B. Oil Spill Probability	CF, R, ACR,	Basin &	Basin,	9	PDS
- size	SC, SL,	Lease	TS		
- number	MCE	Area	Lease		
- timing			Area		
- type (chronic, acute)			DES		
- impact area					
C. Tanker Spill	CF, R,	Coastal	DES	9	PDS
- import tanker	SC, SL,	Area			
- domestic tanker	MCE				
- proportional analysis					
- spill trajectory					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
DATA BASELINE IDENTIFICATION					
G. Shipping Activity	CF, SC	Lease Area	DES	12	MTS TS PDS
- current usage and space demands					
- potential demands					
- ports and sea lanes identification					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- capacity identification					
- origin/destination					
- fishing/OCS traffic					
- shipping safety - vessel damage					
- use conflicts					
H. Recreational -	R	Regional	DES	12	RI
Location Identification		Impact			VI
- beach areas		Area			FI
- shell and finfish					MTS
gathering		Lease			LSPS
- catch and effort		Area			
- species					
- seasonality					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
I. Visual Impact Evaluation - evaluate visual resource quality - components of visual environment - impacts on visual quality - economic analysis of impacts	R, MCE	Onshore Impact Area Lease Area	DES	12	VI
J. Submerged Archaeological Locational Analysis - chronological placement of still stands	ACR	Lease Area Site	DES	18	AP

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- document preserve of man during late Pleistocene - develop probability model - apply probability model - early man site investigation		(Tract) Specific			
K. Terrestrial Archaeological Locational Analysis - document presence of man - analysis of prehistoric environment - develop probability model - apply model	ACR	Regional Impact Area	DES	18	

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
STATEWIDE, REGIONAL, LOCAL IMPACTS ASSESSMENT					
L. Sociocultural Analysis - subsistence - brief social history - currently perceived trends - community response capacity - social interaction dynamics - intergroup, intragroup, intrafamily stress	SI SL	Regional Impact Area	DES	18	NSS LSPS RI

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- priorities regarding conservation of values, traditions, original structures - lifestyle impacts - perception/attitudes toward OCS activity					
M. Community/Regional Infrastructure Analysis - current land use patterns/status - development constraints - housing - current community facilities and service	SI, SL, R, MCE, AWQ	Regional Impact Area	DES	12	LSPS

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- projections of infrastructure needs					
- projections for land use					
N. Population Analysis	CF, R,	Regional	DES	12	SRPE
- population composition	SI	Impact			LSPS
- trends					
- growth prospects					
- local, regional, statewide					
O. Employment Analysis	CF, R,	State &	DES	12	SRPE
- employment	SI	Regional			LSPS
- unemployment		Impact			PDS
- job seasonality		Area			PI
- trends and prospects					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- occupational skills					
- income levels					
- native/local hire					
P. Economic Analysis	CF, R, SI, MCE	State & Regional Impact Area	DES	18	SRPE LSPS
- econometric modeling					
- capital investment					
- fiscal policy					
- characteristics of growth/decline					
- economic indicators					
- local, regional statewide					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- change in unit fish costs					
- seasonal price data for processed fish products					
- change in unit costs processing plants					
- employment changes					
- wage/salary data					
R. Recreation Industry Analysis	R, SI	State & Regional Impact Area	DES	12	LSPS RI
- current expenditures					
- current receipts					
- size and structure of industry					
- land use patterns					

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task

S. Recreation User Preference
- consumer satisfaction - changed quality
- consumer satisfaction - substitutability of activity/site
- consumer use of area
  - site
  - activity
- visitation characteristics
- welfare value of alternative choices
	R, MCE, AWQ	Regional Impact Area	DES	18	RI

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
U. Subsistence Activities - location of subsistence fishing, hunting areas - cultural ties to subsistence - presence of subsistence system	SL	Regional Impact Area	DES	12	NSS LSPS

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
- economic vs mixed economy - current levels of use - projection of future use - jurisdictional issues					
V. Oil Impact on Archaeological Resources - determine degradation of site's environment - effect of oil on radiometric dating techniques - physical degradation of artifacts	ACR	Non-Site Specific	DES	12	

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
W. Antiquities Act Impact - legal interpretation of responsibility - determine of site significance - determine effect - impact on repository - impact on state inventory systems	ACR	Non-Site	DES	12	In house
X. Loss/Benefit Analysis - net economic loss vs. net gains - net social loss vs. social gains - savings from reduced oil spills	CF, R, SI, SL MCE, AWQ, EIT	State & Regional Impact Area	DES	12	FI, NSS, SRPE, RI, LSPS, VI, TS, POS

Types of Studies	Issues	OCS Study Area	Decision Step	Study Lead Time	OCSEAP/SESP Task
Y. Mitigating Measures Analysis - impacts producing agents - techniques to control these agents - cost of control techniques - benefit/cost analysis vs impacts	CF, R, SI, ACR, SC, SL, MCE, AWQ, EIT	State & Regional Impact Area	DES	12	In house

TABLE 5-12. LEASE AREA STUDY SCHEDULES FOR THE ARCTIC REGION

STEPS IN DECISION-MAKING PROCESS

TS = Tentative Sale Schedule
CN = Call for Nominations
TT = Tentative Tract Selection
DE = Preparation of ES
FE = Final ES
DS = Draft SID
FS = Final Sale
FT = Final Tract Selection

NS = Notice of Sale
SL = Sale
XP = Exploration Plan
TP = Transportation Plan
DP = Development Plan
PP = Pipeline Permit
LT = Lease Termination

SPATIAL RESOLUTION

0 = Information in hand, literature reviews
1 = Qualitative, area wide, cursory
2 = Semi-quantitative, hundreds of square miles scale or 25 miles of coastline
3 = Quantitative, 3-10 tract scale or 10 miles of coastline
4 = Quantitative, tract specific (2 to 5 mile resolution)
5 = Quantitative, site specific
6 = No spatial resolution (non-site specific)
7 = Refinement of data, no additional resolution
8 = Local, Regional, State Socioeconomic Data

TEMPORAL RESOLUTION

N = No temporal resolution
A = Annual
S = Seasonal

TABLE 5-12

ARCTIC REGION STUDIES SCHEDULE FOR BEAUFORT SEA

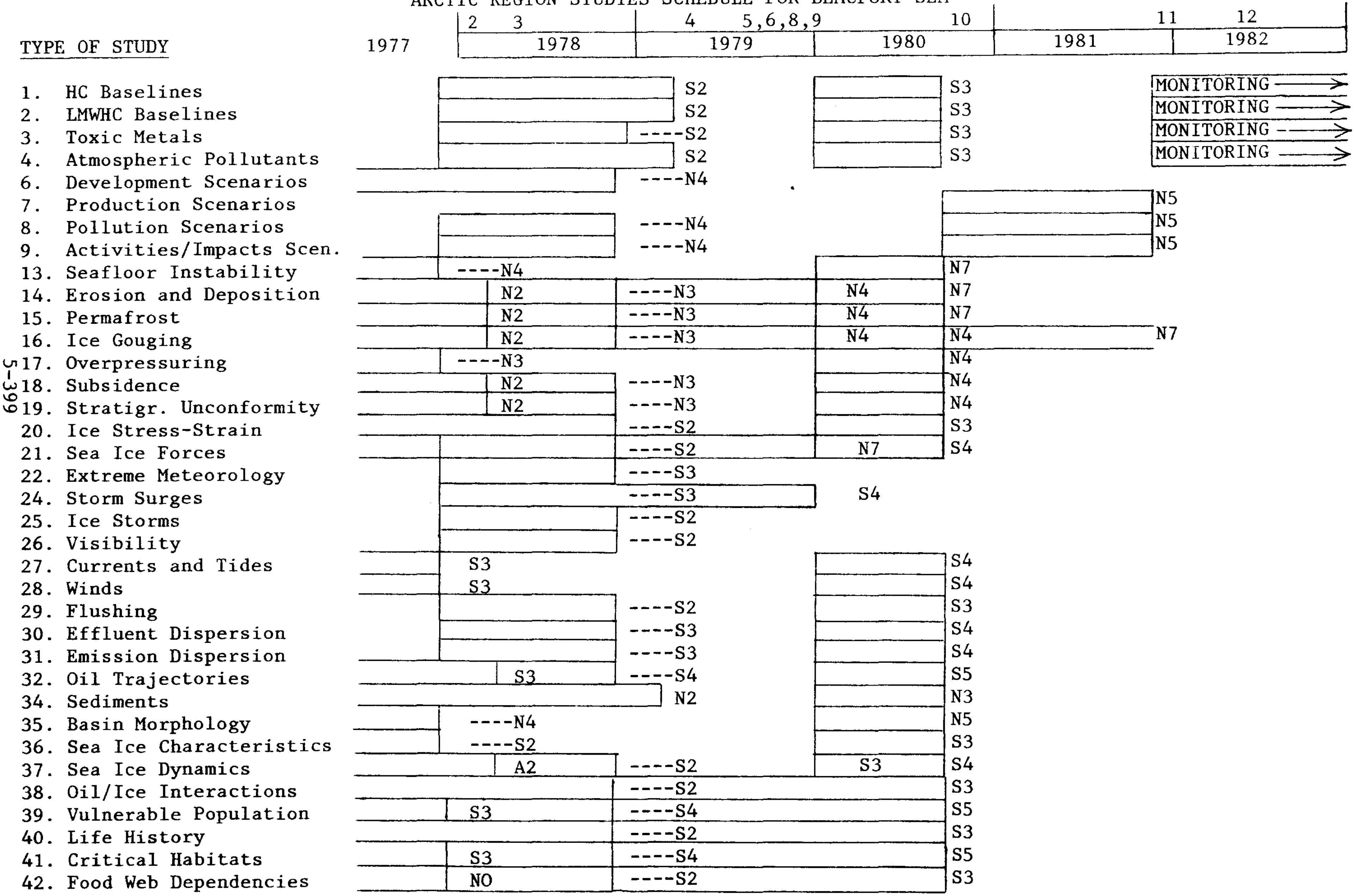


TABLE 5-12

ARCTIC REGION STUDIES SCHEDULE FOR BEAUFORT SEA

TYPE OF STUDY	1977	1978	1979	1980	1981	1982
		2 3	4 5,6,8,9	10	11	12
44. Wetland Ecosystems		S2	----S3			
45. HC Degradation		NO	----S2/N6			
46. Ecosystem Classification		N3	----S3 S4			
47. Laws and Regulations			----S5			
55. Environmental Recovery			----S2	S3	S4	
56. Ecosystem Vulnerability			----N6	N6	N7	
57. Effects on Microbes			----A2 S2	S3		

TYPE OF STUDY	1977	1978	1979	1980	1981
		2 3	4 5,6,8,9	10	11
A. Petroleum Development Scenario		N2	N3		
B. Oil Spill Probability Projection		N2	N3		
C. Tanker Spill Probability		N2	N3		
G. Shipping Activity		N3			
H. Recreational Location Identification		N3			
J. Submerged Archaeological Location Analysis		N5			
K. Terrestrial Archaeological Location Analysis		N5			
L. Sociocultural Analysis		N8			
M. Community/Regional Infrastructure Analysis		N8			
N. Population Analysis		N8			
O. Employment Analysis		N8			
P. Economic Analysis		N8			
R. Recreation Industry Analysis		N8			
S. Recreation User Preference		N8			
U. Subsistence Activities		N8			
W. Antiquities Act Impact			N8		
X. Loss/Benefit Analysis		N5			
Y. Mitigating Measures Analysis				N5	

TABLE 5-12

ARCTIC REGION STUDIES SCHEDULE FOR CHUKCHI SEA

TYPE OF STUDY	NO SCHEDULE				
	1978	1979	1980	1981	1982
1. HC Baselines					
2. LMWHC Baselines					
3. Toxic Metals					
4. Atmospheric Pollutants					
6. Development Scenarios					
7. Production Scenarios					
8. Pollution Scenarios					
9. Activities/Impacts Scenarios					
10. Seismic Hazards		NO	N2		
13. Seafloor Instability		NO	N2		
14. Erosion and Deposition		NO	N2		
15. Permafrost		NO	N2		
16. Ice Gouging		NO	N2		
17. Overpressuring		NO	N2		
18. Subsidence		NO	N2		
19. Stratigr. Unconformity		NO	N2		
20. Ice Stress - Strain		NO	N2		
21. Sea Ice Forces		NO	N2		
22. Extreme Meteorology		NO			
24. Storm Surges		NO			
25. Ice Storms		NO			
26. Visibility		NO			
27. Currents and Tides		NO	S2		
28. Winds		NO	S2		
29. Flushing					
30. Effluent Dispersion					
31. Emission Dispersion					
34. Sediments		NO			
35. Basin Morphology		NO	N3		
36. Sea Ice Characteristics		NO	N2		
37. Sea Ice Dynamics		NO	N2		
38. Oil/Ice Interactions		NO	N2		
39. Vulnerable Population	NO	A2	S3		
40. Life History		NO	A2		
41. Critical Habitats	NO	A2	S3		
42. Food Web Dependencies		NO	A2		

TABLE 5-12
ARCTIC REGION STUDIES SCHEDULE FOR CHUKCHI SEA

		NO SCHEDULE			
TYPE OF STUDY	1978	1979	1980	1981	1982
44. Wetland Ecosystems		NO	A2		
45. HC Degradation					
46. Ecosystem Classification	NO	A2	S2		
47. Laws and Regulations					
55. Environmental Recovery	NO	A2			
56. Ecosystem Vulnerability	NO	A2			
57. Effects on Microbes		NO			

		NO SCHEDULE			
TYPE OF STUDY	1977	1978	1979	1980	1981
A. Petroleum Development Scenario				N1	
B. Oil Spill Probability Projection				N1	
C. Tanker Spill Probability				N1	
G. Shipping Activity				N1	
H. Recreational Location Identification					
I. Visual Impact Evaluation					
J. Submerged Archaeological Location Analysis			N5		
K. Terrestrial Archaeological Location Analysis					
L. Sociocultural Analysis				N1	
M. Community/Regional Infrastructure Analysis				N1	
N. Population Analysis				N1	
O. Employment Analysis				N1	
P. Economic Analysis				N1	
R. Recreation Industry Analysis					
S. Recreation User Preference					
U. Subsistence Activities				N1	
W. Antiquities Act Impact					
X. Loss/Benefit Analysis					
Y. Mitigating Measures Analysis					

TABLE 5-12
ARCTIC REGION STUDIES SCHEDULE - NONSITE

		NO SCHEDULE			
TYPE OF STUDY	1978	1979	1980	1981	1982
5. Crude Oil Composition			N6	UPDATE	
9. Activities/Impacts Scenarios					
33. Oil Dynamics	NO	S3	S4		
43. Structure/Habitats		NO			
45. HC Degradation	NO	N6			
48. Behavior to Oil	NO	N6	N6		
49. Toxicity of Oil	NO	N6	N6		
50. Sublethal Effects	NO	N6	N6		
51. Combined Effects	NO	N6	N6		
52. Toxicity of Metals	NO	N6	N6		
53. Effects of Noise	NO	N6	N6		
54. Tainting	NO	N6	N6		
58. Effects of Structures		NO	N6		
59. Effects of Activities		NO	N6		
60. Vulnerability of Structures		NO	N6		
V. Oil Spill Impact on Archaeological Resources		N6			

5.4 OCSEAP FY 79 TDP PRODUCT SCHEDULES

The actual products generated by the environmental program (OCSEAP) in response to BLM information needs are discussed in detail in Section 5.0 of each FY 79 TDP provided to BLM by OCSEAP under the Basic Agreement. A modification of Table 3-1 has been used as the format for the presentation of these products. The TDP program products format also contains the status of the past, present, and projected resolution of each product generated by OCSEAP. In this way, past and projected program progress can be measured against BLM needs summarized in Table 5-4. Such a comparison, however, requires the recognition of three important factors: (1) Because of time and funding limitations, and the possible early identification of key environmental factors in certain locations, the levels of resolution indicated in the program products list for a given lease area are not necessarily uniform throughout that area. Hence, in some cases, it may only be possible to provide information for a part of the lease area at the schedule and level of resolution indicated by Table 5-4. Additional information for the total lease area would be provided in subsequent years. (2) Abrupt shifts in leasing priorities expressed, for example, by the last three Proposed OCS Planning Schedules (June 1975, January 1977, August 1977) have resulted in reorganization of phasing of studies in some lease areas. (3) As studies progress and more is learned about particular processes, the required and projected product resolution should be continually reevaluated in the light of our improved understanding of the resolution level practically achievable.

The format of TDP data products is geared to the OCSEAP Task-Subtask System. Because the FY 79 TDP's were produced prior to the Alaska regional study plans document, the coordination in numbering according to BLM information needs could not be accomplished. This standarization of format will be undertaken after approval of these regional plans.

5.5 SOURCES OF INFORMATION

The information needs expressed on the preceding pages can be obtained in a number of ways. The choice of the most effective source would depend on the quality and quantity of data needed, the availability of past knowledge, the urgency of the data need, the ability to scientifically measure the phenomenon to be studied, and the cost-effectiveness of the approach.

The following are the primary sources of information that have been identified.

5.5.1 Literature Synthesis

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., economic, sociological, cultural, biological, chemical, geological, and physical information) or very specific study elements (e.g., fiscal policy, cultural patterns, 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 address 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 decision-makers? 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?

Literature Synthesis is 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. The value of their proper utilization, however, is incalculable in terms of efficient use of time and available resources to selectively acquire relevant information.

Literature Synthesis should be the initial step in any new research undertaking and should form a major part of the initial report of each project. Moreover, they may often be the necessary first step preceding the decision to conduct many field or laboratory efforts.

5.5.2 Conferences - Workshops

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 timeframe 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. Another excellent example was the workshops held in Alaska to develop a study plan which later set the stage for the socioeconomic studies program.

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.

5.5.3 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. They are generally of comparatively short duration.

5.5.4 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, and key socioeconomic aspects including archaeology, economic, social and cultural elements. 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 socioeconomic and physical environment with which we are dealing, and in evaluating the longer-term variability of environmental parameters. Where benchmark studies are used for monitoring of baselines, it is important to limit benchmark studies to those for which a statistically accurate data base can be acquired. The natural variability of many environmental parameters precludes their ability in monitoring.

Benchmark studies will help address certain critical questions that the decision-maker asks. For the environmental program, 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 general 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. For the socioeconomic program, the benchmark study consists of information of sociocultural system, natural physical environment, man-made infrastructure, and the transportation system.

5.5.5 Fates and Effects Studies

Those studies conducted for the environmental program 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 OCS oil/gas exploration and development activites. 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. Often fate and effect studies rely on data acquired from benchmark studies for their starting point.

5.5.6 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

Modeling for the socioeconomic program includes development of the petroleum development scenarios; the application of the Man-in-the-Arctic Program (MAP) model to determine impacts on the state/regional economy; population projections; population distribution; and archaeological probability projections. Numerous types of data needs are required for carrying out these modeling efforts using both primary and secondary sources of information.

5.5.7 Scenarios

A petroleum development scenario is defined as the sequence of petroleum development events in a lease sale area corresponding to a given level of potential recoverable oil and gas resources. The function of petroleum development scenarios is to take into account the particular needs of the petroleum industry in each development region and to project the human, material, economic, and environmental requirements of the offshore development portion of total petroleum industry development in the region.

The process by which scenarios are prepared is based on a technology model of OCS development activities. The precept to the technology model is that oil and gas development takes place through private sector investments in such development. The touchstone upon which the entire analysis is based is resource development economics. The analysis attempts to model private sector policy regarding development of the oil and gas resources and takes into account existing and planned onshore and adjacent offshore peteroleum facilities that contribute to continued positive investment returns. The economics are closely related to the environmental and technological constraints as well as the distribution and size of potential finds (among other factors) since these affect the efficiency of recovering the resource.

The U.S. Geological Survey (USGS) through BLM provides the Studies Program current estimates of undiscovered recoverable oil and gas resources for specific offshore areas of Alaska. The USGS estimates attempt to account for 90 percent of the range of probable undiscovered oil and gas resources. Three levels of resource estimates are provided: a low estimate corresponding to a 95 percent probability that there is at least that amount; a high estimate with a 5 percent probability that there is at least that amount; and a statistical mean, which is calculated by adding the low value, the high value, and a modal value and dividing the sum by three. Because USGS estimates correspond to very large geographic areas, the Studies Program must assume that identified lease sale tracts (provided by BLM) contain the entire estimated amounts.

The scenarios are used to drive all the impact analyses for the socioeconomic studies and numerous modeling efforts of the environmental studies. These scenarios are generally first completed on the area of call and modified to a more specific area later in the decision process.

5.5.8 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.

5.5.9 Field Studies

This category is descriptive of an information source for the socioeconomic studies program. It includes a combination of information sources, such as: (1) personal interviews with a sample of residents or users; (2) a questionnaire mailed to a sample of respondents; (3) informal discussions with local, borough, state or federal officials; (4) analyzing newspapers in a content analysis; or (5) attending meetings of city councils, boards or other groups to obtain information issues relevant to these publics. The approach will vary depending upon the availability of information or the depth of the information required. Office of Management and Budget (OMB) guidelines must be followed in obtaining information via some of these sources.

5.6 SOURCE OF INFORMATION IDENTIFICATION FOR STUDY DESIGNS

The choices of the the source of information needed for each information need varies. Often several sources may be useful. Table 5-13 indicates which sources of information discussed previously would be most effective in providing the information needs identified in this program.

TABLE 5-13
POTENTIAL SOURCES OF INFORMATION NEEDS FOR ALASKA OCS STUDIES

	Literature Synthesis	Conference Workshops	Reconnaissance	Benchmark	Fate and Effects	Modeling	Scenarios	Site-Specific Monitoring	Field Su[illegible]y
A. Petroleum Development Scenario	X						X		
B. Oil Spill Probability Projection	X						X		
C. Tanker Spill Probability	X						X		
D. Fisheries Location Identification	X								X
E. Fish Equipment Loss									
F. Fishing Practices	X								X
G. Shipping Activity	X								X
H. Recreational Location Identification	X								X
I. Visual Impact Evaluation						X			
J. Submerged Archaeological Location Analysis						X			
K. Terrestrial Archaeological Location Analysis				X		X			
L. Sociocultural Analysis	X								X
M. Community/Regional Infrastructure Analysis	X								X
N. Population Analysis	X					X			
O. Employment Analysis	X					X			X
P. Economic Analysis	X					X			
Q. Fish Economic Analysis	X					X			X
R. Recreation Industry Analysis	X								X
S. Recreation User Preference	X								X
T. Fisheries User Preference									X
U. Subsistence Activities	X								X
V. Oil Impact on Archaeological Resources						X			
W. Antiquities Act Impact	X								
X. Loss/Benefit Analysis							X		
Y. Mitigating Measures Analysis									

	Literature Synthesis	Conference Workshops	Reconnaissance	Benchmark	Fate and Effects	Modeling	Scenarios	Site-Specific Monitoring	Field Survey
CONTAMINANT RECONNAISANCE									
1. Hydrocarbons				X					
2. Light Hydrocarbons				X					
3. Toxic Metals				X					
4. Air Pollutants				X					
5. Crude Oil Composition				X					
DEVELOPMENT ACTIVITIES									
6. Development Scenario		X					X		
7. Production Scenario		X					X		
8. Pollution Scenario		X					X		
9. Activities/Impacts	X	X					X	X	
ENVIRONMENTAL HAZARDS									
10. Seismic Hazards	X			X					
11. Volcanic Hazards	X			X					
12. Surface/Near Surface Faults	X			X					
13. Seafloor Instability	X			X					
14. Erosion and Deposition	X			X					
15. Subsea Permafrost	X			X					
16. Ice Gouging	X			X					
17. Overpressured Sediments	X			X					
18. Subsidence Potentials	X			X					
19. Stratigraphic Unconformities	X			X					
20. Sea Ice Stress - Strain	X			X					
21. Sea Ice Size - Force	X			X					
22. Extreme Events	X					X			
23. Tsunamis	X								
24. Storm Surges	X								
25. Ice Storms/Icing	X							X	
26. Visibility	X								
TRANSPORT OF CONTAMINANTS									
27. Offshore/Nearshore Circulation	X			X					
28. Offshore/Nearshore Winds	X			X					
29. Residence/Flushing Times			X			X			
30. Effluent Dispersion/Mixing			X			X		X	
31. Emission Dispersion/Mixing			X			X		X	
32. Oil Trajectories					X	X			
33. Oil Slick Dynamics	X	X			X	X		X	
34. Bottom Sediments	X		X						
35. Basin Morphology				X					
36. Sea Ice Features	X		X	X					
37. Sea Ice Dynamics	X	X	X	X		X			
38. Oil/Ice Interactions	X		X			X		X	

	Literature Synthesis	Conference Workshops	Reconnaissance	Benchmark	Fate and Effects	Modeling	Scenarios	Site-Specific Monitoring	Field Surve
RECEPTORS									
39. Vulnerable Populations	X			X					
40. Life Histories	X		X			X			
41. Critical Habitats	X			X					
42. Food Web Dependencies	X		X	X					
43. OCS Structures/Habitats	X							X	
44. Wetland Ecosystems	X		X						
45. Microbial Degradation	X			X	X			X	
46. Ecosystems	X		X			X			
47. Legal Protected Populations/ Habitats	X								
EFFECTS									
48. Behavior to Oil	X				X			X	
49. Toxicity of Oil	X				X				
50. Sublethal Effects of Oil	X				X			X	
51. Combined Effects of Pollutants	X				X				
52. Toxicity of Muds and Cuttings	X				X				
53. Effect of Noise	X				X			X	
54. Tainting	X				X				
55. Environmental Recovery Rates	X				X			X	
56. Ecosystem Vulnerability Indicies	X		X		X				
57. Microbial Activity Impacts of Oil	X				X			X	
58. Effects of OCS Structures	X					X	X	X	
59. Effects of OCS Activities	X					X	X	X	
60. Environmental Vulnerability of OCS Structures	X					X			

5.7 ANNUAL WORK PLANS

The Alaska OCS Studies Staff must still carry the details of this study program one step further in implementing this plan. Having developed the guidance details on types of studies needed, timing of studies, and scheduling, it is still necessary to implement the contracting for information acquisition. Available data must be identified and unfilled data needs must be acquired. We propose to submit subsequent to this plan a statement of present information status, immediate FY 79 study needs, and projected FY 80-81 study needs for each Alaska OCS region, based on the present lease schedule. These statements will include a listing of studies to be funded, detailed study objectives and rationale, prioritization of studies, and a budget request to fund these needs. These Annual Work Plans will be submitted in September of 1978.

Table 5-14 shows the sequence of Alaska studies continuing from FY 78, beginning FY 79, or beginning FY 80 for each region and lease area. As in the lease area studies schedules it shows the sequencing of studies according to time into the lease schedule. The annual work plans will carry the detail of the table to the level of individual study units within each type of study, and will provide details on the duration and resolution of individual contracts.

TABLE 5-14. GENERAL STUDY SCHEDULES FOR LEASE AREAS WITH THE ALASKA OCS REGIONS

Region: Pacific   Continuing Studies FY-79

Type of Study		Lease Area
A.	Petroleum Development Scenarios	NG, K, LCI
B.	Oil Spill Probability Projection	NG, K, LCI
C.	Tanker Spill Probability	NG, K, LCI
D.	Fisheries Location Identification	NG, K
E.	Fish Equipment Loss	NG, K
F.	Fishing Practices	NG, K
G.	Shipping Activity	NG, K
H.	Recreational Location Identification	NG, K, LCI
I.	Visual Impact Evaluation	NG, K, LCI
J.	Submerged Archaeological Location Analysis	NG, K, LCI
L.	Sociocultural Analysis	NG, K, LCI
M.	Community/Regional Infrastructure Analysis	NG, K
N.	Population Analysis	NG, K
O.	Employment Analysis	NG, K
P.	Economic Analysis	NG, K, LCI
Q.	Fish Economic Analysis	NG, K
R.	Recreation Industry Analysis	NG, K
S.	Recreation User Preference	NG, K, LCI
U.	Subsistence Activities	NG, K
X.	Loss/Benefit Analysis	NG, K

Region: Pacific   Continuing Studies FY-79

Type of Study	Lease Area
1. Heavy Hydrocarbon Distribution	NG, K
2. Light Hydrocarbon Distribution	NG, K
4. Concentration and Distribution of Atmospheric Pollutants	NG, K
10. Seismic Risk in OCS Areas	K
11. Volcanic Risks in OCS Areas	K
12. Surface and Nearsurface Fault Hazards	K
13. Seafloor Instability Studies	K
14. Erosion and Deposition in OCS Areas	NG, K
17. Overpressuring of Sediments in OCS Areas	NG, K
18. Subsistence Potentials and Rules in OCS Areas	NG, K
19. Stratigraphic Uncomformities Risk Location Study	NG, K
27. Physical Oceanography of OCS Areas	K
28. Winds and Wind Induced Circulation Studies	K
30. Effluent Dispersion and Mixing Studies	NG
31. Emission Dispersion and Mixing Studies	NG
32. Oil Trajectories of Oil Spills	NG
34. Characteristics of Bottom Sediments in OCS Areas	NG, K
39. Identification of Vulnerable Populations in OCS Areas	NG, K, AL
40. Life History Studies of Vulnerable Species	K, AL
41. Identification and Location of Critical Habitats and Habitat Dependencies of Vulnerable Species	NG, K, AL
42. Food Web Dependencies of Vulnerable Species	NG, K
44. Wetland Ecosystems Descriptor Studies	NG, K

Region: Pacific   Continuing Studies FY-79

Type of Study	Lease Area
46. Ecosystem Classification and Description Studies	NG, K, AL
55. Environmental Recovery and Persistence of Oil Studies in OCS Areas	NG, K, AL
56. Ecosystem Vulnerability Assessment for OCS Ecosystems	NG, K, AL
57. Studies of the Effects of Contaminants on Normal Microbial Activity	K

Region: Pacific Initiate Study FY-79

Type of Study		Lease Area
D.	Fisheries Location Identification	LCI
E.	Fish Equipment Loss	LCI
F.	Fishing Practices	LCI
G.	Shipping Activity	LCI
H.	Recreational Location Identification	LCI
L.	Sociocultural Analysis	LCI
M.	Community/Regional Infrastructure Analysis	LCI, AL
N.	Population Analysis	LCI
O.	Employment Analysis	LCI
P.	Economic Analysis	LCI
Q.	Fish Economic Analysis	LCI
R.	Recreation Industry Analysis	LCI
U.	Subsistence Activities	LCI
X.	Loss/Benefit Analysis	LCI
3.	Distribution of Toxic Metals in OCS Areas	K
10.	Seismic Risk in OCS Areas	LCI, AL
11.	Volcanic Risks in OCS Areas	LCI, AL
12.	Surface and Nearsurface Fault Hazards	LCI, AL
13.	Seafloor Instability Studies	LCI, AL
14.	Erosion and Deposition in OCS Areas	LCI, AL
17.	Overpressuring of Sediments in OCS Areas	LCI, AL
18.	Subsistence Potentials and Rules in OCS Areas	LCI, AL
19.	Stratigraphic Uncomformities Risk Location Study	LCI, AL
22.	Analysis of Extreme Events of Meteorology in OCS Areas	LCI, K, AL
23.	Tsunamis Risk Studies	LCI, K, AL

Region: Pacific   Initiate Study FY-79

Type of Study	Lease Area
24. Ice Storms and Structural Icing Hazards	LCI
25. Assessment of Visibility Hazards Under Extreme Conditions	K, AL
27. Physical Oceanography of OCS Areas	LCI, AL
28. Winds and Wind Induced Circulation Studies	LCI, AL
30. Effluent Dispersion and Mixing Studies	LCI, K
31. Emission Dispersion and Mixing Studies	LCI, K
32. Oil Trajectories of Oil Spills	LCI, K
34. Characteristics of Bottom Sediments in OCS Areas	LCI, AL
35. Basin Morphology	LCI
39. Identification of Vulnerable Populations in OCS Areas	LCI
40. Life History Studies of Vulnerable Species	LCI
41. Identification and Location of Critical Habitats and Habitat Dependencies of Vulnerable Species	LCI
42. Food Web Dependencies of Vulnerable Species	LCI, AL
44. Wetland Ecosystems Descriptor Studies	LCI, AL
45. Assessment of Hydrocarbon Degradation Rates by Natural Microbial Populations	LCI, K
46. Ecosystem Classification and Description Studies	LCI
47. Analysis of Existing Laws and Regulations Protecting Species and Ecosystems	LCI, K
55. Environmental Recovery and Persistence of Oil Studies in OCS Areas	LCI
56. Ecosystem Vulnerability Assessment for OCS Ecosystems	LCI
57. Studies of the Effects of Contaminants on Normal Microbial Activity	LCI, AL

Region: Pacific Initiate Study FY-80

Type of Study	Lease Area
A. Petroleum Development Scenarios	AL
B. Oil Spill Probability Projection	AL
C. Tanker Spill Probability	AL
D. Fisheries Location Identification	AL
E. Fish Equipment Loss	AL
F. Fishing Practices	AL
G. Shipping Activity	AL
L. Sociocultural Analysis	AL
M. Community/Regional Infrastructure Analysis	AL
N. Population Analysis	AL
O. Employment Analysis	AL
P. Economic Analysis	AL
Q. Fish Economic Analysis	AL
U. Subsistence Activities	AL
X. Loss/Benefit Analysis	AL
1. Heavy Hydrocarbon Distribution	NG
2. Light Hydrocarbon Distribution	NG
3. Distribution of Toxic Metals in OCS Areas	NG
4. Concentration and Distribution of Atmospheric Pollutants	NG
10. Seismic Risk in OCS Areas	NG
11. Volcanic Risks in OCS Areas	NG
12. Surface and Nearsurface Fault Hazards	NG
13. Seafloor Instability Studies	NG
14. Erosion and Deposition in OCS Areas	NG
27. Physical Oceanography of OCS Areas	NG
28. Winds and Wind Induced Circulation Studies	NG
57. Studies of the Effects of Contaminants on Normal Microbial Activity	NG

TABLE 5-14. GENERAL STUDY SCHEDULES FOR LEASE AREAS WITH THE ALASKA OCS REGIONS

Region: Bering Sea   Continuing Studies FY-79

Type of Study		Lease Area
J.	Submerged Archaeological Location Analysis	BB, NS
L.	Sociocultural Analysis	NS
10.	Seismic Risk in OCS Areas	NS
12.	Surface and Nearsurface Fault Hazards	NS
13.	Seafloor Instability Studies	NS
27.	Physical Oceanography of OCS Areas	NS
28.	Winds and Wind Induced Circulation Studies	NS
36.	Analysis of Sea Ice Characteristics	BB, NS
37.	Sea Ice Dynamics Studies	BB, NS
38.	Oil/Ice Interaction in OCS Areas	BB, NS
39.	Identification of Vulnerable Populations in OCS Areas	SG, BB, NS
40.	Life History Studies of Vulnerable Species	BB
41.	Identification and Location of Critical Habitats and Habitat Dependencies of Vulnerable Species	SG, BB, NS
46.	Ecosystem Classification and Description Studies	SG, NS
55.	Environmental Recovery and Persistence of Oil Studies in OCS Areas	SG, NS
56.	Ecosystem Vulnerability Assessment for OCS Ecosystems	SG, BB, NS
57.	Studies of the Effects of Contaminants on Normal Microbial Activity	BB, NS

Region: Bering Sea   Initiate Studies FY-79

Type of Study	Lease Area
A. Petroleum Development Scenarios	NS
B. Oil Spill Probability Projection	NS
C. Tanker Spill Probability	NS
D. Fisheries Location Identification	NS, BB, SG
E. Fish Equipment Loss	NS, BB, SG
F. Fishing Practices	NS
G. Shipping Activity	NS
H. Recreational Location Identification	NS
J. Submerged Archaeological Location Analysis	NS
K. Terrestrial Archaeological Location Analysis	NS
L. Sociocultural Analysis	NS, BB, SG
M. Community/Regional Infrastructure Analysis	NS
N. Population Analysis	NS
O. Employment Analysis	NS
P. Economic Analysis	NS
Q. Fish Economic Analysis	NS, BB, SG
R. Recreation Industry Analysis	NS
S. Recreation User Preference	NS
U. Subsistence Activities	NS, BB, SG
X. Loss/Benefit Analysis	NS
10. Seismic Risk in OCS Areas	SG, BB, NS
11. Volcanic Risks in OCS Areas	SG, BB
12. Surface and Nearsurface Fault Hazards	SG, BB
13. Seafloor Instability Studies	SG, BB
14. Erosion and Deposition in OCS Areas	SG, BB, NS
15. Permafrost Characteristics and Hazards Study	NS

Region: Bering Sea   Initiate Studies FY-79

Type of Study	Lease Area
16. Ice Gouging Risk Assessment Studies	NS
17. Overpressuring of Sediments in OCS Areas	SG, BB, NS
18. Subsistence Potentials and Rules in OCS Areas	SG, BB, NS
19. Stratigraphic Uncomformities Risk Location Study	SG, BB, NS
20. Sea Ice Stress - Strain Relationship Analysis	SG, BB, NS
21. Sea Ice Size Forces Relationship Study	SG, BB, NS
22. Analysis of Extreme Events of Meteorology in OCS Areas	SG, BB
23. Tsunamis Risk Studies	SG, BB
24. Ice Storms and Structural Icing Hazards	SG, BB
25. Assessment of Visibility Hazards Under Extreme Conditions	SG, BB
26. Visibility	SG, BB
27. Physical Oceanography of OCS Areas	SG, BB
28. Winds and Wind Induced Circulation Studies	SG, BB
30. Effluent Dispersion and Mixing Studies	NS
31. Emission Dispersion and Mixing Studies	NS
32. Oil Trajectories of Oil Spills	NS
34. Characteristics of Bottom Sediments in OCS Areas	SG, BB
35. Basin Morphology	SG, BB, NS
37. Sea Ice Dynamics	NS
38. Oil/Ice Interaction	NS
39. Identification of Vulnerable Populations in OCS Areas	NS
40. Life History Studies of Vulnerable Species	NS
41. Identification and Location of Critical Habitats and Habitat Dependencies of Vulnerable Species	NS

Region: Bering Sea   Initiate Studies FY-79

Type of Study	Lease Area
42. Food Web Dependencies of Vulnerable Species	SG, NS
44. Wetland Ecosystems Descriptor Studies	SG, NS
45. Assessment of Hydrocarbon Degradation Rates by Natural Microbial Populations	NS
47. Analysis of Existing Laws and Regulations Protecting Species and Ecosystems	NS
57. Studies of the Effects of Contaminants on Normal Microbial Activity	SG

Region: Bering Sea Initiate Studies FY-80

Type of Study	Lease Area
3. Distribution of Toxic Metals in OCS Areas	NS
22. Analysis of Extreme Events of Meteorology in OCS Areas	NS
23. Tsunamis Risk Studies	NS
24. Ice Storms and Structural Icing Hazards	NS
25. Assessment of Visibility Hazards Under Extreme Conditions	NS
26. Visibility	NS

TABLE 5-14. GENERAL STUDY SCHEDULES FOR LEASE AREAS WITH THE ALASKA OCS REGIONS

Region: Arctic Continuing Studies FY-79

Type of Study	Lease Area
1. Heavy Hydrocarbon Distribution	BS
2. Light Hydrocarbon Distribution	BS
3. Distribution of Toxic Metals in OCS Areas	BS
4. Concentration and Distribution of Atmospheric Pollutants	BS
14. Erosion and Deposition in OCS Areas	BS
15. Permafrost Characteristics and Hazards Study	BS
17. Overpressuring of Sediments in OCS Areas	BS
18. Subsistence Potentials and Rules in OCS Areas	BS
19. Stratigraphic Uncomformities Risk Location Study	BS
20. Sea Ice Stress - Strain Relationship Analysis	BS
21. Sea Ice Size Forces Relationship Study	BS
22. Analysis of Extreme Events of Meteorology in OCS Areas	BS
24. Ice Storms and Structural Icing Hazards	BS
34. Characteristics of Bottom Sediments in OCS Areas	BS
38. Oil/Ice Interaction	CS, BS
39. Identification of Vulnerable Populations in OCS Areas	BS
40. Life History Studies of Vulnerable Species	CS, BS
41. Identification and Location of Critical Habitats and Habitat Dependencies of Vulnerable Species	BS
42. Food Web Dependencies of Vulnerable Species	BS

Region: Arctic Continuing Studies FY-79

Type of Study	Lease Area
44. Wetland Ecosystems Descriptor Studies	BS
45. Assessment of Hydrocarbon Degradation Rates by Natural Microbial Populations	BS
46. Ecosystem Classification and Description Studies	CS, BS
47. Analysis of Existing Laws and Regulations Protecting Species and Ecosystems	BS
55. Environmental Recovery and Persistence of Oil Studies in OCS Areas	CS, BS
56. Ecosystem Vulnerability Assessment for OCS Ecosystems	CS, BS
57. Studies of the Effects of Contaminants on Normal Microbial Activity	BS

Region: Arctic Initiate Studies FY-79

Type of Study	Lease Area
A. Petroleum Development Scenarios	LS
B. Oil Spill Probability Projection	LS
C. Tanker Spill Probability	LS
G. Shipping Activity	LS
L. Sociocultural Analysis	LS
M. Community/Regional Infrastructure Analysis	LS
N. Population Analysis	LS
O. Employment Analysis	LS
P. Economic Analysis	LS
U. Subsistence Activities	LS
X. Loss/Benefit Analysis	LS
10. Seismic Risk in OCS Areas	CS
13. Seafloor Instability Studies	CS
14. Erosion and Deposition in OCS Areas	CS
15. Permafrost Characteristics and Hazards Study	CS
16. Ice Gouging Risk Assessment Studies	CS
17. Overpressuring of Sediments in OCS Areas	CS
18. Subsistence Potentials and Rules in OCS Areas	CS
19. Stratigraphic Uncomformities Risk Location Study	CS
20. Sea Ice Stress - Strain Relationship Analysis	CS
21. Sea Ice Size Forces Relationship Study	CS
22. Analysis of Extreme Events of Meteorology in OCS Areas	CS
24. Ice Storms and Structural Icing Hazards	CS
25. Assessment of Visibility Hazards Under Extreme Conditions	CS

Region: Arctic

Initiate Studies FY-79

Type of Study	Lease Area
26. Visibility	CS
27. Physical Oceanography of OCS Areas	CS
28. Winds and Wind Induced Circulation Studies	CS
34. Characteristics of Bottom Sediments in OCS Areas	CS
35. Basin Morphology	CS
36. Analysis of Sea Ice Characteristics	
37. Sea Ice Dynamics	CS
42. Food Web Dependencies of Vulnerable Species	CS
44. Wetland Ecosystems Descriptor Studies	CS

Region: Arctic Initiate Studies FY-80

Type of Study	Lease Area
1. Heavy Hydrocarbon Distribution	BS
2. Light Hydrocarbon Distribution	BS
3. Distribution of Toxic Metals in OCS Areas	BS
4. Concentration and Distribution of Atmospheric Pollutants	BS
17. Overpressuring of Sediments in OCS Areas	BS
18. Subsistence Potentials and Rules in OCS Areas	BS
19. Stratigraphic Uncomformities Risk Location Study	BS
20. Sea Ice Stress - Strain Relationship Analysis	BS
21. Sea Ice Size Forces Relationship Study	BS
22. Analysis of Extreme Events of Meteorology in OCS Areas	BS
28. Winds and Wind Induced Circulation Studies	BS
29. Flushing	BS
30. Effluent Dispersion and Mixing Studies	BS
31. Emission Dispersion and Mixing Studies	BS
32. Oil Trajectories of Oil Spills	BS
34. Characteristics of Bottom Sediments in OCS Areas	BS
35. Basin Morphology	BS
36. Analysis of Sea Ice Characteristics	BS
37. Sea Ice Dynamics	BS

TABLE 5-14. GENERAL STUDY SCHEDULES FOR LEASE AREAS WITH THE ALASKA OCS REGIONS

Region: Non-Site Specific   Continuing Studies FY-79

Type of Study	Lease Area
33. Oil Slick Plume Dynamics	
48. Behavioral Effects of Oil and Other Contaminants	
49. Toxicity of Oil to Vulnerable Organisms	
50. Sublethal Effects of Oil	
51. Combined Effects of Oil and Other Contaminants	
52. Toxicity Tests of Drilling Mud and Cuttings	
53. Effects of Noise on Behavior	
54. Tainting Mechanisms	
57. Microbial Hydrocarbon Degradation Rates Under Natural Conditions	

Region: Non-Site Specific   Initiate Studies FY-79

Type of Study	Lease Area
V. Oil Spill Impact on Archaeological and Cultural Resources	
5. Physical-Chemical Analysis of the Composition of Alaskan Crude Oils	
39. Vulnerability of Structures to Environmental Hazards	
43. Use of OCS Structures as Fish Habitats	
58. Effects of OCS Structures on Vulnerable Population and Critical Habitats	
59. Effects of OCS Activities on Ecosystems	

CHAPTER 6

CHAPTER 6. SCHEDULING OF RESULTS

CHAPTER 6. SCHEDULING OF RESULTS

6.1 INTRODUCTION

The study sequence given in Chapter 5 is designed to allow completion of studies and reporting of results in a timely manner to meet the information needs at each applicable decision step. The need to have these results in hand, in usable form at specific dates, is inherent in this study plan. Part of the goals and objectives of the Studies Program is to insure an effective scheduling of results.

Studies reports may be interim or final, and may be presented in a number of formats. Reporting and data management procedures have been designed to meet the scheduled information needs. This chapter addresses the Alaska OCS Office's objectives and design for the scheduling of results.

6.2 SCHEDULES

This part contains listings and charts of the studies program and management milestones. The milestones listed are those considered to mark only significant events. This is particularly true of programmatic or operational milestones, since a more detailed set of annual milestones is provided in each annual study plan.

6.2.1 DURATION OF STUDIES

The Alaska OCS Studies Program, as it is currently envisioned, is long-term in the sense that it will continue for the duration of any production activity. Original BLM budgeting and planning was based on a five year study plan for the socioeconomic study program and for the environmental program. The plan called for an initial three year period of intensive study in each area, a decrease in funding over the succeeding two years, and a maintenance or sustaining level of funding for an indefinite number of years to monitor the effects of OCS oil and gas exploration and development activity over the long term, to prepare for successive leases in the same area. With experience, this has been modified to some extent to extend the initial period because there remains many unsolved problems, and some parameters are particularly difficult to establish. All funds are obligated on an annual basis even though programs may be planned for longer periods of time. This provides flexibility in the parameters chosen for measurement, re-evaluation of the location of sampling stations, evaluation of the contractor's performance, and evaluation of the data.

6.2.2 PROGRAM TIMING

The timing of the program has been keyed to the leasing and development schedule prepared and provided by the Bureau of Land Management (Chapter 2), the lead time required (Chapter 3), and the duration of the production phase. The relation of the timing of data needs to the decision steps is detailed in Chapter 4. The Study Sequence used for scheduling studies in concert with the BLM schedule is described in Chapter 5. The resultant associated operational, synthesis and reporting schedules, the schedules of results along with significant program milestones, are found in this chapter.

6.2.3 LEAD TIME

A lead time of several years is generally required to discover, develop, and market oil or gas in a usable energy form. By the time a lease is issued, most of the detailed geological, socioeconomic, and geophysical investigations should be completed and the archeological probability areas identified. If a lease does prove productive, statistics show that the discovery usually will be made 1.5 to 4.5 years after the lease sale. In response to a 1974 survey by the Bureau of Land Management, 25 oil and gas (or related) companies made estimates of the time period required, after discovery, to achieve initial and peak production in 17 major OCS areas. The companies estimated that it would take 2.5 to 6.5

years to attain production and 5.5 to 9.5 years to reach peak production. Thus, the total time after a lease sale to achieve initial production would be four to eleven years and to attain peak production would be seven to fourteen years.

6.2.4 SIGNIFICANT PROGRAM MILESTONES

6.2.4.1 Environmental Studies Program

Based upon the availability of resources and the Department of Interior lease schedule dated June 1975, the following significant milestones were planned. Changes in the lease schedule will affect these milestones. These milestones represent the initiation of specific studies in the lease areas and/or the submission of data and information in order to meet BLM and/or USGS environmental requirement for leasing, development or production schedules.

*	Initiate Baseline Studies/Northeast Gulf of Alaska	1/74
*	Submit Environmental Data for NEGOA DES	3/75
*	Initiate Baseline Study/Bering Sea-St. George	5/75
*	Initiate Baseline Study/Beaufort Sea	5/75
*	Initiate Baseline Study/Outer Bristol Basin	5/75
*	Initiate Baseline Study/Gulf of Alaska (Aleutian Shelf)	7/75
*	Initiate Baseline Study/Gulf of Alaska (Kodiak)	8/75
*	Data Submission for NEGOA FES	10/75
*	Initiate Baseline Study/Bering Sea (Norton Basin)	3/76
*	Recommendations Regarding Risk Assessment for PDOD/NEGOA	3/76
*	Submit Environmental Data for GOA/Kodiak DES	5/76
*	Initiate Baseline Study/Cook Inlet	6/76
*	Initiate Phase I Ecological Process Studies-Beaufort Sea	6/76
*	Initiate Baseline Study/Chukchi Sea	7/76
*	Submit Special PI Reports for Cook Inlet FES and Kodiak ES	10/76

*	Submit Environmental Data for Bering Sea/Outer Bristol Basin DES	2/77
*	Recommendations Regarding Risk Assessment for PDOD/Cook Inlet	2/77
*	Submit Environmental Data for Beaufort Sea DES	2/77
*	Submit Environmental Data for Bristol Bay DES	4/77
*	Submit Environmental Data for GOA/Kodiak FES	5/77
*	Submit Environmental Data for Bering Sea-St. George FES	5/77
*	Submit Environmental Data for Beaufort Sea FES	5/77
*	Recommendations Regarding Risk Assessment for PDOP/GOA-Kodiak	7/77
*	Submit Environmental Data for Outer Bristol Basin FES	8/77
*	Recommendations Regarding Risk Assessment for PDOD/Bering Sea-St. George	9/77
*	Recommendations Regarding Risk Assessment for PDOD/Beaufort Sea-St. George	9/77
*	Initiate Ecological Process Studies GOA/Kodiak and Cook Inlet	10/77
*	Submit Environmental Information for Norton DES	11/77
*	Recommendations Regarding Risk Assessment for PDOD/Outer Bristol Basin	11/77
*	Recommendation on Risk Assessment for Bristol Bay PDOD	1/78
*	Submit Environmental Data for GOA/Aleutian DES	2/78
*	Submit Environmental Data for Chukchi Sea DES	5/78
*	Submit Environmental Data for Bering Sea/Norton FES	5/78
*	Recommendations Regarding Risk Assessment for PDOD/Bering Sea-Norton	7/78
*	Submit Environmental Data for GOA/Aleutian FES	8/78
*	Submit Environmental Data for Chukchi Sea FES	8/78
*	Recommendations Regarding Risk Assessment for PDOD/GOA-Aleutian	9/78
*	Recommendations Regarding Risk Assessment for PDOD/Chukchi Sea	11/78

6.2.4.2 SOCIOECONOMIC STUDIES PROGRAM

Based on the availability of resources and the Department of Interior schedule of August 1977, the following significant milestones are directing the socioeconomic studies program. These milestones assume the studies program to have begun in September 1976, and identify what studies will be completed. The information needs data for areas not currently on the proposed schedule are very tentative.

*	Socioeconomic Literature Survey	4/77
-	Beaufort Sea Region	
	* Prudhoe Bay Case Study	2/78
	* Petroleum Development Scenarios	4/78
	* Socioeconomic Baselines	5/78
	* Sociocultural Baselines	6/78
	* Natural Physical Baselines	5/78
	* Forecasts of Population, Employment, and Economy	7/78
	* Assessment Man-Made Environment	7/78
	* Assessment State/Regional Transportation	7/78
	* Assessment Natural Physical Environment	7/78
	* Assessment Sociocultural Systems	7/78
*	Anchorage Baselines	6/78
*	Anchorage Impacts from Beaufort Sea Deveopment	7/78
*	Northern and Western Gulf Petroleum Scenarios	12/78
*	Northern and Western Gulf of Alaska Impact Assessment	5/79
*	Lower Cook Inlet Petroleum Development Scenarios	3/79
*	Lower Cook Inlet Impact Assessment	8/79
*	Chukchi Sea Petroleum Scenarios	10/80
*	Chukchi Impact Assessment	10/80
*	Norton Basin Petroleum Scenarios	10/79
*	Norton Impact Assessment	6/80
*	Aleutian Shelf/St. George/Bristol Bay Scenarios	9/81
*	Aleutian Shelf/St. George/Bristol Bay Impact Assessment	12/81

6.3 OCSEAP SCHEDULING OF RESULTS, TYPICAL LEASE AREA

The sequence of study progression in the Alaskan environmental program reflects the BLM concepts of baseline, special studies, and monitoring as three program elements. In Figure 6-1, these three elements are posed in six Tasks and are portrayed against the time scale for a typical lease area. Development scenarios that provide understanding of the nature and magnitude of potential contaminants and environmental disturbances, to be updated and supplied periodically, may produce modifications to the current plan of studies in any lease area.

Figure 6-2 also shows the time progression of the nature of the program keyed to BLM needs. It also shows a continuing program in the lease area throughout the production phase (1) to provide information for identification and regulation of effects from the production resulting from the first sale, and (2) for assessments in advance of successive sales in the same lease area. It is recognized that the information needed for impact statements, tract selection, and permits for exploratory drilling is, in many aspects, different from that needed to regulate production activities. In general, during exploration, local effects are transient, and, unless the habitat is altered, ecosystems will return approximately to their original state after the local disturbance is removed. Therefore, in advance of leasing and exploratory drilling, BLM will require:

1. Enough information on the distributution, dynamics and interdependence of biota to be assured that the particular sites to be leased and developed do not represent critical habitats or do not contribute substantially to the survival of a population (such as a principal spawning ground or food source).

2. Enough information to identify geological hazards to structures so that hazardous tracts may be identified and licensing and regulatory agencies can assess the adequacy of the industry designs and plans for platform foundations, blowout preventers, etc.

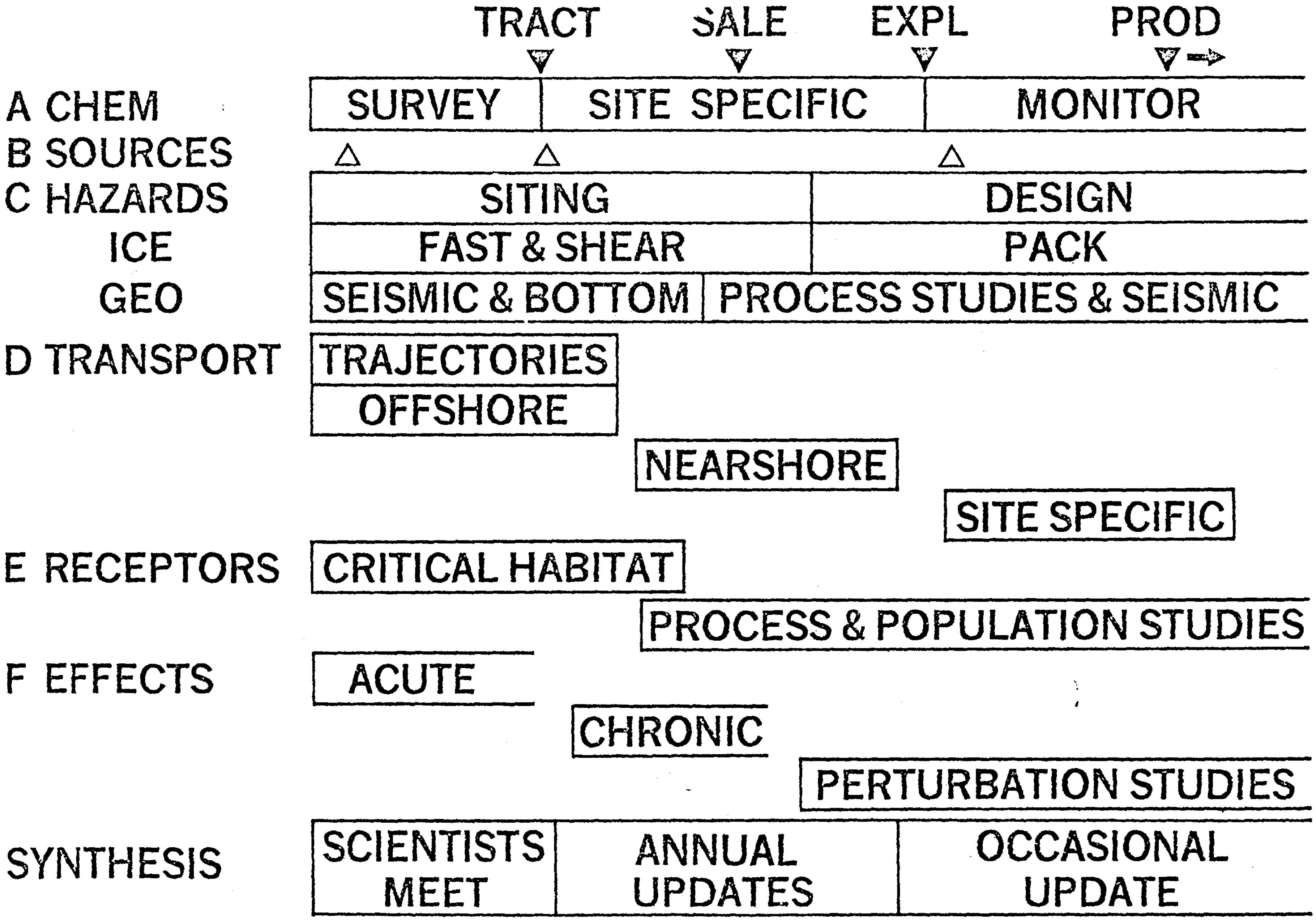

TRACT
SALE
EXPL
PROD
A CHEM
SURVEY
SITE SPECIFIC
MONITOR
B SOURCES
C HAZARDS
SITING
DESIGN
ICE
FAST & SHEAR
PACK
GEO
SEISMIC & BOTTOM
PROCESS STUDIES & SEISMIC
D TRANSPORT
TRAJECTORIES
OFFSHORE
NEARSHORE
SITE SPECIFIC
E RECEPTORS
CRITICAL HABITAT
PROCESS & POPULATION STUDIES
F EFFECTS
ACUTE
CHRONIC
PERTURBATION STUDIES
SYNTHESIS
SCIENTISTS MEET
ANNUAL UPDATES
OCCASIONAL UPDATE

FIGURE 6-1

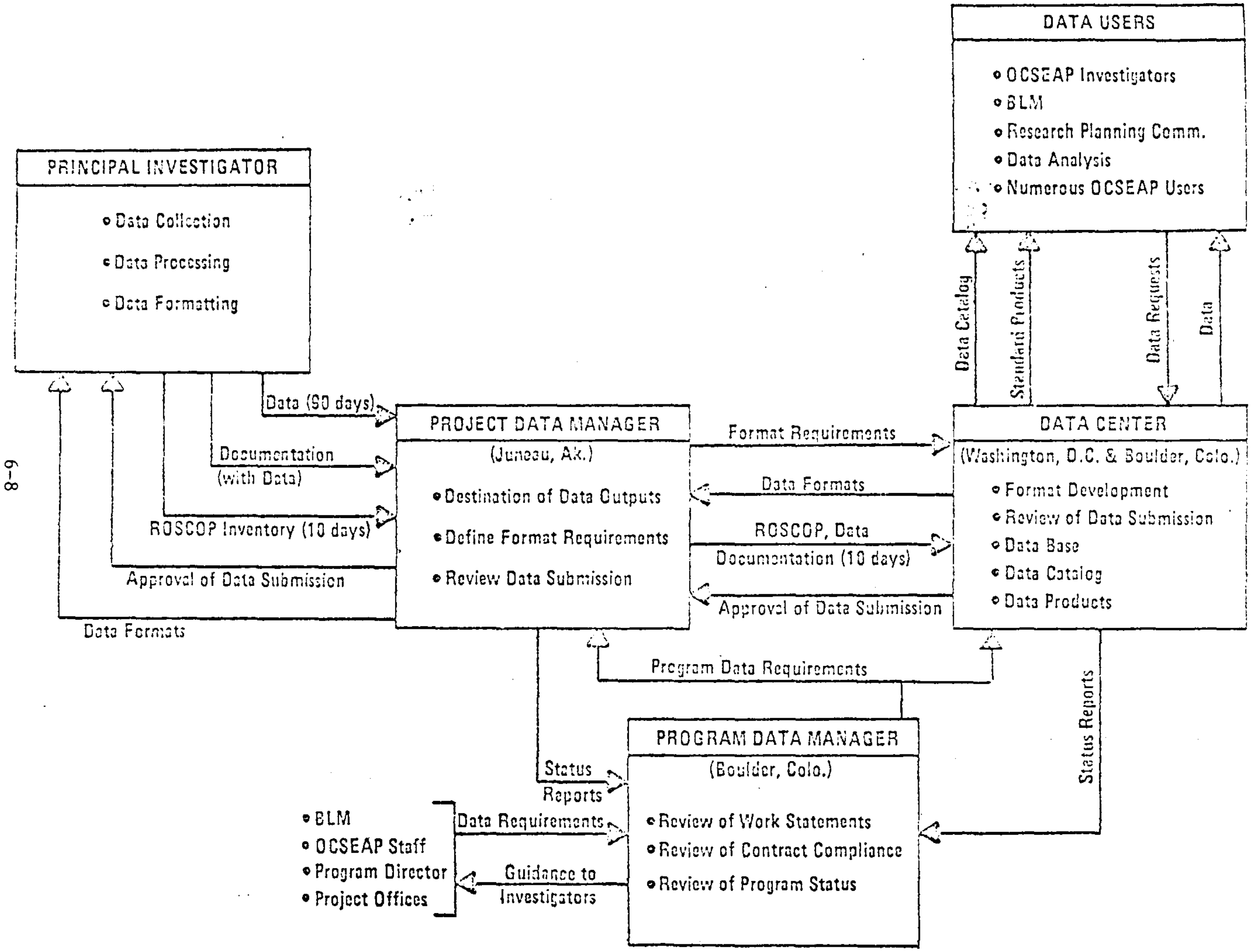


FIGURE 6-2 DATA FLOW DIAGRAM

3. Enough knowledge of wave, wind, and ice so that rig and platform design can be evaluated.

4. Enough knowledge of trajectory pathways so that, for hypothetical blowouts or other large spills, the hazard to critical habitats at some distance can be assessed.

5. Enough knowledge of vertical mixing, oil behavior and interaction with suspended and bottom sediments to predict the characteristics of contaminant plumes at a distance, and to predict the extent of exposure to biota throughout the water column along the trajectory.

Production activities present somewhat different circumstances to be evaluated. Local effects from development activities, construction and operation of pipelines and facilities, acute effects from accidents at well sites, and chronic effects from lesser environmental concentrations of oil, and other contaminants over long production periods must be assessed.

Therefore, for assessments in advance of development, BLM requires the following additional information:

1. Identification of critical and important habitats between individual wells and potential gathering and loading points, as well as of habitats onshore, so that alternate routes and sites can be found, as necessary.

2. Storm surge and wave data in the area of shore facilities.

3. Chronic physiological and behavioral effects levels for important species possibly reached by source plumes from the production area. (Acute toxicity levels give a preliminary estimate of the maximum limits for chronic toxicities; thus acute toxicity research precedes chronic effects research.)

4. Identification of all "important" species within reach of development impact: threatened, endangered, and commercial species; those present in the foodchain of such species; those providing cover or serving other beneficial purpose; those having aesthetic value; and those playing significant roles in important ecosystems.

5. Knowledge of the ecosystem and of the population dynamics of each important species, for assessing the significant effects that changes in particular populations might have on the rest of the environment and on man.

6. Sufficient data on pre-production concentrations of oil, tract metals, and other potential pollutants in the biota and their environment so as to provide a perspective or context for viewing concentrations after production begins.

7. An understanding of source, transport, and uptake, so that regulatory agencies can predict what concentrations are to be expected and develop an appropriate and economic monitoring program.

Thus, preliminary information from studies that are still incomplete may be sufficient to proceed with exploration, provided that the decision is reversible should later results from the environmental studies show the decision unwise. More complete study results with higher confidence levels are necessary for assessment of the production phase. Further assessment in advance of successive sales in the same lease area will benefit from data derived from continuing study and monitoring effort following the first sale. With successive sales, the total impact in an area will increase, and refinement of earlier gross estimates of effects will be essential.

The study sequence calls for a survey of contaminants and biological elements to be commenced as soon as possible. The results of the surveys studies are to be used both as a baseline for the future and as input to design of site specific studies and specific ecosystem studies. These specific studies are determined after information is available on the probable location of impact from oil and gas development, as obtained from the ES, sale, and input from scenarios. Also needed in the design of ecological studies is the information obtained in the biological baseline studies on habitat dependence and population dynamics.

Hazards are emphasized very early in each lease area since the output is critical to the choice of tracts, to stipulations on drilling and production, and to siting and design of facilities. Ice nearshore is studied first because technology still needs to be developed for oil drilling in pack ice.

In order to provide data for BLM to assess probable impacts, the program requires source term information, transport data such as winds and currents, and data on environmental and socioeconomic effects. Initially the transport studies are conducted offshore to provide a context and boundary conditions for the later mesoscale and inshore work. Addition of inshore work is much more difficult and calls for a different combination of size and nature of platforms. The biological program also tends toward more emphasis on the inshore areas with time, although this is not shown explicitly in Figure 6-1.

The environmental effects studies consist of both laboratory and field work. The initial studies use acute toxicity exposures in order to better define the more susceptible species and mechanisms and thus give input to design of more realistic studies using chronic effects level exposures. The effects field work is of two types: ecological process studies and controlled perturbation experiments.

The ecological process studies are conducted using representative lease area ecosystems. They are designed to understand the impact resulting from the insults and perturbations caused by oil and gas development (these are not complete ecosystem studies, but are tailored according to the expected insults from the development). Both the ecosystem and the insults vary within and among lease areas, so that if funding permits there will be one or more of these studies for each lease area. Figure 6-1 shows a transition from emphasis on location of critical habitats toward emphasis on understanding effects on the scale of entire lease areas.

6.4 OCSEAP MANAGEMENT PLANNING

6.4.1 PLANNING

The draft Program Development Plan, FY 1975 - FY 1980 (usually referred to as the "Five Year Plan") outlined the environmental research plan for that period. After extensive discussion between BLM and NOAA, two types of planning documents were agreed upon. First, a new Program Development Plan (PDP) was prepared to describe the program goals and objectives, technical approach, and management plan for the program in general. Second, Technical Development Plans (TDP's) for each lease area have been prepared, each fiscal year describing, in detail, the work planned. The PDP was approved by BLM in December 1976 and since time did not permit the preparation of TDP's before the start of FY 77, research units were approved by BLM on an individual basis for FY 77. Work began in January on the TDP's for the FY 78 program, and these were approved on August 15, 1977. Draft TDP's for FY 79 were submitted to BLM on April 15, 1978. BLM comments on these TDP's is due June 15, and final agreement and approval is scheduled for August 15, 1978.

6.4.2 WORKSHOPS

A number of workshops have been sponsored by the Alaska OCS program. Workshops have greatly varied in format and purpose but were of two general types: the disciplinary workshops, such as chemistry, bird studies, or microbiology, brought together the PI's with staff scientists to discuss the content of the ongoing research and preliminary results, to arrange coordination and data exchange, and to solicit PI comments on future research and program management; planning workshops, such as the Bering Sea meeting and the Barrier Island Lagoon study meeting, discussed the scientific program content of future integrated research efforts. These workshops have provided an excellent opportunity for discussion and exchange of ideas as well as essential feedback to the program management staff. These workshops included:

WORKSHOPS

Disciplinary Workshops

All disciplines	5 Apr. 75
Hydrocarbons	9-10 Dec. 75
Birds	11-12 Dec. 75
Intertidal	13-14 Jan. 76
Intertidal	29-30 Mar. 76
Microbiology	10-11 Aug. 76
Physical Oceanography/Meteorology	13-15 Oct. 76
Birds	20-22 Oct. 76
Permafrost	5 Jan. 77
Chemistry	16-18 Feb. 77
Physical Oceanography/Meteorology	17-19 May 77
Chemistry Review	12-15 Sep. 77
Birds and Mammals Review	25-28 Oct. 77
Physical Oceanography/Meteorology Review	9-11 Nov. 77
Biological Effects Review	29 Nov. - 1 Dec. 77
Geology Review	30 Jan. - 3 Feb. 78
Fish, Benthos Review	17 Apr. - 21 Apr. 78

Planning Workshops

Barrier Island Lagoon Study	28-30 Jul. 76
Bering Sea Integrated Program	3-6 Oct. 76
Barrier Island Lagoon Study	3-5 Dec. 76
Lower Cook Inlet	8-10 Mar. 77
Barrier Island Lagoon Study	6-8 Apr. 77
Lower Cook Inlet Biological Coordination	7-11 Nov. 77
Barrier Island Lagoon Study	6-8 Dec. 77
Kodiak Integrated Program	30 Jan. 78

6.4.3 SYNTHESIS

Six synthesis meetings have been conducted which integrated disciplinary data for the particular lease areas in order to meet BLM decision-making needs and to provide inputs for future research. These meetings, attended by principal investigators, BLM personnel, OCSEAP management, and other scientists, concentrated on identification of key species, important processes and interactions in terms of possible impingement from oil and gas development. Such meetings provide a primary mechanism for arranging interdisciplinary interpretation of observed data. Draft reports summarizing results of proceedings were distributed to participants for their comments and corrections.

A special planning meeting was held coincidental with the Kodiak synthesis meeting to respond to a BLM request for a plan for an augmented lower Cook Inlet research program. Although the proposed plan was not funded in FY 77, many aspects of it were incorporated into the program plan for FY 78. The six synthesis meetings held were:

Synthesis Meetings

Lower Cook Inlet	16-18 Nov. 76
Northeast Gulf of Alaska (NEGOA)	11-13 Jan. 77
Beaufort Sea	7-11 Feb. 77
Kodiak	8-10 Mar. 77
Lower Cook Inlet	16-20 Jan. 78
Beaufort-Chukchi	23-27 Jan. 78

6.4.4 DATA MANAGEMENT AND ARCHIVAL

Data management is concerned with the quality of data collected, from the planning of data collection through the storage and archiving of data in a data base system that will support the requirements of users. The overall management and coordination of this portion of the program is provided by the Program Manager for data and information systems, located in the Program Office. Data managers for each Project Office are responsible for the timely flow of data from investigators and are the point of contact with the PI's on data management matters. The Environmental Data Service (EDS) of NOAA is the data center responsible for developing the data base and archiving appropriate environmental data resulting from OCSEAP. Each PI prepares his data in accordance with guidelines in the OCSEAP Principal Investigator's Handbook, and forwards the data on a periodic basis to the data manager in his Project Office. These data are then sent to EDS, which reviews the data and accompanying documentation and checks all data sets received for technical errors, validity and ranges, and agreement with the OCSEAP data format. Once acceptance, the data are archived. EDS services users' requests, which are channeled through OCSEAP, and provides products such as listing of available data, maps of specified parameters, and statistical analyses of data. The data synthesis and integration effort is outlined in Figure 6-2.

Since 1976 a number of data management objectives were met which contributed to improved data flow and data tracking. The OCSEAP data tracking system has been completed and is operational. The tracking information is distributed quarterly to BLM and OCSEAP data management personnel with more frequent distributions to the Juneau Project Office. A number of products derived from the system have been distributed to OCSEAP personnel including telephone lists, lists of overdue ROSCOP's (a form describing data collected) and data sets and submission summaries.

A pre-processing and processing facility was established in Anchorage to increase capabilities for editing data sets and handling of investigators' coded data. Of the 321 digital data sets in the OCSEAP data bank, 313 were received during this reporting period. Approximately 60 percent of the sets are biological data, over 30 percent are physical data, 5 percent are chemical data, and several geological data sets are included.

A summary of data sets, data reports and ROSCOP's received during the past year is as follows:

	Total	Apr-June 76	July-Sept 76	Oct-Dec 76	Jan-Mar 77
Data Sets*	313	20	54	175	64
Data Reports	117	23	21	40	33
ROSCOP's	196	19	37	108	32

*Total for data sets through March 15, 1977

Data requests have increased gradually, with emphasis changing from earlier requests for archival data to products from the OCSEAP data bank. A significant number of meteorological data requests were completed during the past year. Several data products resulting from BLM and OCSEAP office requests have been developed, including data inventories plotted on specific chart projections, formatted output listings for selected data file types, current meter summaries, water current rose plots, and products from the data tracking system.

The revised version of the taxonomic code has been completed. This code is used to provide a unique number designation for each marine species. Copies were distributed to OCSEAP and other OCS personnel, BLM offices, OCSEAP investigators and data processors, and other interested individuals. The new version contains over 16,000 numeric codes and is more comprehensive than earlier Alaskan codes.

Twenty-two new or modified versions of existing formats were distributed to OCSEAP investigators and other OCSEAP personnel. A copy of all codes used with OCSEAP formats was distributed to data management personnel during the third quarter, and one-page summaries for each format have been completed and forwarded to OCSEAP and BLM data management personnel.

In October 1977 the OCSEAP budget information computer system was brought on-line. This system provides up-to-date financial information to the OCSEAP staff to aid in program monitoring and management. A more sophisticated information system is being designed to aid in proposal and financial tracking. This system should be operational in October 1978.

6.5 OCSEAP PROGRAM

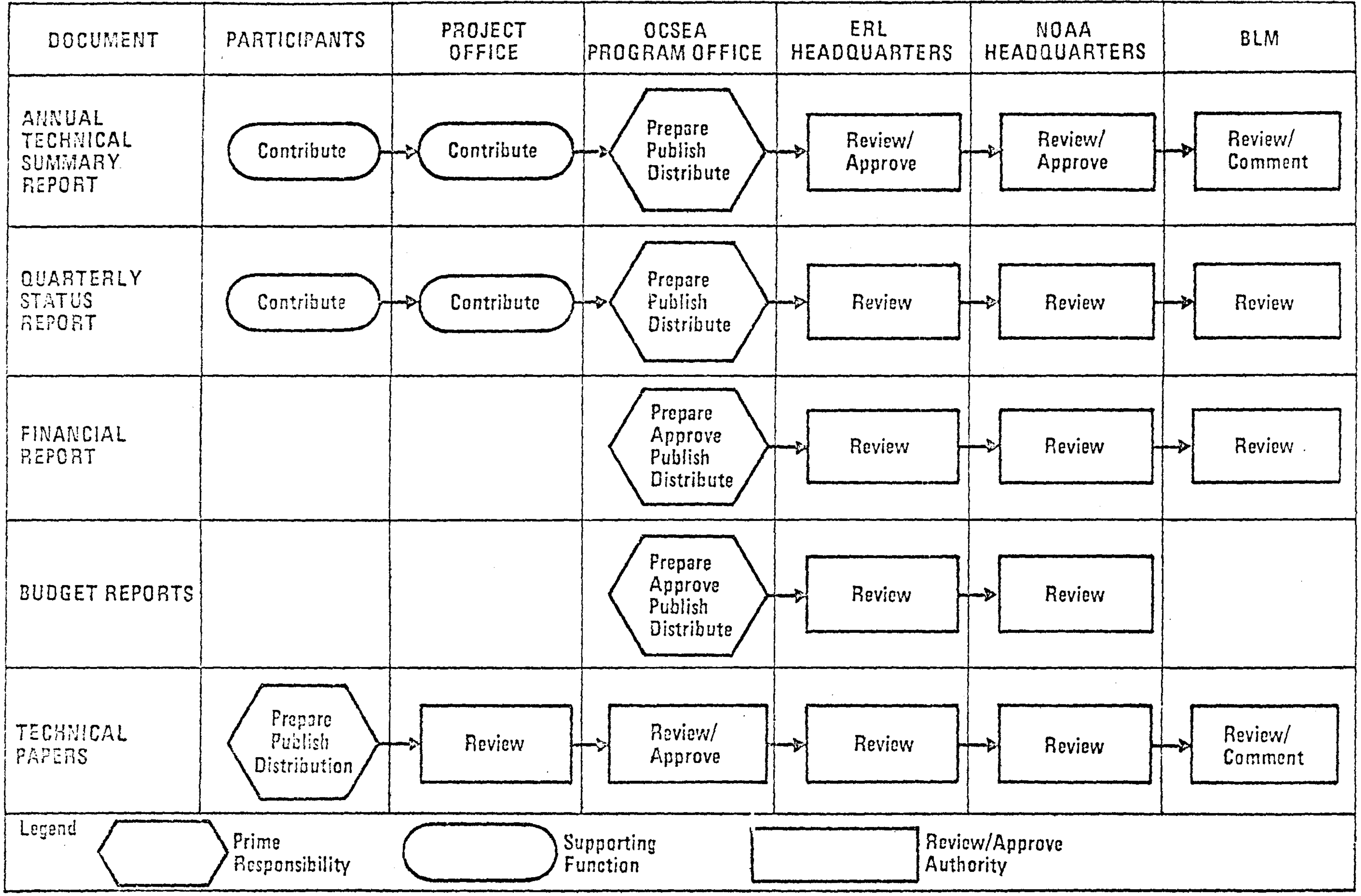
There are several categories of products being prepared by OCSEAP. In the first category are reports that are required to be submitted to BLM on a regular basis. These include PI Quarterly and Annual Reports, OCSEAP's Quarterly Status Report, and the Annual Technical and Executive Summary Reports. OCSEAP compiles the PI reports into volumes for publication, grouping them into categories. The Quarterly Status Report contains scientific highlights for the quarter, a report on data flow, operations summaries, and ship cruise reports. The Annual Technical Summary Report is based on PI Annual Reports and summarizes the information available in each lease area, attempting to give an overall picture of research status in the lease area. The Executive Summary Report contains highlights of the Annual Technical Summary Reports, emphasizing key issues and concerns in each lease area.

The second category of products includes reports, data products, and other materials prepared for BLM in response to their requests or as the result of special meetings. Reports from synthesis meetings are in this category, as are data products specified by BLM for use in preparing Environmental Statements or setting leasing stipulations.

The third category consists of the "deliverables" or "interim products," typically in the form of maps, charts, graphs, and models. These are hard, identifiable items produced from the data and from integration and correlations of the data from individual projects. These interim products are produced and provided to increasing resolution and specification in accord with the needs at successive decision points in the leasing schedule. As the program progresses, these are collated with accompanying text to produce updated and improved drafts of synthesis reports for each lease area. The types and scheduling of OCSEAP reports designated as deliverables under the Basic Agreement are shown in Figures 6-3 and 6-4.

Publications/Reports

In addition to program planning documents already referred to, a number of other publications have been prepared by BLM and/or OCSEAP:



DOCUMENT	PARTICIPANTS	PROJECT OFFICE	OCSEA PROGRAM OFFICE	ERL HEADQUARTERS	NOAA HEADQUARTERS	BLM
ANNUAL TECHNICAL SUMMARY REPORT	Contribute	Contribute	Prepare Publish Distribute	Review/ Approve	Review/ Approve	Review/ Comment
QUARTERLY STATUS REPORT	Contribute	Contribute	Prepare Publish Distribute	Review	Review	Review
FINANCIAL REPORT			Prepare Approve Publish Distribute	Review	Review	Review
BUDGET REPORTS			Prepare Approve Publish Distribute	Review	Review	
TECHNICAL PAPERS	Prepare Publish Distribution	Review	Review/ Approve	Review	Review	Review/ Comment

MANAGEMENT REPORTS RESPONSIBILITY

FIGURE 6-3

	DISTRIBUTION				
	BRANCH OF ENVIRONMENTAL STUDIES (733)	BRANCH OF CONTRACT OPERATIONS (551)	ALASKA OCS OFFICE	DEPT. OF INTERIOR, MAIN LIBRARY	DEPT. OF INTERIOR, ALASKA RESOURCE LIBRARY
ANNUAL TECHNICAL SUMMARY REPORT	10	Cover letter only	15	3	3
ANNUAL PRINCIPAL INVESTIGATOR REPORTS (unedited)	1	--	2	--	--
ANNUAL PRINCIPAL INVESTIGATOR REPORTS (edited)	2	Cover letter only	7	3	3
ANNUAL EXECUTIVE SUMMARY	10	1	25	3	3
QUARTERLY REPORTS	2	Cover letter only	5	--	--
TDP	2	1	7	--	--

BLM REPORT DISTRIBUTION

FIGURE 6-4

FY 76 Work Statements
FY 75 NEGOA Annual Technical Report Summary
PI Annual Reports (year ending March 31, 1976)
Annual Technical Summary Report '76 including
  Annual Executive Summary
PI Quarterly Reports (April - June 76)
PI Quarterly Reports (July - Sept. 76)
PI Quarterly Reports (Oct. - Dec. 76)
Quarterly Report to BLM (Jan. - Mar. 76)
Quarterly Report to BLM (April - June 76)
Quarterly Report to BLM (July - Sept. 76)
Quarterly Report to BLM (Oct. - Dec. 76)
BLM Baseline Studies Guideline/Rationale
Alaska OCS Principal Investigators' Annual Reports, 1977
Program Work Statements, 1977, Alaska OCS
An Assessment of the Demersal Fish and Invertebrate Resources of
  the NEGOA, Yakutat Bay to Cape Clear
A Gas Chromatographic-Mass Spectrometric-Computer Analysis of
  Hydrocarbons Associated with Zooplankton, Sediment, and Fuel
  Oils. Independent Laboratory Analysis (Quality Control)
  5 reports

The Western Gulf of Alaska, A Summary of Available Knowledge, 1974.

6.6 SOCIOECONOMIC STUDIES PROGRAM PRODUCTS

The following documents have been produced for Alaska OCS Socioeconomic Studies Program.

Title

First Annual Program Develop Plan
First Annual Synthesis of Findings (Executive Summary)

Literature Survey

Beaufort Sea Basin Petroleum Development Scenarios for the Federal Outer Continental Shelf: Interim Report

Prudhoe Bay Case Study

Baseline Studies: The Beaufort Sea Region: Interim Report

Beaufort Sea Petroleum Development Scenarios for the State-Federal and Federal Outer Continental Shelf

Beaufort Sea Region

Man-Made Environment

Beaufort Sea Region Sociocultural Systems

Beaufort Sea Region Natural Physical Environment

Beaufort Sea Region Socioeconomic Baseline

Anchorage Socioeconomic Baseline

Anchorage Impact Assessment

Alyeska-Fairbanks Case Study

Governance in the Beaufort Sea Petroleum Development Region

Forecast and Analysis of Population, Employment, and the Economy/Beaufort Sea Region

Assessment of the Man-Made Physical Environment/Beaufort Sea Region

Assessment of State/Regional Transportation/Beaufort Sea Region

Assessment of the Natural Physical Environment/Beaufort Sea Region

Assessment of Change in North Slope Sociocultural

Beaufort Sea Region Socioeconomic Impact Synthesis

Comparative Analysis of Selected Alaska Case Studies

Monitoring Petroleum Related Activities in Alaska

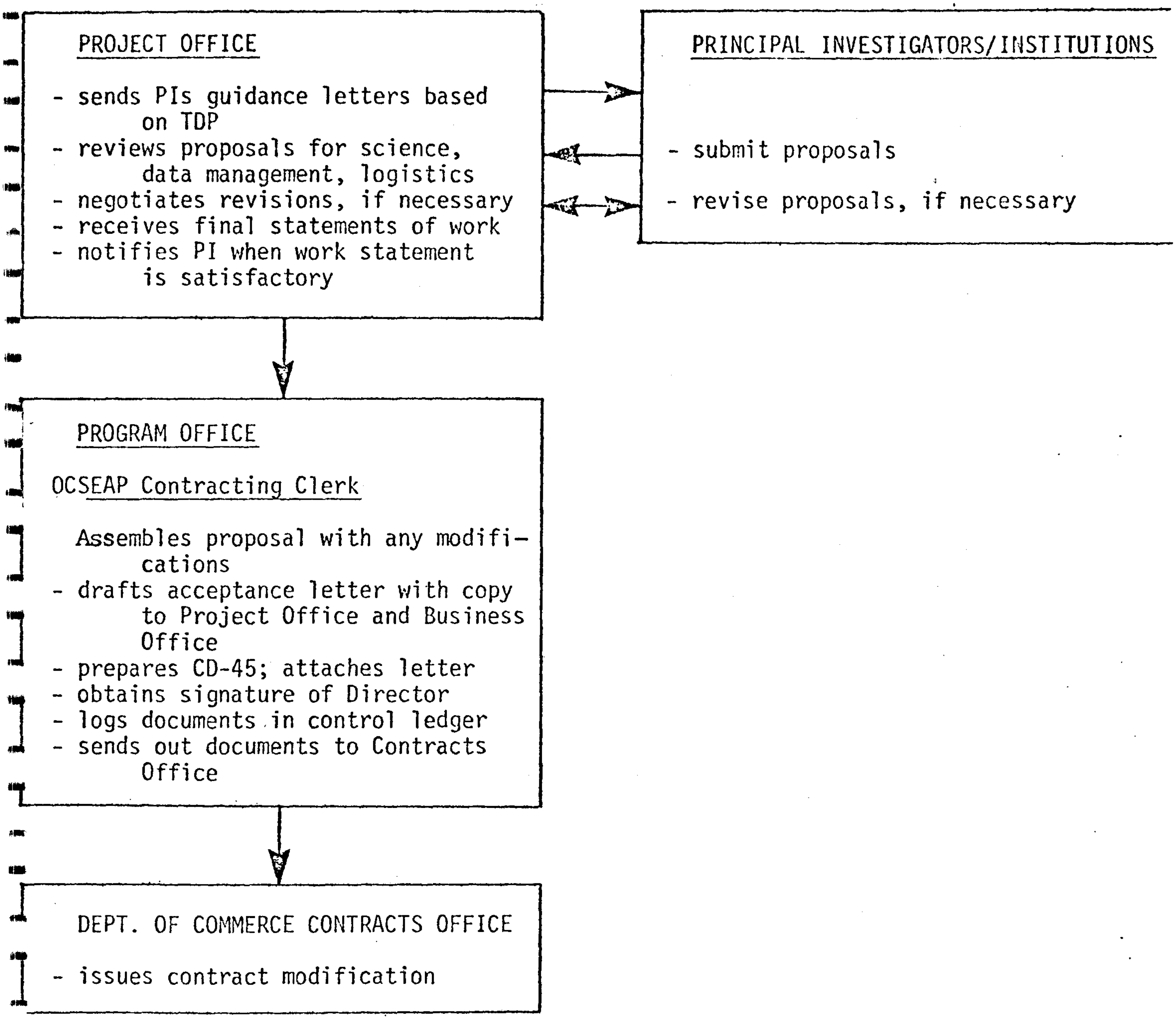
6.7 CONTRACTING PROCEDURE

6.7.1 ENVIRONMENTAL STUDIES PROGRAM

Specific research projects begin as the result of RFP's in an area that has been identified as requiring study, unsolicited proposals, or renewals of ongoing projects. When a need for work in a new geographic or disciplinary area is identified, an RFP is sent out (Figure 6-5). The proposals received through this process undergo

FIGURE 6-5

OCSEAP PROPOSAL PROCESSING -- RENEWAL PROPOSALS



PROJECT OFFICE

- sends PIs guidance letters based on TDP
- reviews proposals for science, data management, logistics
- negotiates revisions, if necessary
- receives final statements of work
- notifies PI when work statement is satisfactory

PRINCIPAL INVESTIGATORS/INSTITUTIONS

- submit proposals
- revise proposals, if necessary

PROGRAM OFFICE

OCSEAP Contracting Clerk

Assembles proposal with any modifications
- drafts acceptance letter with copy to Project Office and Business Office
- prepares CD-45; attaches letter
- obtains signature of Director
- logs documents in control ledger
- sends out documents to Contracts Office

DEPT. OF COMMERCE CONTRACTS OFFICE

- issues contract modification

a review by a panel of experts in the field as well as a Technical Proposal Evaluation Committee (BLM) or a Source Evaluation Board (OCSEAP) review prior to being funded. Unsolicited proposals (Figure 6-6) are carefully screened by a staff scientist and outside reviewers, as well as being reviewed and approved by OCSEAP and the BLM. The renewal proposals (Figure 6-7) are reviewed and altered, if necessary, to meet the changing requirements of the program, based on the criteria listed in the paragraph above. Emphasis may be on a different lease area than was studied the previous year, a different focus in the same lease area, or a different level of effort. As part of the proposal negotiation phase, a guidance letter is sent to the PI (see Table 6-1 - example guidance letter).

6.7.2 SOCIOECONOMIC STUDIES PROGRAM

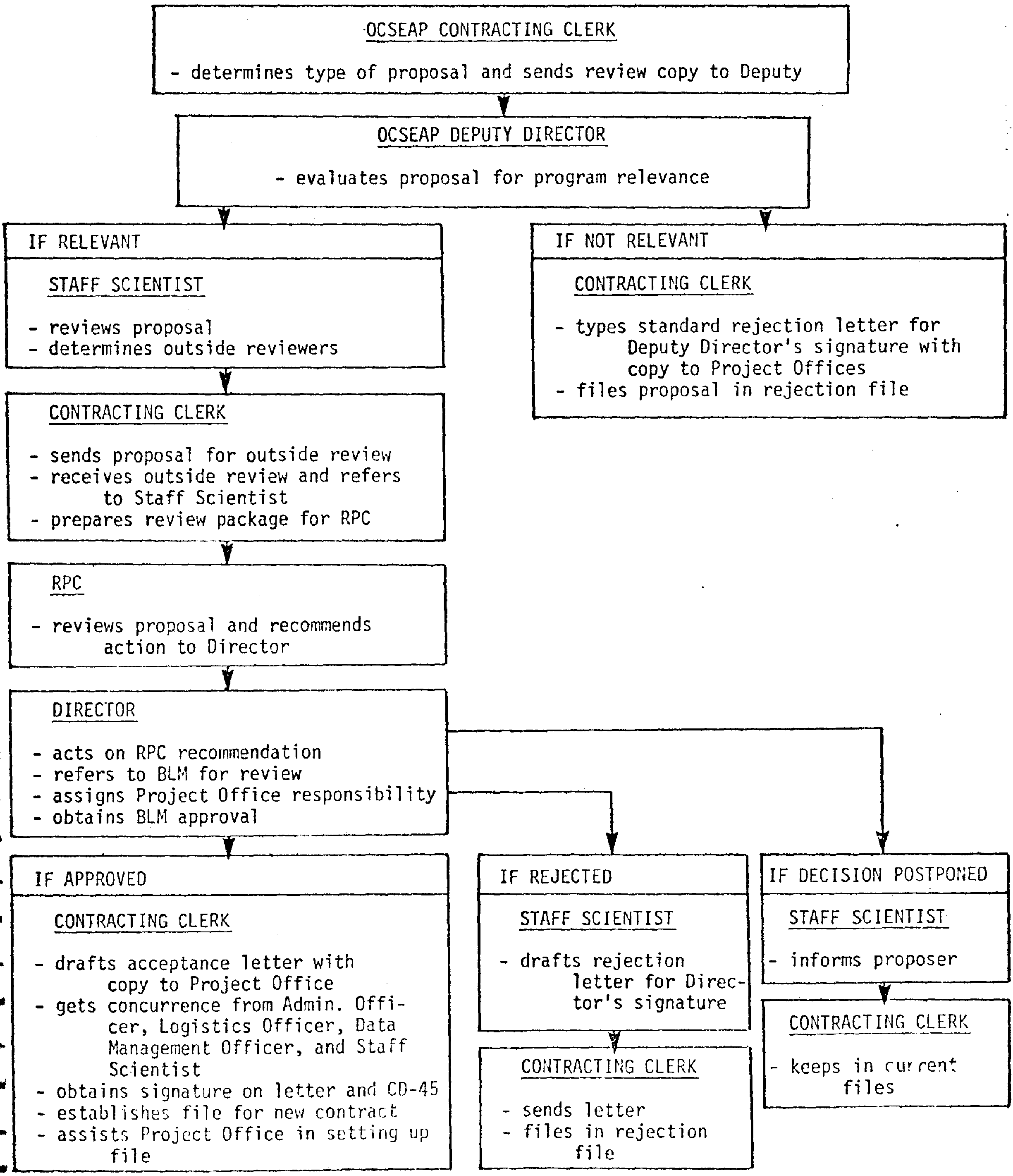
Specific research projects begin as a result of an RFP or a Statement of Work (SOW's). SOW's are either prepared by BLM or Peat, Marwick, Mitchell & Co. (PMM&Co.) at the request of BLM. All studies that are directly related to the socioeconomic studies program are contracted through PMM&Co. with subcontractors either sole sourced or RFP's issued. Some special studies are contracted, either sole source or by RFP, by the Alaska OCS Office, or the Contracting Offices of BLM, Washington, D.C.

6.8 OCSEAP RESEARCH MONITORING

An integral part of the OCSEAP management system revolves around the continuing process of research monitoring or "tracking." This involves the assignment of a specific OCSEAP staff scientist or "tracker" to each research project, usually long before the research actually begins. This scientist develops and maintains communications between the PI and the management staff on all aspects of the research effort. The tracker handles most proposal negotiations, data flow problems, logistics scheduling, and report processing, and periodically follows progress of each research unit guided by the Tracker's Checklist (Table 6-2). Normally, the

FIGURE 6-6

OCSEAP PROPOSAL PROCESSING - UNSOLICITED PROPOSALS



OCSEAP CONTRACTING CLERK

- determines type of proposal and sends review copy to Deputy

OCSEAP DEPUTY DIRECTOR

- evaluates proposal for program relevance

IF RELEVANT

STAFF SCIENTIST

- reviews proposal
- determines outside reviewers

CONTRACTING CLERK

- sends proposal for outside review
- receives outside review and refers to Staff Scientist
- prepares review package for RPC

RPC

- reviews proposal and recommends action to Director

DIRECTOR

- acts on RPC recommendation
- refers to BLM for review
- assigns Project Office responsibility
- obtains BLM approval

IF APPROVED

CONTRACTING CLERK

- drafts acceptance letter with copy to Project Office
- gets concurrence from Admin. Officer, Logistics Officer, Data Management Officer, and Staff Scientist
- obtains signature on letter and CD-45
- establishes file for new contract
- assists Project Office in setting up file

IF REJECTED

STAFF SCIENTIST

- drafts rejection letter for Director's signature

CONTRACTING CLERK

- sends letter
- files in rejection file

IF DECISION POSTPONED

STAFF SCIENTIST

- informs proposer

CONTRACTING CLERK

- keeps in current files

IF NOT RELEVANT

CONTRACTING CLERK

- types standard rejection letter for Deputy Director's signature with copy to Project Offices
- files proposal in rejection file

FIGURE 6-7

OCSEAP PROPOSAL PROCESSING – RFPs

DEPT. OF COMMERCE CONTRACTS OFFICE

- receives and acknowledges all proposals

OCSEAP CONTRACTING CLERK

- receives proposals for administration
- prepares proposals for Experts' Panel review

EXPERTS' PANEL REVIEW

- rates proposals

OCSEAP CONTRACTING CLERK

- prepares proposal packages for Source Evaluation Board (SEB) review

SEB REVIEW

- receives proposal evaluations
- prepares recommendations to Source Selection Official

SOURCE SELECTION OFFICIAL

- acts on recommendations of SEB (concur/non-concur)

DEPT. OF COMMERCE CONTRACTS OFFICE

- awards contracts
- issues official notification of selection/non-selection

OCSEAP CONTRACTING CLERK

- transmits completed file of SEB proceedings to Research Support Services
- sets up active research unit and contract files
- files nonselected proposal packages in RFP rejection file
- at SEB discretion sends OCSEAP acceptance/rejection letters
- notifies Project Office of new project to monitor and assists in setting up Project Office file

TABLE 6-1

EXAMPLE GUIDANCE LETTER TO A P.I.

Dr. ____________________
Agency
City
State
Zip code

Reference: OCSEAP Research Unit #____

Dear Dr. __________________:

At this time we are soliciting renewal proposals for the 1978 fiscal year, starting 1 October 1977 and ending 30 September 1978. Requests for these proposals are based on a Five Year Program Development Plan for the environmental assessment of the Alaskan continental shelf. This Plan has been developed by our Research Planning Committee.

We are inviting you, Mr. ____________________ and Dr. __________________ to submit a renewal proposal for FY78 for continued oceanographic studies in the Norton Sound and Chukchi Sea lease areas. Your proposal should include additional FY78 field studies in Norton Sound and the analysis and interpretation of data collected in Norton Sound and the Chukchi Sea during FY77. Because of the relatively low leasing priority in the Chukchi Sea, no additional field work is planned in this lease area during FY78.

The funding guidance for FY78 is $225,000, to be distributed between the Chukchi Sea and Norton Sound approximately as follows:

Chukchi Sea	33%
Norton Sound	67%

Field studies in the Norton Sound lease area during FY78 should include winter current and CTD observations in the St. Lawrence Island/Norton Sound region and within Norton Sound proper, since conditions during FY77 did not permit investigations of the hydrographic regime during winter ice cover.

Summer studies should include detailed hydrographic observations, Eulerian and Lagrangian current measurements, and satellite imagery to determine the circulation patterns and residence time within Norton Sound and to delineate the location, movement and frontal structure of the Yukon River discharge plume.

You should coordinate your FY78 field efforts and the analysis of FY77 data from Norton Sound with modeling studies to be conducted by Drs. ________________ and ________________ (Research Unit #___) to ensure that, to the extent practicable, your project will provide useful model input and calibration data.

Expected products from this research activity include:

1. Digital current meter, pressure gauge, and CTD data submitted to OCSEAP in approved-format, processed data types.

2. Narrative reports containing descriptions of measurement locations, measurement and analysis techniques, sampling frequency and duration; descriptions of regional hydrography, results of statistical analyses of current meter and pressure gauge records and, to the extent permitted by the study, a description of regional and nearshore circulation patterns.

3. The following visual data representations:

   - Time plots of filtered current meter and pressure gauge data showing both tidal and non-tidal velocity and pressure fluctuations.

   - Progressive vector diagrams.

   - Energy density spectra.

   - Plots showing coherence between wind, corrected sea level and currents.

   - Plots showing estimated return frequencies of selected extreme values of current, where record lengths permit.

   - Maps showing surface drifter trajectories.

   - Maps of horizontal salinity and temperature distribution at selected depths and isopycnal surfaces.

   - Maps of salinity, temperature, and density distributions on selected vertical sections.

   - Time series plots of vertical density and velocity profiles at selected anchor stations.

   - Satellite imagery photographs that elucidate key circulation features.

This year's proposal format is requesting information on future years' research efforts for those investigators who expect to continue into FY79 and beyond. We are asking for this additional information because: 1) we believe a better program will result when research can be viewed in a perspective longer than a single fiscal year; 2) we will be able to estimate future total program costs and the impact of different total budget levels; and 3) our information base will be improved for writing research plans for FY78. Please be assured that we are well aware of the uncertainties associated with environmental research, and that no future commitment is implied by your furnishing this information.

Please prepare your renewal proposal according to the enclosed guidelines and mail it to the ____________ Project Office in time for delivery no later than 15 June 1977. We expect to have letters of final decisions on all proposals mailed by 22 August 1977. If, in preparation of this renewal proposal, you have specific questions regarding this request or the guidance provided, please call or write the ________ Project Office. Your inquiry will be referred to a staff scientist for an immediate answer.

We have made our best estimate of what this project should accomplish during FY78 to meet BLM needs. However, we encourage you to bring to our attention specific aspects in which you feel that the above guidance might be modified or improved to enhance the overall scientific quality and output of the project. You should also keep in mind that OCSEAP must issue guidance and invite renewal proposals at this time in order to complete review and funding procedures before 1 October 1977. However, the schedule for BLM's final approval of the FY78 Technical Development Plans is 15 August 1977. Therefore, your comments on the above guidance will be useful in our coming discussions with BLM.

We would like to thank you for your contributions to OCSEAP and look forward to another year of cooperative effort.

Sincerely,

____

Project Manager, ____________ Project Office

Enclosures

cc: Program Office

TABLE 6-2

TRACKER'S CHECKLIST

Checklist of topics:

1. Principal Investigator's general evaluation of progress (overview).
2. Status of data management plan (definition of data, schedule, format, quality control, documentation).
3. Material and personnel (e.g. equipment obtained, personnel hired or trained, calibration accomplished).
4. Literature (e.g. literature reviewed; special literature searches accomplished; searches for archived documents, data, and materials).
5. Sampling (e.g. cruises made, stations visited, samples obtained).
6. Processing (e.g. samples or materials processed).
7. Data analyzed (list and describe).
8. Status of data destined for archives.
9. Results of analyses to date.
10. Actual or possible obstacles to contract completion according to schedule. Suggestions for alternative strategies.
11. Budgetary status of project.
12. Summary of progress toward targets of contract year (percent):
    a. Samples obtained.
    b. Samples processed.
    c. Samples analyzed.
    d. Data on cards or tape.
13. Special instructions for project guidance (e.g. formatting and organization of presentations of information and data; needed statistical treatments and tests; form and content of final products; special areas, relationships, or species of emphasis; course alterations due to developing gaps or changing concepts).
14. Monitor's views on project progress.
15. Other comments.

tracker consults with the researcher several times a year at synthesis workshops, disciplinary workshops, site visits, and PI visits to the Project Offices. Routine communication takes place by telephone in the interim. Trackers are responsible for monitoring the progress of their assigned research units, reviewing performance, quality control of data, and progress in meeting objectives of the research within the goals of OCSEAP. They also summarize the status and highlight scientific findings of each project quarterly and annually for use by the management staff and for inclusion in required status reports.

6.9 OCSEAP LOGISTICS PLANNING AND IMPLEMENTATION

Because of the remoteness, size, and harsh climate of the study area, logistics planning and implementation are integral factors in the success of the research program. Logistic requirements are projected one to two years, and logistics planning interacts constantly with both research programs and ship and aircraft scheduling. Annual operational plans are developed by the logistics officer within each Project Office. These plans are forwarded to the Program Office, where they are reviewed by the Logistics Coordinator to determine consistency with policy, feasibility, adequacy, and to identify required coordination for the program as a whole. The basis for developing the logistics plans are the TDP's and the logistics requirements questionnaires filled out by each PI. The plan submitted by each Project Office is a coordinated plan for all studies assigned to that office. These plans include a detailed schedule of events; integrated ship support requirements; integrated aircraft support requirements; integrated quarters and subsistence support requirements; identification and resolution of special problems; scheduled movement and deployment of personnel, equipment, ships, and aircraft; details, timing, and requirements for support facilities; identification of required funding and source; and contingency plans.

Implementation of project objectives is insured through methods such as the cruise instructions utilized on each ship cruise. Scientific objectives are stated, each sample type to be collected is described with methods for recording the data, equipment to be furnished is listed, and maps are provided of sampling locations. A Chief Scientist representing OCSEAP is present on cruises; he has the authority to revise or alter the technical portions of the cruise instructions, within established limits, as work progresses and problems arise, and he submits a report at the end of each cruise.

APPENDIX

BASIC AGREEMENT

Between

The Bureau of Land Management

and

The National Oceanic and Atmospheric Administration
AA550-BA7-4

I. Background

The Department of the Interior has initiated a broad program for the exploration and development of the energy resources contained within the outer continental shelves of our Nation as part of our Nation's program for achieving energy independance. The minimization of environmental risk is of paramount importance in the planning and conduct of this program. Legislative initiatives have prescribed authorities, responsibilities, and procedures pertaining to this program and have been implemented within the Department of the Interior and the Bureau of Land Management.

NOAA, as a result of its statutory responsibilities in marine resource assessment, and in coastal zone and resource management, has developed the necessary expertise and capabilities for conducting large scale marine environmental studies. The design and implementation of interdisciplinary scientific studies required to meet NOAA's on-going program requirements are directly applicable to the BLM environmental studies.

A. <u>Legislative Authority of BLM.</u> In 1953, the Outer Continental Shelf (OCS) Lands Act (67 Stat. 462) was passed establishing Federal jurisdiction over the submerged lands of the continental shelf seaward of State boundaries. The Act charged the Secretary of the Interior with the responsibility for the administration of the mineral exploration and development of the OCS. It also empowered the Secretary to formulate regulations so that the provisions of the Act might be met. In conjunction with this authority, the Department adopted three overall minerals management goals:

1. receipt of fair market value for the minerals leased;
2. orderly development of resources;
3. protection of the environment.

Subsequent to the passage of the OCS Lands Act of 1953, the Secretary of the Interior designated the Bureau of Land Management (BLM) as the administrative agency for leasing submerged Federal lands, and the Geological Survey for supervising production. The Bureau of Land Management was also designated by the Secretary as lead agency for all environmental actions pertaining to the development of the minerals resources of the OCS.

APPENDIX 1

The Submerged Lands Act (67 Stat. 29) set the inner limit of authority of the Federal Government by giving the coastal states jurisdiction over the mineral rights in the seabed and subsoil of submerged lands adjacent to their coastline out to a distance of three nautical miles. There are two exceptions, Texas and Gulf Coast of Florida, where jurisdiction extends to three (3) leagues based on terms for admission.

In 1969, the National Environmental Policy Act was implemented. This act required all Federal agencies to utilize a systematic, interdisciplinary approach that will insure the integrated use of the natural and social sciences in any planning and decision-making which may have an impact on man's environment.

Congressional Appropriations Bills give to BLM those monies required to carry out its required tasks. The BLM's marine environmental studies program has received funds identified as specific line items in FY 75, FY 76, and FY 77 budgets.

In addition to these Acts, there have been a number of other reports by The Council on Environmental Quality ("OCS and Gas An Environmental Assessment"), the Stratton Commission Report, National Academy of Sciences Studies, and others, that have recommended studies of this type be performed.

B. Legislative Authority of NOAA. NOAA likewise has responsibilities on the OCS under the following legislation: The Marine Protection Research, and Sanctuaries Act of 1972 addresses ocean dumping, comprehensive marine environmental research programs, and special protection to unique coastal areas. Title II, Section 202, of the Act assigns to the Secretary of Commerce (NOAA) responsibility for initiating comprehensive and continuing programs of research with respect to the possible long-range effects of pollution, overfishing, and offshore development activities.

Title III of the Act states that the Secretary of Commerce, (NOAA) after consultation with appropriate Federal and State departments and agencies, may designate as marine sanctuaries those coastal areas that he determines necessary for the purpose of preserving or restoring such areas for their conservation, recreational, ecological, or aesthetic values.

The Coastal Zone Management Act of 1972, administered by NOAA, addresses management of the Nation's coastal zone in a coordinated and uniform basis. The Act declares that it is national policy to preserve, protect, develop and, wherever possible, to restore or enhance the resources of the Nation's coastal zone for this and succeeding generations. The objectives of the Act are: (1) to encourage and assist the States to develop and implement coastal zone management programs; (2) to foster Federal-State cooperation and joint participation in effectuating the purposes of the Act; and (3) to promote broad participation in the development of State coastal zone management programs.

Amended in 1976, it provides for financial assistance to coastal states to study, plan for, manage, and control the impact of energy resource development and production affecting the coastal zone. The Marine Mammal Protection Act of 1972 limits the taking of marine mammals. The Secretary of Commerce or the Secretary of the Interior, depending on the species, may waive this prohibition only if he receives scientific evidence that the waiver would not endanger the species to be taken. The legislation has for its primary purpose the protection and preservation of mammals in order to maintain the health and stability of the marine ecosystem as a whole.

The special Energy Research and Development Act of 1975, provided for the reactivation of three NOAA vessels "...for the purpose of conducting surveys, investigations and research connected with the environmental effects of offshore energy-related activities." Specifically, all government agencies are to give preference to the use of these vessels in conducting environmental assessment studies in connection with OCS energy development.

C. BLM Environmental Program Objectives. To satisfy the requirements of these acts, the BLM laid out broad program objectives for leasing and impact analyses. The objectives for the environmental aspects of the program are:

1. to provide information about the OCS environment that will enable the Department and the Bureau to make sound management decisions regarding the development of mineral resources on the Federal OCS;

2. to acquire information which will enable BLM to identify those aspects of the environment which might be impacted by oil and gas exploration and development;

3. to establish a basis for prediction of impact on the environment of OCS oil and gas activities; and

4. to acquire impact data that may result in modification of leasing regulations, operating regulations, or OCS operating orders to permit more efficient resource recovery with maximum environmental protection.

D. Aspects of the BLM Environmental Impact Assessment Programs. The BLM efforts in fulfillment of the program objectives are Environmental Impact Statemdnts (EIS), environmental assessment teams, environmental studies, literature surveys, socio-economic studies, public conferences on problems affecting man's environment, special studies that contribute to an understanding of the processes affecting this environment, the establishment of environmental baselines, and programs for monitoring operational impacts.

E. Implementation of OCS Environmental Programs. The BLM implements its OCS environmental programs through in-house efforts, cooperative agreements with States and Federal agencies, and contracts with States, Federal agencies, and the private sector.

II. Purpose

This document sets forth the agreement between the National Oceanic and Atmospheric Administration (NOAA) and the Bureau of Land Management (BLM) for the design, management, and conduct of a program of marine environmental data acquisition and analysis in the Alaskan continental shelf areas identified by the BLM for oil and gas exploration.

III. Objectives

NOAA agrees to design, manage, and conduct an interdisciplinary program of applied sciences for the Alaska continental shelf which will be directed toward fulfilling the tasks listed below:

A. Determination of the pre-development distribution and concentration of potential contaminants commonly associated with oil and gas development.

B. Identification and estimation of the potential hazards posed by the environment to petroleum exploration and development.

C. Determination of the ways in which contaminant discharges move through the environment and how they are altered by physical, chemical and biological processes.

D. Determination and characterization of the biological populations and ecological systems that are subject to impact from petroleum exploration and development.

E. Determination of the effects of hydrocarbon and trace element contaminants on individuals, populations, and ecological systems.

Such a program will optimize the synoptic interdisciplinary acquisitions of data and insure the scientific integrity of the interdisciplinary nature of these data.

IV. Scope

A. Program Development Plan. The Program Development Plan (PDP), entitled "Environmental Assessment of the Alaskan Continental Shelf" dated December 1976 shall serve as the basic operating document for the marine environmental studies program to be carried out under the authority of this Agreement. Changes made in the PDP must be agreed to by both agencies. Ambiguities or contradictions between the PDP and this agreement shall be resolved by the language of this agreement.

B. Technical Development Plans. A set of Technical Development Plans (TDPs) shall be developed annually by NOAA based on funding guidance and priorities provided by BLM. A separate TDP shall be developed for non-area-specific studies and for each Alaskan Outer Continental Shelf lease area which shall describe the scope of the annual program.

C. Physical Area. The NOAA will conduct its investigations in relation to the following marine areas of Alaska:

1) Northeastern Gulf of Alaska
2) Western Gulf of Alaska
3) Lower Cook Inlet
4) Outer Bristol Basin
5) Bering Sea (St. George)
6) Bering Sea (Norton Basin)
7) Chukchi Sea (Hope Basin)
8) Beaufort Sea
9) Gulf of Alaska (Aleutian Shelf)

And such other areas as may be agreed to by BLM and NOAA.

D. Exclusions. Several aspects of the total scope of the BLM's OCS environmental program for Alaska are retained for in-house management and are not included within the scope of this Basic Agreement. These items are the preparation of environmental assessment statements, all social science studies and assessments, development scenarios, regulatory scenarios, on-shore facilities impact studies, site-specific monitoring, and basic research. No BLM funds may be expended for any of the excluded activities under this Basic Agreement unless specifically approved in advance by the Designated Officer.

This exclusion in no way prohibits NOAA from conducting any such activities with other than BLM funds, recognizing NOAA's statutory responsibilities in resource and coastal zone management.

V. Responsibilities

A. BLM. The BLM has the responsibility for providing program policy, priorities, and scope of work. The BLM has an obligation to insure that NOAA is kept informed as to those significant matters which affect NOAA's activities under this agreement, such as, BLM budget estimates for the Alaska OCS Marine Environmental Program, priorities among lease sale areas, types and timing of information needed within each area, long-range program guidelines, and current official leasing information. BLM shall keep NOAA informed as to its internal management of this effort in terms of structure, authority, responsibility, lines of communication, and coordination.

B. NOAA. The NOAA is responsible within the limitations of this document and the PDP, for the scientific design of the program, the initiatio of all aspects of the work, the timely accomplishment of the effort, and the scientific validity of the findings. NOAA shall keep the BLM informed as to its internal management of this effort in terms of structure, authority, responsibility, lines of communication, and coordination.

VI. Funds.

The BLM funds are annual operating appropriations and by legislative intent and history are for gathering of data on the continental shelf. The funds must be obligated within the fiscal year in which they are appropriated.

VIII. Program administration

A. Program Management.

1. NOAA and BLM agree that the management of this highly complex program is a major undertaking and requires the establishment of a program oriented approach to management. The management scheme should be formalized in terms of its structure, information base, and controls. The parties agree that a formal structure which describes the functions, responsibilities, and authority of key personnel at all levels as well as the flow of information and lines of communication comprise an essential element of the scheme. Standard procedures for acquiring information which will enable managers at all levels to function effectively are a key element of the management scheme. Cost and technical performance data can best be acquired by the application of systematic procedures for estimating, budgeting, monitoring (interim milestones for cost and performance), reporting, and cost identification to the lowest level of supervised work. The identification of the relationship of each unit of work to all others is critical information if the allocation of resources by managers to problem solving is to optimize program performance. The management scheme will procedurally address all aspects of the program which require special attention or control in order to insure the scientific integrity and quality of all data developed in the light of the purposes for which the data were developed. The identification and control of factors which insure the scientific integrity of the interdisciplinary aspects of the program is considered significant.

2. NOAA agrees to develop procedures for identifying and predicting variance from the budgeted cost for each of the scientific sub-tasks contained in the approved TDP's. The procedures must be capable of predicting and reporting a program underrun annually on or before June 30th to the BLM Designated Officer.

3. NOAA agrees to maintain a program office with complete program overview and direction. The Program Director shall be located in this office and shall not be assigned or assume any other responsibilities which may detract from his/her ability to manage this program.

B. Solicitation, Contracts, and Agreements. NOAA agrees to provide the BLM with copies of all proposal solicitations, contracts, and agreements which are to be funded in whole or in part by BLM funds.

C. Changes.

1. BLM Directed Changes.

a. The Designated BLM Officer may, at any time, after consultation with the NOAA Program Director, by written order designated or indicated to be a change order, make any change in the work within the general scope of the Interagency Agreements in any one or more of the following:

(1) in the specifications;

(2) in the method or manner of performance of the work;

(3) in the place of inspection, delivery, or acceptance.

b. Any other written order from the Designated Officer, which causes any such change, shall be treated as a change order under this clause, provided that NOAA gives the Designated Officer written notice within thirty (30) calendar days stating the date, circumstances, and source of the order and that NOAA regards the order as a change order.

c. Except as herein provided, no order, statement, or conduct of the Designated Officer shall be treated as a change under this clause or entitle the NOAA to an equitable adjustment hereunder.

d. If any change under this clause causes an increase or decrease in NOAA's cost of, or the time required for, the performance of any part of the work under any Interagency Agreement, whether or not changed by any order, an equitable adjustment shall be made and the Interagency Agreement modified in writing accordingly.

e. NOAA will respond with an assessment of the impacts of directed changes on the adequacy of the technical program within 14 calendar days. If NOAA intends to assert a claim for an equitable adjustment under this clause, they must, within 30 calendar days after receipt of a written change order under a. above, or the the furnishing of a written notice under b. above, submit to the Designated Officer a written statement setting forth the general nature and estimated monetary extent of such a claim, unless this period is extended by the BLM. The statement of claim hereunder may be included in the notice under b. above.

f. The BLM shall, prior to the issuance of change orders hereunder, notify the NOAA Program Office of the scope and extent of all change orders and shall discuss the impact of such changes on the overall program. In the event the BLM issues a change under the provisions of this clause which cannot be accomplished by NOAA because of manpower ceilings, funding, or other causes beyond NOAA's control, NOAA shall immediately notify the Designated Officer that the change cannot be accepted and the reasons therefore.

2. NOAA Initiated Changes. NOAA may make changes to NOAA initiated contracts or Interagency Agreements which changes do not change the general scope and objectives for that research unit as approved

in the TDP without the prior approval of the BLM whenever the total dollar effect of any such change does not exceed 30% of the approved TDP budget for that research unit. The total dollar effect shall be calculated by adding the estimated cost of the deleted work to the estimated cost of the added work. All other technical and budget changes require the prior consent of the BLM Designated Officer. This clause shall not be construed to authorize obligations greater than the total amount transferred by BLM to NOAA on any Interagency Agreement.

D. Reports of Work. NOAA agrees to provide reports of work in addition to those specified in the PDP as deemed necessary by the BLM Designated Officer. An equitable adjustment in cost and schedule shall be made.

E. Inspection. The BLM, through authorized representatives, has the right at all reasonable times, to inspect, or otherwise evaluate the work performed or being performed hereunder and the premises in which it is being performed. If any inspection, or evaluation is made by the BLM on the premises of the NOAA, contractor, or other Federal participants, the NOAA shall provide and shall require its contractors to provide all reasonable facilities and assistance for the safety and convenience of the BLM representatives in the performance of their duties. All inspections and evaluations shall be performed in such a manner as will not unduly delay the work. The BLM representatives shall respect the privy of contract between NOAA and its contractors. The DOAR shall give prior notification to Program Manager of all inspections.

IX. Program Review

NOAA agrees to perform or cause to be performed reviews and/or evaluations, in addition to those reviews and/or evaluations specified in the PDP, of aspects of the program being conducted by NOAA when requested to do so by the BLM Associate Director. An equitable adjustment shall be made in cost and schedule.

X. Coordination

NOAA shall, at the request of the BLM Assistant Director for Minerals Management, prepare briefings on the program. Coordination with the OCSESAC regarding the Alaska OCS Marine Environmental Program shall be through the BLM. This includes requests for review, comment, or any other advice on the program. This shall in no way abrogate any rights or responsibilities of the NOAA in their role as a member of the OCSESAC. Both agencies will keep each other advised concerning presentations to third parties which have implications with regard to the studies or policy related to the Alaska OCS Marine Environmental Program.

XI. Data

A. Data Rights. Unlimited rights to all data acquired wholly or partially with BLM funds shall be reserved to the BLM unless the prior written consent of the BLM Designated Officer is obtained for the acquisition of limited rights. The unlimited right to the possession of the original form of the data shall be similarily reserved to the BLM. Data is defined as recorded information regardless of form or character, of a scientific or technical nature. It may, for example, document research, experimental, development or engineering work; or be usable or used to define a design or process to procure, produce, support, maintain, or operate material. The data may be graphic or pictoral delineations in media such as drawings or photographs; text in specifications or related performance or design type documents; in machine forms, such as punched cards, magnetic tape, computer printouts; or may be retained in computer memory. Examples of technical data include research and engineering data, engineering drawings and associated lists, specifications, standards, process sheets, manuals, technical reports, catalog item identifications, and related information.

The BLM, or its authorized representatives, shall have the right to request any data or information, the acquisition of which was funded by BLM funds, either in the central repository or in the hands of investigators.

B. Data Archival. NOAA shall develop and maintain a system for cataloging, storing, and preserving all original data in a manner which will insure its ready retrieval and use. NOAA and all participating organizations shall have unrestricted use of all such data unless it has been specifically excluded from public disclosure.

All data will be formatted and transmitted to the Environmental Data Service or other appropriate data archives as determined by BLM, for cataloging, indexing and archiving in accordance with the data management portion of the approved PDP.

XII. Publications

All publications or presentations of or pertaining to technical or scientific data developed under BLM funds shall acknowledge BLM sponsorship and be submitted to the BLM at least sixty (60) days prior to its release. The release of such information within a period less than sixty (60) days shall be made only with the prior written consent of the BLM Designated Officer.

XIII. News Release

Each agency shall apprise the other prior to release to the news media of any news release pertaining to any aspect of this program.

A Technical Development Plan (TDP) shall be prepared by NOAA for each Alaskan Outer Continental Shelf lease area and a separate TDP for a program of non-area-specific studies. The plans shall be submitted to BLM annually for approval in accordance with the approved PDP. The TDP's shall describe each Research Unit or sub-task in sufficient detail to enable the BLM to evaluate the relevance and value of each element to BLM objectives. The level of expenditures for each element of the program, logistics, management, and the schedule for accomplishing each element of work shall be discussed. Approval of TDP's will be accomplished by the preparation and signing of Interagency Agreements which incorporate the approved TDP's and authorize the initiation of work contingent upon the availability of funds. When funds are appropriated and available, the Interagency Agreement's will be modified to authorize the transfer of funds. The parties agree that no work, procurement or interagency agreements shall be initiated by NOAA prior to approval of the TDP except by mutual agreement.

A. Implementation. The parties agree that NOAA is responsible for all delegations of work required to implement approved TDP's and that the following regulations and statements of executive policy are applicable:

1. Federal Procurement Regulations. The provisions of this regulation shall apply to all contracts with States and the private sector.

2. Economy Act, 31 U.S.C. 686. The provisions of this act shall apply to all work contracted to another Federal agency.

3. OMB Circular A-76. The provisions of this document shall apply to all work performed by NOAA which falls within the provisions of the document.

4. OMB Circular A-101. The provisions of this document apply to contracts with educational and non-profit research institutions.

5. OMB Circular A-109. The provisions of this document shall apply to the description of requirements except when the BLM or the NOAA determines that a policy for stating certain requirements in specific "how to" terms is essential to the achievement of program objectives.

B. BLM Review Period. The NOAA shall submit to the BLM ten (10) copies of each TDP for the BLM review and approval. The BLM shall review each TDP within sixty (60) days after receipt. The submission of TDPs shall be accompanied by the submission of unedited Annual Principal Investigator Reports for the applicable areas. Copies of the TDP shall be distributed as follows: two (2) copies to BLM (733), one (1) copy to BLM (551), and seven (7) copies to the Alaska OCS office. Copies of the unedited Annual Principal Investigator Reports shall be distributed as follows: two (2) copies to the Alaska OCS Office and one (1) copy to BLM (733).

F. Program Schedule:

January 5	BLM provides NOAA with initial funding guidance of program level for planning for next fiscal year. It will be based on Presidential Budget submitted to Congress.
February 20	Quarterly Status Report submitted to BLM with Quarterly Progress Reports of Principal Investigators.
April 15	Draft TDP's submitted to BLM with Annual Principal Investigators reports.
May 20	Quarterly Status Report submitted to BLM.
** June 15	BLM provides NOAA with a statement of comments and recommendations on each TDP.
July 30	Final TDPs are transmitted to BLM.
August 1	Annual Technical Summary Report submitted by NOAA to BLM. Edited Annual Progress Reports of Principal Investigators submitted to BLM.
August 15	BLM shall provide NOAA with information concerning the program funding level for the following fiscal year based on BLM appropriation legislation, and approving final TDPs by preparation and signing of Interagency Agreements.
August 20	Quarterly Status Report submitted to BLM with Quarterly Progress Reports of Principal Investigators.
October 1	Interagency Agreement modification providing funds.
November 20	Quarterly Status Report submitted to BLM with Quarterly Progress Reports of Principal Investigators.
** December 1	BLM provided NOAA statement of desired program direction, priorities among lease sale areas, types and timing of information needed within each area, tentative budget guidance, and any other pertinent information that will aid NOAA in its program planning for the following fiscal year.

** Within two weeks, BLM and NOAA will meet for amplification of guidance and/or resolution of issues, as requried.

XIV. Statutory Responsibility

Nothing contained in this Agreement shall abrogate the statutory responsibilities or authorities of either agency signatory to this agreement.

XV. Termination

Either the BLM or the NOAA may terminate this Agreement by giving thirty (30) days written notice to the other. NOAA agrees to assist the BLM during the transition period when BLM assumes management of the contracts and agreements funded under authority of this Agreement. BLM agrees to reimburse NOAA for costs incurred during the transition. This hereby terminates Basic Agreement 03550-IA5-18.

XVI. Points of Contact

The NOAA Designated Officer is the Director, Environmental Research Laboratory.

The BLM Designated Officer is the Contracting Officer for the Alaska Continental Shelf Office.

U.S. Department of Commerce
National Oceanic and
Atmospheric Administration

David H. Wallace

David H. Wallace
Associate Administrator
for Marine Resources

JAN 12 1977

Date

U.S. Department of the Interior
Bureau of Land Management

Frank A. Edwards

Frank A. Edwards
Assistant Director, Minerals Managemen

Jan. 12, 1977

Date