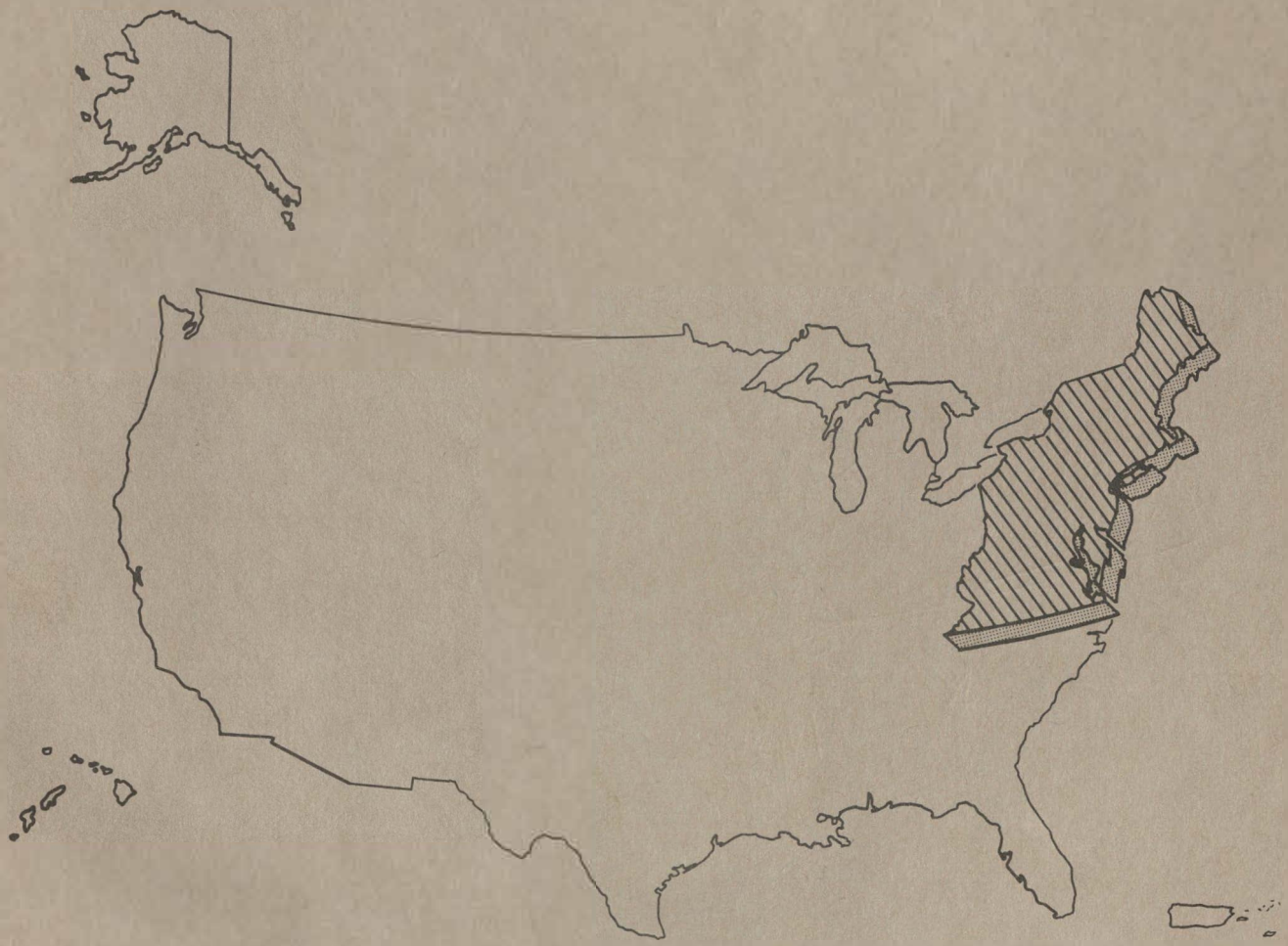
Report of North and Mid Atlantic Region Conference on Marine Pollution Problems

Durham, N.H., June 11-13, 1980



September, 1980

Chairman's Statement

The National Ocean Pollution Planning Act of 1978 requires the Federal Government to identify national needs and priorities for for ocean pollution research, development, and mointoring as part of the continuing planning process. This report is one of five regional assessments of ocean pollution problems, information needs, and recommended priorities for action. The observations and conclusions in this report do not necessarily reflect the policies or programs of the U.S. Government. They constitute, however, a vital input to the Federal planning process, and together with the missions and mandates of 11 Federal agencies will provide the base for preparing the second Federal plan for the National Ocean Polution Planning Act. The contribution of all of those who participated in the regional conference that led to this report is gratefully acknowledged.

James P. Walsh, Chairman
Interagency Committee on Ocean Pollution
Research, Development, and Monitoring

National Marine Pollution Program Office

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Report of North and Mid Atlantic Region Conference on Marine Pollution Problems

Durham, N.H., June 11-13, 1980

Prepared for:

Interagency Committee on Ocean Pollution Research, Development and Monitoring

Federal Coordinating Council for Science, Engineering, and Technology

By:

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Working Paper No. 5: Federal Plan For Ocean Pollution Research, Development and Monitoring, FY 1981-1985

September, 1980

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PREFACE

In May 1978, President Carter signed Public Law 95-273, the National Ocean Pollution Research and Development and Monitoring Planning Act of 1978 (the Act). The Act requires that the Executive Branch "establish a comprehensive 5-year plan for Federal ocean pollution research and development and monitoring programs in order to provide planning for, coordination of, and dissemination of information with respect to such programs within the Federal Government." The first Federal 5-year plan, covering fiscal years 1979-1983, was completed following a national workshop and published in August 1979. The Act further mandates biennial update and revision of the Plan, with the second Federal 5-year plan due February 15, 1981, covering fiscal year 1981-1985.

The first Federal Plan analyzed the ocean pollution problem from a regional perspective as well as with regard to key pollutants and causes of marine pollution. The regional perspective proved to be a vital means for focusing abstract ideas of necessary research, development, and monitoring activities onto real-world marine pollution needs and problems. However, the statements of regional needs and problems in ocean pollution contained in the first Federal Plan were developed by Federal experts. While these statements were given non-federal review before they were incorporated into the Plan, that review was not conducted at the regional level. Therefore, in preparing the second Federal Plan, NOAA's National Marine Pollution Program Office has succeeded in substantially increasing the level of regional participation through a series of regional conferences held in early summer, 1980. This report is the product of the North and Mid-Atlantic Regional Conference on Ocean Pollution Research, Development and Monitoring, organized and conducted by the MIT Sea Grant College Program at the New England Center in Durham, New Hampshire, June 10-13, 1980.

The North and Mid-Atlantic Region encompasses the coastal areas, including the continental shelf, of the United States from the U.S.-Canadian border in Maine south to the Virginia-North Carolina border. The conference sought to bring together the spectrum and cross section of experts and interested citizens from industry, academia, state and local governments, regional federal agencies, environmental and conservation organizations, and the public interest groups with as balanced a geographical distribution as practicable.

Using a variety of background information provided to participants prior to the Conference and drawing heavily on individual expertise, the Conference was organized into five working panels: Coastal Land Use Practices and Recreation, Marine Energy, Marine Mineral Resources, Marine Transportation, and Marine Waste Disposal. Each panel was then required to accomplish four objectives:

- o Develop a series of statements defining significant marine pollution problems within the region.
- o Identify the related set of information and/or data needs required to deal with each problem area and which can be met through ocean pollution research, development and monitoring.
- o Recommend the priority in which the sets of information/data needs should be met.
- o Provide a justification (rationale) for the priority order assigned to the sets of information/data needs.

The panel chairmen in joint session and the conference plenary session established the final integrated priority list of problem/issue statements The panel chairmen then prepared a summary report of their panel deliberations, conclusions and recommendations (see Section 4 for details). Using all available data, but depending primarily on the panel chairman's reports, the first draft of the conference report was prepared and submitted for review according to the following plan established at the conference final plenary session:

Draft copies were sent to each panel chairman, to each conference steering committee member who attended the conference, and to each conferee who requested, in writing prior to 11 July, to review the draft report.

Following receipt of review comments up to and including the 14 August deadline, the draft report was revised in a special meeting of the panel chairmen with the conference chairman, the conference coordinator, and the conference report editor. This final report has considered and incorporated as appropriate all reviewer comments. Each reviewer has been advised of the action taken and has been invited, along with all readers, to comment on this final version directly to the Director, National Marine Pollution Program Office (NMPPO), NOAA, US Department of Commerce, 6010 Executive Blvd., Rockville, MD 20852. Dissenting opinions received by NMPPO prior to final publication will be considered for inclusion in the report as Appendix D.

Preliminary copies of this final report have been sent to each registered conference attendee. The original and five copies of this final report are submitted herewith in completion of the MIT Sea Grant College Program's obligation and commitment to organize, conduct and report on the subject conference.

I certify that we have accurately and faithfully reported the deliberations, conclusions and recommendations of the conferees to the best of our ability. I also request and expect that this product of the intensive and dedicated efforts of these citizens and interest representatives will be received and incorporated as a valuable regional input to the next Federal 5-year plan.

29 August 1980

Dean A. Horn
Director, MIT Sea Grant College Program
Conference Chairman

1.0 EXECUTIVE SUMMARY

1.1 Introduction

The National Ocean Pollution Research, Development, and Monitoring Planning Act of 1978, Public Law 95-273 (the Act) names the National Oceanic and Atmospheric Administration (NOAA) as lead agency for developing a comprehensive plan for Federal ocean pollution research, development, and monitoring activities. Section 4 of the Act mandates that the Plan contain a statement of National problems related to ocean pollution, an identification of the information necessary to deal with those problems, an assessment of the priority in which ocean pollution research, development and monitoring activities should be undertaken to meet those information needs, and an analysis of the extent to which existing and planned Federal programs will assist in meeting identified priorities. Finally, Section 4 requires that the Plan contain recommendations for changes in Federal ocean pollution research, development, and monitoring programs where necessary to better address assigned priorities.

To assist the Administrator of NOAA in carrying out his responsibliites under the Act, the President's Science Advisor chartered the Interagency Committee on Ocean Pollution Research, Development, and Monitoring (COPRDM) as a standing committee of the Federal Coordinating Council for Science, Engineering, and Technology. The COPRDM, made up of senior representatives of the federal departments and agencies involved in ocean pollution research, development, and monitoring, is chaired by NOAA's deputy administrator.

Recognizing that the responsibilities of NOAA and the Interagency Committee would require a significant amount of staff support, the NOAA Administrator has established the National Marine Pollution Program Office (NMPPO) to assist the Chairman in ensuring implementation of the recommendations contained in the first and subsequent Federal Plans and in preparing future Federal Plans. This office, which is in NOAA's Office of Policy and Planning, is staffed by a number of NOAA professionals as well as full time representatives of several of the other Federal agencies with major involvement in ocean pollution research, development, and monitoring.

Each Federal Plan is required by the Act to cover a period of five fiscal years. The first Plan, issued in December 1979, covers fiscal years 1979-83. The Act mandates biennial update and revision of the Plan, with the second Plan due February 15, 1981.

The first Federal Plan analyzed the ocean pollution problem from a regional perspective as well as with regard to key pollutants and causes of marine pollution. The statements of regional marine pollution problems and information needs were developed by Federal experts and were given non-Federal review before they were incorporated into the Plan. However, that review was not conducted at the regional level. In spite of these limitations, the regional perspective proved to be a vital means for focusing abstract ideas of necessary research, development, and monitoring activiites onto real-world marine pollution needs and problems. It was the intention of the Interagency Committee to strengthen the regional emphasis in preparing the second five-year Plan so that it would more accurately reflect key National problems and assist in assuring that necessary ocean pollution research, development, and monitoring is undertaken by the Federal government in a timely and

efficient manner. Regional participation was substantially increased by means of a series of five regional conferences, initiated by NMPPO in January 1980, and held in June of 1980, each hosted by a Sea Grant institution as follows:

- North and Mid-Atlantic coast-Maine through Virginia
- South Atlantic and Gulf of Mexico - North Carolina through Texas, including Puerto Rico and U.S. Virgin Islands
- Pacific coast - California through Washington including Hawaii and Pacific Islands
- Great Lakes
- Alaska

The conferences have provided an opportunity for regional coordinating bodies, state/local government officials, private industry, academia and public interest groups with an involvement in ocean pollution issues to make a policy statement regarding important regional marine pollution problems and information needs and to comment on Federal program plans which are intended to respond to those issues and information needs.

1.2 Purpose

The purpose and objective of the North and Mid-Atlantic Regional Conference on Ocean Pollution, Research, Development and Monitoring are best summarized by the "Charge to the Panel Members" given at the conference. The stated Purpose was to develop policy statements regarding significant marine pollution problems within the region and to identify the needed technical and scientific information and/or data for effective policy, regulation and resources management decisions relative to marine pollution. The Interagency Committee on Ocean Pollution Research, Development and Monitoring will give careful consideration to the regional policy statement in developing the next Federal plan.

1.3 Federal Plan for Ocean Pollution Research, Development, and Monitoring.

The Federal Plan is used by Federal agencies, the Office of Management and Budget and the Congress in making funding decisions on Federally supported marine pollution research, development and monitoring.

In accomplishing the conference purpose, each panel was asked to accomplish four objectives as follows:

- Develop a series of statements defining significant marine pollution problems within the region.
- Identify the related set of information and/or data needs required to deal with each problem area which can be met through ocean pollution research, development and monitoring.
- Recommend the priority in which the sets of information/data needs should be met.
- Provide a justification (rationale) for the priority order assigned to the sets of information/data needs.

The prepared problem statements, the identified information needs, the established priorities and the summary statements of the Panel Chairmen form the basis of this Conference Report. The complete results of the Panel deliberations are presented in Section 4.0.

1.4 Organization

The first actions of the Conference Chairman and Conference Coordinator were to form the steering committee (see Appendix B) and to hold a series of planning meetings. Steering Committee representation was drawn from regional Federal offices, state and local governments, regional coordinating bodies, academia, private industry, and public interest groups. The major responsibility of the steering committee was to develop an initial statement of regional marine pollution issues based on the members' perceptions and on existing source materials addressing regional marine pollution problems, information needs, and research priorities. The steering committee was also responsible for nominating attendees for the various conference sessions and working with the staff of NMPPO to assure that the regional conference would address key issues and yield information that could be readily used to formulate the 1981 Federal Plan.

The Steering Committee decided at its second meeting to organize the Conference by five topical panels, identified as the principal sources of ocean pollution, as follows:

- Coastal Land Use Practices and Recreation
- Marine Energy
- Marine Mineral Resources
- Marine Transportation
- Marine Waste Disposal

In carrying out its primary responsibility to develop an initial statement of regional marine pollution issues, the Steering Committee organized three sub-regional meetings/workshops to develop problem statements of particular concern to the sub-region in some or all of the topical panel areas. These meetings covered the New England area; New York-New Jersey area, including Long Island Sound and the New York Bight; and the Delaware-Maryland-Virginia area. Reports from each sub-regional meeting were then made available to the Panel Chairmen and Conference participants with the issues providing an input to or reference for the Panel deliberations. The major issues cited by the sub-regional reports are briefly discussed in the next sub-section, and the Regional Issues Papers are summarized in Section 4 of this report.

In addition to the Issue Papers prepared by the Sub-Regional meetings organized by the Steering Committee, the Conference Panel Chairmen and Conference Attendees were provided by NMPPO with the following source documents and reference materials prior to or at the Conference session:

- Federal Plan for Ocean Pollution Research, Development and Monitoring, August 1979.

- Catalog of Federal Ocean Pollution Research, Development and Monitoring Program, Fiscal Years 1978-80.

- Inventory of Regional non-Federal Marine Pollution Research, Development and Monitoring Programs.

- Federal Agency Marine Pollution Research, Development and Monitoring Program Prospectus Summary, Fiscal Years 1980-84.

The second major responsibility of the Steering Committee was to nominate the attendees for the several Conference sessions. Having decided to organize the Conference around the topical panels, the next action was to select the following Panel Chairmen and to engage them in the nomination of attendees:

- Marine Waste Disposal Panel
  Dr. J. R. Schubel
  Director
  Marine Sciences Research Center
  SUNY

- Marine Mineral Resources Panel
  Dr. Frank Monastero
  Manager
  Environmental and Ocean Services
  Raytheon Corporation

- Marine Energy Panel
  Dr. Bruce Neilson
  Virginia Institute of Marine Science

- Marine Transportation Panel
  RADM R. W. King USN (ret)
  Executive Office
  National Academy of Engineering

- Coastal Land Use Practices and Recreation Panel
  Dr. Lee Koppelman
  Long Island Regional Planning Board

The principal criteria for developing the invitation list were established as follows:

- Comprehensive and balanced regional representation would be maintained while also
- Maintaining a balanced representation of state and local government interest, regional Federal regulatory agencies, industry, conservation and environmental interests, and academia.
- The number of panel members would be limited to between 10 and 20 per panel in order to assure adequate representation and expertise within an effective and manageable working group.

The success of the efforts of the Steering Committee, the Panel Chairmen and the Conference organizers in structuring the conference within these criteria is best shown by TABLE 1.1 which analyzes the Conference attendance list (Appendix A).

The summary objective of this Conference was to identify the principal regional problems/issues/needs on which to base, in part, the next 5-year Federal Program for Ocean Pollution Research, Development and Monitoring by drawing on the expertise and perspectives of the Conference participants. The problem statements, therefore, represent the professional and personal knowledge and expertise of the participants. In the interest of time and cost, no concerted effort has been made to vigorously document the problem statements by citations and references.

1.5 Major Regional Issues

Common among the three sub-regional workshop reports are five major regional issues. These workshop reports are summarized in more detail in Section 4 of this report. The five major common issues merit identification and comment here because of the influence these issues carried over to the full Regional Conference in June. There is no attempt to rank the five issues since each is considered to be in the "highest priority" category.

Dredging and dredge disposal is a critical issue that impacts to a significant degree each port and harbor area in the North and Mid-Atlantic region. Commmerce, industry and employment are dependent on maintenance dredging of ports and channels; the issue is inextricably woven into the economic fabric of the entire area. It is not a question of "if" but rather "how" to remove and dispose of the dredge spoils in an economic and environmentally safe manner.

Closely allied to dredge disposal is the second major issue, sewage and industrial waste disposal. The Federal limitation on ocean dumping, scheduled to be effective in 1981, is not considered to be economically or environmentally practicable or enforceable by many experts. There is a great urgency for obtaining the necessary information and data required to develop viable alternative solutions to this major issue.

In parallel with the first two issues cited above is the third major issue: collecting and synthesizing existing data in a comprehensive, accessible, and effective data bank. More information and data are available than are now being brought to bear on the resolution of critical ocean pollution issues. A better understanding of what is available and a clearer identification of the crucial areas of missing data will also lead to more meaningful and effective environmental monitoring programs in the future.

A fourth major issue is to study and better understand the cumulative and synergestic effects of multiple pollutants in the marine environment. This issue is not new and is recognized as perhaps the most difficult to address.

Finally, the fifth major issue impacting this entire region is the generic category of petroleum hydrocarbons in the environment. This includes the results of the development of offshore resources, the risks of shipping and handling both crude and product cargoes and the pervasive concerns about oil spill containment and clean-up both inshore and offshore.

TABLE 1.1

Analysis of Attendance List

The total attendance at the conference was 70 persons.

The attendees below do not include the conference organizers, the NOAA and BLM representation or Steering Committee members not assigned to panels. These eight attendees participated in several panels, in order to interact with and contribute to more than one topical area.

A. Summary by Panels:

PANEL	Academia	Industry	Reg Fed	State/Local	Conserv.	Total
Marine Energy	4	4		1		9
Marine Minerals	2	3	5	5	1	16
Marine Waste Disp.	4	2	1	5	2	14
Marine Trans.	3	2	3	5		13
Coastal Land Use & Rec.	3		1	3		7
Rapp & Staff	3		1	1	2	7
TOTALS	19	11	11	20	5	66

B. Geographic Distribution:

Virginia	1	New Jersey	6	Massachusetts	15
Maryland	7	New York	13	New Hampshire	8
Washington, DC	3	Connecticut	0	Maine	4
Delaware	3	Rhode Island	6		

1.6 Key Regional Problems, Information Needs and Conclusions

The Regional issues and problems, the information needs, and the supporting rationale for establishing the priority actions produced by the North and Mid-Atlantic Regional Conference in June 1980 are reported in two ways.

In Section 3, this Report presents the authors' synthesis, conclusions and recommendations based on the information and data in Section 4. This is one synthesis; others could be made. The authors have tried to accurately reflect and report the consensus views of the Conference and hope the conclusions and recommendations will provide an important contribution to the next Federal 5-Year Plan.

Section 4 presents the entire set of problem statements developed by each Panel, preceded by a summary report prepared by each Panel Chairman. These reports are presented in their entirety so that all readers, reviewers, and users of this Report will have the same basic information, readily available for their independent analysis and conclusions, as was used by the authors of this report.

Nine major regional problems/issues and information needs of "highest priority" evolved from this synthesis of the Conference results,.

Dredging -- both the act and the disposal of dredge spoil are economic necessities required to support our nation's industries and commerce. The preparation of environmentally sound, economically viable and operationally reasonable management plans for port, harbor and channel maintenance and/or development seems to underlie all aspects of this problem area. The greatest need is to develop accurate, reliable data that will provide the technical criteria on which sound policy and management decisions can be based. Establishing the degree of toxicity; reliable bioassay tests; short term and long term effects; and development of innovative processing techniques were most often cited as specific needs.

This "highest priority" classification results from the recognition that since dredging is an economic necessity in our national interest, the effects must be understood and adverse effects must be minimized.

Comprehensive Monitoring Systems -- are essential to obtain adequate early warnings of serious changes resulting from man's actions in the ocean, coastal waters and estuaries of this Region and to differentiate the changes from inherent natural variations. The principal needs are for the design and development of integrated systems for selected critical locations with specific needs focusing on sampling systems, analytic techniques, and data management.

Highest priority is assigned in order to establish systems and procedures that will provide reliable reference conditions and accurately measure changes caused by disposal actions in the marine environment.

Information and Data Management, Synthesis and Evaluation -- no coordinated system exists to organize, synthesize, evaluate, access, and manage the vast amounts of data and information available from many years of completed and on-going ocean pollution research and monitoring. There is a desperate need to inventory, catalogue and digest all past and on-going research data and information, and to make it available to both researchers

and decision-makers in a usable format. Analysis is also needed to identify areas or topics where information and data are missing to better design and implement future research programs and monitoring systems.

A "highest priority" effort is needed to make the data available and useful, to eliminate duplicate activities, and to pinpoint highest priority missing data and information.

Industrial Waste Disposal -- is the necessary and continuing consequence of our manufacturing economy. Land disposal options are not assured so that ocean dumping and at-sea incineration remain important, viable alternatives. The crucial information needs are closely tied to our ability to monitor newly developed methodology and processes. The study of short term - long term effects, levels of toxicity, bioaccumulation and biomagnifications, and biota recovery rates were cited as critical specific needs.

This need is of highest priority because industrial wastes will continue to exist and must be handled. Innovative disposal systems such as at-sea incineration require that the risks and consequences be known in advance to be properly accounted for and managed.

Shifting to Coal -- is a major problem/issue, especially for this ocean region, resulting from the world energy crisis and the actions to utilize this nation's vast coal resources. Information is needed to first define the potential magnitude of the problem and then to identify the forms and effects of the pollution products (e.g., leachates, fly ash, solid wastes, acid rain).

Highest priority is assigned to this issue because there is an opportunity to conduct the research and to act responsibly and direct development before the pollution problem becomes a crisis.

Chlorinated Discharges -- represent a long-standing pollution source which is just becoming recognized as a major issue due to significant volume increases and the identification of extremely hazardous by-products. Data and information are required on the fate of chlorine produced halocarbons, mutagenic components, bioaccumulation, and sub-lethal effects impacting commercially important finfish and shellfish species. Increased use of chlorine for power generation and sewage treatment makes understanding and action on the issue a highest priority.

Biological Assessment -- procedure and methods that are reliable and accurate are essential to assessing and understanding the impact of toxicants on the environment. There is an urgent need to review existing procedures, to determine their accuracy, and to select the best for further refinement and improvement.

New toxic materials are continuing to be introduced into the marine environment, and establishing dependable, effective bioassay techniques to predict primary effects as well as assess existing conditions is a highest priority action.

New York Bight -- is a site-specific area that can serve as a case study for many other ocean pollution problem areas. However, not enough information has been collected or adequately documented to enhance the usefulness of past research information. Measuring the content of polynuclear aromatic

hydrocarbons in the Bight sediments and establishing the net mass flows of toxicants to the Bight over time are two examples of critical information needs.

Prevention of further degradation of this important area, the ability to revitalize the ecosystem, and the opportunity to monitor and to document recovery of this area justify a highest priority designation.

Coastal Power Plant Cooling -- is a specific problem issue of growing magnitude. More information and data are needed to compare the environmental impact of salt water cooling towers to once-through cooling, especially data on the impact on the biota and on human health and safety. Highest Priority is assigned so that proper actions can be taken before the problem/issue becomes a crisis.

2.0 INTRODUCTION

The North Atlantic region stretches from the United States-Canadian border (Northeast channel) to New York. The area is characterized by narrow deep open inlets, cool fertile waters and large tidal ranges. Heavy spring runoff locally dominates coastal circulation, but natural erosion and sedimentation are not severe problems.

The Mid-Atlantic region which stretches from New York to Cape Hatteras includes major estuaries, New York Harbor, Raritan Bay, Delaware Bay, and Chesapeake Bay, parts of which have undergone considerable degredation as a result of heavy urbanization and industrialization.

Both regions serve the Washington-New York-Boston megalopolis as recreational sites and waste disposal sites and they also contain commercially important fisheries. Lobsters, clams and scallops are harvested in the North and cod, haddock, herring and flounder fisheries are especially productive. In the Mid-Atlantic waters, oyster and blue crab constitute the largest commercial fisheries, the latter being the largest fishery of its kind in the world. The Chesapeake Bay estuary provides wintering grounds for great flocks of duck, geese and whistling swans. Productivity in both areas is potentially endangered by increased runoff, waste disposal, dredging, continued industrialization and transportation-related pollution.

At the same time, this recreational and fishing area supports the ports of Hampton Roads, for example, which handles more than half of the nation's exports of coal to Europe and Japan. The Boston, Baltimore, Philadelphia and New York ports handle about half of the exports and imports of the nation--a vital function in an increasingly interdependent world. Refineries in Philadelphia, Delaware, and New Jersey provide fuel and petrochemicals for all of the Eastern seaboard. Lighters and barges use the coastal waters and major rivers to distribute refined products from Maine to Virginia. American well-being depends upon the shipping lanes.

In the North Atlantic region, marine pollution is presently confined to relatively localized areas, with estuary modification presenting a problem in many areas such as Boston, Providence, and Portsmouth, N.H. This situation might change drastically with the development of a petroleum industry in Georges Bank. It is not clear whether the well developed ocean circulation and strong tidal currents characteristic of the area, which provide a tremendous flushing capacity, will mitigate the effects of pollution. Long term effects of polluting activities in the Mid-Atlantic Bight areas and estuaries are not well understood. The fish kill of 1976 caused by bottom water anoxia and the closing of Long Island Beaches because of waste washing onshore remind coastal citizens that processes continue to happen whether they are understood or not. Perceptible changes, such as tainting of seafood organisms and higher incidences of fish and shellfish disease, are indicators of the deleterious effects of toxic metals, PCBs, and other polluting substances. Decreases in the striped bass population may be attributable to pollution-related problems.

OCS oil and gas exploration is being conducted in the area, and there is concern over potential impacts of these activities on the marine ecosystem. Potential oil development in the Baltimore Canyon and on Georges Bank raise basic societal issues. Can we eat fish in warm homes? Can we have a clean and healthy ocean, while using the ports and harbors to the maximum economic benefit?

The Steering Committee's members later divided the region into three sub-regions: New England, New York Bight, and Mid-Atlantic. This division was based on geographical convenience for the sub-regional groups and on a more or less natural geographic/oceanographic division, i.e. Gulf of Maine, the New York Bight, and the Chesapeake and Delaware Bays.

Of the many problem areas identified, several were repeatedly stressed. In the area of Coastal Land Use, land use modification and non-point discharges were clearly a priority. Dredging was a top priority in all three sub-regions under Marine Waste Disposal. Steam electric power was mentioned as a priority need in two out of three regions under Marine Energy. Under Marine Resources both oil and gas development, and sand and gravel mining were considered very important issues. Marine Transportation needs were generally not broken down into topics but waste dumping, dredging, oil and gas development were mentioned as they pertained to the four other categories in addition to vessel standard and lightering concerns.

Although millions of dollars are spent every year monitoring the marine environment in these regions, the data are not readily accessible and in some cases are suspect. All groups agreed that effective monitoring and a data information bank for environmental quality control was needed. In this way, research and information dissemination could be coordinated, avoiding duplication and information loss. The second unanimous need was for research on the effects of cumulative impacts and stresses on the total ocean environment. A third need was for research in the effects and outcomes of present or proposed strategies to improve the quality of the environment.

Preliminary planning was done by the Steering Committee, with additional work done in sub-regional workshops. The attendees at the conference created the final problem statements and priorities within panels. Panel chairmen drafted the summary statements prefacing each group of problem statements. The conference organizers and rapporteurs are responsible for this draft.

3.0 CONCLUSIONS AND RECOMMENDATIONS

The five Conference Panels created a total of 88 priority problem statements having one or more "key information needs". These problem statements are presented for each panel following the individual Panel Chairman's Report (see Section 4 below). Common problems and information needs appearing in related problem statements, or from two or more panel sessions, have been grouped to generate overall conference priorities and consensus. This section presents one synthesis of these commmon concerns and the reasons for the assigned degree of prominence. To emphasize that all problems developed by the panels and summarized in this report are important, the following summaries are categorized as highest priority, high priority and priority. However, there is no attempt to prioritize the problems/issues or needs within a category, and the sequence of discussion therein does not imply any relative importance or priority.

3.1 HIGHEST PRIORITY

3.1.1 Dredging [WD 1 to WD 8, MT 10, MT 11, CLR 5]*

Problem/Issue:

Dredging has been required in the Mid and North Atlantic Region ports, channels, harbors, and marinas for more than 100 years. It must be continued to maintain our ports and dependent industries, and thus our economic strength for the indefinite future.

Were the dredged materials not contaminated, the impacts would be perceived as minor and associated problems solvable through proper management techniques based on temporal and areal disposal of dredged materials. However, point and non-point releases of various toxic substances and nutrients have resulted in contaminated sediments in channels and harbor areas which must be dredged.

There is a critical need to develop a dredged material management plan for each major port within the region. Each plan should ensure that required maintenance dredging projects can be carried out without prolonged and costly delays and with predictable and acceptable risk to the environment and its living resources. The plan should be based upon a rigorous assessment of the environmental, economic, socio-political and public health factors associated with each of the full range of alternatives.

Key Information Needs:

The full list of key information needs is lengthy, reflecting the difficulty in quantifying the scope of this subject. However, any summary should include the following critical items:

1) Establish criteria to characterize dredged materials in terms of pollutants and toxicity; determine the correlations between stress on the biota and the bulk concentrations of pollutants; establish reliable and effective bioassay and bioaccumulation tests; determine the long term ecological effects of low concentrations of pollutants; decide how to select acceptable dumping sites.

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*The numbers refer to the problem statements found in Section 4, following each panel report. The problem statements are numbered at the top of the first page of each problem statement. In the problem statement designations, CLR is used for Coastal Land Use and Recreation, ME for Marine Energy, MR for Mineral Resources, MT for Marine Transportation, and WD for Waste Disposal.

2) Before and during dredging, determine the mechanisms and rate of sediment-water column exchange of contaminants and the redistribution of contaminants in the dredged area.

3) Given reliable criteria to evaluate the effects of ocean disposal of dredge spoil, compare those consequences with the effects (and costs) of land disposal.

4) Develop innovative processing methods to reduce contaminants before disposal, and new modes for disposal of contaminated materials.

5) Effects of dumping should be quantified. The rate of recovery of the biota at abandoned dumpsites must be studied.

Rationale for Priority:

Dredging was identified as a pollution source or cause in eleven problem statements. More than any other topic, dredging was deemed an area of deepest concern throughout the conference.

Dredging is an economic necessity. As noted in the problem statements, the Ports of Baltimore, Philadelphia, Norfolk, New York and others would become almost useless in a few years if they were not continually maintained by dredging. The Port of Baltimore, for example, contributes about $3 billion to the economy of Maryland, representing perhaps 10% to 15% of the Gross State Product, and affects over 170,000 jobs. Economy (in fuel and dollars) afforded by larger ships pressures port authorities to deepen harbors by further dredging. Thus the economic impacts of prohibiting dredging--either directly by law or indirectly by preventing economic disposal of dredged materials--would be catastrophic.

At the same time, decades of dumping industrial wastes have transformed many harbor and river bottoms into reservoirs of toxicants, carcinogens, mutagens, and unknown waste. These discarded materials have the potential for killing biota, becoming assimilated in the human food chain, and ultimately affecting the health and welfare of people who live near the coast, or eat sea food.

While continued dredging is essential to the national interest, its effects must first be understood and then negative effects minimized.

Related Non-federal Research Identified by the Panel:

- o Maryland Port Administration has begun examining potential usefulness in Baltimore of a dredged material dewatering process being tested by US Army Corps of Engineers.
- o Maryland Environmental Service commissioned a study in 1974, "The Technical & Economic Feasibility of Producing Beneficial Products from Baltimore Harbor Dredged Spoil."
- o Maryland Water Resources Administration prepared a report in 1977, "Management Alternatives for Dredging and Disposal Activities in Maryland Waters."
- o Maryland's Dept. of Natural Resources supports research and monitoring on dredging and dredged material disposal in the Maryland portion of Chesapeake Bay.
- o The New York Dept. of Environmental Conservation supports research on dredging and disposal of PCB-contaminated sediments in the Hudson River.

o The Long Island Regional Planning Board supports research on dredging problems on Long Island.

3.1.2 Comprehensive Monitoring System [WD 3 and WD 32, CLR 1, MR 1]

Problem/Issue:

It is not now possible to describe long-term changes in Northeastern coastal waters or estuaries, to distinguish significant changes in the "health" of those systems from inherent natural variations, to obtain adequate warning signals of potentially serious changes, or to present the necessary systems-wide data required for many kinds of management decisions. Comprehensive monitoring systems are needed to provide information for management planning and for operational decision making.

Principal Information Needs:

The design of schedules, location, gear, selection of physical, chemical and biological samples, analytic techniques, data management and other elements of monitoring systems must be outlined, tested, refined and matured for each coastal system or estuary to be tracked. Specific research and calibration studies will be required to develop the design. For each ecosystem, however, the specific design must respond to the characteristics and desired uses of that ecosystem.

Long-term trends in the significant variables must be recorded and presented in a form useful to both scientists and to managers.

Statistically reliable (i.e., accurate and precise) data regarding uptake of xenobiotic constituents (e.g., PCB's, kepone) in benthic invertebrates are required from around commonly used disposal sites that are not impacted by anthropogenic wastes other than dredged material. The experimental design employed to obtain these data must emphasize statistical power (the ability to detect real differences among data) and time-series analyses. The experimental design must be compatible with designs suggested in the ocean dumping regulations and final ocean discharge criteria.

Rationale for Priority:

Monitoring is required to supply baseline information which will allow detection of changes in the marine environment. Analysis as well as data collection should be emphasized, and all monitoring efforts -- federal, state, university, and private -- should be coordinated.

As pressures and usage of the coastal region increase, the necessity for assuring that multiple changes do not seriously damage the useful qualities of the marine ecosystem is of urgent importance. Detecting dangerous trends, indicating potentially destructive new additions and separating significant changes from natural variations are all necessary to protect these resources from damage, avoid wasteful investment in unnecessary pollution control and guide improvements in water quality.

Decision making today is hampered by the lack of monitoring data, and decision making tomorrow will not improve unless the required monitoring takes

place in the immediate future. Environmentally sound dredging, waste disposal and power plant siting all depend on continued application of comprehensive monitoring systems.

3.1.3 Information and Data Management, Synthesis and Evaluation

Problem Statement/Issue: [WD 4, WD 16; ME 4; CLR 2; MR 10]

Monitoring is a necessary but insufficient precursor for good management decisions. Information and data must also come from a wide variety of sources, and be readily accessible and evaluated. Similarly, widely dispersed information on sources of toxic substances should be organized to determine the information gaps and the degree to which the evaluations of control methods can be improved. Dredge spoil from harbor areas is believed to be the single largest source of toxic materials entering the oceans in the North and Mid-Atlantic region. However, efforts to evaluate possible countermeasures are hampered severely by ignorance of the sources of contaminants clinging to particles that must be dredged.

There exists no coordinated system for organizing, accessing and managing the vast amounts of data and information generated from coastal and marine pollution control and monitoring research. NOAA must begin a long-term (5-10 years) effort towards creating such a national information network.

Principal Information Needs:

Establish a prototype regional (e.g., geographic NY Bight, Chesapeake Bay, Georges Bank, Narragansett Bay) data and information management system which would consist of:

a) an inventory of all past and ongoing research on coastal planning and marine pollution

b) an inventory of experts/researchers, and research institutions

c) bibliographic information, concentrating on grey literature

d) pertinent data and an inventory of other existing support data; an instruction manual for users and a minimal staff at a central access location for user assistance

e) inventory of gaps in the information base and research to assist in recommendations for research needs and priorities

The inventory should include: historical shoreline modifications, biological ecosystems, remote sensing information, economic and demographic information, estuarine and hydrodynamic information and physical, chemical and biological water quality information. High quality compatible data in the areas of meteorology, hydrodynamics, water quality data, soil data, land use data, and population projections are further examples of what is needed.

Rationale for Priority:

Data and information in coastal planning and marine pollution control and monitoring are scattered, multidisciplinary and not organized in readily accessible systems. Knowledge of what has and has not been done, researched or documented would help avoid unwitting duplication of effort and pinpoint priority areas where further research and study is needed. Some existing data bases and information are available from sources such as NTIS, Smithsonion and

MRIS. Organizing and coordinating the information in one source would benefit planners and decision-makers.

The information in this system can also be formatted and "translated" to provide readily accessible and comprehensible documents for active and informed public participation, and for the media.

Also, many future generating stations will be located in the coastal zone, near major population centers where the marine environment is already under stress.

The siting of new energy facilities could be greatly streamlined if available information were collated in the form of regional maps and summaries addressing the regional distributions of water quality, circulation, shoreline stability, sensitive environments, and sensitive or commercially important species.

Regional syntheses are important to the plant siting process from several standpoints:

1) thermal, and especially entrainment effects, which must be analyzed from a regional standpoint, are critical to the acceptability of new sites and selection of a cooling system (once-through vs. cooling towers).
2) unnecessary duplication of effort can be avoided and experimental designs streamlined when all existing data pertaining to specific areas are available as input
3) collation of sets of site-specific data from many locations can identify trends and promote insights which would otherwise be unknown
4) delays in licensing of critical energy facilities could be avoided if use of existing data were maximized.

Non-Federal Research Identified:
Councils of State Planning Agencies
"Federal Data Coordination Project"
National Governor's Association
"Policy Study and Synthesis Statements"
Texas "Natural Resources Information System"

3.1.4 Industrial Wastes Disposal

Problem Statement/Issue: [WD 13, 15, 27, 28, 30 and MT 4, 6, 7, 8, 9]
Industrial wastes are a necessary consequence of our manufacturing economy. The enormous amount of chemical waste generated each year by industry has created a national disposal problem, as terrestrial dump sites become scarcer. An alternative method of disposal is needed away from land and populations. Specific ocean dumping sites and at- sea incineration will continue to provide one option for disposing of these wastes.

The rate of biotic recovery of an abandoned acid or sewage sludge ocean dump site is relatively unknown. To date most studies have focused on the effects of the dumping process. Recovery rates are now being studied regularly

in dredging and in dredge material disposal sites. A similar effort should be undertaken at discontinued acid and sewage sludge dump sites.

There is a related need for multidisciplinary studies of the legal and policy environment surrounding and/or constraining all new ocean pollution development and monitoring technologies, such as the incinerator ship. Such studies should help design workable, effective laws and regulations and, if appropriate, provide incentives for implementing new technologies.

Principal Information Need:

Information should emphasize in situ methodology and focus on processes rather than acquiring data. Monitoring, planning and scheduling should be cast in terms of physical oceanographic processes, for without knowledge of the driving mechanisms resolution of the ecological problems cannot be resolved. Representative data might include growth, reproduction, behavior, and pathology.

Acids & Bases: Short-term effects are mainly known, while long-term sub-lethal effects must be determined. Further work on mutagenic effects is needed. A first priority is to identiy specific acids/bases which may be acceptable for disposal at sea, and the levels of impurities which may be harmful.

When certain wastewaters are disposed of at sea from moving barges, the organisms most immediately affected are plankton. However, even drastic mortality affects a very small portion of the total population in the disposal area. Information is needed on the speed with which such populations "repair" themselves by reproduction and recruitment, i.e., bringing in new previously unexposed organisms. The significance of varying degrees of mortality on the higher trophic levels in the disposal area should also be assessed.

At-Sea Incineration: How do repeated exposures to residues of toxic materials falling in water affect the various biological communities? What happens when planktonic organisms drift within a polluted water mass which maintains its integrity for relatively long periods (e.g. anticyclonic eddies)? What effect will stack emissions have upon pelagic or migratory birds?

Rationale for Priority:

The process of recovery is important for health and economic reasons, i.e. when can shellfish beds be safely opened after cessation of dumping?

Chemicals are implicated in a large numer of non-infectious chronic diseases. These diseases can be caused by direct contact or by modulating body mechanisms such as the neuroendocrine or immunological systems. Reproductive malfunctions or damage to embryo development are also associated with some chemicals.

The Federal government (MarAd/EPA) is exploring the possiblity of incinerating hazardous chemical waste at sea in a suitable ship capable of incinerating both liquid and solid toxic wastes at designated burn sites. The problems associated with this disposal method involve the collection, transportation to a port, loading on board the ship, and ultimate

incineration. Resolution must necessarily be initiated by the government and eventually taken over by private industry.

The entire chemical industry might be considered a polluting activity with many widespread sources of waste. The importance of chemicals--pesticides, herbicides, plastics, medicines, etc.--to the US is enormous and well-known. The risks to health may be the greatest we face at this time. Acceptable disposal methods are nonexistent for some chemicals and disappearing for others. Hazardous waste disposal may be the pollution problem of the eighties, and disposal at sea may be the solution.

3.1.5 Shifting to Coal

Problem Statement/Issue: [ME 7; WD 9, 10, 11, 12, 14; MT 19]

Conversion of power plants and large bulk carrier ships to coal from oil will introduce several new, environmentally hazardous problems. First, fire and dust problems are associated with storage, transportation and handling of coal. Next, coal burning causes air pollution problems. Finally, there are disposal problems with soot, fly ash, bottom ash, scrubber sludge and other solid wastes. In many instances the oceans will be the final sink for some of the coal by-products. Possible environmental impacts on marine waters and organisms from a shift to coal for power production must be estimated and assessed now.

In parallel, there is a need to verify the economic parameters for alternative disposal/deposition methods to complement the biophysical research and to help guide the selection of optimal disposal methods.

Key Information Needs:

1) Estimate the magnitude of coal usage in the future and the location of coal-fired power plants situated in the coastal region.
2) Conduct studies for engineering/design economics data on process costs including changes in coastal land use and transportation patterns as part of total energy production (per kw) costs.
3) Estimate potential timing and rates of conversion and the probable increases in waste for the time interval 1980-2030.
4) Determine the effect of leachate and fugitive dust from coal piles in the marine environment.
5) Determine the effects of disposal of fly-ash and/or other solid wastes in the marine environment.
6) Establish the indirect effects of acid rain and the atmospheric transport of combustion products, such as polycyclic aromatic hydrocarbons and other harmful compounds.

Rationale for Priority:

Immediate health damages and environmental impacts have been observed in localized areas due to the above factors. The volume of coal waste will be large and conventional land disposal will probably not be practicable in crowded urban areas. Fly ash and sludge wastes dumped in the ocean represent a threat to marine organisms. The part that these complex hydrocarbons play in damaging the aquatic ecosystems or in contaminating the human food sources must be established.

It is not certain that a shift to coal or some other alternative fuel will necessarily increase pollution. Nonetheless, this subject merits early attention in order that data and assessments will be available in a timely fashion.

Non-Federal Research Identified:

"Hazard Assessment of Fly and Bottom Ash Dumped at the 106-mile Ocean Waste Disposal Site in New York Bight," Con Edison, NY

3.1.6 Chlorinated Discharges

Problem Statement/Issue: [ME 2; WD 19]

Water disinfection, waste water (sewage) treatment and the electric power industry consume a large fraction of the chlorine produced in the United States. The oxidative chlorination products (hypohalous acids, halamines, etc.) are extremely toxic. Moreover, up to several percent of chlorine decays by forming halocarbons, including trihalomethanes. For the most part, the nature of other decay products and their persistence is not yet known even though there is evidence that some of them are bioactive. Some compounds produced by chlorination are also mutagenic. Furthermore, the increasing number of chlorine discharges from treatment plants may be affecting migratory behavior in anadromous fish.

Key Information Needs:

1) The fate of chlorine-produced halocarbons in the environment should be determined and potential for biomagnification should be elaborated.

2) The mutagenic components of chlorinated wastewater should be identified and their effect on the environment assessed.

3) At present only a small percentage of chlorine decay can be accounted for by known products. Therefore, kinetic information on decay processes should be obtained considering water quality variables, such as organic content, nitrogen content and speciation, salinity, and temperature.

4) Adequate and accurate analytical methods for monitoring chlorine produced oxidants and chlorine decay products must be developed.

5) Sublethal biological effects, such as alteration in development and behavioral modifications affecting feeding ecologies and reproductive behavior of commercially important species require much greater attention.

Rationale for Priority:

Modern power plants sometimes require large volumes of the available water. Any chemical modification which affects a large fraction of local environment requires close scrutiny.

Chlorination is known to produce traces of mutagenic compounds, and there is a distinct possibility of pass-through to human consumers of fish and shellfish. It creates major changes in the chemical state of trace metals and amino-nitrogen compounds. Low levels of chlorine can alter migratory behavior in fish. Recent evidence shows that sublethal doses of chlorine in the range applied by power plants have long-term effects on growth of entrained

crustaceans. In Maryland, shad catches have declined seriously and chlorine is among the causes being considered at this time. These are only a few examples of how chlorine might affect aquatic ecosystems.

Non-Federal Research Identified:
State of Maryland's power plant siting program.

3.1.7 Biological Assessment

Problem Statement/Issue: [MR 4, CLR 6]

The principal significant effects of adding materials or causing changes in the coastal waters and the estuaries are those which injure the biota and the related processes. Loss of the biota or hindrance of the processes reduces the usefulness of the marine system. However, present methods for biological assessment of existing or potential changes are seriously inadequate for measuring impacts or estimating the effects of proposed changes.

Key Information Needs:

Methods that have predicted impacts should be reviewed with the objective of comparing their appropriateness and effectiveness in specific situations. After evaluating and intercomparing these methods, the most effective ones should be further refined and de novo statistical methods should be developed to provide a more powerful basis for dealing with these data. Hypothesis testing, causal analysis, multivariate analysis and simulation modeling should be examined.

Rationale for Priority:

As new materials are rapidly invented and technological changes are frequent, the inclination to dispose of minor and major pollutants in estuaries and coastal systems is very strong since it appears to be inexpensive. At the same time, the capacity of these systems is declining in many areas. It is necessary to predict the primary effects of each material and change prior to introduction and to assess the effects of those already in place. Limited chemical sampling, standard bioassay procedures, and post-injury observation will not suffice. There is an urgent need for improved ability to assay biological effects.

3.1.8 New York Bight [WD 29, 30]

Problem Statement/Issue:

The Waste Disposal Panel identified the New York Bight as a site-specific location which is representative of problems in similar environments all over the world. Knowledge of many factors remains marginal even after extensive, long term studies. For example, sources of hydrocarbons, including polynuclear aromatic hydrocarbons, to the Bight have not been well established. Information is not available to define the rate of input of toxic materials to the Bight from net estuarine flow; and quantitative data on sources of toxic materials is sketchy.

Principal Information Needs:
The sources of polynuclear aromatic hydrocarbons to Bight sediments must be determined. A careful study must be designed to determine mass flows over the entire year for selected toxic materials (see recommendations of the 1979 Panel). Data must be developed regarding concentrations and mass or volume inputs of sources such as the Hudson, Passaic, Hackensack and Raritan Rivers, including the definition of transport pathways.

Rationale for Priority:
Prevention of further degradation and the eventual restoration of the quality of both the estuary and the Bight depend on accurate decisions to control toxic materials. Because the presently available data is inadequate, risks remain poorly defined and may be increasing for both the biota and the public.

3.1.9 Coastal Power Plant Cooling

Problem Statement/Issue: [ME 1, ME 5, ME 8]

Conventional once-through cooling water systems (CWS) have three basic types of marine environment impact potential. Nektonic organisms may impinge on screening devices at CWS intakes, plankton that pass through these screens and through the plant will experience thermal, mechanical and chemical stresses; and resident marine organisms in the receiving waters exposed to the thermal effluent can display certain adverse responses. Considerable site specific work has been done dealing with impingement, entrainment, and thermal effluent effects. While this specific research may help identify an existing problem, its value would greatly increase if a systematic analysis of representative studies identified generic features that could be generally applied to future design and operating plans for proposed power plants.

An alternative to the once-through power plant cooling water system is the cooling tower (natural and mechanical draft). While cooling towers have been employed widely for inland freshwater power plants, they have not been used at coastal sites with ocean water. The environmental impacts of salt water cooling towers have not been fully examined so far. Some estuarine salinity cooling towers exist, but they are not without problems.

Principal Information Needs:

The volumes of reports that detail local biosystem response to currently operating coastal power plants contain the basic information necessary to approach this problem. A systematic review of such material must be undertaken by competent marine scientists with the objective of identifying common positive and negative features to guide future designs.

The alternative of using cooling towers in coastal regions should be studied thoroughly to assess both risks to the environments and impact on human health and safety.

Rationale for Priority:

The almost certain proliferation of coastal power plants can only proceed with adequate concern for and protection of valuable marine resources. Each proposed site must undergo its own rigorous assessment. If

common lessons learned can be applied, the process can be accomplished in a more orderly and cost effective fashion.

The Water Act (PL92-500) and the use of existing mixing zone criteria tend to favor the use of cooling towers for steam electic power plants in semi-enclosed water bodies. The relatively unlimited dilution volume at coastal sites and the greater potential impact from cooling towers may favor once through cooling for power plants situated in marine environments, but the potential of saltwater cooling towers needs to be investigated.

3.2 HIGH PRIORITY

3.2.1 Sewage Disposal [MT 18, WD 17, WD 18, WD 20-23]

Problem Statement/Issue:

Sewage discharges from municipal outfalls, rivers flowing to the ocean and ships may be visible, obnoxious and potentially pathogenic. Substantial funds are being committed at all levels of government to upgrade the treatment of municipal wastewaters in large coastal urban areas. There are serious questions regarding the cost-effective use of these funds in older urban areas where combined domestic and storm sewer overflows exist.

There is a continuing need for regional plans which 1) delineate the sources and amounts of domestic, industrial and agricultural wastes entering estuarine and coastal waters; 2) project increases or decreases in loadings for the next 2 to 3 decades; 3) indicate how these can be managed (alternatives, pollution abatement or reduction, recycling, etc.); and 4) conduct assessments and monitoring to ensure that management plans meet their goals and objectives.

Vessels are required to treat or hold sewage, but the need for and efficacy of such systems has not been clearly demonstrated. Lack of pump out facilities results in large scale neglect or disregard of regulations.

Principal Information Needs:

Information required to manage domestic sewage is similar to that required to manage dredging and dredged material disposal. The present and future needs of society must be determined. The effects of domestic wastes separately and combined with industrial wastes on marine water quality, and the various uses proposed for these waters, e.g., mariculture, fishing, recreation, etc. should be assessed by region.

The degree of treatment required to obtain a certain water quality and the quality of the biota in different areas must be established. It is necessary to determine the effect of improved quality on water use patterns, to assess the impact of combined sewers vis-a-vis upgraded treatment in old urban areas, and to determine the impacts of chlorination/dechlorination on estuaries and marine communities. Existing monitoring programs performed at outfalls should be evaluated, corrected or abolished, and evaluation criteria should be developed for implementing Sections 301h and 403 of the Clean Water Act.

Finally, studies must be initiated at NY-NJ Deepwater Dump Site #106 prior to 1982 and continued for sufficient time to establish a pre-dumping baseline and to define site specific impacts, including toxicity and bioaccumulation. Experimental design must account for depth and dispersive characteristics. Parallel studies at the existing nearshore (12 mi.) site (currently planned to cease in 1981) must be continued in order to establish the rate of recovery after cessation of dumping.

Rationale for Priority:

Ocean outfalls have immediate health and economic aspects. Beaches befouled by poor or non-existent sewage treatment systems are cited as disease sources the world over. In addition, the suggestion or public perception of contaminated water can have enormous economic repercussions.

Legal challenges to the 1981 sludge dumping deadline and to implementation of land-based alternatives will require hard facts. A significant data base is being developed which indicates serious risks to public health in populous urban areas if implementation of land-based alternatives is enforced. Similarly, the impact(s) of domestic wastes has been cited frequently as a principal cause of decline in estuarine and coastal water quality. Unless a reliable data base is available for the marine environment, the ultimate decision will probably be for that disposal technique having the least supporting documentation of risk to resources or public health.

3.2.2 Bioassay and Biological Monitoring

Problem Statement/Issue: [WD 24, 25, 26; ME 3; MR 1, MR 6]

Bioassays are being used more frequently to test or screen wastes before disposal. However, more information and better standard tests are needed to relate the bioassays to biological monitoring programs. A particular example is the effects of at sea disposal of drilling muds.

Offshore coastal waters present a viable alternative to various land-based methods for disposing municipal, industrial and hazardous wastes and wastewaters. To screen wastes for such disposal requires the availability of appropriate, accurate and repeatable bioassay procedures. These "standard" tests should be designed to account for the dynamics of waste dilution as a function of time. The bioassay test is gaining popularity as a check for material toxicity. Unfortunately the commonly used test organisms are not representative of those found in outer continental shelf areas. Also, in some cases, the bioassay test does not adequately handle long term, sublethal impacts.

There is widespread concern over the routine at-sea disposal of drill cuttings, muds, and associated fluids adversely affecting the environment into which these materials are dumped. Additional systematic analysis of the available environmental and economic facts are needed to improve the management scheme for, and to support decisions about, the disposition of these substances.

Principal Information Needs:

A reliable, accurate bioassay system requires:

1) Laboratory bioassay facilities designed to simulate the time-concentration relationships observed or expected as a result of waste dispersion.

2) Acute and chronic bioassay "end-points" to realistically assess of the significance of bioassays.

3) Established relationship of laboratory bioassay information and results to direct effects on the site specific marine biota.

In order to utilize a reliable bioassay system effectively, information and data are required on:

1) the magnitude of the problem, i.e., quantities released into the environment, dispersion, dilution and settling rates, flushing rates or mass transport in the area;

2) the toxic effects of individual compounds and matrix effects on key species;

3) the persistence of toxicity of these substances;

4) the economics and environmental impacts of various alternative disposal schemes, e.g., barging to shore sites with subsequent upland disposal.

Rationale for Priority:

Environmentally acceptable disposal of wastes in the ocean requires knowledge, assessment, or forecasting effects on site specific biota. While it is relatively easy to measure contaminant levels in the ecosystem, it is difficult to 1) relate these measurements to laboratory bioassays and 2) to predict effects on living resources based on field measurements of toxic substances.

Several compounds in drilling muds have been proven lethal to marine organisms in laboratory experiments, and have raised concern that either breeding populations of fish stocks (or fish food) or unique environments (e.g., coral reefs) will be adversely impacted. This could result in loss of income to fishermen, loss of aesthetic qualities or unique environments, or loss of recreational resources. Conversely, overly stringent requirements on the drilling industry may impose an excessive economic burden resulting in suspension or reduction of exploratory activities, contrary to the best national interest.

3.2.3 Ocean Pollution Disasters: Prevention and Response

Problem Statement/Issue: [MT 1-3, 5, 9, 13-15, 17, 21; MR 2, 7, 8]

The Campeche blowout in the Gulf of Mexico and the AMOCO CADIZ spill on the coast of France illustrate important problems and issues of very large scale spills: containing and collecting massive amounts of oil; disposing of what has been collected; taking preventative actions against oil spills; and making contingency plans.

Methods applicable to chemical spills are almost nonexistent, while the tools available for spill response are too few and inadequate. Funding for studies to solve or attack oil spills is much less than for studies of spill fate and effects. Renewed effort to develop or improve mechanical cleanup and new, major efforts to add new tools are needed.

All commercial oil spill containment and clean-up products are not effective for every spill in all kinds of weather. Uniform testing and certification of such equipment is needed so that the effectiveness of available equipment can be established for various spill conditions.

With the expansion of offshore petroleum operations into deeper waters and the increasing use of subsea production systems, there is concern about capabilities for containing and collecting hydrocarbon flows from subsea wells, production equipment, and sea floor fractures and channels.

Some contingency plans are more effective than others. There should be an in-depth review of contingency plan responses to determine what factors make one plan more effective than others.

Principal Information Needs:

Synthesize an effective system for responding to marine pollution incidents when they occur. Specific issues must include: (1) tradeoffs between pollution costs and response costs, (2) spectrum of economic implications of various decisions and policies (from a public and private viewpoint), (3) physical, technical, logistic, economic, regulatory aspects, and (4) comparison between alternative clean-up technologies and systems.

For salvage and clean-up systems:

1) Assess the forces and resources in various areas, which would be needed to prevent or cope with a major disaster, and identify the shortfall

2) Assess the development or conversion of other local resources to have a duel mode capability to overcome any shortfall e.g., 1) oil rig work boats providing a towing or pushing capability and carrying contaminant or clean-up gear, 2) use of local harbor craft, 3) use of local fishing fleet.

There is a continuing technical need for:

1) Better understanding of boom and oil slick hydrodynamics.

2) Reliable, detailed data on the behavior of oil: emulsion formation, slick dispersion and spreading, cold weather problems, deepwater/seafloor leakage.

3) Analysis of vessel casualties and improvements in both design and operating procedures.

4) Standard engineering procedures for equipment design.

5) Development of shore and beachcleaning methods and equipment.

6) Training and other personnel requirements.

In order to assure that commercially available oil spill containment and clean-up equipment is effective for intended use(s), the United States Coast Guard should be charged to certify performance characteristics. Manufacturers should be required to test the effectiveness and compatability with other equipment of oil spill absorbents, booms, skimmers, etc. under various temperatures, wind and wave conditions, oil types, climatic conditions, and currents. Results of such tests should be made available to the public upon product approval.

Rationale for Priority:

The massive spills resulting from the groundings of the TORRY CANYON and the AMOCO CADIZ illustrated that no countries are adequately equipped to deal with a major disaster. If such a disaster occurred off the eastern seaboard, the present forces available would probably be unable to contain it.

An equipment user has no uniform testing results upon which to base decisions regarding equipment use. As a result, inappropriate applications/usage of oil spill containment and clean-up equipment allow avoidable pollution of the marine environment.

Since all Atlantic OCS exploratory wells are drilled from floating drilling units, the wellheads and blowout prevention equipment are located on the seafloor. Prospects for production on the Atlantic continental margin appear best in the deeper water above the slope. Subsea completions will be important in such areas. As offshore production expands, concern about mitigating seafloor spills will increase.

A decision is required as to whether the US government should own and maintain adequate emergency forces and resources, or whether the private sector should share this responsibility.

3.2.4 Dynamics of Pollutant Dispersal

Problem Statement/Issue: [WD 31, WD 33, WD 34; ME 6]

Both fine particles and chemical pollutants disperse through diffusion and transport (or convection). The problem encompasses both micro and macro hydrodynamics.

At the Crystal Mountain Conference in August, 1979, estimates were made of the assimilative capacity of the 106-mile wastewater disposal site. This work would entail a combination of experimental studies and mathematical modeling of the Middle Atlantic Bight to develop a method for evaluating the assimilative capacity of other areas.

Once a pollutant (particulate, heat, radionuclide, heavy metal, toxic) enters the water column, its subsequent fate is governed by coastal and estuarine transport and mixing processes (tidal current, waves, interaction of estuaries with coastal waters, net drift, upwelling, etc.). These processes are governed by the hydrodynamics of the regional water body (Gulf of Maine, L.I. Sound, etc.).

Principal Information Needs:

In order to study these problems we need information about three dimensional net and tidal current information, three dimensional salinity and temperature distribution, non-tidal ocean surface tilt (bottom pressure field), effects of near- and far-field meteorological events on the coastal hydrodynamics, and interaction of estuaries with coastal flow fields.

Experiments should develop procedures for tracing "tagged" parcels of ocean water over periods of several days to weeks, and conduct tracer studies under different oceanic regimes for at least a month. Verified mathematical

models should be developed for predicting the transport and residence times of materials disposed of in selected portions of the offshore coastal waters and to assess effects of discharges from many separate point sources.

A study of fine grained particle dispersal should search for the sources of fine particles, the routes and rates of dispersal, and the sites and rates of accumulation in each major estuary in the region and in the New York Bight.

Characteristics of the particles and associated contaminants should be studied to see how they change in different parts of the system. It is not clear how physical (i.e., mixing), chemical (i.e., salinity), and biological (i.e., filter feeding organisms) characteristics affect the state of agglomeration of particles, hydraulic behavior, and sites of deposition.

Rationale for Priority:

Most of the more insidious contaminants, e.g. metals, chlorinated hydrocarbons and radionuclides, are relatively insoluable in water. Since they are rapidly scavenged from the water near their points of introduction by fine particles, their transportation and accumulation are controlled by the fine particle sediment system.

Further studies will improve the general understanding of how coastal power plants interact with ecosystems and fisheries. Much of this information is unavailable, leading to delays in licensing power plants. The studies also would be useful for other marine energy factors (e.g., entrainment effects) and for waste disposal, land use siting decisions and marine transportation. The effects of heat disposal and resulting thermal pollution must be considered.

3.3 PRIORITY

3.3.1 Oil and Gas Development

Problem Statement/Issue: [MR 3, MR 4, MR 11, MR 12, MR 13; MT 16, MT 20]

Exploration and development of oil and gas in the Baltimore Canyon, on Georges Bank and other areas of the continental shelf raise issues common to all offshore exploration and production plus a few which are unique.

First, reference conditions should be established in order to assess the contribution of petroleum hydrocarbons from all sources of oil and gas activities.

During the oil and gas production phase, criteria must be developed to determine appropriate disposal techniques for formation waters of a given site and set of physical-biological conditions.

Oil production/transportation systems in OCS areas will probably rely upon the transfer of crude oil to a tanker through some form of single point mooring system. Little information is available on historical spillage rates during such transfer operations so there is concern about transfer operations at offshore production facilities, particularly in the harsh North Atlantic environment.

The USGS oil spill risk analysis model should be upgraded to include biodegradation, oxidation, emulsification and other factors besides advection to determine the fate of oil.

While offshore crude oil unloading terminal for supertankers have been considered for the East Coast, to our knowledge no state has yet initiated the permit process. Without an offshore unloading facility, the oil will have to be double handled by lightering to smaller vessels or trans-shipped.

Finally, when spills do occur there are no teams of experts or standard methods for assessing the effects (social to chemical) of an oil spill, and state/Federal responsibilities are poorly defined.

Principal Information Needs:

In order to estimate the incremental effects of oil spilled during OCS activities, we need improved methodology for estimating the contributions of petroleum hydrocarbons to the total ocean input loading, and an assessment of that incremental load impact on living resources

In dealing with production and separation of brines, we need a synthesis of available information on the composition of brines, fate of brines after disposal, effects of brines on organisms and alternative methods for discharge.

In order to improve our modeling of oil spills, we need an evaluation of reliability and capability of various existing models and model components; suggestions to include additional existing algorithms or develop and incorporate new ones in the USGS risk model calculations; and the establishment of a mechanism to continually update the model capacity.

It is also necessary to determine whether tank vessel or pipeline transportation presents less hazard to the marine environment and to establish criteria for pipeline construction and tank vessel operations.

Finally we must establish procedures to manage the complex issues of oil spill damage assessment.

Rationale for Priority:

Offshore crude oil unloading terminals offer a proven method to supply crude oil to our existing East Coast refineries. With today's large tankers, these offshore terminals provide an economical, fuel-efficient system which actually improves safety and, in turn, dramatically reduces oil pollution associated with tanker operations.

Georges Bank in particular, and the OCS area generally, are prime world sources of protein. Resolution of the problems described above is essential for rational management of the ocean and effective balancing of protein and energy resources.

3.3.2 Physical Modification in the Coastal Zone

Problem Statement/Issue: [CLR 3, CLR 4; WD 32]

The progressive physical modification of the North and Mid-Atlantic region shoreline by human actions is a significant factor in ocean pollution. Some of the direct effects include placement of contaminated materials in estuarine wetlands, beach and dune area changes, the channelization of rivers and their tributaries, shoreline stabilization measures such as jetties, groins, bulkheading, and rip-rap, and in the alteration of natural drainage systems in wetlands and adjacent upland areas. Many of these modifications are associated with the siting of major facilities such as airports, power plants, highways, and shipping terminals.

Wetlands are the irreplaceable base of the biological productivity in the North and Mid-Atlantic region aquatic systems . They are widespread, cover an extensive area, and are extremely difficult to monitor or even inspect on a regular and frequent basis.

Techniques are needed to identify and define the effects of various impacts, to indicate assimilative capacities, and rapidly respond to degrading actions or any non permitted uses.

Principal Information Needs:

- Determine rate, type, and extent of shoreline modification to date, based on actual inventory of coastal zones.
- Systematically monitor shoreline modifications currently underway and projected, in order to provide perspective on the dynamics of the shoreline modification process.
- Assess in terms of individual modifications, accumulation of similar modifications, and aggregations of diverse modification, of direct and indirect effects on ocean environment attributable to shoreline modifications, e.g., effects of loading or carrying capacity of marine resources such as wetlands, etc.

The extensive program of satellite photography and other imaging techniques carried out in the 1960s and 1970s provide an historic record of the wetland areas. These records potentially show the changes in these areas in both extent and quality. A program must be initiated to utilize this information and to optimize the collection of these data in the future.

Rationale for Priority:

Physical modification results in marine resources degradation (e.g., fish spawning areas, shellfish beds, wildlife/waterfowl resting, nesting areas); non-renewable resources destruction (beaches, dunes, wetlands, biotic communities); degradation of water quality through accelerated sedimentation and siltation, introduction of toxic substances, and altered water temperature; and aggravation of natural flood hazards.

3.3.3 Radioactive Material

Problem Statement/Issue: [ME 11, ME 12]

Radioactive waste materials should be disposed of using methods and sites determined to be environmentally acceptable both now and in the indefinite future.

Radionuclides from fossil-fuel generating facilities and from planned and accidental releases at nuclear generating facilities could be accumulating in the environment and causing ecological problems.

Principal Information Needs:

Failsafe methods of containing the waste materials must be developed and demonstrated. Sites appropriate for waste disposal must be located and evaluated, and the ecological effect of radionuclides in the environment must be assessed.

Rationale for Priority:

Nuclear generating facilities are likely to continue to be an important element in the power industry. Citizens have heightened awareness with nuclear problems/issues.

If the national policy is to develop regional disposal sites, then disposal in the North and Mid-Atlantic marine environment appears to be one potential solution to this problem.

3.3.4 Alternative Energy Sources

Problem Statement/Issue: [ME 9, ME 10, ME 12]

In our search for renewable energy sources, the ocean cannot be neglected. Alternative sources of energy such as wave and tidal power may produce electrical energy without the undesirable side effects associated with conventional power facilities. OTEC technology may be used to produce liquid NH_3 or H_2 and these products could be shipped or piped to users in the Mid or North Atlantic coasts.

Principal Information Needs:

Feasiblity studies (including economic aspects, technology development and environmental consequences) for extracting energy from tides and waves should be supported.

Specific information needs will have to be defined after technological development and economic/political decisions affecting OTEC are more advanced.

Rationale for Priority:

Alternative sources of energy may produce cleaner power and lower our dependence on fossil and nuclear fuels, but shipments and use of OTEC technology products could create safety and environmental problems.

3.3.5 Offshore Sand, Gravel and Shell Mining

Problem Statement/Issue: [MR 9]

Economic terrestial sand and gravel resources supporting the construction industries in regional urban centers are being rapidly depleted. New York City already uses major quantities of sand and gravel derived from the ocean. Offshore sand and gravel mining by its nature involves significant disturbance of the substrate and of associated benthic communities. Large scale mining can also affect nearshore currents and, consequently, erosion and deposition patterns. In addition, offshore mining activities may have significant implications for ocean disposal of dredge spoil and sludge in the excavated pits.

Principal Information Needs:

There is a need for better definition and assessment of sand and gravel resources (quantity and quality) available, including economic potential and environmental impacts.

Systematic monitoring of all mining operations should be required to provide important baseline studies complimentary to dredging and dredge disposal issues.

There is a need to synthesize existing knowledge concerning the biological effects of mining, including removal/destruction of biota, impacts of increased suspended solids, and pollutant release from the sediment resevoir. Some data on these various aspects have been compiled from studies conducted elsewhere, but very little is relevant to species found in the Northeast.

Rationale for Priority:

Offshore mining is expected to become more significant as a result of land use competition in urbanized areas. Offshore mining activity in the New York City area involves around 12 million tons per year, of which 8 million tons is from the Bight. The changing economics of sand and gravel mining indicate a need for marine mining in the next 5 to 10 years. It is necessary to have a set of regulations in place which will allow for recovery of those resources with the appropriate safeguards.

Non-Federal Research Identified:

New York is funding a 3 to 5 year study of the economic and environmental impact of sand and gravel mining in NY State waters.
Previous work has been done in Rhode Island on the economics of sand and gravel mining.

3.3.6 Vessel Operations/Pollution Prevention

Problem Statement/Issue: [MT 12, 22, 23]

Over 80% of pollution from regulated vessels and facilities is caused by human error. Higher standards of education and training are needed to reduce this pollution threat.

Discharge of bilge water and cargo tank washings is also a major source of ocean pollution. The International Maritime Consultative Organization approved limits are 100 ppm and not more than 60 litres of oil per nautical mile. There is no way of measuring this other than stopping discharging when a sheen appears on the water, and this cannot be seen in heavy weather or in the dark. Furthermore, many discharge outlets are below the waterline. Illegal discharge often occurs accidentally or deliberately at night. The 1973 International Convention on Prevention of Pollution from ships and the 1978 Tanker Safety Pollution and Prevention Conference requires the installation of monitors, but the regulations are not yet ratified.

Bilge slops are not permitted to be pumped overboard in US waters. Oil/water separators are used on larger vessels, but the small recreation vessel fleet has no means of removing oily bilge slops without pump out facilities available ashore.

Principal Information Needs:

There is a need to study shoreside pump out facilities for bilge slops from small vessels.

Some companies are developing monitors as private ventures and these are being evaluated by the USCG and USN. In general the monitors are expensive--$15,000 for bilge warning and $100,000 for cargo tank installations-- and are not particularly accurate. Some of the funds devoted to aerial and satellite surveillance systems to detect spillages should be diverted to the development of less expensive monitors which would prevent pollution at the source. After accurate monitors have been developed shipboard recording monitors which would be installed in all ships and inspected as part of arrival are needed to stop illegal discharge.

Availability and need for improved hands-on training and education of operational personnel on vessels and shore side terminals should be studied.

- Ascertain qualifications of crew to handle spills
- How much can increased training reduce pollution?
- Identify various training programs [simulators] and effectiveness
- What union aspects apply?
- What are options; what options are feasible?

Rationale for Priority:

Training, monitoring and facilities to prevent introduction of oil into the sea are less expensive than cleaning up or suffering damage.

4.0 PANEL SESSION REPORTS

Since geography and land useage varies enormously throughout the North and mid-Atlantic region, the area was partitioned into three subregions: New England; Connecticut, New York and New Jersey; and Delaware, Maryland and Virginia. Workshops were held in the subregions prior to the full regional conference to identify local problems and issues, establish initial priorities in the five major categories (Coastal Land Use and Recreation, Marine Energy, Marine Mineral Resources, Marine Transportation, and Waste Disposal), and to provide provocative ideas which were sent to all attendees prior to the meeting. Section 4.1 of this chapter summarizes the three subregional reports and the perceived problems.

Panel members developed problem statement worksheets during the conference in Durham which described a particular issue or problem and the related information need. Each panel chairman prepared a report providing an integrated overview of the panel problem statements, after considering the priorities established at the conference. The five panel chairmen's reports along with the full set of problem statements are listed in Section 4.2.

The steering committee selected leaders of the subregional workshops who in turn contacted interested persons to join the regional panels. Many but not all of the attendees from the subregional workshops joined the conference in Durham. (Unfortunately attendence records were not kept.) We thank the anonymous attendees and note the extent of participation is wider than the attendance and steering committee lists indicate.

4.1 REGIONAL ISSUES

4.1.1 Region I - New England

Although local concerns vary regarding the problems in the five conference categories of coastal land use and recreation, marine waste disposal, marine energy, marine mineral resources and marine transportation, two basic research needs are common to all:

- To assess and synthesize existing information on New England's ocean pollution problems; and
- To study the cumulative and/or synergistic effects of various stresses on the New England ocean environment.

Many pollution problems would be handled more efficiently by eliminating unknowing or unnecessary research overlaps and coordinating research gathering efforts, analyses and distribution of appropriate information to decision makers. The second point emphasizes the interactions among many of the stresses on the ocean environment to exert cumulative impacts. Understanding the effects of continuous additions of various pollutants into the system instead of on a case-by-case basis involves evaluating the effects on the total population rather than on individual species. Information is needed on how pollutants travel, where they eventually end up, and how they are concentrated in the environment.

Some issues contained in the five conference categories were considered together while others -- sewage sludge dumping, ocean thermal energy conversion, deep sea-bed mining, and brine producing activities -- were not considered applicable to New England. The following sub-regional workshop summary of each highest and high priority need is presented following (as much as possible) the five conference groupings.

COASTAL LAND USE AND RECREATION

Highest Priority: Non-point source pollution, particularly urban runoff, contributes to the deterioration of New England's coastal water quality. Research needs involve the analysis of amounts, types and origins of pollutants entering the ocean; and analysis of relative benefits and costs of combined vs separated storm sewers.

High Priority: Facility siting in the coastal zone was considered a management rather than research need. It contributes to cumulative impacts on the ocean environment (see second basic research need above).

MARINE WASTE DISPOSAL

This area was considered by the workshop group as the pollution category of greatest importance to New England.

Highest Priority: Sewage and Industrial Disposal includes both effluent discharges from sewage facilities and the ocean dumping of solid, particularly industrial, wastes. Associated concerns are incremental increases in background concentrations of pollutants and synergistic effects of various effluent constituents. Although toxic industrial wastes are currently not dumped offshore, numerous recent discoveries of ground water contamination from previous inappropriate land disposal and the difficulty in locating land facilities may direct attention towards the ocean as a disposal option. Research needs include examinations of cumulative synergistic effects of pollutants, analysis of PCB, DDT and other chemical contaminants in New England harbors, benefits and costs of alternative methods of hazardous or toxic waste disposal, economic loss due to bacterial contamination of shellfish beds from sewage discharge, and biological effects of sewage and industrial effluent chlorination on adjacent ecosystems.

Contaminated Dredged Material Disposal focuses on disposal of contaminated materials. Concerns about cumulative effects of toxic materials and the need for regional disposal sites were expressed. Research needs include determining the specific low energy regional disposal sites for contaminated dredge materials, and developing monitoring programs to assess the impact from disposal at chosen sites.

MARINE ENERGY

High Priority: Electric Power Facilities sited in the coastal zone pose numerous environmental problems. Current problems include effects of effluent chlorination, incremental coastal zone growth, entrainment and impingment at cooling water intakes and cumulative effects on impacted ecosystems. Another key issue is deciding what appropriate questions must be asked during the siting process to accurately assess potential environmental effects.

MARINE MINERAL RESOURCE

High Priority: Oil and Gas development on Georges Bank, a highly controversial subject, currently focuses on the potential conflict between New England's fishing industry and petroleum development. In addition to the emphasis on spill effects, other problems look at the

numerous discharges associated with petroleum platforms such as chronic low level hydrocarbons, heavy metals and drilling muds. Research needs include the cumulative and synergistic effects of heavy metal discharges and potential effects of fisheries from low level hydrocarbon and drilling mud discharges.

High Priority: Sand and Gravel Mining nearshore is becoming more economically feasible and greater pressure will be exerted in the future to develop this industry. However, little information is available on effects of mining on New England's marine coastal environment. Research should analyze short and long term effects of sand and gravel mining on different coastal ecosystems.

MARINE TRANSPORTATION

High Priority- Marine Transport problems include operational discharge of oil into the ocean and environment hazards posed by vessels and cargoes transported. Research needs include the analysis of vessel standards to minimize risks of accidents and loss of cargo into the marine environment, and an examination of engineering/design approaches such as double hulled vessels and segregated ballast tanks to minimize environmental impacts.

4.1.2 Region II - New York Bight Area

Region II encompasses Connecticut, New York, New Jersey and Long Island. Outlined below are the more important problems of Ocean Pollution in this region.

Effective Monitoring and Data Bank: Millions of dollars are spent in monitoring the marine environment in this region. With improved coordination of research and dissemination programs, data already generated could be easily recovered and applied to problems by decision makers and scientists. An effective data bank for environmental quality control is a highest priority need.
Research is needed on the effects and outcomes of present and proposed strategies to improve the quality of the environment. This work should concentrate on three actions: upgrading sewage treatment, the 1981 ban on sewage sludge dumping, and pretreating wastes.

Dredging and Disposal and the Quality of the N.Y. Bight

A dredging and dredged material management plan is badly needed. Projects should examine the criteria, standards and costs for protecting the air, water and land. It is necessary to learn if burial and capping are a safe method of disposing of contaminated materials.

Contaminants, Water Quality and Living Resources

Questions in this area are: What are the locations and strengths of contaminants entering the marine environment? What factors, including water quality, affect the living resources and our ability to utilize them? Can we change these factors, and at what cost? Specific questions focus on designing monitoring programs to give early warnings of pollution, so that at least some living resources can be saved.

4.1.3 Region III - Mid-Atlantic Region

In addition to coastal waters, two large estuaries, Delaware Bay and Chesapeake Bay, characterize the sub-region of the Atlantic Coast between the northern border of North Carolina to New Jersey. Regional pollution concerns for this area were identified in the following categories.

COASTAL LAND USE

As a broad category, coastal land use was ranked high. New Jersey has passed legislation establishing a solid waste disposal fund and an amendment to Delaware's Coastal Zone Legislation of 1971 permits on-shore facilities for pipelines. The activities permitted by these amendments could have significant environmental ramifications which should be studied prior to new legislation. The state of Maryland also has adopted coastal zone management legislation but Virginia has not.

Problems of non-point source pollution have been documented in "208 studies" at several designated areas in Chesapeake Bay and in Delaware. Non-point discharges, which are commonly difficult to identify and control but appear to contribute considerable pollutants to aquatic systems, are ranked high among coastal land use problems. Water use practices of upstream withdrawals and returns also greatly affect water quality. Non-point discharge and water practices are more obvious in urban areas and in the upper watershed of the Delaware Valley and the Susquehanna River. Although these activities are essentially out of sight from the lower bays and coasts, their impact must be recognized.

Recreation: Recreation is a major industry in the area, and the environmental impact is felt onshore and in nearshore waters. During the summer, the influx of tourists has exceeded the capabilities of some sewage systems. New marinas increase the needs for disposing human wastes, and the likelihood that oil and gas will enter the marine environment.

Living Resource Utilization

Environmental problems associated with living resource utilization involve the long term decline of water quality and the disposal of marine food processing products. Problems eminate from the Trenton-Wilmington area in the north, from the tourist industry and from overfishing of selected stock by commercial interests. Plans to renovate and enlarge a former fish dock and processing center in Lewes, Delaware near the mouth of the Bay might mean greater landings. Food processing activities would probably expand, which subsequently would increase the probability of further degradation of water quality unless appropriate practices were invoked.

MARINE WASTE DISPOSAL

Sewage Dumping

At present Philadelphia maintains a sewage dump site off Ocean City, Maryland. Although dumping is scheduled to cease in 1981 it has already received easement from earlier deadlines. Measureable environmental degradation has occurred at this site. The effects of both cessation or continuence of disposal in 1981 should be assessed in order to estimate whether environmental conditions will recover or continue to deteriorate.

Municipal Sewage Outfall

The single major municipal sewage outfall along Delaware's ocean coast is located at South Bethany Beach, Delaware, heart of Delaware's ocean tourist beaches. In view of the ecological and economic significance, this outfall deserves monitoring attention. New Jersey's proposed outfalls warrant the same consideration, as does the large ocean outfall presently under construction at Virginia Beach.

There is evidence of a serious depression in water quality in the waters around small outfalls, and high trace metal concentrations of Hg, Cd, Cu, and Pb. Compiling a directory of outfall sites, discharge composition and volume in the riverine portions of the estuaries would be helpful.

Industrial Dumping

An industrial dump site located off Ocean City, Maryland, contains a suite of trace metals including vanadium and titanium. Research should be done on how the metals from the dump site may have contributed to the degredation of the nearby sewage sludge disposal area.

Dredge Spoils

Dredging and spoils are ranked high. The 18 disposal sites in the Delaware Bay area will be filled to capacity (6.5 million cubic yard/year) by the mid 1990's unless viable alternatives are developed. Similar disposal sites near Baltimore and in Hampton Roads have a limited capacity and will be full in the not-too-distant future.

Research is needed to find additional disposal sites or alternatives to dumping. Also, studies should be conducted to extimate the spoil volumes for periodic dredging of ferry terminals and tributary channels in the Bays, and the effect of developing a deepwater port in Delaware waters, or off the mouth of Chesapeake Bay.

Radioactive Waste

Research should assess the hazard the New Jersey continental shelf deepwater dump site that receives radioactive waste. Studies should specifically examine the strong southwest drift in the area that could potentially move these wastes toward southern New Jersey or Delaware's ocean coast. The hazards due to accidental release of radioactive wastes from nuclear generating facilities should be evaluated for both the ocean coasts and the estuaries.

MARINE ENERGY

Electric Power

From every indication, the size of existing plants will increase or new plants will be constructed. Therefore concern about electric power generation on air and water quality is ranked high. The environmental effects associated with these plants should be examined carefully.

Nuclear Electric Power

The plant at Salem, New Jersey is the principal source of nuclear electric power in the Delaware Bay area, and should be monitored carefully. A

large pre- and post-operation field survey program has been mounted for several years and is still in progress.

Chesapeake Bay has nuclear generating facilities along its shore (Calvert Cliffs), estuaries (Surry on the James River) and tributaries (North Anna on the upper York River and Three Mile Island on the Susquehanna). Considering the number and size of these facilities, special attention should be given to the accumulation and effects of radionuclides in the Bay.

Ocean Thermal Energy Conversion

Opportunities for OTEC systems are presently not immediately obvious in the Mid-Atlantic coastal area. Therefore this category is not applicable.

Developmental Ocean Energy Technology

The environmental consequences of this activity are probably similar to OTEC concerns but the attitude should be one of wait and see.

MARINE MINERAL RESOURCE

Oil and Gas

This category is ranked moderate since Exxon is presently the only major oil company exploring for oil and gas off New Jersey. In addition to potential spills at well sites from blowouts, some evidence shows that the hydrographic conditions off New Jersey are conducive for dispersing drilling muds.

Deep Sea Bed Mining - Non-applicable at present.

Sand and Gravel Mining

Although nothing is currently extracted, the status of this category could change dramatically depending on the rate and volume projected for extraction of terrestial resources. Research should be done on site areas and effects of sediment extraction from the beaches and nearby offshore waters.

Brine-Producing Activities

Brine-producing activities such as desalination and oil drilling are not presently considered a problem. In the event of considerable offshore or onshore oil and gas exploration and exploitation, this ranking would have to be re-evaluated.

MARINE TRANSPORTATION

This important activity depends on dredging and spoil disposal. Moreover, transportation involves oil and gas, ore, coals, and a wide variety of toxic materials which also qualify as potential pollutants or health hazards. High standards of oil lightering must be maintained and enforced to reduce chronic accumulations of hydrocarbons. Research should look into the environmental effects of extending the lightering areas.

There is need for continued monitoring of lightering volumes, oil imports and refinery capacity. Finally, regional studies identify a wide variety of development potentials in Delaware and New Jersey, and a large refinery is planned for Portsmouth, VA.

4.2 PANEL CHAIRMEN'S REPORTS AND PROBLEM STATEMENTS

4.2.1 Coastal Land Use And Recreation

At the onset the panel discarded the concept of recreation as being of equal weight with land use since it is but one element within the overall land use scheme of coastal development.

In the initial discussions the panel identified some two dozen problems that contribute to ocean pollution as a result of man's uses and misuses of the coastal zone, both inland and outland. Since the prime focus of impact vis-a-vis our panel is the contributions that land use decisions make on the marine environment, we were concerned with three basic classes of action: 1) insertion, 2) extraction, and 3) modification.

Most of the near-shore extraction related problems, whether for mineral use, navigable channel development, OCS exploration and development, were more related to the work of the other panels. We concentrated on the issue of dredging as a class of actions, and turned this material over to Dr. Jerry Schubel's panel on waste disposal since it was presumed that they would go into greater detail. This left us with the issues of insertion, e.g., sanitary and solid waste disposal, landfill operations, spoil site disposal, and the whole class of shoreline modifications.

In terms of priority and relative importance, we have a very strong correlation in the numbered voting system to indicate that physical modificaton of the shoreline, as a result of coastal land use practices including recreation, was absolutely the number one factor contributing to marine water pollution. In second place we were concerned with the impact that results from individual and often independent land use decisions. In one sense, the first class of problems has to do with the cumulative impact of human settlements (by the year 2000 four out of five Americans will live in the nation's coastal zone). Just the numbers alone and the waste products generated will constitute one of the major sources of contaminant input into the near shore environment.

Relative to the impact of individual decisions, which also would include sub-elements such as dredge material disposal, it is essential to have a solid understanding of the biological assessment on the effects of such impacts.

The last two areas of concern transcend both major problems - identifying the need for a comprehensive monitoring program of coastal and estuarine systems, and developing an information system. We had a strong consensus that since we often do not control the major land use decisions, to better manage the coastal zone we at least should be in a position to understand the impacts over time as a result of land use perturbations. All too often new research efforts result in a total reinvention of the wheel. This not only is costly, but often is a perverse reversal of priorities and could be mitigated if NOAA were to concentrate on the establishment of a national information network. Certainly the materials developed in a national monitoring program would be a core series of data for such a system. During the discussion we tried to get to the second and third level of debate and prepared a paper dealing with the impact of marinas on the New Jersey shellfisheries. Covering one of the major recreational-commercial areas of use and misuse, this example showed the type of individual land use decision and its impact on the marine environment.

CLR 1

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Coastal Land Use and Recreation

Sub-topic: Monitoring of Coastal and Estuarine Systems

Specific identified problem or issue (describe in a short narrative statement):

It is not possible to describe long-term changes in Northeastern coastal waters or in the estuaries, to distinguish some of the significant changes in the "health" of those systems from the inherent variations, to obtain adequate early signals of potential serious changes or to present the necessary systems-wide data required for many kinds of management decisions.

Key information required for action or problem resolution:

The best index observations must be determined to characterize the principal components and processes in the continental shelf region and important estuaries of the Mid-Atlantic and New England area.

The design of schedules, location, gear, selection of physical, chemical and biological samples, analytic techniques, data management and other elements must be outlined, tested, refined and matured for each system to be tracked - the coastal system and each important estuary. Specific research and calibration studies will be required in the development of the design. For example, it is highly probable that observations will include salinity, temperature, principal nutrients, suspect toxicants, indicator biota and indication of rates of primary production and the principal processes. For each ecosystem, however, the specific design must respond to the characteristics and desired uses of that mass.

Long-term trends in the significant parameter must be recorded and presented in a useful form for scientists and managers.

Please comment on why this problem is important:

As pressures on the coastal region increase, the necessity increases for assuring that multiple changes do not seriously damage the useful qualities of the marine ecosystem. The detection of dangerous trends, the indication of destructive new additions and the separation of significant changes from trivial natural variations are all necessary to protect these resources from damage, avoid wasteful investment in unnecessary pollution control and guide improvements in water quality.

Is this a site specific local problem, a regional, national, or global one?

The ecosystem is the proper unit of attention. Each estuary merits proper monitoring and the Atlantic coastal system or natural sub-systems must be monitored. It is essential that commonality of monitoring efforts and data be achieved and maintained. Status designations, primary sampling techniques, data units and data management systems, among other elements, should be fully compatible systems, and the design should permit nesting of intensive examinations within any area of interest with potentials for relating those data with those on a larger scale.

What, in your estimate, is the immediacy of the threat or need for information?

Primary designs for monitoring are required within five years. Implementation is a different and difficult phase, and the coastal zone and principal estuaries should be under adequate monitoring within ten years.

Other comments:

Monitoring is conducted and must be continued by industry, by cities, states, regional agenices and federal agencies. Every reasonable effort must be made to develop and continue true compatibility between these and the regional monitoring programs.

CLR 2

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Coastal Land Use and Marine Recreation

Sub-topic: Information and Data Management

Specific identified problem or issue (describe in a short narrative statement):

There exists no coordinated system for organizing, accessing and managing the substantial amounts of data and information generated from coastal and marine pollution control and monitoring research.

We recommend that NOAA begin a long-term (5-10 years) effort towards creation of such a national information network.

Implementation:

1) NOAA coordinate & document access to and use of existing pertinent Federal and Federally sponsored data bases.

2). NOAA begin designing a quality assurance program as overall guidance for data production, compatability, and management.

3). A prototype regional (e.g., NY Bight, Chesapeake Bay, Georges Bank, Narragansett Bay) data and information management system which would consist of:

a) an inventory of all past and ongoing research on coastal planning and marine pollution

b) an inventory of experts/researchers, and research institutions

c) bibliographic information, concentrating on grey literature

d) pertinent data and an inventory of other existing support data; an instruction manual for users and a minimal staff at a central access location for user assistance

e) inventory of gaps both in the information base and in scientific research to assist in recommendations for research needs and priorities

Products/Services Generated:

1) Comprehensive sets of data used for planning and managerial decision-making.

2) Synthesized information briefings for a) managers, decision-makers and planners; b) public interest groups and the media. These documents/packages would be produced by professional technical writers from the information generated by the system.

3) Directories, handbooks and bibliographies.

4) Verified models utilizing the information contained within the proposed information system, and accessed through the system, to assist in coastal resource and marine pollution management and planning decisions by visually depicting:

a) assessment of current problems

b) forecasting of future trends/problems

c) production of alternate scenarios towards solving those problems and avoiding "crisis" solutions

Key information required for action or problem resolution:

[Refer to items under topic of "Implementation":]
1) A user access guide/manual of existing data bases.
Projects similar to this are being worked on by components of NOAA. The Environmental Data and Information Service, for example, could provide this information.

3) item (d). Information and data subjects to be inventoried include: historical shoreline modifications, biological ecosystems, remote sensing information, economic and demographic information, estuarine and hydrodynamic information and physical, chemical and biological water quality information.

Models would include: High quality compatible data in the areas of meteorology, hydrodynamics, water quality data, soil data, land use data, and population projections are examples of what is needed.

Note: Prototype study: NOAA should take a target area to conduct a prototype of organizing all existing information to: a) see if system is possible and work out design problems; b) evaluate and discard superceded, useless, redundant or bad data/information; c) begin to design and implement a quality assurance program from this study.

Please comment on why this problem is important:

Data and information in coastal planning and marine pollution control and monitoring is scattered, multidisciplinary and not organized in one or several readily accessible systems.

Knowledge and utilization of what has and what has not been researched or documented would aid in avoiding duplication of effort and pinpointing priority areas where further research and study is needed. Organization and coordination of the information in one source would aid planners and decision-makers in their efforts.

The information in this system can also be formatted and "translated" to provide readily accessible and comprehensible documents for active & informed public participation, and for the media.

Is this a site specific local problem, a regional, national, or global one?

This is a local and regionally manageable problem that has both national and global potential.

What, in your estimate, is the immediacy of the threat or need for information?

(1) & (2) - 1 year; (3) - 5 years (10 years for optimum input, design & function, particularly of models)

Other comments:

Potential funding/sponsoring sources:
Sea Grant universities through their State or private funding components
Councils of State Planning Agencies Federal Data Coordination Project
National Governor's Association Policy Study & Synthesis statements
Texas Natural Resources Information System

CLR 3

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Coastal Land Use & Recreation

Sub-topic: Physical Modification of Shoreline

Specific identified problem or issue (describe in a short narrative statement):

The progressive physical modification of the shoreline by works of man in the North and Mid-Atlantic Region is a significant factor affecting ocean pollution. This process has both direct and indirect effects. Some of the direct effects include placement of contaminated materials in estuarine wetlands, through dredging disposal or dumping of solid wastes. The direct effects of shoreline modification are seen in beach and dune area changes, the channelization of rivers and their tributaries, shoreline stabilization measures such as jetties, groins, bulkheading, and rip-rap, and in the alteration of natural drainage systems in wetlands and adjacent upland areas. Many modifications are associated with the siting of major facilities, such as airports, power plants, highways, and shipping terminals, but they may occur as separate activities.

A typical indirect effect from the filling-in of coastal wetlands or waterfront sites is increased development, which may generate pollutants and demand for their disposal in or near the ocean. Recreation development may involve active use of waterfront lands and immediately related water areas for swimming or marinas, and have the further effect of requiring higher standards of water quality to protect public health. The cumulative effects of these shoreline modifications are neither quantified in meaningful terms nor well understood in terms of their implications for ocean resources in the future. Therefore, effective policy, regulations, and resource management decisions relative to marine pollution cannot be made in an adequate scientific context.

Key information required for action or problem resolution:

- Determination of rate, type, and extent of shoreline modification to date, based on actual inventory of coastal zones.
- Systematic monitoring of shoreline modifications currently underway and projected, to provide perspective on the dynamics of the shoreline modification process.
- Assessment, in terms of individual modifications, accumulation of similar modifications, and aggregations of diverse modification, of direct and indirect effects on ocean environment attributable to shoreline modifications, e.g., effects of loading or carrying capacity of marine resources such as wetlands, etc.

Please comment on why this problem is important:

The problem is important because it results in:
1) Marine resources degradation (fish spawning areas, shellfish beds, wildlife/waterfowl resting, nesting areas).
2) Non-renewable resources destruction (beaches, dunes, wetlands, biotic communities).
3) Degradation of water quality, through accelerated sedimentation and siltation, introduction of toxic substances, and altered water temperature.
4) Aggravation of natural flood hazards.

All of the foregoing results are inimical to society in general and frequently create site-specific risks and hazards and adverse economic effects, typically manifested in:

- contamination of drinking water and water-related recreation facilities
- contamination of shellfish beds and fish-spawning areas
- hazards inherent in the destruction of beach/dune/wetland systems
- reduction of economic use potential of basic marine resources for fishing, water-dependent recreation, and related commercial activities

Is this a site specific local problem, a regional, national, or global one?

Primarily a regional problem, with national policy implications. The cumulative effects of the site-specific local problems created the basis for the regional and national problems.

What, in your estimate, is the immediacy of the threat or need for information?

Five years

Other comments:

NAS/NRC Study, Urban Waterfront Lands, 1980
ORCA Study
US EPA Study, Chesapeake Bay Program

CLR 4

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Coastal Land Use & Recreation

Sub-topic: Impact of Individual Land Use Decisions:
The Impacts of Marinas on New Jersey Shellfisheries

Specific identified problem or issue (describe in a short narrative statement):

1) Shellfish constitute one of the most highly prized components of the American diet.
2) New Jersey has been a major supplier of shellfish, but of the state's total shellfish acreage of 400,000 acres, 25%, or 100,000 acres, is now closed.
3) Every shellfish ground contiguous or proximate to a marina in the State of New Jersey is closed.
4) Substantial production of safe shellfish may be lost.
5) Given that the nature of the affected shellfish really requires closures in the interests of public health, what part of marina construction - composition of materials, extent of bulkheading, pier expanse, - placement, and/or activity appears inherently antagonistic to shellfish?
6) Would it be possible to design a marina compatible with existing shellfisheries?
7) Would it be possible to design a "Marina Rehabilitation Package," to open existing adjacent shellfisheries?

Key Information Required:

1) Shellfish near existing New Jersey marinas will be sampled and analyzed in relation to human health.
   a. Coliform counts
   b. Communicable diseases
   c. Possibly harmful parasites
   d. Heavy metal counts
   e. Oils of various compositions
2) Existing health standards will be examined to determine rationality: e.g., does a high coliform count really affect human health? Is it a useful indicator?
3) Shellfish grounds and superadjcent waters near marinas will be subjected to the following analyses:
   a. Coliform counts
   b. Nutrients
   c. Heavy metals: mercury, vanadium, cadmium
   d. Oils of varying composition, viscosity, and densities
4) The contaminants considered "serious" will be traced, to determine the degree of cause represented by the adjacent marinas.
5) Each contaminant traced to a marina will be examined to see if it is inevitable that the marina will discharge the particular contaminant. The following possiblities will be examined:
   a. Boat exhaust discharge
   b. Human waste

c. Facilities degeneration, e.g., rotting structures
d. Silting and/or dredging
e. Oversupply of nutrients and consequent rumancy plant growth
f. Spill prevention

6) A "non-harmful" marina will be designed and a pilot will be tested. If successful, the technique will be tried on a public basis.

7) An attempt will be made to design a "marina rehabilitation" package to apply to existing facilities, incorporating specific objectives and techniques.

8) A parallel study will be carried out to determine whether a statewide "clean-up" would indirectly cause a level of shellfish depredation exceeding optimal sustainable yield. Does closure of shellfish beds actually provide necessary protection?

9) a. Are present standards realistic, or too severe in some cases or too lax in others?

b. Is existing methodology adequate to trace cause and effect, i.e., shellfish contamination to human health problems?

c. What regulations would assume that no intolerable damage to the biota will occur at the lowest feasible cost to marina interest? An intensive laboratory animal program may be instituted to test a number of presumed shellfish contaminants at various concentration levels.

10) It may be necessary to estimate the secondary environmental effects of:
a. Paving, i.e., marina parking lots
b. Extensive bulkheading
c. Service establishments, e.g., garbage disposal.

Please comment on why this problem is important:

The problem is hardly limited to New Jersey, and the methodology is certainly exportable.

However, while the problem is critical for shellfishermen, processors, and marketers, it must be considered less so in the broad perspective.

CLR 5

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Coastal Land Use & Recreation

Sub-topic: Disposal of Dredged Materials

Specific identified problem or issue (describe in a short narrative statement):

The disposal of dredged materials in coastal and marine waters continues to be a managerial problem even though much research has been carried out relating to various dredging activities. The problem remains of where to place clear or contaminated dredged material. Fishery habitat and water quality must be protected.

Key information required for action or problem resolution:

Information needed for managerial decisions includes: projected volumes of materials to be disposed and their composition; better test procedures for determining components of materials; resource characterization of areas to be dredged and for areas where materials are to placed; alternatives to open water disposal; better bioassay tests (lab tests/real world relationships); and impacts of a plant disposal.

Please comment on why this problem is important:

Dredging is an economic necessity for harbor vitality on the East coast. Yet the placement of dredged materials can cause significant impact on aquatic resources if managerial decisions or placement are made in the absence of sound technical data. This information must be produced in a timely fashion so as to not further delay the already time-consuming permit process.

Is this a site specific local problem, a regional, national, or global one?

Regional (harbor specific) and national; possibly global

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

Waterways Experiment Station, Corps of Engineers, Vicksburg, Mississippi, has carried out much work on dredging methodology and disposal alternatives.

CLR 6

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Coastal Land Use and Recreation

Sub-topic: Biological Assessment of the Effects of Material and Environmental Alterations

Specific identified problem or issue (describe in a short narrative statement):

The principal significant effects of adding materials or changing the coastal waters and the estuaries are injurious to the biota and related biological processes. Loss of the biota or hindrance of the processes reduces the usefulness of the marine system. However, present methods for biological assessment of existing or potential changes are seriously inadequate for measuring impacts or estimating the effects of proposed changes.

Key information required for action or problem resolution:

Assessment is needed of: of the biological effects of existing and emerging chemicals (heavy metals, organic biocides, hazardous chemicals, etc.), placements of dredged materials with varying chemical associates, changes in temperatures and salinity, hydrocarbon derivatives and a variety of materials such as sewage, industrial and metropolitan sludges.

What biological components and related processes best represent the estuaries and coastal ecosystems and can be employed to assay materials and new conditions?

What specific tests and protocols will adequately estimate potential impacts in coastal waters and estuaries?

Please comment on why this problem is important:

New materials are rapidly invented, technological changes are frequent and the inclination to use estuaries and coastal systems for receiving minor and major pollutants is very strong since it appears to be inexpensive. At the same time, the capacity of these systems is known to be declining in many areas, it is necessary to predict the primary effects of each material and change prior to introduction and to assess the effects of those already in place. Limited chemical sampling, standard bioassay procedures, and post-injury observation will not suffice. There is urgent need for improved ability to assay biological effects.

Is this a site specific local problem, a regional, national, or global one?

Two sets of bioassay procedures will be required - one for estuaries and one for coastal waters. Organisms and methods may in some cases be common between these.

What, in your estimate, is the immediacy of the threat or need for information?

Urgency is high, but the development and standardization of protocols must be done with care. Should be completed within five years.

4.2.2 Marine Energy

Research problems related to marine energy for the North and Mid Atlantic coasts can be grouped into five general areas: cooling water systems, subregional studies, development of new measurement techniques, preparation for future trends and technologies, and radioactive by-products of generating facilities. Specific problem areas will be addressed below and are listed in the table.

Cooling Water Systems

The use of coastal waters for cooling is perhaps the predominant manner by which electrical generating facilities interact with and impact upon the marine environment. Although much research has been conducted over many years, we must continue to address substantive problems. For example, chlorination has been used to control biofouling for decades, yet the biological effects of many chlorination products remain unidentified. Therefore continued research on chlorination products was given a Highest Priority ranking. Similarly, entrainment and impingement studies have been conducted at many sites. A High Priority research area is to synthesize this work with the objective of discerning information that would influence the design and operation of facilities.

In an effort to minimize entrainment and impingement effects, the use of cooling towers has been promoted and, in some instances, required. Evaluation of the environmental consequences of seawater cooling towers was given a Highest Priority ranking, since it is not possible to determine these effects from our experiences with freshwater systems. The environmental consequences must be known before a true comparison of the alternatives can be made.

Innovative uses of power plants should continue to be studied. In addition to waste heat utilization, there are other possible positive interactions such as the introduction of air into the thermal effluent to increase dissolved oxygen levels in the receiving waters. Such beneficial uses of a power plant warrant study and testing.

Methodology Development

Closely related to the cooling water systems impacts is the need to develop better tools for monitoring environmental changes and impacts. Specifically it is a Highest Priority recommendation that statistical techniques be developed which are appropriate to the types of data generated in biological studies. The analytic methods traditionally applied have been both non-standardized and only marginally effective since they were originally developed for other purposes, such as controlled experiments. The highly variable nature of environmental data makes it very difficult and expensive to acquire sufficient samples to meet the assumptions of these more traditional methods. It is necessary, therefore to refine or develop more effective analytic protocols in dealing with these data, with the objective of both providing a more rigourously developed foundation for decision making and increasing the cost-efficiency of environmental sampling.

Regional Approach

The panel recommends that problems be approached from a regional or subregional point of view as well as on a site specific basis. This is

necessary because the interactions (both among several power plants and between power plants and other activities) are more likely as the population and the industrial activity increase. This is especially true for those semienclosed water bodies within the region such as Chesapeake Bay and Long Island Sound.

Synthesis of existing data on a (sub)regional basis received a Highest Priority ranking since it would provide guidance as to the degree to which interactions and cumulative impacts are presently occurring. A High Priority need is to study coastal hydrodynamics for the regions, since knowledge of the physical environment and transport processes is important to understanding most other facets of the marine environment.

Future Trends and Technologies

The rising price of petroleum products and other factors ensure that the marine energy situation will change in the future. The most imminent change is a shift back to coal for generating power. Through many indirect routes -- fugitive dust from coal piles, atmospheric fallout, disposal of scrubber sludges -- this shift could have a significant impact on the marine environment and therefore was considered a High Priority.

In addition alternative energy sources will be tested and developed during the next decade. Studies are needed to assess the feasibility of harnessing wave and tidal energy for power production. Although OTEC facilities are not considered appropriate for the Mid and North Atlantic coasts, studies should determine how the storage and transfer of energy (i.e., as hydrogen gas) from OTEC installations would affect the North Atlantic region.

Radioactive Byproducts of Generating Facilities

The panel considered two types of radioactive byproducts: radionuclides and radioactive wastes. Radionuclides arise from both fossil fuel and nuclear generating facilities. Monitoring programs for radionuclides should be continued to document conditions and trends in radionuclide levels. However, the panel lacked the expertise to evaluate the adequacy of existing programs.

Disposal of radioactive waste materials has not been resolved on a national basis. The panel recommended that present studies of disposal in the ocean should be continued, with the understanding that the assigned priority should be directly related to the likelihood that the ocean will be selected as a disposal site.

MARINE ENERGY

Highest Priority	High Priority	Priority
Cooling Water Systems		
Seawater Cooling Towers	Synthesis of Entrainment/ Impingement Data	Innovative Uses
Chlorination Products		
Methodology Development		
Regional Synthesis of Existing Data	Coastal Hydrodynamics	
Future Trends and Technologies		
	Shift to Coal	Alternative Energy Sources
		OTEC/Energy Storage & Transfer

Problems Identified but Not Ranked

Radionuclides
Radioactive Waste Disposal

ME 1

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Energy

Sub-topic: Seawater Cooling Towers

Specific identified problem or issue (describe in a short narrative statement):

An alternative to the once-through mode of operation for power plant cooling water systems is the cooling tower (natural and mechanical draft). While cooling towers have been employed widely for inland freshwater power plants, they have not been used at coastal sites where there is ocean water. The environmental impacts of salt water cooling towers have not been fully examined. Some estuarine salinity cooling towers exist, but they are not without problems.

Key information required for action or problem resolution:

1) Identify concentrated blowdown constituents, concentration factors, plume behavior when released to the receiving waters, and effects upon marine populations.

2) Determine whether saline aeorsols adversely affect native and cultivated vegetation and result in shifts in plant community composition or in loss of income to farmers. Salt drift may be expected to damage plant tissue by direct deposition or indirectly in the case of soil deposition.

3) Assess probability of human safety decreases if fogging and icing of highways and bridges occurs due to aerosol plumes under various meteorological conditions.

4) Assess the risk to human health where cooling water is drawn from surface waters containing domestic sewage. Pathogen contamination of cooling tower blowdown and drift should be investigated.

5) Detailed cost-benefit analysis of the aesthetic impact of cooling towers in coastal environments should be made to determine the value in having unobscured horizons in a region of relatively low physiographic relief.

Please comment on why this problem is important:

The Water Act (PL92-500) and the use of existing mixing zone criteria tend to favor the use of cooling towers for steam electic power plants in semi-enclosed water bodies. The relatively unlimited dilution volume at coastal sites and the greater potential impact from cooling towers may favor once-through cooling for power plants situated in marine environments.

ME 2

Worksheet for Outlining Problems and Identifying Needs

(Use separate sheet for each problem)

Panel Name: Marine Energy

Sub-topic: Chlorine Impacts

Specific identified problem or issue (describe in a short narrative statement):

The electric power industry currently uses about 25,000 tons of Cl_2 per year for fouling control. (OTEC plants, if they begin to make significant inroads into the power market, will increase this figure immensely.) The oxidative chlorination products (hypohalous acids, halamines, etc.) are extremely toxic. Moreover, up to several percent of chlorine decays by forming halocarbons, including trihalomethanes. For the most part, the nature of other decay products and their persistence is not yet known even though there is evidence that some of them are bioactive.

Key information required for action or problem resolution:

1) Identification of decay products is badly needed. At present only a small percentage of chlorine decay can be accounted for by known products. Kinetic information on decay processes should be obtained. Water quality variables, such as organic content, nitrogen content and speciation, salinity, and temperature should be considered in the experimental designs to study this problem.

2) Analytical methods for monitoring chlorine produced oxidants and chlorine decay products must be developed. Present methods are inadequately sensitive and according to one recent report, chlorine determinations may be erroneous by a factor of up to three when applied to seawater.

3) Research on improved application and monitoring procedures in power plants for chlorine are needed.

4) Sublethal biological effects, such as alteration in development and behavioral modifications affecting feeding ecologies and reproductive behavior, require much greater attention. Priority should be given to commercially important species.

Please comment on why this problem is important:

Modern power plants sometimes require most of the water near their fluvial or estuarine sites, so chemical modification of the cooling waters requires close scrutiny. Chlorination is known to produce traces of mutagenic compounds. It creates major changes in the chemical state of trace metals and amino-nitrogen compounds. Low levels of chlorine alter migratory behavior in fish. Also according to one report, fish mating behavior was altered by chlorination even though the chlorine itself was destroyed with a biologically inactive dechlorinating agent. Further, recent evidence suggests that sublethal doses of chlorine in the range applied by power plants have long-term effects on growth of entrained crustaceans.

ME 3

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Energy

Sub-topic: Methodology Development - Development of Quantitative Methodologies to Evaluate Biotic Changes.

Specific identified problem or issue (describe in a short narrative statement):

Ability to evaluate and predict impact to marine biotic communities is limited by the analytic methodology available and the fact that the methods that have been traditionally applied have been both non-standardized and only marginally effective. Because of the multivariate, highly variable nature of environmental data, a suite of analytic protocols must be further refined or specifically developed.

Key information required for action or problem resolution:

Review the methods that have been applied to compare their appropriateness and effectiveness in specific situations. After evaluating and intercomparing these methods, those that are presently most effective should be further refined and de novo statistical methods should be developed to provide a more powerful basis for dealing with these data. Methods to be examined include hypothesis testing, causal analysis, multivariate analysis and simulation modeling.

Please comment on why this problem is important:

This problem pervades all areas of marine research related to impact analysis. Optimization of these analytical tools would provide a more rigorously developed foundation for decision making.

ME 4

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Energy

Sub-topic: Regional Data Synthesis and Evaluations

Specific identified problem or issue (describe in a short narrative statement):

At present, most environmental work on power plant siting, marine outfall siting and waste disposal is done on a site-specific basis. Regional information synthesis is needed from at least two standpoints.

First, where several power plants are concentrated in semi-enclosed water bodies such as Long Island Sound or Chesapeake Bay, impacts of entrainment and thermal additions must be assessed on a cumulative or regional basis.

Second, the siting of new energy facilities could be greatly streamlined if available information were collated in the form of regional maps and summaries addressing the regional distributions of water quality, circulation, shoreline stability, sensitive environments, and sensitive or commercially important species.

Key information required for action or problem resolution:

Such regional syntheses will require collation of extensive bodies of site-specific data, much of it in the "gray" literature. Inconsistencies resulting from use of different techniques must be resolved whereever possible. Aside from the basic distributional data required as input to the regional maps and summaries, the following broad information categories are required for the entrainment and thermal addition syntheses:

-an accurate knowledge of the heat budget for the water body in terms of both natural and artificial sources and sinks

-an understanding of the population size, distribution, and dynamics for key fin- and shellfish species

-ability to differentiate natural physical and biological temporal and spatial variability from changes resulting from human activity

-knowledge of synergistic effects of thermal additions with other human contributions such as discharged sewage and non-point source pollutants.

Please comment on why this problem is important:

Many new generating stations will have to be located in the coastal zone to satisfy future energy demand. These will tend to be located near major population centers where the marine environment is already under stress. The regional syntheses are important to the plant siting process from several standpoints:

1) thermal, and especially entrainment effects, which must be analyzed from a regional standpoint, are critical to an acceptability of new sites and selection of a cooling system (once-through vs. cooling towers).

2) duplication of effort can be avoided and experimental designs streamlined when all existing data pertaining to specific areas are available as input

3) collation of sets of site-specific data from many locations can identify trends and promote understandings which would otherwise be unnoticed.

4) delays in licensing critical energy facilities could be avoided if use of existing data were maximized.

Other comments:

The suggested regional synthesis will also assist in siting marine outfalls and other coastal facilities.

Initial attempts at regional summarization have been undertaken by various coastal zone management groups, as in the state of Maine. Also, NASA, through the Atlantic Urban Regional Project, is applying Landsat data to categorize various coastal regions for land use.

ME 5

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name Marine Energy

Sub-topic Synthesis of Existing Entrainment/Impingement Data

Specific identified problem or issue (describe in a short narrative statement):

Conventional once-through cooling water systems (CWS) have three basic types of marine environment impact potential. Nektonic organisms may be impinged on screening devices at CWS intakes. Plankton that pass through these screens and are entrained through the plant experience thermal, mechanical and chemical stresses. Marine organisms in the receiving waters exposed to the thermal effluent can display certain adverse responses. Considerable site specific work has been done dealing with impingement, entrainment, and thermal effluent effects. While this specific research may help identify an existing problem, it could serve a much greater use if a systematic survey of representative studies were to disclose certain generic features that could then be applied to future design and operating plans for proposed power plants.

Key information required for action or problem resolution:

The basic information exists today in the volumes of reports that detail local biosystem response to currently operating coastal power plants. A systematic review of such material must be undertaken by competent marine scientists with the objective of identifying both positive and negative common features. Each power plant site is unique with respect to the marine biotic community placed at risk, yet certain broad ecological principles apply over the entire coastal region. Along with certain common interactions with once-through CWS, these principles may point to some generic approach to CWS design and operation.

Please comment on why this problem is important:

The almost certain proliferation of coastal power plants can only proceed with adequate concern for and protection of valuable marine resources. Each proposed site must undergo its own rigorous assessment, however, if common lessons learned can be applied, and the process can be accomplished in a more orderly and cost effective fashion. The solution reduces the risk to marine resources and in addition should aid in conservation of human resources. It should be noted that salt water cooling towers, an alternative cooling technology with its own peculiar problems, are required if the effects of a once-through CWS are found unacceptable.

Is this a site specific local problem, a regional, national, or global one?

National, that impacts on environmental concern, economic well-being and national security.

What, in your estimate, is the immediacy of the threat or need for information?

One year - It is important to begin as soon as possible

Other comments:

Electric utility funded research has generated a data base. Some consolidation and synthesis of this data base has been done by a private research consulting group funded by the Utilities Water Act Group (UWAG), a consortium of electric industry companies.

ME 6

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Energy

Sub-topic: Coastal Zone Hydrodynamics

Specific identified problem or issue (describe in a short narrative statement):

Once a pollutant (particulate, heat, radionuclide, heavy metal, toxic) is introduced into the water column, its subsequent fate is governed by coastal and estuarine transport and mixing processes (tidal current, waves, interaction of estuaries with coastal waters, net drift, upwelling, etc.). These processes are governed by the hydrodynamics of the regional water body (Gulf of Maine, L.I. Sound, etc.). The problem is beyond the means and responsiblity of the individual power companies to address.

Key information required for action or problem resolution:

1) Three dimensional net and tidal current information.
2) Three dimensional salinity and temperature distribution.
3) Non-tidal ocean surface tilt (bottom pressure field).
4) Effects of near and far field meteorological events on the coastal hydrodynamics.
5) Interaction of estuaries with coastal flow fields.

Please comment on why this problem is important:

These studies will improve our understanding of how coastal power plants interact with ecosystems and fisheries. Lack of information leads to delays in licensing of power plants. The studies also would be useful for other marine energy factors (e.g., entrainment effects) and for waste disposal, land use siting decisions and marine transportation.

ME 7

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Energy

Sub-topic: Shift to Coal - Effects of Shift for Power Generation

Specific identified problem or issue (describe in a short narrative statement):

There is a need to estimate and assess the environmental impacts on marine waters and organisms of a shift to coal for power production, since the oceans will be the final sink for some of the coal and by-products of its utilization.

Key information required for action or problem resolution:

1) Estimate the magnitude of coal usage in the future.
2) Effect of leachate from coal piles.
3) Effect of fugitive dust from coal piles.
4) Effect of leachate from fly-ash and scrubber sludge disposal sites.
5) Effects of disposal of fly-ash and/or other solid wastes in the marine environment.
6) Effects of acid rain and the atmospheric transport of combustion products, such as polycyclic aromatic hydrocarbons and other harmful compounds.
7) Assess changes in coastal land use and transportation patterns due to the increased coal usage.

Please comment on why this problem is important:

Immediate health damages and environmental impacts have been observed in localized areas due to the above factors. Although impacts are likely to be much less severe in the coastal environment, one cannot exclude the possibility of subtle, yet important ecological impacts.

Other comments:

The impacts from coal utilization must be balanced against those ameliorations due to reduced use of other fuels. For example, coal will probably result in increased amounts of leachate from coal piles, but the likelihood of oil spills will be reduced. This need is very important on a national basis, but is less urgent for the marine pollution program since impacts on the marine environment are likely to be indirect.

ME 8

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name Marine Energy

Sub-topic Innovative & Beneficial Uses of Power Plants

Specific identified problem or issue (describe in a short narrative statement):

Potential exists for large coastal power plants to become important assets in the environmental management of coastal waters. One example is aeration of cooling discharges to introduce oxygen into waters which have deteriorated because of sewage pollution. Another example is use of waste heat to improve hatchery operations.

Key information required for action or problem resolution:

The federal government should try to stimulate research on new, innovative uses of existing power facilities in coastal resources management.

Other comments:

This problem area is one which could eventually result in significant local improvements or benefits. However, the funding necessary to achieve this objective generally could be very low relative to other competing demands.

ME 9

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Energy

Sub-topic: Alternative Energy Sources

Specific identified problem or issue (describe in a short narrative statement):

Alternative sources of energy such as wave and tidal power may produce electrical energy without the undesirable side effects of conventional power facilities.

Key information required for action or problem resolution:

Feasiblity studies (including economic aspects, technology development and environmental consequences) for extracting energy from tides and waves should be supported.

Please comment on why this problem is important:

Alternative sources of energy may produce energy with less pollution and lower our dependence on fossil and nuclear fuels.

ME 10

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name Marine Energy

Sub-topic OTEC Energy Storage and Transfer

Specific identified problem or issue (describe in a short narrative statement):

One unresolved problem in the development of OTEC technology is how to transfer energy from the plant to the user. Some suggestions include using the energy at sea to produce liquid NH_3 or H_2. These products then would be shipped or piped to the user.

Key information required for action or problem resolution:

Specific information needs will have to be defined after technological development and economic/political decisions affecting OTEC are more advanced.

Please comment on why this problem is important:

This technology could create safety and environmental problems.

Is this a site specific local problem, a regional, national, or global one?

Global

Other comments:

The potential for OTEC in the Mid and North Atlantic Region is perceived to be low. However, energy could be stored at OTEC site and then transferred to other locations, and in this manner affect the region.

ME 11

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Energy

Sub-topic: Radionuclides in the Marine Environment

Specific identified problem or issue (describe in a short narrative statement):

Radionuclides from fossil-fuel generating facilities and from planned and accidental releases at nuclear generating facilities could accumulate in the environment and cause ecological problems.

In addition, the effect of other toxic substances which may be released from generating stations should be investigated.

Key information required for action or problem resolution:

Monitoring of ambient levels of radionuclides in the marine environment is needed so that changes in levels can be discovered and appropriate actions taken.

The panel included no persons with expertise in the field of radionuclides, therefore, we cannot properly assess the adequacy of present programs. This problem appears to warrant further consideration, but by persons who are better informed than the members of the panel.

Please comment on why this problem is important:

Nuclear generating facilities are now and are likely to continue to be an important element in the power industry. Also citizens have heightened awareness of problems with nuclear facilities.

ME 12

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Energy

Sub-topic: Radioactive Waste Disposal

Specific identified problem or issue (describe in a short narrative statement):

There is a need to determine methods and sites for the disposal of radioactive waste materials that will be environmentally acceptable now and for the indefinite future.

The panel included no persons with expertise in radioactive waste disposal. However, the radioactive waste disposal problem will become more critical as on-site storage facilities at power plants are filled. This problem should be resolved now, rather than when it has become a full-blown crisis.

Key information required for action or problem resolution:

1) Methods of containing the waste materials that will not fail (e.g., due to corrosion or fracture from high pressures) must be developed and tested.
2) Sites appropriate for waste disposal must be located.

Please comment on why this problem is important:

If the national policy is to develop disposal sites in each region of the country, then for the North and Mid Atlantic regions, disposal in the marine environment appears to be one potential solution to this problem. The importance of this problem to the marine environment is directly related to the likelihood that the marine disposal option will be utilized.

4.2.3 Marine Mineral Resources

The marine minerals panel focused primarily on oil and gas activity with minor consideration of sand and gravel mining. No other minerals were identified as being viable for the next five years, and none are likely to be economically important in the next ten years.

Pollution problems associated with exploring for and developing marine mineral resources received a lower overall priority than waste disposal or transporation. The panel agreed that considerably fewer adverse impacts would result from offshore mineral-related activities than from shipping activities or ocean waste disposal, because the volume of pollutants was relatively small and the impacted areas were mostly localized. Itr was the opinion of the panel members that many of the problems were perceived rather than real, and elevated in the public eye due to the absence of a coordinated, comprehensive summary of the results of past and ongoing research efforts. In many cases the workshop participants recommended a synthesis and evaluation of existing information before embarking on new studies. Specific, carefully considered studies to answer pressing questions should not be disregarded, but they should be viewed in the context of a broader information base.

TABLE 4.1 summarizes the 13 most important issues, ranked from 1 (least important) to 5 (most important). The averages reflect a consensus of the vast majority of the 12 participants in all but three cases. TABLE 4.2 briefly describes the five issues that were dropped from consideration. Problems related to siting support facilities in the coastal zone were referred to the Land Use and Recreation panel.

By far the most significant issues recommended for immediate attention were development of a regional monitoring scheme and selection of debris disposal sites. The committee felt quite strongly that these two issues should be a high priority for the workshop as a whole. If the only consideration were pollution from marine mineral activities, then these two would have a much lower overall priority.

The concept of a regional monitoring program has received limited attention until recently because of the complexity of the system and the difficulty in deciding on a measurement scheme. A recent conference conducted by NOAA addressed the concept of assimilative capacity of a coastal area which disregards source initially and focuses on the total pollutant load that the receiving waters can accomodate. This approach begs the question of a regional monitoring program for a variety of pollutants and nonpollutant indicators of the health of receiving waters. One individual suggested monitoring "ecological indicators," but this approach has led to the demise of many monitoring programs because of the nonspecific sampling scheme and the difficulties in interpreting the data. At least one ongoing regional monitoring program, Ocean Pulse, could be the base for a more comprehensive monitoring scheme. However, there has been no mechanism to develop a coordinated scheme; perhaps the emerging Office of Marine Pollution Assesment will remedy that situation. At the very least there will be some means for coordinating efforts on a regional basis and insuring that very specific objectives will be established and adhered to.

A discussion followed on the existence of a centralized data source. Two weaknesses are inherent in the present environmental data management system: inability to respond in a timely manner, and inability to provide real

data products or up-to-date data inventories. The major reasons for these weaknesses are the timely submission of data reports from funded programs and the lack of internal resources. In any case, improving the data management system is essential for a successful regional pollution management scheme.

The second highly important issue was the designation of disposal sites and/or techniques for handling contaminated debris, i.e., oiled sediments resulting from spilled toxic or hazardous materials. Disposing such material after a spill on Maine's Piscataquis River took two years and a long public review to secure interim approval of a disposal site. This situation could be avoided by having pre-approved disposal sites. The pending grant from the U.S. Environmental Protection Agency to the New England Regional Commission to examine alternative disposal sites and their operation may partially solve the problem, but it is not certain what types of materials will be encompassed and when the selection process will begin. The panel felt overwhelmingly that this item should encompass all hazardous and toxic material spills, including petroleum from offshore oil and gas activities.

Four of the issues were assigned a value of 4.0. The concern over pollution prevention related to the offshore oil and gas industry is apparent in MR7 (oil spill recovery technology) and MR8 (testing and certifying equipment). Existing oil spill containment and clean-up equipment is woefully inadequate in even moderate seas; under the high energy conditions experienced on Georges Bank, containment and cleanup equipment is useless. Recent discoveries in the middle Atlantic area and prognostications by the USGS indicate that economically valuable deposits of oil and gas will likely be found in the deeper waters off the mid-Atlantic and North Atlantic coasts. Wellhead completions in these areas will probably be of the subsea variety. Blowouts associated with such completions would be impossible to control with existing technology. The panel recommended that this topic be studied now rather than waiting until after the completions. The resulting technology would be transferable from one geographic area to another and should be pursued as a generic topic. Panel members disagreed whether the responsibility for such investigations lay with the Federal government or the private sector. Some felt that if the government heavily subsidized development of such equipment, then the private sector would not spend money on R&D. On the other hand, the Coast Guard has and will probably continue to fund such development in a small way.

Testing and certifying spill containment and clean-up equipment was unanimously accepted once the issue was clarified. Initially panelists believed that the Federal government would get into the business of independent testing and certifying performance. However, they deemed it more appropriate for the manufactures to provide test results at their expense which verify, for instance, the rate at which a skimmer removes oil from the sea surface under various conditions. Some panelists felt that the marketplace would be self-pruning and that a piece of equipment which fell below its advertised specifications would not be widely purchased. The counter-argument notes that such an approach results in ineffective cleanup when the equipment is most needed, and wasted funds in buying equipment whose capabilities cannot be verified.

The possibility of sand and gravel mining in the U.S. coastal ocean beyond the three mile limit has been discussed for more than 10 years but has never materialized for a variety of economic, environmental and legal/regulatory reasons. The same factors cited in the past for encouraging

marine mining have become more pressing in recent years and will continue to increase.

The panel felt that within the next five years, marine sand and gravel mining will become a reality in several major urban areas of the North and Mid-Atlantic. It is therefore prudent to synthesize existing knowledge about the impacts of mining now and to assess the adequacy of that information. No new research efforts should be undertaken until the synthesis and assessment is completed and information gaps can be identified.

Research on the biological effects of long-term exposure to low levels of petroleum hydrocarbons should be treated in essentially the same manner as effects of sand and gravel mining. A tremendous amount of research has been carried out on toxicity from exposure to massive amounts of petroleum hydrocarbons and on single compounds, single species and physicochemical changes in petroleum hydrocarbons in the marine environment. No single comprehensive plan can be used as a guideline for additional research efforts. Therefore, research is done on what seems to be a good idea, what someone perceives as an information need, or what is the current crisis. Several inventories on effects of research have been done, most recently by Exxon Corporation, but inventories are only part of the problem. A plan must be developed which considers the important effects and questions, then evaluates the availability and quality of data/information to address those questions. Critical information paths need to be identified before new efforts can be undertaken to fill those gaps. This is a fairly standard synthesis of information approach to the problem, but is desperately needed to focus on areas where information is lacking rather than continue to generate disparate pieces of data.

Standardizing bioassay techniques is a necessary adjunct to marine pollution programs ranging from dredged material disposal permit evaluation to monitoring point source discharge from offshore rigs. The Marine Technology Society and the American Petroleum Institute attempted to develop recommended standard techniques in 1975 at a workshop; a document was prepared but never formally adopted by the scientific community or the regulatory agencies. The reliability and intercomparability of effects assessments using bioassay techniques would improve tremendously with standardized procedures.

The single most controversial topic was the effects of disposing drill cuttings, muds, and associated fluids from oil and gas offshore operations. Half the panelists assigned it a very high priority and half a very low priority. There is particular concern around Georges Bank, where it is proposed that all cuttings and muds be barged to shore for disposal rather than discharging them on site. This will be an expensive proposition for the oil exploration companies and may not be the most environmentally acceptable alternative.

Evidence from laboratory studies indicates that drilling muds adversely affect marine organisms. But the preponderence of field evidence fails to show a negative impact on the biota.

The problem of scale was an important consideration. Relative to all of Georges Bank, how much area will be affected by discharging drilling effluents from one, five, ten, or one hundred exploratory or production rigs? What is the duration of a single discharge event? There was substantial discussion on whether this was a real or perceived problem. The panel agreed

that there was a singular lack of coherent assessment of the effects of drilling effluents which could be presented to the fishermen, who are the most concerned about the effects on the biota. The committee recognized that the EPA and the petroleum companies have been researching the topic, and a symposium in January 1980 presented the results of a substantial amount of research by industry, government and academia. Panelists unanimously agreed that any recommended disposal scheme should be considered in light of the economic and environmental consequences of all the alternatives based on the best available information. (Some panel members expressed concern that barging cuttings and muds to shore for disposal may result in a more environmentally sensitive problem in the coastal zone than would have been created offshore.) The immediate synthesis and evaluation of all available information will be essential in establishing viable criteria for choosing one disposal technique over another.

Three problems were considered moderately important: determining the contribution of petroleum hydrocarbons from all sources, oil spill effects assessment, and improving oil spill modeling capability.

There have been numerous attempts at qualitative and semi-quantitative estimates of the amounts of petroleum hydrocarbons introduced from various sources. Better methodology is needed to estimate those inputs to more effectively direct efforts to control the total load.

Oil spill affects assessment (damage assessment) was also controversial. In the wake of the IXTOC blowout in Campeche Bay and the refusal to provide funds to NOAA for damage assessment, a plan is being prepared to describe objectives and means for conducting damage assessment when another major spill occurs. Some panel members felt that this task was nearly impossible because of the difficulty of quantifying damage, and that the ultimate decision would be made within the existing legal system. Others argued that it was unconscionable for scientists to judge the decision on the extent of damage to and the value of the natural resources. The scientific community must provide the framework for damage assessment including the best indicators of damage, how they should be measured, and who should conduct the assessment. We cannot wait for another Ixtoc incident before developing a plan.

The existing oil spill risk assessment model that the USGS uses in OCS prelease analysis determines the fate of spilled oil only by advective processes. The model fails to consider physiocochemical biodegradative, oxidative, or sedimentation processes, thereby giving a worst-case prediction. The model must be upgraded to include these factors and provide a more realistic appraisal of potential impact. This conforms with the approach discussed earlier for drilling cuttings and muds, namely giving the best possible information to the public to avoid raising false concerns and anxiety.

The lowest ranked issues dealt with biological effects of brine discharge and control of oil spills during at-sea transfer from a production platform to a barge or tanker. Studies from the Strategic Petroleum Research Program in the Gulf of Mexico showed rapid dispersion of the brine plume and minimal localized and short-term effect on organisms. A set of criteria should be established to select the discharge mechanism based on the volume and metals composition of the brine and the proximity to unique habitats. Unusual concentrations of toxic substances (i.e., metals) in brines must be monitored. Because there is currently no production in the mid and North Atlantic area with little anticipated over the short term, this is unlikely to become a major issue over the next five years.

Since any near term future commercial production in the mid and North Atlantic will most likely be gas, not oil, improving oil transfer systems from producing platforms to barges or tankers received a low priority. (See the section on Marine Transportation dealing with lightering.)

TABLE 4.1

RANKING OF ISSUES CONSIDERED BY MARINE MINERALS RESOURCE PANEL

ISSUE	NO.	AVERAGE RANK
Regional monitoring	MR 1	5.0
Disposal site selection for contaminated debris	MR 2	5.0
At-sea oil spill recovery technology	MR 7	4.0
Testing and certifying oil spill cleanup & containment equipment	MR 8	4.0
Sand and gravel mining	MR 9	4.0
Effects of chronic exposure to low levels of petroleum HCs	MR 10	4.0
Standardized bioassay testing procedures	MR 6	3.5
Disposal of drill cuttings, muds, etc.	MR 5	3.5
Determining the contribution of petroleum HCs from all souces	MR 3	3.0
Oil spill effects assessment	MR 4	3.0
Upgrading oil spill risk assessment model	MR 11	3.0
Brine discharge	MR 12	2.0
Oil production transfer systems	MR 13	2.0

TABLE 4.2

ISSUES ADDRESSED BY PANEL BUT DROPPED FROM FINAL CONSIDERATION

ISSUE	REASON DROPPED
Oil spill effects, effects of dispersants and contaminant and cleanup	The issue was too complicated and all-encompassing. The first part was incorporated into MR4 and MR10; the last part into MR8. Dispersants were dropped because the subject has been overstudied and existing regulants properly address the issue.
Debris from offshore oil and gas operations	This was a management problem, not something to be solved through a research, development or monitoring study.
Lack of standardized biological data collection techniques	Standardization is a generic problem continuously considered by the scientific community and management, regulatory, and R&D agencies. Refer to MR4 and MR6 for pollution problems resulting from marine mineral resource activities.
Biological effects of marine mining	This issue was felt to be five years ahead of its time.
Environmental & economic effects assessment of oil spills	The issue was couched in terms of institutional and financial responsibility for oil spill damage assessment, and was judged a political/administrative/legal problem. The technical issue is included in MR4.

MR 1

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name Mineral Resources

Sub-topic Monitoring

Specific identified problem or issue (describe in a short narrative statement):

Lack of fully coordinated long-term monitoring program for estuarine and shelf waters of the Northeast.

Key information required for action or problem resolution:

A variety of monitoring projects are being carried on, some sporadically, in the Northeast. There is need for continuity and coordination of efforts and for prompt analyses of data acquired. The basic objective of monitoring is to detect changes in the marine environment. Standardized procedures are required. An office of pollution monitoring has been established within NOAA.

An accessible data bank has been established within the NOAA-Northeast Monitoring Program (NEMP).

Please comment on why this problem is important:

Monitoring is required to supply baseline information which will detect changes in the marine environment. There is a need to emphasize analysis as well as data collection, and a need to coordinate all monitoring efforts -- federal, state, university, and private. There is also a need for input monitoring.

What, in your estimate, is the immediacy of the threat or need for information?

One, five & ten years

Other comments:

Minimal monitoring by industry is required prior to permit for ocean dumping. Rig monitoring for effects of petroleum exploration and production is and will be required.

MR 2

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Mineral Resources

Sub-topic: Oil and Gas Development

Specific identified problem or issue (describe in a short narrative statement):

Once contaminated debris is removed from an oil spill site, what should be done with it? At the present time there are not timetable alternative means (e.g., approved up-land disposal sites) for ultimate treatment.

Key information required for action or problem resolution:

1) Justification for designating disposal sites
2) Type of treatment alternatives available
3) Establishment of criteria for site designation
4) Other considerations

Please comment on why this problem is important:

Spills are continuing to occur and alternative means are necessary to complete the clean-up process. At the present time a spill could conceivably be picked up but then there is the remaining problem of disposition of the debris. This represents significant potential health and environmental hazards.

Is this a site specific local problem, a regional, national, or global one?

National

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

State of Maine - DEP

MR 3

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Mineral Resources

Sub-topic: Oil and Gas Development

Specific identified problem or issue (describe in a short narrative statement):

Determine the contribution of petroleum hydrocarbons from all sources related to OCS oil and gas activities.

Key information required for action or problem resolution:

1) Improved methodology for estimating contributions (from various sources) of petroleum hydrocarbons contributing to the total load.
2) Significance of incremental load in terms of impact on living resources .
3) Evaluation of feasibility of controlling input from various sources.

Please comment on why this problem is important:

There is a pressing need to assess the "assimilative capacity" of the marine environment with regard to various types of pollutants and the total pollutant load. Petroleum hydrocarbons (from all sources) represent a significant fraction of that load.

Is this a site specific local problem, a regional, national, or global one?

Global

What, in your estimate, is the immediacy of the threat or need for information?

One year

MR 4

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Mineral Resources

Sub-topic: Oil Spill Effects Assessment

Specific identified problem or issue (describe in a short narrative statement):

1) There are not standard methods of assessing the effects (social to chemical) of an oil spill.
2) Assessments are done haphazardly, or not at all.
3) No team of experts can assess the effects of an oil spill over a long period of time.
4) State/Federal responsibilities are poorly defined. (What can the State expect from the Feds?)

Key information required for action or problem resolution:

1) What should be assessed?
2) What species should be used in assessments? Should non-commercial species also be assessed?
3) Who should perform the assessments?
4) What analysis methods should be used? Over what time period?
5) What type of background (support) information is necessary for proper assessment?

Please comment on why this problem is important:

1) The effects of oil pollution are poorly understood.
2) Oil spills do affect the environment.
3) There is confusion in defining the roles of the state and Federal government in assessing the effects of an oil spill.

Is this a site specific local problem, a regional, national, or global one?

Global

What, in your estimate, is the immediacy of the threat or need for information?

Five years

Other comments:

Existing laws require that this damage assessment methodology be developed. However, funding is inadequate to complete the task in a reasonable time frame.

MR 5

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name Marine Mineral Resources

Sub-topic Oil and Gas Development

Specific identified problem or issue (describe in a short narrative statement):

There is widespread concern over the routine at-sea disposal of drill cuttings, muds, and associated fluids adversely affecting the environment into which these materials are dumped. Additional systematic analysis of the available environmental and economic facts are needed to improve the management scheme for, and to support decisions about, the disposition of these substances.

Key information required for action or problem resolution:

1) Perspective on the magnitude of the problem (i.e., How much material is being released into the environment? What are the dispersion, dilution and settling rates? How does this relate to flushing rates or mass transport in the area?)
2) Determination of the physico-chemical alteration of disposal material.
3) Evaluation of the toxic effects of individual compounds and matrix effects on key species.
4) Assessment of persistence of toxicity of these substances.
5) Location of vulnerable population/habitats that should be protected from disposal of such material.
6) Assessment of economics and environmental impacts of various alternative disposal schemes, i.e., barging to shore sites with subsequent upland disposal.
7) Establishment of criteria for application of alternative drilling fluid disposal techniques.

Please comment on why this problem is important:

Disposal of cuttings, muds, and associated fluids accompanies oil and gas exploration and develpment activities wherever they are being conducted. It is estimated that for a single average 15,000 feet deep well, the total weight of drill cuttings to be disposed will range from 65,000 to 620,000 tons for an exploratory well, and from 215,000 to 950,000 tons for a production well. Likewise, the total amount of drilling mud will range from 4,000 to 40,000 tons (exploratory) and 14,000 to 60,000 (development). Several of these compounds have been shown to be lethal to marine organisms in laboratory experiments, and there is concern that either breeding populations of fish stocks (or fish food) or unique environments (e.g., coral reefs) will be adversely impacted by these compounds. This would result in loss of income to fishermen, loss of aesthetic qualities of unique environment, or loss of recreational resources. On the other hand, application of too stringent requirements on the oil industry may impose an undue and unnecessary economic burden and result in suspension or reduction of exploration activities which would not serve the best national interest.

Is this a site specific local problem, a regional, national, or global one?

National, but heavy regional emphasis in Georges Bank area

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

The American Petroleum Institute, Exxon, Shell and other oil companies have conducted studies on the effects of specific compounds on selected organisms; numerical models to describe the behavior of plumes emanating from a point source; their effects on certain marine commmunities. These studies have encompassed theoretical, laboratory and field aspects of the problem to various degrees.

MR 6

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Mineral Resources

Sub-topic: Oil and Gas Development

Specific identified problem or issue (describe in a short narrative statement):

The bioassay test is gaining popularity as a test of material toxicity to determine concentrations of drilling discharges which kill a certain percentage of organisms within a set time frame. Unfortunately the test organisms which are commonly used in the bioassay procedure are not representative of those found in outer continental shelf areas. Also, the bioassay test does not adequately assess long term, sublethal impacts.

Key information required for action or problem resolution:

1) Can the bioassay test be applied to site specific representative organisms instead of, or in addition to, standard: fathead minnow, briner shrimp, rainbow trout, and mumichog?
2) (a) How can the long term and sub-lethal impacts of discharges from drilling platforms best be assessed? Recommendations for study include: the incorporation of the bioassay as an ongoing impact monitoring test, b) analyses of test organisms for occurrences of chromosomal anomalies, c) biochemical analyses, d) behavior studies, e) pathological studies, f) observable physiological changes, and g) changes in ecological communities.
3) In conducting such studies the most sensitive life stages of test organisms should be those most closely observed - i.e., the egg and larval stages.
4) (a) Can the effects that are seen in bioassay tests using standard organisms be translated to organisms found in the area of concern?
(b) What organisms are found in the area of concern that could/should be used in bioassay-bioaccumulation studies?

Please comment on why this problem is important:

Problem is important in developing a reliable assessment of the effect of pollutants on resident species in an area of concern.

Is this a site specific local problem, a regional, national, or global one?

National and global

What, in your estimate, is the immediacy of the threat or need for information?

Five years

Other comments:

McIntyre and Pearce "Feasibility of Effects Monitor" (International Council for the Exploration of the Sea, Rapp. Proc.-Verb, 1980)

MR 7

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Mineral Resources

Sub-topic: Oil and Gas Development

Specific identified problem or issue (describe in a short narrative statement):

With the expansion of offshore petroleum operations into deeper waters and the increasing use of subsea production systems, there is concern about capabilities for containing and collecting hydrocarbon flows from subsea wells, production equipment, and sea floor fractures and channels. No effective system has been demonstrated for collecting such spills in high-energy environments.

Key information required for action or problem resolution:

1) How does oil (under varying pressures and with different gravities and gas oil ratios) flow and disperse from a seafloor source?
2) What forces are exerted on underwater collection devices in varying water depths and currents?
3) What techniques and materials are available to contain such spillage at the seafloor and transfer it to surface storage and separation equipment? What are the advantages and disadvantages of each option?
4) What changes occur in crude oil while rising to the surface?

Please comment on why this problem is important:

All Atlantic OCS exploratory wells are drilled from floating drilling units. The wellheads and blowout prevention equipment are therefore located on the seafloor. Prospects for production on the Atlantic continental margin appear best in the deeper water above the slope. Subsea completions will be important in such areas. As offshore production expands, concern about mitigating a seafloor spill will increase.

Is this a site specific local problem, a regional, national, or global one?

Global

What, in your estimate, is the immediacy of the threat or need for information?

Five years

MR 8

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Mineral Resources

Sub-topic: Oil and Gas Development

Specific identified problem or issue (describe in a short narrative statement):

All commercial oil spill containment and clean-up products are not effective for all kinds of spills in all kinds of weather. Uniform testing and certification of such equipment is needed so that the effectiveness of available equipment can be established for various spill conditions.

Key information required for action or problem resolution:

In order to assure that commercially available oil spill containment and clean-up equipment is effective for intended use(s), the United States Coast Guard should require that such equipment is USCG certified prior to becoming available for actual use. Manufacturers should be required to test the effectiveness and compatability with other equipment of oil spill absorbents, booms, skimmers, etc. under various: 1) temperatures, 2) wind and wave conditions, 3) oil types, 4) climatic conditions, and 5) currents. A detailed testing procedure should be established by USCG to address the above. Results of such tests should be made available to the public upon product approval, thus allowing product users to better evaluate their oil spill clean-up and containment product needs and to better use products once they have been purchased.

Please comment on why this problem is important:

An equipment user has no uniform testing results upon which to base decisions. As a result, inappropriate applications/usage of oil spill containment and clean-up equipment allow for avoidable pollution of the marine environment.

Is this a site specific local problem, a regional, national, or global one?

National

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

A similar program is presently in place for chemical oil spill dispersants, chemical collection agents, and biological agents. This "certification" program is executed by EPA according to Annex X of the National Oil Spill Contingency Planning Legislation.

MR 9

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Mineral Resources

Sub-topic: Sand, gravel and shell mining

Specific identified problem or issue (describe in a short narrative statement):
Offshore sand and gravel mining by its nature involves significant disturbance of the substrate and of benthic communities. Long-term environmental effects of dredging should be better evaluated and documented, including implications of siltation in mined areas. Large scale mining can also affect nearshore currents and consequently erosion and deposition patterns. In addition, offshore mining activities can have significant implication for ocean disposal of dredge, spoil and sludge.

Key information required for action or problem resolution:
1) Better definition of sand and gravel resource (quantity/quality) distribution, including potential for environmental disruption from siltation. Better information on environmental conditions in areas of potential dredging, especially distribution of commercially-important species such as surf clams and sea scallops. Such data should include sea floor sediment, biota, and water quality and circulation. Further study on implications of closer integration of dredging with disposal of dredged materials. Monitoring of mining operations to complement baseline studies.
2) Elements of this problem are compounded by the lack of standardized sampling and data reduction techniques.
3) There is a need to synthesize existing knowledge concerning the biological effects of mining in the region of concern. These effects include removal/destruction of biota, as well as impacts of increased suspended solids and pollutant release from the sediment resevoir. There is some data on these various aspects from studies conducted elsewhere. Very little is relevant to species found in the Northeast.

Please comment on why this problem is important:
Nearshore mining can effect erosional/depositional zones and nutrient and pollutant flows, and can have adverse impacts on benthic organisms. Offshore mining is expected to become more significant as result of land use competition in urbanized areas. Offshore mining activity in the New York City area involves around 12 million tons per year, of which 8 million tons is from the Bight. The changing economics of sand and gravel mining indicate that there will be a need for marine mining in the next 5 to 10 years. It is necessary to have a set of regulations in place which will allow for recovery of those resources with the appropriate safeguards.

Is this a site specific local problem, a regional, national, or global one?
Site-specific/regional

What, in your estimate, is the immediacy of the threat or need for information?
Five years

Other comments:
New York is funding a 3-5 year study of the economic and environmental impact of sand and gravel mining in NY State waters. Previous work done by Grigalunas at URI on the economics of sand and gravel mining.

MR 10

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Mineral Resources

Sub-topic: Oil and Gas Development

Specific identified problem or issue (describe in a short narrative statement):

What is the effect on organisms of long-term (greater than 3 years) exposure to low levels of petroleum derived hydrocarbons (crudes and products)? For the purposes of this committee, this issue should be properly framed in the context of incremental loading resulting from oil and gas activities. However, the issue has a broader significance in terms of all sources of hydrocarbons (i.e., sewage [?] discharges, non-point source, etc.) and the total "capacity" of the system.

Key information required for action or problem resolution:

1) Summary of all available research on the topic.
2) Evaluation of the quality of that information (research techniques, relevance).
3) Synthesis of useful information into a statement of "state of knowledge", judgement of allowable limits, if possible.
4) Identification of future research needs, if any.

Please comment on why this problem is important:

There is a potential risk of carcinogenic effects from such exposure to commercial fish & shellfish stocks. These effects could reduce fish stocks directly or reduce fish food and ultimatley affect fish stocks. There is also a potential for human health effects through consumption of affected organisms, although this is very low given the present state of knowledge.

Is this a site specific local problem, a regional, national, or global one?

Global

What, in your estimate, is the immediacy of the threat or need for information?

Five years

MR 11

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Mineral Resources

Sub-topic: Oil and Gas Development

Specific identified problem or issue (describe in a short narrative statement):

There is a need to upgrade the USGS oil spill risk analysis model to include biodegradation, oxidation, emulsification and other factors besides advection in the determination of fate of oil (as done in prelease analyses).

Key information required for action or problem resolution:

1) Evaluation of existing reliability and capability of various models and model components to approximate actual fate of oil as we know it.
2) Suggestions for inclusion of additional existing algorithms in the USGS risk model calculations.
3) Development of new algorithms and incorporation into the model.
4) Establishment of a mechanism to continually update the model capacity.

Please comment on why this problem is important:

There is a wide range of resources at risk from spilled oil. An accurate assessment of the potential of that risk is important in making resource management decisions, e.g., to explore or develop a particular OCS region. The accuracy of the potential risk could determine how much (and what) OCS area is explored and developed.

Is this a site specific local problem, a regional, national, or global one?

National

What, in your estimate, is the immediacy of the threat or need for information?

One year

MR 12

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Mineral Resources

Sub-topic: Oil and Gas

Specific identified problem or issue (describe in a short narrative statement):

During the oil and gas production phase, formation waters (brines, which are essentially concentrated sea water) are routinely discharged into the ocean. A set of criteria needs to be developed to determine which disposal technique is appropriate for a given site and set of physical-biological conditions.

Key information required for action or problem resolution:

Synthesis of available information on:
1) Composition of brines
2) Fate of brines after disposal
3) Alternative methods for discharge
4) Physico-chemical alterations of brines
5) Effects of brines on organisms

Please comment on why this problem is important:

During the production phase, brine discharge could reach one million barrels per day depending on the age of the field, the rate of production, etc. These brines could contain significant amounts of toxic trace metals or other substances which are potentially hazardous to the environment. Well-founded management alterntives for brine disposal will result in the optimum decision (economics vs. environmental impact) for a given set of conditions.

Is this a site specific local problem, a regional, national, or global one?

Local problem

What, in your estimate, is the immediacy of the threat or need for information?

Five years

Other comments:

Studies resulting from the Strategic Petroleum Reserve program (DOE and NOAA) and the OTEC sponsored programs (DOE) will be useful ancillary information sources.

MR 13

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Mineral Resources

Sub-topic: Oil and Gas Development

Specific identified problem or issue (describe in a short narrative statement):

Oil production/transportation systems in frontier areas may often be dependent upon the transfer of crude oil to a tanker through some form of single point mooring system. There is little information available on historical spillage rates during such transfer operations. Because other types of transfer operations have been the source of frequent spills, there is concern about transfer operations at offshore production facilities, particularly in harsh environments.

Key information required for action or problem resolution:

Step 1: Gather data on spillage rates at North Sea loading terminals and other similar facilities throughout the world. The performance of different types of systems should be evaluated with consideration given to spillage rates, environmental loads, downtime, age, inspection procedures, and other factors.
Step 2: Identify best systems for different OCS areas and means for monitoring the performance of such systems.

Please comment on why this problem is important:

Unstable bottom conditions, deep water, size of fields, distance from refineries, and other factors may preclude the use of pipelines in transporting offshore production. Because of the lack of historical data, there is concern that chronic spillage will result from transfer operations. Data must be gathered to determine whether this is problem.

Is this a site specific local problem, a regional, national, or global one?

Global

What, in your estimate, is the immediacy of the threat or need for information?

Five years

Other comments:

Oil companies operating in the North Sea or other (international) offshore areas may have gathered spillage data on their loading activities. However, we have not been able to obtain such data and have seen no published reports.

4.2.4 Marine Transportation

The Marine Transportation Panel defined its scope as including vessels of all sorts, the seagoing workforce, shore connecting points in the marine transportation system (ports, terminals, marinas), and salvage and pollution clean-up. It was clear that this system definition would probably overlap somewhat with other panels in project recommendations, but duplication was considered preferable to gaps. Particular discussion centered on pipelines as a marine transportation mode. The panel resolved to present any projects which were developed and approved, but the overall subject of pipelines should be more appropriately and fully considered by the Marine Energy and Waste Disposal panels.

With two additions, the panel agreed that the suggested hierarchical listing of marine transportation pollution sources provided prior to the meeting was adequate.

1. General Vessel Operations

    Routine Discharges
        Machinery Space Bilge
        Sewage
        Trash and Garbage
        Residue from Alternative Fuels to Petroleum

2. Transport of Hazardous Materials

    Routine Operations
        Tank Washing Reception Facilities

    Accidental Releases
        Transfer Operations
        Collisions, Groundings

3. Transport of Petroleum

    Routine Discharges
        Pump Room Bilges
        Tank Washings
        Ballast Water

    Accidental Releases
        Transfer Operations
        Collisions, Groundings

To provide reasonable assurance that all aspects of ocean pollution research, development, and monitoring relating to marine transportation would be considered, the panel proceeded from a definition of scope and delineation of sources to a discussion of the several pertinent subject areas. These are listed below with representative examples of the topics possibly meriting special attention.

1. Technical

    Ship Design
    Port and Terminal Design
    Cargo Handling and Transfer Equipment
    Navigation and Communication Systems

2. Operational

Vessel Routing
Traffic Control
Maneuvering, Seakeeping

3. Personnel

Certification, Licensing
Training (e.g., Use of Simulators)

4. Salvage, Pollution Clean-up

Equipment Development
Equipment Stocking Points
Casualty Identification and Mitigation

5. Data and Information

Characterization of Cargo
Ship Location
Weather

6. Regulatory and Organizational

State and Local
Federal
International

Marine transportation as a possible source of pollution has received particular attention as a result of such casualties as TORREY CANYON, AMOCO CADIZ, and ARGO MERCHANT. Action by government at all levels and by the industry has in fact been underway for several years. For example, major legislation on marine pollution was enacted by the Congress late in the last century and several other U.S. Statutes have ensued. Considerable activity generally sponsored by the International Maritime Consultative Organization (IMCO) has resulted in a number of proposed international agreements such as the Tanker Safety and Pollution Prevention Proctocol, 1978, and Standards of Training, Certification, and Watchkeeping for Seafarers. Hazardous material transportation in general and petroleum transport in specific have been the theme of many major symposia, including recurring ones such as the Biennial Oil Spill Conference.

The North and Mid-Atlantic Region is an area of tremendous maritime importance. The panel did not have time to address the myriad facets but nonetheless considered a broad range of activities: existing ports and marinas, possible development of offshore terminals to permit use of large dry bulk ships and tankers, resource development offshore (e.g., Georges Bank and the Baltimore Canyon, sand and gravel mining), special facilities such as LNG terminals and new refineries serviced directly by ships, operations in rivers (e.g., special New England high current conditions).

The Marine Transportation group submitted 26 problem areas for consideration, which were later melted down to a final 21. These 21 problem statements were categorized into seven problem areas: Dredge and Dredge Material Disposal, Hazardous Material Disposal, Pollution Response, Pollution Prevention, Manpower and Human Factors, Offshore Facilities, and Alternate Fuels.

Pollution Response: Statements in this area were generally ranked high. Improvements in salvage and cleanup equipment was indeed the highest marine transportation priority followed by state and community contingency planning. Response modelling and other response measures were placed below dredging and hazardous material disposal priorities but they still ranked high making the pollution response category the most important area of consideration.

Dredging and Dredged Material Disposal and Hazardous Material Disposal: These two areas together constituted the greatest bulk of priorities after pollution response concerns, even higher than pollution prevention concerns. Hazardous industrial materials were ranked slightly above toxic dredged materials but the group discussions indicated that both were essential areas of concern.

Manpower and Human Factors: It was generally agreed that human errors were responsible for many instances of oil pollution. Research should address the effects of both higher training standards and longer experience on one ship.

Pollution Prevention: Pollution prevention research was generally ranked next in line. Response modelling, lightering considerations and impediments to transportation were considered. Sewage and bilge water pumpout facilities were a lengthy topic of discussion and the group generally agreed that this was an area that New England should be especially concerned with in the future.

Alternative Fuels and Offshore Facilities: These two areas were generally ranked the lowest. They were generally seen as issues whose importance hinged on the development of an oil production industry off the North and Mid-Atlantic coast.

The highest ranked tasks in the marine transportation area were aimed at rectifying a bad situation first and not with preventive measures until present problems have been cleared up. Spills and present dumpsites are an immediate threat to the New England area even though the situation has not yet been complicated with the development of an oil production industry. When and if this happens these priority rankings might well change drastically.

MT 1

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Transportation

Subtopic: Salvage and Cleanup

Specific identified problem or issue (describe in a short narrative statement):

The tools available for spill response are too few and are inadequate. The funding for studies to solve or attack oil spills is much less than the funding for studies of spill fate and effects. Renewed effort to develop or improve mechanical cleanup and new, major efforts to add new tools are needed. Improved methods and equipment for immediate on-scene response must also be considered, such as viscous oil pumping systems, back-up shipboard equipment, non-removal mitigation methods, etc. Methods applicable to chemical spills are almost nonexistent.

Key information required for action or problem resolution:

1) Better understanding of boom and oil slick hydrodynamics
2) More information on the behavior of oil: emulsion formation, slick spreading, windowing, cold weather problems, etc.
3) Analysis of vessel casualties and steps a vessel could take to lessen pollution.
4) Standard engineering procedures for equipment design.
5) Improved pump designs
6) Models for slick dispersion that include emulsions and the effects of chemical dispersants.
7) Shore and beachcombing methods and equipment
8) Training and other personnel requirements.

Please comment on why this problem is important:

Oil shipment by tanker and subsea pipeline can be expected to grow. The size of spills continues to grow. The resources at risk are varied: fisheries, clam and oyster beds, bird sanctuaries, marinas and beaches, estuaries, etc.

Is this a site specific local problem, a regional, national, or global one?

Global

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

Very low level efforts to develop new booms and skimmers by various small companies. Modest effort to develop new dispersants.

MT 2

Worksheet for Outlining Problems and Identifying Needs

(Use separate sheet for each problem)

Panel Name: Marine Transportation

Sub-topic: Contingency plans

Specific identified problem or issue (describe in a short narrative statement):

Oftentimes, contingency plans fail during a response effort due to a combination of factors. Some contingency plans around the country are more effective than others. There should be an in-depth review of contingency plan responses to determine what factors make one plan more effective than others.

Therefore, all contingency plans in the Northeast should be studied to identify steps and procedures necessary to implement the plans as well as recommend specific actions which must be taken by the various agencies involved in planning.

Each major Northeast port should have a port plan which should include but not be limited to:

1) Identification of vulnerable resources
2) Spill trajectory models
3) Investigation of prevention techniques being used at oil terminal & Hay Mat facilities
4) Independent assessment of navigational systems
5) Identification of clean-up resources
6) Identification of disposal or storage facilities

Key information required for action or problem resolution:

1 a) Identification of agencies at state and local level who have interest
  b) Data collected in a professional systematic manner
  c) List of vulnerable resources
  d) Prepare bird cleaning strategy & recommend equipment stockpile
2 a) Knowledge of or definition of area to be served by model
  b) Development of some standard type of data base
  c) Input on expected variables for spill prediction
3 a) Identification and mapping of all potential spills (stationary) in study area.
  b) Voluntary review of prevention techniques presently in place at these places
  c) Professional advice on updating prevention plans
4 a) Mapping all identified traffic routes by type and frequency of passage.
  b) Professional assessment of adequacy of existing navigation systems based on this data
  c) Review of historical casualty data
  d) Professional estimate of the amount of traffic that the system can stand without strain
  e) Recommendations for improvements, after interviews with system users, to appropriate agencies.
5 a) Listing of all equipment (specialty to non-specialty) that could be called upon in the event of a spill
  b) Training personnel on proper use and limitations of gear
  c) Location of gear and compatability of various pieces of equipment to each other.

6 a) Locate areas where safe storage or disposal of spill materials can be undertaken
b) Gain control of land (public or private acquisition)
c) Design storage or disposal system
d) Obtain all local, state, and federal permits
e) Construct facilities
f) Study feasibility of recycling wastes vs. disposal

Please comment on why this problem is important:

Before an effective response can be undertaken it is very important to know as much as possible about the potential spilling activity. This strategy must be conducted in conjunction with all state, local and Federal representatives such that roles can be defined.

With this mechanism in place, less spills are likely; the ones that do happen are smaller and most importantly, clean-up can be very effective because of availability of pre-designated studies.

Is this a site specific local problem, a regional, national, or global one?

All port areas anywhere, but best addressed on a regional or state basis depending on density of facilities.

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

State of Maine Port Strategy Plans for Casco Bay & Penobscat Bay
A study of the alternatives for oil spill debris disposal which includes site location of four separate holding and processing facilities
(Casco Bay Resource Inventory)

MT 3

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name Marine Transportation

Sub-topic Pollution Response

Specific identified problem or issue (describe in a short narrative statement):

All of the New Hampshire gas and oil storage facilities for petroleum being transported by ship are sited on the Piscataqua River. Any spill is a major problem in the area because the current in the river can be as much as 6 to 7 knots. If a spill occurs on an incoming tide, the entire estuarine system could be contaminated in a matter of minutes.

Key information required for action or problem resolution:

It is difficult to pinpoint the kind of information needed to resolve the problem. Every vessel is different, some of the problems relate to mechanical failure and others to human error. An oil spill in September 1979 from a vessel of recent vintage and US Registry is still under investigation. Emphasis should be on preventive measures such as more thorough Coast Guard inspection and an independent system of monitoring.
Flow, catch points
Contingency plan for regional area (what new can be done in this area)

Please comment on why this problem is important:

Host of areas exist and we must deal with them

Is this a site specific local problem, a regional, national, or global one?

Site specific problem with broader implication

Other comments:

Non-Federal research: Visitation & recording; regional discussion in Maine and New Hampshire

MT 4

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Transportation

Subtopic: Industrial Hazardous Materials Disposal

Specific identified problem or issue (describe in a short narrative statement):

The economy of this country depends heavily on our industrial manufacturing facilities, including many plants which generate waste products that are hazardous in varying degrees. Today disposal sites are either almost filled, in the process of being shut down because of leakages or breaks, or are not permitted to open because of failures to meet environmental concerns. Nevertheless, the refuse is generated daily, and needs to be handled. Since much of this refuse is generated from plants on rivers and bays, the material in the past has been dumped with the water or placed in dumps near the water that are leaking or being breached until ultimately the wastes leach into the waters.

Key information required for action or problem resolution:

1) Quantitities of refuse.
2) Present available and acceptable disposal sites.
3) Remaining unused capacity in present sites.
4) Research available on state of the art construction of disposal sites.

Please comment on why this problem is important:

1) Jobs.
2) Taxes.
3) Products manufactured.

Is this a site specific local problem, a regional, national, or global one?

National problem.

What, in your estimate, is the immediacy of the threat or need for information?

One to five years

MT 5

Worksheet for Outlining Problems and Identifying Needs

(Use separate sheet for each problem)

Panel Name: Marine Transportation

Sub-topic: Emergency Capability Task Force for Salvage & Cleanup

Specific identified problem or issue (describe in a short narrative statement):

1) The size of ships carrying hazardous cargos is increasing and there is insufficient permanent equipment available to deal with a major emergency such as towing off a lee shore or containing or cleaning up after a major spill. Crude oil tankers will average nearly 200,000 DW tons by 1985.
2) It is unreasonable to expect any one organization to fund expensive capital equipment and personnel for the very occasional major potential accident or disaster.
3) The U.S. Coast Guard has insufficient equipment to meet a major hazard. They are in favor of the private sector owning, maintaining and using stock whenever possible, but it may not be economically viable for private companies to do so.
4) The USN is building ATF's but they will be unable to man them and that they will be mobilized immediately after acceptance trials.

Key information required for action or problem resolution:

1) An assessment of the forces and resources in various areas needed to prevent or cope with a major disaster
2) What forces and resources are available and what is the shortfall
3) Could this shortfall be overcome by converting other local resources to a duel mode capability.
   a. Should oil rig work boats be given a towing or pushing capability? Should they carry contaminant or clean up gear?
   b. What could harbor craft do if they were converted?
   c. Would the fishing fleet help?
4) Could the ATF's be used for regular commercial towing of large intercoastal port barges, which could be anchored if the ATF (diverted or converted)to an emergency. Could they be used regularly for C.G. patrol or hydrographic duties.
5) If the ATF's can be used for regular service, are they fully equipped to make a major contribution to a major emergency: eg towing, firefighting, oil boom laying, applying dispersants.
6) What incentives and motivations would be required to persuade the private sector to develop dual purpose capabilities. Who would provide them.
7) If dual purpose capabilities were adopted, how often should the emergency role be exercised, how would these be funded, organized, conducted, and analysed?

Please comment on why this problem is important:

The groundings and the resulting massive spills of the Torry Canyon and the Amoco Cadiz illustrated that few countries are adequately equipped to deal with a major disaster. The present forces available would probably be unable to contain such a disaster off the Eastern Seaboard.

A decision is required as to whether the US government should own and maintain adequate emergency forces and resources or whether this responsibility should be shared with the private sector.

Is this a site specific local problem, a regional, national, or global one?

Local and probably national/international

What, in your estimate, is the immediacy of the threat or need for information?

Immediate threat, 1 year

Other comments:

1) Many major oil companies have studied the problem of towing ULCCs.
2) The society of Naval Architects and Marine Engineers Panel H 10 has examined tugboat capability.
3) The Office of Marine Environment and Systems of the US Coast Guard has developed the concept of multi-purpose tugs in a resource change proposal.

MT 6

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Transportation

Subtopic: Chemical Waste Incinerator Ship

Specific identified problem or issue (describe in a short narrative statement):

The enormous amount of chemical waste generated each year by industry has created a disposal problem. Dumping sites are becoming scarce and will soon be non-existent. An alternative method of disposal is needed away from land and populations.

Key information required for action or problem resolution:

The Federal government (MarAd/EPA) is exploring the possibility of incinerating hazardous chemical waste at sea. This can be done by designing and constructing a suitable ship capable of incinerating all types of toxic wastes, both liquid and solid, at designated burn sites. The problems associated with this disposal method involve the collection, transportation to a port, loading on board the ship, and ultimate incineration. Resolution will probably be initiated by the government and eventually taken over by private industry.

Please comment on why this problem is important:

Toxic wastes are a serious risk to public health of the environment due to contamination of ground or water.

Is this a site specific local problem, a regional, national, or global one?

National one

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

Incineration at sea of chemical wastes has been successfully demonstrated. The German-owned ship Vulcanus during the 1970's incinerated the various US generated chemical wastes, including agent 'herbicide orange' in the Gulf of Mexico and the Pacific Ocean. Under EPA surveillance the burns were 99.9% complete with no adverse environmental inpact.

MT 7

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Transportation

Subtopic: Hazardous Waste Disposal at Sea

Specific identified problem or issue (describe in a short narrative statement):

Disposal of hazardous wastes at sea may soon become the preferred method. Incineration is particularly promising for some chemicals. Growth of this activity should be preceded by a study of several problems, so that the government will be better prepared to regulate the operations reasonably. Response to spills of liquid, powdered, drummed, etc. materials needs further research. Criteria for safe transfer operations must be developed. Incineration monitoring requirements are needed.

Key information required for action or problem resolution:

1) Scope of the problem: types and amounts of chemical waste, present disposal methods, present handling methods, feasible at-sea disposal methods, etc.
2) Personal safety problems and solutions: routine dangers, spill response hazards, dangerous byproducts.
3) Monitoring to be required by regulation: sampling and measurement methods, minimum necessary measurements, reporting requirements.
4) Acceptable methods for different chemicals or mixtures.
5) Cost/benefit/risk analysis and comparison with alternatives.

Please comment on why this problem is important:

The polluting activity might be considered to be the entire chemical industry. Their importance to the US is enormous and well-known -- pesticides, herbicides, plastics, medicines, etc. The risks to health may be the greatest we face at this time.
Acceptable disposal methods are nonexistent for some chemicals and disappearing for others. Hazardous waste disposal may be the pollution problem of the eighties, and disposal at sea may be the solution.

Is this a site specific local problem, a regional, national, or global one?

Mostly national, soon to be global

What, in your estimate, is the immediacy of the threat or need for information?

One year

MT 8

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Transportation

Subtopic: Regulatory studies

Specific identified problem or issue (describe in a short narrative statement):

There is a need for multidisciplinary studies of the legal environment surrounding and constraining new ocean pollution development and monitoring technologies, such as an incinerator ship. Their purpose is to identify possible changes in laws, regulations or policies which might facilitate research, development and implementation pertinent to the technology (assuming facilitation is desirable). In essence, this kind of study helps to design workable, effective laws and regulations controlling and, if appropriate, providing incentives for implementing the technology.

Key information required for action or problem resolution:

1) In the incinerator ship example, laws and regulations may include
-authority to plan (e.g., programmatic conditions for its use)
-authority to act (e.g., build the ship, use it)
-authority to forbid and permit others to act or to use (e.g., power to enjoin, to license, to set standards)
-authority to allocate, to spend (e.g., subsidies, tax incentives, to issue exclusive rights to burn refuse)
-provisions for liability for failure to act responsibly (burning the incinerator other than according to standards)

2) To create new laws or amend existing ones the regulator needs an understanding of the existing laws as suggested by the action captions relating to the planning and action provisions relevant to oil spill cleanup. The regulator also needs an understanding of the technical, financial, operational dimensions of the system to be regulated.
The various categories about which data are required pertaining again to oil spills.

MT 9

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Transportation

Sub-topic: Preventative Design Measures to Reduce Pollution

Specific identified problem or issue (describe in a short narrative statement):

Over the past ten years many advances have been achieved in tanker design. Notwithstanding that progress and recognizing that prevention of the spills is preferred to cleaning up spills, the following available design measures should be examined:
1) Double hulls/double bottoms
2) Lateral thrusters

Key information required for action or problem resolution:

1) Risk analysis and cost-benefit assessment. CDR James C. Card, US Coast Guard, examined 30 pollution casualties that resulted from tanker groundings in US waters between January 1969 and April 1973. In his analysis on effectiveness, 27 out of the 30 pollution casualties would not have resulted in oil pollution if the tanker were fitted with a standard double bottom (1/15th of the beam).
2) Lateral thrusters can serve two purposes. The first is improved slow speed controllability and the second is a back-up device to the rudder on today's large single-screw, single-rudder tankers.

Please comment on why this problem is important:

The grounding of the AMOCO CADIZ and the resulting 60,000,000 gallon oil spill was precipitated by a rudder failure. Since the main propulsion system of the AMOCO CADIZ was in working condition, if the tanker were equipped with a lateral thruster (bow thruster), the master could have used the thruster as a back-up rudder, selected the proper heading and steamed at a slow speed out to sea until assistance arrived.

Is this a site specific local problem, a regional, national, or global one?

National/global

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

Cdr. James C. Card, USCG, has conducted a preliminary assessment entitled, "Effectiveness of Double Bottoms in Preventing Oil Outflow from Tanker Bottom Damage Incidents", MARINE TECHNOLOGY, Society of Naval Architects and Marine Engineers, January 1975.

MT 10

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Transportation

Sub-topic: Dredging/Disposal

Specific identified problem or issue (describe in a short narrative statement):

For the park and industries in the New York metropolitan region dependent on maritime shipments, the primary transportation issue is assuring access to their facilities. This assurance is inextricably tied up with issues related to disposal of dredged material, which involves both technical and regulatory questions. The normal depth of NY harbor is 18-19 feet yet modern, ocean-going vessels require depths of 35-45 feet. Because of siltation rates, an average of 10 million cubic yards must be dredged annually.

Key information required for action or problem resolution:

1) The reliability and effectiveness of present or proposed testing techniques (such as bioassays, bioaccumulations, biomagnification).
2) Development of a scientific consensus regarding criteria and thresholds for approving dredged material for ocean disposal.
3) Assessment of the environmental inpacts of other disposal sites and techniques.
4) Technical requirements for safe land based disposal of toxic materials.
5) Technical requirements for capping-monitoring of its effectiveness in containing dredged materials.
6) Determination of regenerative capacity of traditional ocean sites if disposal is discontinued.

Please comment on why this problem is important:

Both economic and natural resources are at risk. If dredging is curtailed, severe economic dislocations will occur because of disruption to maritime industries. If dredge disposal continues in the ocean, health on various fauna may be impaired and this may, in fact, have risk for human health.

Is this a site specific local, regional, national, or global problem?

While some aspects of the issue are site-specific, the overall nature of the problem is national.

What, in your estimate, is the immediacy of the threat or need for information?

One to five years

MT 11

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Transportation

Sub-topic: Dredging and Dredged Material Disposal

Specific identified problem or issue (describe in a short narrative statement):

Dredging to maintain of existing shipping channels and for deeper channels to handle increased draft requirements of existing ships requires disposal areas to place the dredged material. Such sites are not now available and the unresolved problems are causing extensive economic and environmental impacts on this region.

For the port and industries in the New York metropolitan region dependent on maritime shipments, the primary transportation issue is assuring access to their facilities. This assurance is inextricably tied to issues related to disposal of dredged material, which involves both technical and regulatory questions

Key information required for action or problem resolution:

1) What are the alternatives for disposal
What is the feasibility of alternatives

2) Possible study areas:
-Diked area reuse management
-Dewatering dredged material
-Commercial reuse/recycling of dewatered dredged material
-Development of processes to remove contaminants from dredged material
-Identification of acceptable disposal areas (ocean, bay, land)
-Development of procedures for Federal subsidies for higher costs of disposal methods including transportation to deep ocean sites or inland strip mines.
-The reliability/effectiveness of present or proposed testing techniques (such as bioassays, bioaccumulations, biomagnification)
-Development of a scientific consensus regarding criteria/thresholds for approving dredged material for ocean disposal
-Assessment of the environmental impacts of other disposal sites/techniques
-Technical requirements for safe land-based disposal of toxic materials
-Technical requirements for capping; monitoring of its effectiveness in containing dredged materials
-Determination of regenerative capacity of traditional ocean sites if disposal is discontinued.

Please comment on why this problem is important:

The Port of Baltimore is the fifth largest deepwater port in the United States in tonnage of foreign waterborne commerce and the fourth largest in volume of container cargo. Current Maryland Port Administration figures indicate that the Port contributes $3 billion to the economy of Maryland annually. Port oriented activities comprise 10 to 15% of the gross State product. Over 170,000 workers owe their jobs to the port. Over 10,000 ships a year call at the port.

This positive economic impact will not continue unless port channels are maintained at authorized depths (maintenance dredging) and unless deeper channels are provided to handle today's larger ships. Maryland's first port, Joppa, was abandoned when sediment lessened channel depths and made the port unusable. A similar fate befell the once thriving port area of Elkridge on the Patapsco River.

Is this a site specific local problem, a regional, national, or global one?

Regional - immediate
National- short range - 25 years
Global - 50 years

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

Maryland Port Administration has begun examining potential usefulness in Baltimore of a dredged material dewatering process being tested by US Army Corps of Engineers.

Maryland Environmental Service commissioned a study in 1974, "The Technical & Economic Feasibility of Producing Beneficial Products from Baltimore Harbor Dredged Spoil."

Maryland Water Resources Administration prepared a report in 1977, "Management Alternatives for Dredging and Disposal Activities in Maryland Waters."

MT 12

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name Marine Transportation

Sub-topic Vessel and Terminal Operations (Manpower & Human Factors)

Specific identified problem or issue (describe in a short narrative statement):

Over 80% of pollution from regulated vessels and facilities is caused by people. Higher standards of education and training are needed to reduce this pollution threat.

Key information required for action or problem resolution:

Study availability and need for improved hands on training and education of operational personnel on vessels and shore side terminals.

-Ascertain qualifications of crew to handle spills
-How much do you reduce pollution by increasing training?
-Identify various training programs [simulators] and effectiveness
-What union aspects apply?
-What are options; what options are feasible?

Please comment on why this problem is important:

Continuity of manning of ships
Identified, proved problem

Is this a site specific local problem, a regional, national, or global one?

National

What, in your estimate, is the immediacy of the threat or need for information?

One year

MT 13

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Transportation

Sub-topic: Seagoing Work Force

Specific identified problem or issue (describe in a short narrative statement):

The "Seagoing Work Force" of the United States' Merchant Marine is operating in an antiquated work environment with outdated training and licensing programs. The work environment must be updated to permit our seagoing personnel to serve on the same ship or same type of ship in lieu of serving on the next available ship as assigned by the "hiring halls". The seaman must also be permitted a "set rotation" in lieu of waiting months, after his vacation, before receiving his next assignment.

Key information required for action or problem resolution:

Investigate the possibility of utilizing the unassigned seagoing work force of the U.S. merchant marine to augment the personnel of the U.S. Navy or the U.S. Coast Guard. These merchant seamen could be ideally used in the pollution-control tugboats in a fashion similar to the volunteer firemen in many smaller cities. Training and licensing could be improved in the following:

1) More realistic training with required recurrent training
2) Use of simulators for ship handling and cargo loading
3) Required performance standards for advances in grade
4) Periodic performance testing for maintaining licenses
5) Licenses tied to ship size and type
6) Special training for pollution control measures of oils and chemicals
7) Clarify pilot/master relationship and authority

Please comment on why this problem is important:

The seagoing work force of the U.S. Merchant Marine has been given neither a proper work environment nor the proper training to safely operate today's larger, more complex ships. Many of today's marine accidents which are attributed to "human error" are the result of an unforgiving marine system. The marine systems must allow for "limited human error", with improved training if necessary, if we want to reduce accidents and pollution

Is this a site specific local, regional, national, or global problem?
National (U.S. Coast Guard and MARAD), global (United Nations/IMCO)

Other comments:

School of the Master, Mates and Pilots (MITAGS) near Baltimore, Maryland.
United Nations/IMCO-Committee on Standards for Training and Watchkeeping.
Contact U.S. Coast Guard, Office of Merchant Marine Safety, Division of Merchant Vessel Personnel.

MT 14

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Transportation

Sub-topic: Evaluation of Decisions Toward An Improved Oil Spill Prevention Scheme

Specific identified problem or issue (describe in a short narrative statement):

What is the best recommended set of "prevention" actions against oil spills? Or, how can we "best" reduce the likelihood of a risk of future oil spills? Should this be done via tanker double bottoms, vessel traffic control, etc.? We need a basis for assessing what efforts should be undertaken and where the effort can best be placed

Key information required for action or problem resolution:

1) Ability to evaluate how changes in technology of tanker transportation affect the likelihood of a spill. Current incidence analysis assumes no technological changes. Need to gather data on causes of accidents.
2) Ability to evaluate damages (damage and vulnerability data). "Damages averted" concept: How much is the expected spill damage reduced if a technological change toward spill prevention is implemented. These damages averted should be compared to the costs of implementing the prevention scheme in question.
3) Develop a cost-risk/benefit model to assess the merits and costs of various alternatives.

Please comment on why this problem is important:

Resources at risk (fisheries, tourism, etc.)

Is this a site specific local problem, a regional, national, or global one?

Either local or global

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

There are probably many studies covering "bits and pieces" of the problem but none that synthesizes all aspects.

MT 15

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Transportation

Sub-topic: Bridge Hazards to Marine Transportation

Specific identified problem or issue (describe in a short narrative statement):

Inability of the Army Corps of Engineers to include potential pollution problems as a decision making criteria in their formulas for replacing bridges and/or widening or lengthening existing navigation channels.

Facility modernization or construction of bridges occur with little or no regard to potential navigational hazards caused by marine traffic that must pass through the structure.

Key information required for action or problem resolution:

1) Study development of original A.C.E. formulas for the purpose of updating them to include concerns over pollution.

2) Look at the process by which new bridges are sited or old bridges repaired to determine whether the potential for an accident is taken fully into consideration.

Please comment on why this problem is important:

Some instances of known navigational hazards, that if not improved (primarily because of age) could cause a disastrous incident. Presently, decisions to improve a channel (outside of regular maintenance) must be made primarily on economic justification.

MT 16

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Transportation

Sub-topic: Offshore Crude Oil Unloading Terminals

Specific identified problem or issue (describe in a short narrative statement):

In 1975, the average size of crude oil tankers serving United States ports was less than 50,000 deadweight tons; today that average is approximately 100,000 deadweight tons and by 1985 it is projected to be nearly 200,000 deadweight tons. Not a single East Coast port of the United States can accommodate a 200,000 deadweight ton tanker; furthermore, not a single offshore crude oil unloading terminal is presently planned for our East Coast. This lack of an offshore unloading facility means that the oil will be double handled by lightering to smaller vessels or trans-shipped.

Key information required for action or problem resolution:

Offshore crude oil unloading terminals offer a proved method by which crude oil can be supplied to our existing East Coast refineries. These offshore terminals with today's large tankers, provide for an economical, fuel-efficient system which actually improves safety and, in turn, dramatically reduces oil pollution associated with tanker casualties.

Please comment on why this problem is important:

See 1985 case for a projected offshore terminal-Table 25, page 362, for the environmental impact and Table 26, page 363, for the economic impact of the attached paper "Tankers and the U.S. Energy Situation: An Economic and Environmental Analysis."

Is this a site specific local, regional, national, or global problem?

Regional/East Coast and West Coast since the Gulf Coast is constructing LOOP.

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

The Gulf of Mexico offshore crude oil unloading terminal (LOOP) is scheduled to be completed by February of 1981, to supply crude oil to the Gulf refineries.

"Tankers and the US Energy Situation: An Economic and Environmental Analysis"

MT 17

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Transportation

Sub-topic: Modeling tools for evaluation of alternative decisions and policies on marine pollution response

Specific identified problem or issue (describe in a short narrative statement):

How can society synthesize a system for responding to marine pollution incidents should they occur? How can this be done in an "adequate" (or "improved", or "optimal") way? Specific issues: (1) tradeoffs between costs of pollution and response costs, (2) spectrum of economic implications of various decisions and policies (from a public and private viewpoint), (3) aspects of problem: physical, technical, logistic, economic, regulatory, (4) comparison between alternative clean-up technologies and systems.

Key information required for action or problem resolution:

1) Pollution incidence profile (probabilistic analysis of spill occurrence)
2) Performance characteristics of clean-up equipment (booms, skimmers, dispersants)
3) Evaluation of damages. Vulnerability and resource impact assessment
4) Sensitivity analysis of uncertain parameters

Please comment on why this problem is important:

Risks significant to society

Is this a site specific local problem, a regional, national, or global one?

Either local or global

What, in your estimate, is the immediacy of the threat or need for information?

?

Other comments:

MIT study attempts to do this for clean-up.
Study may be used as a tool for analysis of options before policy makers.

MT 18

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name Marine Transportation

Sub-topic General Vessel Operations Pollution Prevention

Specific identified problem or issue (describe in a short narrative statement):

Sewage discharges from vessels are now regulated by USCG. Certain small vessels have been temporarily exempted due to lack of operable small treatment units. Other larger passenger vessels have received temporary waivers due to large volume of waste generated by passenger load. All vessels have a problem if they select holding tanks as their solution to sewage problems - no pump out facilities exist for large vessels or small recreational boats.

Key information required for action or problem resolution:

1) Identify existing facilities for dumping & for pumping
2) Number of crafts involved: pleasure; commercial fishing; US cargo; foreign flag
3) available manufacturing capability for treatment units - price, delivery time, efficiency

Please comment on why this problem is important:

This facet of marine pollution has received no attention from federal, state or local agencies. Specific development plan and funding needed.

Individual unit cost is high per vessel at a time when the accumulated end product cannot be handled. Instances of polluting are highly visible to society when in actuality they may not be of significant volume when measured against the cost to comply, the cost to regulate and monitor, and the follow-on costs of providing auxillary pumping facilities.

Is this a site specific local problem, a regional, national, or global one?

National

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

Non-federal research: Sweden has good program

Nothing being done on local or national except for State of Maryland which requires new marinas to build pump-out facilities

MT 19

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Transportation

Sub-topic: Marine Propulsion Alternate Fuels

Specific identified problem or issue (describe in a short narrative statement):

In recent years fuel has risen from about 25% to 50% of ship operating costs. This fact plus questions of continued oil availability have led the marine industry to consider use of alternative fuels to the present bunker or diesel oil. For example, there is increased interest in coal in some form. This shift requires an assessment of environmental impact along with such key system questions as source and form of fuel, loading, storage, and handling, types of machinery, and training requirements.

Key information required for action or problem resolution:

From the viewpoint of potential pollution, it is necessary to know fire or dust problems in storage, loading, handling, combustion products, means of controlling undesireable products, significant variations between at-sea and in-port use of the fuel, nature and characteristics of any residue, and methods for its disposal.

Please comment on why this problem is important:

It is not certain that a shift to coal in some form, or to some other alternative fuel, will necessarily increase pollution possiblities. Nonetheless, this subject merits early attention in order that data and assessments will be available in a timely fashion.

Is this a site specific local problem, a regional, national, or global one?

Changes in marine fuels are most likely to be global

What, in your estimate, is the immediacy of the threat or need for information?

Five years

Other comments:

No comprehensive non-federal program is known, but Dept. of Energy has sponsored a major study of alternative fuels, Maritime Administration has done some work, and the Maritime Transportation Research Board of the National Research Council has completed a report on alternative fuels.

Some companies are understood to be looking at alternative fuels and the Society of Naval Architects and Marine Engineers is considering projects on this subject. There are coal burning ships in operation.

MT 20

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name Marine Transportation

Sub-topic Transportation of Petroleum (Offshore Facilities)

Specific identified problem or issue (describe in a short narrative statement):

Production phase of development of petroleum resources on Georges Bank will provide a threat to marine environment.

Key information required for action or problem resolution:

Determine whether tank vessel or pipeline transportation presents least hazard to marine environment and establish criteria for pipeline construction or tank vessel operations. Determine if seabed can accommodate buried pipeline, best route for line and impact on environment. If tanker operations are necessary, type of transfer and collection which will provide least environmental damage. Examination of weather conditions and its effect on oil transportation on Georges Bank.

Please comment on why this problem is important:

Needs to be fully explored prior to selection of transport mode.

Is this a site specific local problem, a regional, national, or global one?

Regional

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

Non-federal research: CZM research into regulations

MT 21

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Transportation

Sub-topic: Pollution Reporting

Specific identified problem or issue (describe in a short narrative statement):

There is no routine organization for:
a. Instructing masters to report observed pollution, its type and severity.
b. To whom to report it.

We should identify possible ways that an early warning system can be established.

Key information required for action or problem resolution:

1) If this lack exists:
   a. A standard format on the lines of a ship's weather report should be designed. Alternatively it could be an addition to the routine weather report format.
   b. The report could be transmitted to the appropriate shore radio station, which would be required to relay it to the pollution control authority for that area for information and/or action.

2) Assess alternate ways data can be reported and how effective they would be.

Please comment on why this problem is important:

Monitoring of event; spills can be easily reported.

MT 22

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Transportation

Sub-topic: Bilge Water and Tank Washings from Ships

Specific identified problem or issue (describe in a short narrative statement):

Discharge of bilge water and cargo tank washings is a major source of ocean pollution. The IMCO approved limits are 100 ppm and not more than 60 litres of oil per n.m. There is no way of measuring this other than to stop discharging when a sheen appears on the water and this cannot be seen in heavy weather or in the dark. Furthermore, many discharge outlets are below the waterline. Illegal discharge often occurs accidentally or deliberately at night. The 1973 International Convention on Prevention of Pollution from ships and the 1978 Tanker Safety Pollution and Prevention Conference requires the installation of monitors, but the regulations are not yet ratified.

Key information required for action or problem resolution:

1. Some companies are developing monitors as private ventures and these are being evaluated by the USCG and USN.
2. In general the monitors are expensive, $15,000 for bilge warning and $100,000 for cargo tank installations, and are not all that accurate.
3. Recommend: a) that some of the funds being devoted to aerial and satellite surveillance systems to detect spillages after they have occurred be shifted to the development of less expensive monitors which would prevent pollution at source.

b) that (after accurate monitors have been developed) consideration be given to developing shipboard recording monitors which would be installed in all ships and inspected as part of arrival. This would stop illegal discharge.

Please comment on why this problem is important:

In addition to use on ships, possibility of use for site monitoring (Wright & Wright research on Martha's Vinyard).

Other comments:

Companies doing research in this area are: Teledyne; Baird; Mallory.

MT 23

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name Marine Transportation

Sub-topic Vessel Operations/Pollution Prevention

Specific identified problem or issue (describe in a short narrative statement):

Bilge slops are not permitted to be pumped overboard in US waters. Oil /water separators are used on larger vessels. The small recreation vessel fleet has no means of removing oily bilge slops without pump out facilities available ashore.

Bilge slop pump out facilities are needed to meet existing requirements

Key information required for action or problem resolution:

There is a need to study shoreside pump out facilities for bilge slops from small vessels.

Is this a site specific local problem, a regional, national, or global one?

National

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

Research means of handling bilge with small boats

4.2.5 Marine Waste Disposal

The panel considered four kinds of wastes--dredged materials, industrial wastes, municipal wastes and sewage sludge. Radioactive wastes were discussed only briefly. Each panel member was asked to come to the workshop with prepared problem statements, which were then combined and revised during the workshop. The problems were ranked by importance using the criteria provided to each participant.

4.2.5.1 GENERAL PROBLEMS OF WASTE DISPOSAL

Two general problems with a very high priority emerged:

1. The need to review all existing monitoring programs and to assess their effectiveness in attaining stated objectives. Programs which fail to fulfill these objectives or which have none should be redirected or abolished.

2. The need to standardize methods and techniques used in sampling and analyzing pollutants and their effects, and in reporting results. The panel recognized a variety of reasons to monitor marine waters, but the majority of the panel felt that too often monitoring programs have too little value for the expense incurred. Furthermore, the panel recommended that monitoring programs should be concentrated in nearshore waters, particularly estuaries and bays, and in a few selected locations in open continental shelf waters used for waste disposal.

Measurement programs should focus on places known to have been impacted, the so-called "hot spots", and selected reference areas. With increasing energy costs, more thought and effort should be directed toward developing a variety of remote sensing tools and techniques.

Many kinds of wastes are introduced into the marine environment from a large number of sources. To manage these wastes and their impacts on the environment and biota effectively, we must inventory the sources, develop appropriate control strategies, and document recovery rates.

Inventory the sources of inorganic and organic wastes to coastal waters.

The locations and strengths of the sources should be determined, as well as the characteristics of the wastes. Distinctions should be made between natural and anthropogenic wastes, and between point and non-point sources.

Much of the required information is being collected by a variety of governmental agencies and by industry. Inventories should be made within subregions.

The initial effort should concentrate on the synthesis and analysis of existing data to determine future data needs before undertaking new observational programs. Case studies of one or more appropriate areas would be useful to establish methodology and demonstrate the efficacy of the approach.

Assess which sources are amenable to control, by what measures, at what cost, and at what benefits to the environment, the biota, and society.

The principal reasons for controlling the sources of wastes entering the marine environment are: to improve the quality of the environment and its living resources, to decrease public health hazards, and to change the uses

society makes of its coastal waters. Selection of sources for control should be based on an assessment of how these factors would be affected. This assessment should be done as part of the comprehensive case studies described below.

Document changes in the environment and the biota following cessation of dumping or alteration of dumping practices.

A number of ocean sites once used to dispose of liquid and solid wastes have been, or will be, abandoned. Monitoring should continue at those sites for which there is an historical data base that might permit an assessment of environmental and biological changes following cessation of dumping, or changes in the kinds and volumes of wastes received. Such sites include Deepwater Dump Site 106, Philadelphia dump site, and New York Bight sewage sludge disposal area after 1981.

4.2.5.2 DREDGING AND DREDGED MATERIAL DISPOSAL

Since colonial days, dredging has been a persistant activity required to maintain most ports, harbors and marinas. The disposal of the dredged materials, not dredging itself, continues to cause concern principally because of the subtle chronic biological effects that result from long-term exposure to contaminated sediments. Water column effects during dumping have been well documented and are local in space and time. Acute effects of burial are also well established.

The amount of dredged material dumped between 1973-1978 in open coastal waters governed by the Marine Protection, Research, and Sanctuaries Act of 1972 (PL92-532) ranged from 31.4 million m^3 (1977) to 75.0 million m^3 (1974). Disposal in future years will probably not vary by more than a factor of two from the yearly average for that period--52.4 million m^3. Data are not available for the volumes of dredged material disposed of in estuaries, bays, lagoons and other nearshore waters, which are not covered by PL92-532, but this amount is estimated at least 10 times the total volume of dredged material disposed of in marine waters offshore.

Enforcement of the recently adopted bioaccumulation criterion will increase the amount of dredged material unacceptable for ocean disposal, and alternative disposal sites will have to be found. From 10 to 20% of the total volume of material dredged from New York harbor may fail this test. At present, no acceptable alternative sites have been identified.

The principal problems of disposal arise from the contaminants asociated with the dredged materials. Because many contaminants, e.g., most metals, chlorinated hydrocarbons and radionuclides, are relatively insoluble, they are rapidly scavenged from the water near their points of introduction. Their subsequent dispersal and accumulation are controlled by the fine grained sediment system of that particular body of water. Fine particle systems are not well understood for any coastal water bodies within the region, and should receive attention.

Much more effort should be directed at reducing the sources of contaminants to coastal waters. However, even if all sources of contaminants could be eliminated immediately, the problems of dredging and disposing of those contaminated sediments already in the aquatic environment would remain for decades to come. Therefore, a high priority should be given to the development of a dredged material management plan for each port within the region, and new and innovative methods of handling contaminated dredge materials.

A dredged material management plan should be developed for each port within the region.

The plans should be based on an identification and assessment of all the alternatives. Sites should be inventoried and the environmental, public health, economic, and socio-political effects of disposing different kinds (qualities and quantities) of dredged material in each site should be assessed. Pilot experimental dumps may be useful.

New and innovative ways of handling contaminated dredged materials should be investigated.

Several new innovative methods of handling contaminated dredge materials are: combining submarine sand mining with disposal of contaminated wastes in the excavated pits and capping with clean materials; constructing offshore port islands; and processing to remove contaminants.

Some specific research questions that should be addressed include:

1. What effects do natural (storms) and man-induced (dredging) disturbances of the bottom have on the release and dispersal of both dissolved and particle-bound contaminants?
2. Can contaminated dredged materials be isolated from the biota by submarine burial and/or capping with clean materials?

4.2.5.3 INDUSTRIAL WASTES

New and more stringent regulations to control the disposal of hazardous wastes in the terrestrial environment (i.e., the Resource Conservation and Recovery Act of 1976 [RCRA]) will increase pressure to use the ocean as a potential receiver for wastes. At present, more than 400 substances are restricted for terrestrial disposal under RCRA, and the number and volume will increase.

Converting oil-fired power plants to coal will result in large volumes of coal wastes--fly ash, bottom ash, and scrubber wastes. In coastal areas, the ocean is a potential receiver for these wastes. Fly ash and bottom ash will be dumped experimentally at Deepwater Dump Site 106 in summer 1980. Stabilized mixtures of ash and scrubber wastes will be used to construct a fishing reef off Fire Island (NY) in summer 1980.

Another near-term ocean disposal strategy is incineration of wastes at sea. The method is restricted to suspensions with high BTU contents, usually greater than 6000 BTU per pound, and is used in Europe to dispose of organohalogens. At the present time, the Maritime Administration is considering acquiring an incinerator ship, and an incineration site near Deepwater Dump Site 106 has been proposed. It appears that RCRA regulations will cause some liquid wastes formerly placed in landfills to be incinerated at sea.

Since there will be increasing pressures to dispose of wastes in the ocean, we should begin immediately to identify a number of dispersal and containment sites in continental shelf and slope waters throughout the region.

Inventory the sources of industrial wastes to the region.

The sources of industrial wastes to the region should be documented, their locations and strengths specified and the characteristics of the wastesestablished. Much of the pertinent information is being collected by industries and by a variety of governmental units. These data should be collated and synthesized before any new observational programs begin. For this very large undertaking we recommend that one, or at most a few, careful case studies be made for selected subregions. Appropriate subregions should have significant environmental impacts from industrial wastes and a good data base.

Determine which of the sources of industrial wastes are amenable to control.

An assessment should be made to determine which sources of industrial wastes are amenable to control, at what costs, and to determine what changes in environmental quality, the biota and human use patterns can be expected for different levels of source control.

Determine the patterns and rates of recovery of the environment and biota following cessation of dumping at selected sites.

Efforts should concentrate on a few carefully selected sites to document the patterns and rates of recovery of the environment and biota after dumping ends. Two candidate sites are Deepwater Dump Site 106 and the industrial dump site off Massachusetts.

Identify and evaluate alternatives of disposing of a variety of industrial wastes.

All potential modes and sites for disposal of many kinds of industrial and domestic wastes should be identified and assessments made of the environmental, economic, human health and socio-political effects of each.

Some specific questions to be addressed at oceanic sites are listed below. Pilot dumps will be required to provide some answers.

1. How will different hazardous liquid and solid materials behave if disposed of at different sites in the ocean?
2. How will they affect the environment and the biota?
3. How widely will particulate wastes (i.e., sewage sludge, fly ash, bottom ash) be dispersed when released into the water column in deep water?
4. Can hazardous particulate matter be buried safely at sea and capped with clean sediment to isolate the contaminants from disturbance by storm and from burrowing organisms?
5. What effects does the airborn plume from an incinerator ship have on birds and on aquatic life?

4.2.5.4 MUNICIPAL WASTES

Municipal wastes are discharged directly into the marine environment at many points throughout the region. Most municipal discharges enter estuaries as point and non-point sources; some enter open coastal waters directly through outfall pipes (point discharges) but most reach open coastal waters in the discharge from estuaries. Huge sums are being spent to upgrade sewage treatment plants. The panel felt a particular need to assess what level of

treatment is needed for each estuary to attain specific levels of water quality, and to assess how these changes would affect living resources and human use patterns. Indiscriminate upgrading of all treatment plants may result in little benefit to the environment and society and may, in fact, lead to environmental degradation in special circumstances. Different plants may require different levels of treatment.

A second concern was that too much attention was placed on reducing coliform levels with too little attention given to potential human health problems associated with viruses and toxic chemicals.

Assess the effects of upgrading sewage treatment plants on water quality, the biota and human use patterns.

Billions of dollars have been spent upgrading sewage treatment plants throughout the region with little documentation on the environmental effects. Detailed case studies should be made of several areas to assess how upgraded treatment has affected water quality, the living resources, and human use patterns. Areas chosen for analysis should include New York Harbor, Boston Harbor, Narragansett Bay and at least one estuary that receives smaller inputs of municipal wastes.

New York Harbor is of particular interest because of New York City's system of combined sewers and storm drains. Many panelists were concerned that because of the combined system, the huge investment being made to upgrade treatment plants would have little effect. Before spending additional amounts, a critical assessment should be made to determine the effects of past actions.

Assess the need for chlorination at sewage treatment plants and power plants, and determine the impacts on the environment, biota and human health.

Large amounts of chlorine are used at sewage treatment plants to kill bacteria and degrade organic matter, and at power plants with once-through cooling systems to control the growth of fouling organisms in the condensor tubes. These account for more than 10% of all chlorine used in the US. Not all of the chlorine is utilized, and highly toxic chlorinated and brominated organic matter is produced. The effects of these halogenated organic compounds on the environment, biota and human health are poorly understood and should be assessed. A more fundamental question relates to the need for chlorination in the first place. Chlorination kills coliform bacteria (the indicator organisms) but not viruses and other microorganisms which pose far greater human health hazards. The need for chlorination at power plants could be reduced, if not eliminated, by using higher excess temperatures. We should determine whether chlorination is desirable at sewage treatment plants and power plants.

4.2.5.6 SEWAGE SLUDGE

Dumping of sewage sludge at sea will be banned beginning in 1981. While there may be waivers and delays in compliance, this activity will decrease and disposal at some ocean sites will be discontinued in the early 1980s. Cessation of dumping provides an opportunity to document what changes (recovery) of the environment and the biota occur, and at what rates. Two sites which we recommend specifically for continued monitoring are the New York Bight Apex and the Philadelphia dump site. This type of monitoring should be given a high priority.

Identify the alternative modes for sewage sludge disposal, including dumping at sea, and assess the environmental, economic, socio-political and human health effects of each.

This should be done on a sub-regional basis and a management plan should be developed for each appropriate subregion. All the alternatives should be identified and assessed on a site-specific basis within each sub-region.

Document the patterns and rates of recovery of a number of sewage sludge dump sites in the ocean.

Candidate sites include the Philadelphia dump site and the New York Bight Apex. All sewage sludge dumping at the Philadelphia site is expected to end in 1981. There is not yet a definite date for cessation of sewage sludge dumping in the New York Bight.

With cessation of sewage sludge dumping at the Philadelphia site, all waste disposal activity will have to stop. In the New York Bight Apex, dredged material and industrial waste dumping will continue. Both sites present important opportunities to learn something about waste disposal:

1. the Philadelphia site to document the patterns and rates of recovery of an environment and its biota after all anthropogenic inputs are removed, and
2. the New York Bight Apex to document the extent to which sewage sludge dumping has contributed to the overall degradation to the Bight and its biota, and to document any recovery that occurs when this stress is removed.

WD 1

Worksheet for Outlining Problems and Identifying Needs

(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Dredged Material Disposal

Specific identified problem or issue (describe in a short narrative statement):

There is a critical need for a dredged material management plan for each major port within the region. Each plan should ensure that required maintenance dredging projects can be carried out without prolonged and costly delays and with predictable and acceptable risk to the environment and its living resources.

The plan should be based upon a rigorous assessment of the environmental, economic, socio-political and public health factors associated with the full range of alternatives.

Key information required for action or problem resolution:

1. Characterization of materials and associated contaminants accumulating in channels that require frequent maintenance dredging.
2. Assessment of the physico-chemical behavior of these materials and associated contaminants if placed in a variety of disposal environments--upland, marginal, overboard, etc.
3. Assessement of the economic impacts of each disposal alternative.
4. Assessment of the biological effects of disposal in a variety of environments.
5. Evaluation of new modes of disposal of contaminated materials, e.g. combining submarine sand mining with dredged material disposal in the excavated pits.

Please comment on why this problem is important:

Dredging has been a persistent activity in ports and marinas throughout the region for more than 100 years. But we still have no plans to ensure that projects can be carried out in a timely fashion and with predictable and acceptable environmental effects. Ten to 20% of the volume of material dredged from NY Harbor each year (10^6 cubic yards) will fail to meet present bioassay and bioaccumulation criteria for ocean disposal. New sites will have to be found if the Port is to be operated in its present mode and without long and costly delays. Other major ports face similar problems.

Is this a site specific local problem, a regional, national, or global one?

National

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

Maryland's Dept. of Natural Resources supports research and monitoring on dredging and dredged material disposal in the Maryland portion of Chesapeake Bay.

The New York Dept. of Environmental Conservation supports research on dredging and disposal of PCB-contaminated sediments in the Hudson River. The Long Island Regional Planning Board supports research on dredging problems on Long Island. Agencies in other states with in the region also support research on these topics.

WD 2

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Dredged material disposal

Specific identified problem or issue (describe in a short narrative statement):

Papers prepared for the 1979 statutory meetings of the International Council for the Exploration of the Sea (ICES) and Sub-regional Working Papers developed for this conference indicate that dredging and disposal of dredging materials pose a significant environmental concern in habitats from the northern Gulf of Maine to Chesapeake Bay, where the problem appears to be the number one concern. Most of the adverse effects revolve around 1) the impact(s) of turbidity and siltation at the dredging site per se, 2) the impact on living resources of accumulated toxins in dredged sediments and chemical reactions (reduced DO, etc.) at the dredging site, 3) the impacts of burial on the benthos by dumped dredging materials at diposal sites and the effects of suspended sediments (turbidity, etc.) at disposal sites, and 4) the effects of the toxic moieties (PCB's, heavy metals, etc.) of dredged materials on plankton, benthos and demersal and pelagic fisheries.

Were the dredged materials not contaminated, the impacts would be perceived as minor and associated problems solvable through proper management techniques based on temporal and areal disposal. However, increased point and non-point releases of various toxic substances and nutrients have resulted in contaminant loading in channels and harbor areas.

Therefore, dredging and disposal require management plans specific for each harbor (Casco Bay) or harbor complex (NY-NJ harbor system). The management plans should emphasize: 1) what are the sources and pathways of flux for major contaminants, 2) how can terrestrial treatments or management eliminate, or reduce to acceptable levels, the wastes which are presently entering harbors and coastal and estuarine waters, 3) how can contaminated dredged materials and wastes be disposed of with the least environmental insult until harbors and coastal waterways are kept free of contaminants, and 4) what are the most acceptable ways of dredging and disposal once harbors and coastal waterways undergo pollution abatement and are largely free of contaminants?

Secondary questions will then include such topics as: 1) can clean dredging materials and related wastes substitute for mined materials in various construction activities, 2) should highly polluted harbors such as the Port of New York and Hudson River be cleaned up by dredging or other removal of contaminated sediments, or should time purge contaminated sediments once pollution abatement has eradicated point and nonpoint sources of contaminants, and 3) how much effort should be placed on controlling point and nonpoint sources of toxic substances and nutrients in relatively unpolluted and undredged habitats such as Barnegat Bay and Little Egg Harbor, New Jersey, and Gardiners Inlet and Bay, Long Island?

Key information required for action or problem resolution:

The key information and data needs are diverse and range from "real" scientific data needs to the perceptions of and demonstrated needs of society. Arranged in a "logical" order some of the needs are:

1. What are the present and future needs of society in regard to the use of harbor areas and estuarine and coastal waters for mariculture and other marine protein/food producing systems? These needs should be considered in the light of future energy sources and low energy food producing systems in close proximity to large urban areas (which reduces energy required for processing, shipping and storage of foodstuffs).
2. What are the present and future needs of society for recreation sites near major metropolitan centers? Should or can society afford to travel to distant resorts when there is the potential for clean beaches, good boating and excellent fishing within a brief commuting time from Times Square or Independence Mall?
3. What industrial and other traditional economic uses are projected for harbors and waterways? Can these exist side-by-side with food production and recreational systems?
4. The scientific information requirements needed for management would include the following:
    a. Regional characterization of materials and associated contaminants accumulating in channels that require frequent maintenance dredging
    b. Regional assessment and monitoring of the physico-chemico behvior of these materials and associated contaminants if placed in a variety of disposal environments --upland, coastal "islands", continental shelf and deep ocean
    c. Regional assessment and monitoring of the biological effects of disposal in a variety of environments
    d. Assessment of the economic impacts of each disposal alternative
    e. Evaluation of new types of disposal of contaminated materials, e.g., combining submarine sand mining with dredged material disposal in the excavated pits.
    f. Consideration of present and new offshore sites for disposal of solid and industrial wastes including dredged materials.

Please comment on why this problem is important:

While dredging has been intermittent in East Coast ports, channels and marinas for more than 100 years, we still cannot ensure that projects can be carried out in a timely fashion with predictable and acceptable environmental effects. Ten to 20% of the volume of material dredged from NY Harbor each year (10^6 cubic yards) will fail to meet present bioassay and biaccumulation criteria for ocean disposal. New sites will have to be found for the Port to operate in its present mode and without long and costly delays. Other major ports face similar problems.

Dredging and dredged materials disposal are obviously related to and will be contingent upon effects of point and nonpoint sources of contaminants. Current methods of contaminated (biologically and chemically) dredged materials disposal affects fisheries resources, aesthetics associated with recreational fishing, boating and other coastal water uses, and may pose significant health problems to living resources and humans.

Often the effects of ocean dumping are confused with the effects of sewage discharge, or contaminants carried seaward from harbors and estuaries via terrigenous export. Therefore, managers of habitats and habitat quality must first be concerned with how the components of the ecosystem interact as they are affected by man's activities.

Is this a site specific local problem, a regional, national, or global one?
National/global

What, in your estimate, is the immediacy of the threat or need for information?
One year

WD 3

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Dredged Material Disposal

Specific identified problem or issue (describe in a short narrative statement):

Dredged material constitutes approximately 80% by weight of all substances dumped into the oceans of the United States. About 35% of this material is polluted and must conform to bioassay - and bioaccumulation-based criteria established in the 1977 ocean dumping regulations. The bioaccumulation-based criteria and associated guidelines provide for field investigations to evaluate the potential for accumulation of toxic constitutents in the human food chain. However, statistically rigorous field investigations have not been conducted in the vicinity of many important disposal sites.

Key information required for action or problem resolution:

Statistically reliable (i.e., accurate and precise) data regarding uptake of xenobiotic constituents (e.g., PCB's, kepone) in bethic invertebrates are required around commonly used disposal sites that are not impacted by anthropogenic wastes other than dredged material. The experimental design employed to obtain these data must emphasize statistical power (the ability to detect real differences among data) and time-series analyses. The experimental design must be compatible with designs suggested in the ocean dumping regulations and final ocean discharge criteria.

Please comment on why this problem is important:

Dredging operations are critical to the economic well-being of the country. In some cases, these operations pose the most serious of environmental risks - bioaccumulation of potentially toxic constituents in the human food chain. The most commonly employed techniques for evaluating the magnitude of this risk - laboratory bioaccumulation studies - are prohibitively expensive (about $10,000 for testing a single sample of dredged material) for small property owners and difficult to extrapolate to the environment.

Is this a site specific local problem, a regional, national, or global one?
National

What, in your estimate, is the immediacy of the threat or need for information?
One year

Other comments:

Major dredged-material sites are located off the coasts of Maine (two sites), Massachusetts (two sites), New York and New Jersey (about nine sites). Additional major sites are located in Long Island Sound, Delaware Bay, and Chesapeake Bay.

WD 4

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Waste Disposal

Subtopic: Dredged Material Contaminant Sources

Specific identified problem or issue (describe in a short narrative statement):

Dredge spoil from harbor areas is the single largest source of toxic materials entering the oceans in the North and Mid-Atlantic region. Efforts to evaluate means to alleviate this problem are hampered severely by a lack of knowledge on sources of contaminants.

There is a need to organize widely dispersed information on sources of toxic substances to determine the information gaps and the degree to which the evaluations of control methods can be improved.

Key information required for action or problem resolution:

1) Review NPDES permits, permit applications and pertinent state files to obtain data on sources of toxic materials.

2) Review calculations of inputs, mass flows or material balances for selected toxic materials in estuarine and ocean areas, and compare input terms to the calculations reviewed. (See O'Connor, et al, and/or Mueller, et al.)

3) Define research or monitoring needs for each substance to find missing sources or to correct material balance, flow or input calculations.

4) Define sources amenable to controls which would result in effective reductions in sediment contamination. (See, eg., Assimilative Capacity of U.S. Coastal Waters, 1979)

5) Define the optimum control programs which will reduce most effectively the sediment contamination in harbor areas dredged for navigation.

Please comment on why this problem is important:

Until the sources of sediment pollutants are defined we will have a continuing and potentially increasing problem with contaminated dredge spoils. Action is imperative.

Is this a site specific local problem, a regional, national, or global one?

Global

What, in your estimate, is the immediacy of the threat or need for information?

One year -- action in no less than 5 years

WD 5

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel name: Waste Disposal

Subtopic: Offshore Disposal of Polluted Dredge Material

Specific identified problems or issue (describe in a short narrative statement)

1) Problem, in part, is assumption of continued dumping with limited hope to use material to create islands or wetlands.

2) Problem is a lack of sufficient options to reduce frequency and quantity of offshore disposal as well as upgrade the quality of what is dumped.

Key information required for action or problem resolution:

1) Need to develop a multi-optional approach

2) Need to identify (qual. + quant.) the "contribution" of pollution to marine sediments that are apt to be dredged

3) Need to control sources (dump cleaner material)

4) Once dredged, need technology to remove, or sufficientely reduce, heavy metals, etc.

5) Need to find uses of dredged material. Also, to promote and coordinate uses if need be (stockpile for later use)

6) Need to develop onshore system, stockpile, transfer, etc.

7) Need to develop containerized areas

8) Need offshore zoning. Here material can or cannot be dumped. Also seasonal constraints, such as spawning, migration, etc. (will require synthesis of existing info data).

Please comment on why this problem is important:

1) Reduce disturbance to deepwater ecosystems

2) Reduce health risk associated with fish and shellfish obtained from or associated with polluted areas.

3) Reuse or recycling will improve "economic," reduce energy needs (barging)

WD 6

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name Waste Disposal

Sub-topic Dredged material disposal

Specific identified problem or issue (describe in a short narrative statement):

Although the short term water quality impacts appear to be minimal, the long term ecological effects of the dumping of dredged material in the New York Bight have never been addressed. Of particular importance is the question of uptake of contaminants into the food web, especially via deposit feeders. Questions that should be investigated are: 1) Can a cause and effect relationship be demonstrated between bulk sediment concentration of contaminants & uptake into the NY Bight food web? If not, what should we be looking at to determine the mechanism of uptake (are the current regulatory testing procedures adequate)? 2) To what extent is this uptake, if any, significant? 3) Can appropriate organisms be found in significant enough quantities to begin to answer 1 & 2?

Key information required for action or problem resolution:

Appropriate lower trophic level organisms that directly consume or utilize dredged material dump site sediments are to be collected & analyzed for concentrations of appropriate contaminants. Then a determination has to be made whether or not this uptake, if any, is significant both from an ecological & human health perspective.

Please comment on why this problem is important: Dredging must be continued in order to maintain availability of port of New York. Dumping at sea is therefore a necessity until economical alternatives can be found.

Is this a site specific local problem, a regional, national, or global one?

Regional

What, in your estimate, is the immediacy of the threat or need for information?

Five years

Other comments:

The Corps is starting to get a handle on the bioaccumulation problem through its regulatory bioassay/matrix procedures. The problems that still exist include the difficulty in finding appropriate organisms (sedentary invertebrates in the dump site sediments are limited in species and abundance & other organisms such as whiting, ling, lobster & cancer crabs are migratory), appropriate controls & the masking effect of other pollution sources.

WD 7

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Dredged Material Disposal

Specific identified problem or issue (describe in a short narrative statement):

Real problem is with disposal of polluted material. Clean material can be utilized for beach nourishment. Bioassays should not be conducted by applicant as in most cases there is not enough time or money to get useful results.

Key information required for action or problem resolution:

-Can polluted material be capped and will this cap last?
-What are best sites for capping?
-What material should be disposed of offshore in the ocean or upland?
-Contour lines of certain chemicals, e.g., PCB in lines, possibly of order of magnitude concentrations.
-Identification of communities stressed by man's activities
-Effect of certain chemicals as whole life cycle of representative important species, particularly, reproductive phase

Please comment on why this problem is important:

Lack of dredging can hurt port areas and industries and recreational facilities.

Disposal of material in the ocean depends on the definition of "trace elements." International agreements prohibit the dumping of certain toxics, i.e. PCB's except in trace amounts. Government agencies at the State and Federal levels are currently trying to come up with a definition of "trace element".

Is this a site specific local problem, a regional, national, or global one?

Global

What, in your estimate, is the immediacy of the threat or need for information?

One year

WD 8

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name Waste Disposal

Sub-topic Redistribution of Contaminants through Sediment Disturbance

Specific identified problem or issue (describe in a short narrative statement):

It is essential to know the extent to which the disturbance of sediments contributes to redissolution or resuspension of contaminated sediments. Disturbance may occur because of storm flows or surges, or deliberate movement such as dredging.

Key information required for action or problem resolution:

1) A test of fresh water dredging effects has been carried out in the upper Hudson River for PCB removal. The reports should be reviewed and research designed to answer remaining questions about sediment water exchanges.

2) Extremely careful monitoring should be done of dredging areas and spoil ponds during any forthcoming dredging of PCB "hot spot" areas in the upper Hudson River. Transport downriver near the dredging and across the dam at Green Island must also be carefully observed.

Data indicating serious redistribution and inadequate removal and sequestration of the PCBs must persuade us to cease dredging and redesign the operation or permanently abandon it if redesign is impossible.

3) Selected future dredging of contaminated sediments in harbor areas of high salinity should be studied to determine the extent of contaminant redistribution.

4) Requirements for dredging should be rewritten as necessary to take account of these findings.

Please comment on why this problem is important:

Dredging has been ordered by a court to remove mercury from Berry's Creek in the Hackensack meadowlands. The development of reliable data on redistribution is essential if we are to successfully eliminate the hazard at any of the sites with contaminated sediments. Dredging processes may require considerable revision to achieve removal rather than redistribution.

Is this a site specific local problem, a regional, national, or global one?

Global

What, in your estimate, is the immediacy of the threat or need for information?

One year and continuing

WD 9

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel name: Waste Disposal

Sub-topic: Industrial Waste Disposal

Specify identified problems or issue (describe in a short narrative statement)

For ocean disposal of coal combustion wastes we must verify economic parameters for alternative disposal/deposition methods to complement the biophysical research and help select disposed modalities.

Key information required for action or problem resolution:

- Production (stabilization, block fabrication and curing costs)
- Transportation costs
- Deposition costs
- Monitoring costs

Please comment on why this problem is important

We must be able to speak with economic authority about the viability of this alternative disposal mode.

Is this a site specific, local problem, regional, national, or global one?

For coal waste disposal sites, i.e., near the plants or along coal and waste transport routes.

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

Some work now by Michael Baker & Co. of Beaver, PA, under an EPA contract.

WD 10

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Waste Disposal

Subtopic:

Specific identified problem or issue (describe in a short narrative statement):

In conjunction with the biophysical research and monitoring required to determine the engineering and economic feasibility of dumping coal combustion wastes in the sea, an assessment is needed of the present and future regulatory problems. (See also economic assessment of ocean disposal of coal wastes).

Key information required for action or problem resolution:

- Present states and federal (also international) regulations impacts
- Resolution of type and form of "special substances" limitations to be imposed under RCRA

Please comment on why this problem is important:

The present CWARP project will be meaningless unless the process is politically viable in the short run (2-5 years) to be put in place before other disposal alternatives are chosen through ignorance or from apparent preclusion because of existing (non-applicable but in-force) regulations.

Is this a site specific local problem, a regional, national, or global one?

Regional, near coal plants now or to be converted from oil.

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

NYS Sea Grant Law Institute Prof. Robert Reis has commenced some work on this for Stephen Wilson at NYSERDA.

WD 11

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Waste Disposal

Subtopic: Industrial Waste Disposal

Specific identified problems or issue (describe in a short narrative statement)

Fly ash particles serve as the condensation nuclei for various polynuclear aromatic hydrocarbons that have become fixed in post-combustion. How have compounds identified as hazardous or toxic reacted in the saline aquatic environment?

Key information required for action or problem resolution:

Data from program to assay these PNAHs should be brought forward in a timely fashion (may involve current project speed-ups) and integrated into fly-ash environmental assessments that are now underway.

Please comment on why this problem is important:

There is a great need to find ocean deposition sites for fly-ash because of the scarcity and capital costs for upland disposal sites. The part that these complex hydrocarbons from this source (as opposed to other non-energy-production sources) play in damaging the aquatic ecosystems or in penetrating the human food sources must be established.

Is this a site specific, local problem, a regional, national, or global one?

Ties into sites for marine disposal.

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

NYS DOH assays of PNAHs

WD 12

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Fly ash and other coal waste disposal at sea

Specific identified problem or issue (describe in a short narrative statement):

With the return of coal as a major energy source, large quantities of fly ash and sludge must be disposed of in an environmentally acceptable manner.
Specific problem:
1) Should fly ash be dumped in the ocean?
2) Should other coal wastes be dumped in the ocean?
3) The role of stabilized coal wastes in the ocean.
4) Up-to-date assessment of comparative costs (all costs, including environmental damage) for this and terrestrial disposal modes.

Key information required for action or problem resolution:

1) The anticipated annual volume of coal wastes: 1980-2030
2) Location of coal-fired power plants, specifically plants situated in the coastal region.
3) Behavior or fate of coal wastes in the sea.
4) Engineering/design economics data on process costs as a part of total energy production (per Kw) costs.
5) Potential timing as to dates of conversion and the probable increases in waste over time.

Please comment on why this problem is important:

1) The volume of waste is large; conventional land disposal will not be possible in crowded urban areas.
2) The fly ash and sludge wastes if dumped in the ocean may represent a threat to marine organisms.

Is this a site specific local problem, a regional, national, or global one?

Regional- East Coast, although some coal plants will be constructed on the West Coast

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

State agencies in New York.

WD 13

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Industrial Wastes

Specific identified problem or issue (describe in a short narrative statement):

Recently issued RCRA regulations (and similar State regs.) identify specific hazardous substances which must be disposed of in designated facilities. Allowable facilities are few and incapable of accepting present waste quantities. Designation of new sites will be exceedingly difficult or politically unacceptable. Therefore, in reviewing alternative disposal methods, ocean disposal from coastal areas will become increasingly attractive. Examples of wastes which may be acceptable are acids and bases for direct disposal (pipe, barge) or high BTU organic wastes through at-sea incineration.

Key information required for action or problem resolution:

Acids & bases: Short-term effects are mainly known. Long-term sub-lethal effects must be determined. Further work on mutagenic effects is needed. Identification of specific acids/bases, which may be acceptable, and of the levels of impurities which may be harmful (toxicity and biomagnification) is of first priority.
At-sea incineration: How do repeated exposures to toxic residues (which fall to water) affect the various biological communities? What are the effects on planktonic organisms from prolonged exposure, when such organisms must drift within a polluted water mass which maintains its integrity for relatively long periods (e.g. anticyclonic eddies)? What effect will stack emissions have upon pelagic or migratory birds?
Identification of other potentially pelagic acceptable materials is needed.

Please comment on why this problem is important:

Ocean disposal of some hazardous substances may be more economically and environmentally acceptable than the alternative land-based disposal methods. The cost to make this determination for generic materials is too great for an individual company or sub-government agency. Thus, the most desirable disposal method may not be utilized.

Is this a site specific local problem, a regional, national, or global one?

National, possibly global; serious regional problem

What, in your estimate, is the immediacy of the threat or need for information?

Five years

WD 14

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Industrial Waste Disposal

Specific identified problem or issue (describe in a short narrative statement):

Coal Waste - Artificial Reef Project

In view of the money, effort expended and both industrial and governmental interest in this project, we must ensure that site and proximal monitoring be sustained in the long run.

Key information required for action or problem resolution:

Testing for release of heavy metals and toxics and/or their consumption by various grazing biota, etc.

Please comment on why this problem is important:

While we've begun to approach the conclusion point that this form of disposal is feasible (engineering) and relatively benign (environmentally), the major question still remains concerning long-term impacts. In particular, the occurence of eventual disintegration and substance releases should be addressed.

Is this a site specific local problem, a regional, national, or global one?

Regional and national

What, in your estimate, is the immediacy of the threat or need for information?

5-10 years (CWARP is designed to "sunset" in 1983)

WD 15

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name Waste Disposal

Sub-topic Industrial Waste Disposal

Specific identified problem or issue (describe in a short narrative statement):

The health and environmental risks of continual exposure to chemicals or other industrial wastes are not well known yet. A percentage comparison of the leading causes of death in 1900 and those of 1960 shows a striking shift from infectious diseases to a variety of chronic degenerative diseases such as cancer, or diseases of the heart, lung and other organs/tissues. Other chemically caused effects are property loss in the form of materials damaged by corrosive environmental pollutants, nutrient depletion from soils by acid rain, or injury to our natural ecosystems from the discharge of toxic substances.

Key information required for action or problem resolution:

Characterize the nature and extent of risks posed by potentially hazardous chemicals.

Develop control strategies, technologies, systems and/or management practices which will prevent, interdict, or at least minimize exposure to hazardous chemicals.

Need research on toxic substances effects on humans & the environment.

Assess the magnitude and mechanisms of population exposure to toxicants.

Produce integrated risk assessments and criteria adornments to support future regulatory decisions.

Characterize toxic emission sources by developing a data base that describes the chemical industry, and develop and evalute of alternate control strategies or technology systems to mitigate human exposure to hazardous chemicals.

Please comment on why this problem is important:

It is estimated that chemical induced mutagenesis may be included in as much as 10% of all human disease, including contributions to virtually all known chronic diseases. These diseases can be caused by direct contact or through influences on modulating body mechanisms such as the neuroendocrine or immulogical systems. Reproductive malfunctions or damage to embryo development are also health risks associated with some chemicals.

Is this a site specific local problem, a regional, national, or global one?

Global

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

Measures to control toxic chemicals once they have been released into the environment are generally difficult to implement, prone to failure, and expensive. Strategies for toxic control must be based on implementing control measures at or near the source of entry into the environment.

WD 16

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Industrial Waste

Specific identified problem or issue (describe in a short narrative statement):

Need for information (criteria) on specific toxic substances with which to allow responsible decision-making with respect to marine/public health.

Key information required for action or problem resolution:

Need information to relate body burden levels of specific toxic substances in various tropic levels to the organism/ecosystem's health and public health risks. In addition, the mechanism by which the uptake occurs must be defined (i.e., from the water, the food source, or both). Emphasis should be on uptake from solids/particulates. Identities of specific substances of concern and candidate marine organisms is a first requirement.

Please comment on why this problem is important:

Decisions could be made based on hard data; otherwise, an overly conservative judgment could lead to significant adverse economic impacts, or conversely, not sufficiently conservative decisions could lead to serious risks to marine resources and/or public health.

Is this a site specific local problem, a regional, national, or global one?

National, possibly global; of immediate regional need

What, in your estimate, is the immediacy of the threat or need for information?

Five years

WD 17

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Municipal Sewage Outfalls and Sewage Sludge Dumping

Specific identified problem or issue (describe in a short narrative statement):

Numerous interactions involve both outfall discharge and dumping of solid sewage. In an area such as metropolitan New York, wastes discharged from outfalls 1) become involved with harbor and channel sediments (later to be dredged), 2) flow seaward and subsequently become intimately associated with wastes from sludge and industrial waste dumping and 3) are taken up in biota or physical systems and carried hundreds of kilometers from their original source.

In other coastal or riverine treatment systems, as testified to by numerous reviews for the 301 (h) permit waiver process, solid wastes may be held to be discharged through outfalls during "noncritical" periods of the year or are mixed regularly in storm sewer systems and inadvertently discharged to harbors and coastal waters during periods of high runoff. Evaluations of current primary and secondary treatment and discharge practices suggest that while there are no or limited impacts in many regions, numerous situations exist in which sewage discharges, alone or in conjunction with other wastes, have an impact on water quality. Again, it is often difficult to separate the effects of such discharges in receiving waters from those which result from nonpoint sources such as urban street and road runoff or runoff from agriculture lands.

Thus there is the immediate need for regional plans which 1) delineate the sources and amounts of domestic, industrial and agricultural wastes entering estuarine and coastal waters; 2) project the changes in loadings (increases or decreases) for the next 2-3 decades; 3) indicate how these can be managed (alternatives, pollution abatement or reduction, recycling, etc.); and 4) conduct assessments and monitoring to ensure that management plans meet their goals and objectives.

Key information required for action or problem resolution:

The information in regard to domestic sewage is similar to that required for managing dredging and dredged material disposal. The present and future needs of society must be determined. Then regional assessments must be made in regard to the effects of domestic wastes, in addition to and with industrial wastes, on marine water quality and the various uses proposed for these waters, i.e., mariculture, fishing, recreation, etc. In some areas, the effects of industrial wastes in concert with domestic wastes will be significant whereas in others, agriculture runoff and other nonpoint sources of wastes and nutrients will exacerbate the effects of domestic waste. In the upper Delaware Bay and Hudson River estuaries, all major sources of pollution will be involved, and management often will have to made decisions based on best judgements of the effect(s) of each component without full evidence in regard to the total effect of each.

Please comment on why this problem is important:

The impact(s) of domestic wastes has been often demonstrated to be the principal cause of decline in estuarine and coastal water quality. This has been shown in communities or regions which have no known industrial or agriculture inputs, either to the domestic sewage system or via unique outfalls or nonpoint sources. Closures of shellfish beds adjacent to small nonindustrial communities are among the best examples of effects of domestic sewage; closing offshore clam beds near the sludge disposal sites on the basis of coliform bacteria is an example of the consequences of sludge dumping.

Is this a site specific local problem, a regional, national, or global one?

National/global

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

See catalog of Federal Ocean Pollution, Research, Development, etc.

WD 18

Worksheet for Outlining Problems and Identifying Needs

(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Sewage Discharge

Specific identified problem or issue (describe in a short narrative statement):

Substantial funds are being committed at all levels of government to upgrade the treatment of municipal wastewaters in large coastal urban areas. There are serious questions regarding the cost-effective use of these funds in older urban areas where combined sewer overflows exist.

Key information required for action or problem resolution:

Assess how the degree of treatment will affect water quality and the quality of the biota in different areas (examine historical data for previous action). Assess the effect of improved quality on water use patterns. Assess the impact of combined sewers vis-a-vis upgraded treatment in old urban areas. What are the impacts of chlorination/dechlorination on estuaries and marine communities. A review of existing monitoring programs performed at outfalls should be undertaken; if the programs are not responsive, redirect or abolish them. Develop evaluation criteria for implementing Sections 301h and 403 of the Clean Water Act (i.e., is secondary treatment necessary for coastal outfalls, what are the treatment levels required to maintain healthy marine community near outfall)?

The closer older, urban communities get to full secondary treatment of all dry weather raw discharges, the more apparent it becomes that combined sewer outflows have a substantial impact on water quality. The issue needs to be addressed in order to make reasonable decisions on the value of extremely expensive controls on COSs, particularly, how extensive the controls ought to be and the nature of those controls. A present need exists for evaluation criteria for determining the level of treatment necessary to maintain a healthy marine environment and protect public health in estuarine/coastal areas. The use of effluent guidelines rather than ambient water quality criteria may not result in adequate protection or conversely expend large amounts of money with little return.

WD 19

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Chlorinated Discharges from Sewage Treatment Plants

Specific identified problem or issue (describe in a short narrative statement):

Roughly 5% of the chlorine produced in the United States is used for disinfection of water and wastewater. Especially in the case of wastewater applications, large numbers of organic compounds are produced. Some compounds produced by chlorination have also been found to be mutagenic. Furthermore, the increasing number of chlorine discharges from treatment plants may affect migratory behavior in anadromous fish.

Key information required for action or problem resolution:

1) The fate of chlorine-produced halocarbons in the environment should be determined and potential for biomagnification considered.
2) The mutagenic components of chlorinated wastewater should be identified and their effect on the environment should be assessed.
3) Fish avoidance of chlorine and the consequence for migratory and mating behavior requires considerably more study.

Please comment on why this problem is important:

Fisheries resources may be adversely affected. In Maryland, shad catches have declined seriously and chlorine is among the causes being considered at this time.
With regard to mutagens, there is a distinct possiblity of pass-through to human consumers of fish and shellfish.

Is this a site specific local problem, a regional, national, or global one?

Global

What, in your estimate, is the immediacy of the threat or need for information?

One year

Other comments:

Chlorine has also been targeted as a problem by the Marine Energy group. However, the problems associated with using chlorine at power plants and at sewage treatment plants are different because of different dosage levels and different water quality.

WD 20

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Sewage Sludge

Specific identified problem or issue (describe in a short narrative statement):

Failure of major New York/New Jersey sewerage authorities to comply with the Congressionally mandated 1981 deadline to cease ocean dumping, cessation of sludge dumping at the existing nearshore (12-mile) dump site, and reintroduction of the deep ocean (106-mile) dump site offers an unusual opportunity to define the real effects of sewage sludge dumping. Limited data are available on sludge dumping at the deep ocean site; extensive data exist for the nearshore dump site.

Key information required for action or problem resolution:

Initiate studies at deep ocean site prior to 1982 and continue for sufficient time to define site specific impacts, including toxicity and biomagnification potential. Experimental design must account for depth and dispersive characteristics. Continue studies at the existing nearshore site (currently planned to cease in 1981) to follow recovery after cessation.

Please comment on why this problem is important:

Legal challenges to the 1981 deadline and to determinations that land-based alternatives must be implemented since sludge dumping is "harmful" will require hard facts. A significant data base is being developed which indicates serious risks to public health in populous urban areas if land-based alternatives are enforced. Unless a similar data base is available for the marine environment, the ultimate decision will be for that disposal technique having the least supporting documentation of risk to resources or public health.

Is this a site specific local problem, a regional, national, or global one?

Regional

What, in your estimate, is the immediacy of the threat or need for information?

Five years

WD 21

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Marine Waste Disposal

Sub-topic: Sewage

Specific identified problem or issue (describe in a short narrative statement):

Waste from municipal sewage outfalls continues to be among the oldest, most unglamorous and persistent human impacts in estuarine and coastal areas. The Delaware Bay is no exception.

Key information required for action or problem resolution:

1) Updating town, city, county and regional outfall sites.
2) Estimating volume of outfalls.
3) Qualitative and quantitative characterization of chemistry of outfall effluent.
4) Assessing public health, socio-political and economic activities associated with sewage outfalls.

Please comment on why this problem is important:

Sewage and sewage outfalls can immediately affect public health (swimmers), fisheries (shellfish and finfish) and amenities (tourism). Increased chlorination in outfalls represents another problem which is only vaguely understood.

Is this a site specific local problem, a regional, national, or global one?

Regional problem for the Delaware Bay area, also national and probably global.

What, in your estimate, is the immediacy of the threat or need for information?

There has been marked degradation in some Delaware rivers since a sewage sanitation outfall was installed.

Other comments:

The Delaware Department of Natural Resources and Environmental Control is following the fate of some of these outfalls. Agencies in other states within the region also support research.

WD 22

Worksheet for Outlining Problems and Identifying Needs

(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Non-point Discharge

Specific identified problem or issue (describe in a short narrative statement):

Site-specific activities such as dredging and spoil disposal, industrial and sewage dumping, and oil spills are very visible and tend to receive the lion's share of attention as pollution causes. However, a non-site specific form of pollution, termed non-point discharge, has been recognized recently. Examples include urban run-off from streets, parking lots, storm drains, treatment plant overloads, etc.

Key information required for action or problem resolution:

1) Improved basic modeling of the DO-BOD-heat-nitrogen interactions in the upper estuary for the mass balance analysis required to determine the unrecorded BOD and ammonia sources.

2) More information is needed about occurrence and fate of pollutants other than BOD and nitrogen.

3) Data from dry and wet days.

Please comment on why this problem is important:

Non-point discharge is rapidly becoming recognized as one of the largest sources of organic waste in coastal and estuarine areas. As much as two thirds of the organic load can be derived from urban run-off and non-point discharge.

Is this a site specific local problem, a regional, national, or global one?

Regional, but it applies on a national level as well.

What, in your estimate, is the immediacy of the threat or need for information?

Immediate (one year)

Other comments:

Non-federal organizations in the Delaware Bay estuary include the Delaware River Basin Commission and in particular the Water Resources Research Insitute of Rutgers University.

WD 23

Worksheet for Outlining Problems and Identifying Needs

(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Ocean outfalls

Specific identified problem or issue (describe in a short narrative statement):

The effect of ocean outfalls on the beaches and coastal wetlands of the Northeastern U.S. is poorly known. A number of preoperational studies have been conducted, but no conceptual scheme or uniform mode of monitoring sites has emerged. Criteria should be developed to identify and study critical chemical and biological characteristics at representative outfall sites.

Key information required for action or problem resolution:

1) Characterization of diffuser types focusing on dilution rates in near field and far field areas;
2) Characterization of site physical oceanography -- proximity to tributaries, rivers and other outfalls, tidal conditions, metereology;
3) Regular assessment (qualitative and quantitative) of nutrient loads to anticipate and predict conditions conducive for red tides;
4) Enumeration of marine pathogens in addtion to standard coliform and fecal coliform counts, including viruses and protozoans;
5) Documentation of unusual occurences of invertebrates and vertebrates.

Please comment on why this problem is important:

Ocean outfalls have immediate health and economic aspects. Examples of disease from beaches befouled by poor or no sewage systems are known the world over. Concern about microorganisms at outfall sites should not be dismissed because of cynicism about the effectiveness of monitoring programs. In addition the suggestion of sour water or public perception of tainted water can have enormous economic effects on amenity values. Delaware's 25 km of coastline support a $200+ million industry.

What, in your estimate, is the immediacy of the threat or need for information?

This problem should come under immediate attention but probably more important is the generation of a long term rational program.

Other comments:

Within the State of Delaware I am unaware of any non-federal monitoring effort.

WD 24

Worksheet for Outlining Problems and Identifying Needs

(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Monitoring

Specific identified problem or issue (describe in a short narrative statement):

Monitoring programs, particularly biological monitoring programs, are usually carried out from design through analysis without a specific mechanism to implement the results in management decisions and programs.

Key information required for action or problem resolution:

Most biological monitoring programs are oriented to define the status of a species or a biological system within a broad general problem category. This analysis, which is usually based on selected parameters, should include specific goals which define or describe the intent to address a particular management program or programs.

Please comment on why this problem is important:

Without a management implementation goal, managers are faced with monitoring results describing ecological problems or ecological differences between areas seen as problems by scientists, citizens and managers, but which lack any discernible point of interface with available management tools or mechanisms. Attempts by managers to interpret the results of others usually meet with intense criticism.

Is this a site specific local problem, a regional, national, or global one?

Probably global, certainly national

What, in your estimate, is the immediacy of the threat or need for information?

One year

WD 25

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel name: Waste Disposal

Sub-topic: Standard bioassay procedures

Specific identified problems or issue (describe in a short narrative statement)

The ability to use offshore coastal waters for disposal of municipal, industrial and hazardous wastes and wastewaters is needed as a viable alternative to various land-based methods. To screen wastes for such disposal requires the availability of appropriate bioassay procedures. These "standard" tests should be designed to account for the dynamics of waste dilution as a function of time.

Key information required for action or problem resolution:

1) Laboratory bioassay facilities designed to simulate the time-concentration relationships observed or expected as a result of waste dispersion.

2) Acute and chronic bioassay "end-points" for realistic assesesment of the significance of bioassays.

3) Establishment of the relationship of laboratory bioassay information and significant effects on marine biota.

Please comment on why this problem is important:

Disposal of wastes in the ocean requires knowledge, assessment, or forecasting of the effects on the biota expected.

Is this a site specific, local problem, regional, national, or global?

National

What, in your estimate, is the immediacy of the threat or need for information?

Five years

WD 26

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Biological Effects Monitoring

Specific identified problem or issue (describe in a short narrative statement):

There is a general lack of longterm baseline data concerned with the concentrations of contaminants in biota, sediments and waters of the northwest Atlantic. More importantly, there is even less information on the effects of known levels of contaminants on various developmental stages of living marine resources. Consequently it is difficult or impossible to: 1) assess chronic effects due to longterm changes in contaminant loading and pollution abatement and 2) evaluate the effects of sudden or catastropic changes.

There should be in place a longterm program using operation techniques for assessing contaminant loading of the marine ecosystem, including organic and inorganic toxins, and gross materials, as well as a biological effects monitoring program to evaluate temporal and spatial aspects of contaminants loading on the crucial life history stages of selected biota. The program should be based on the concept of technology transfer from research and the provision of a national marine pollution monitoring program.

Key information required for action or problem resolution:

Key information would include: rates of growth, feeding, reproduction and production; behavioral responses; physiological and biochemical accomodations; tissue and cellular changes; genetic stability; population and community integrity; and disease incidence in organisms challenged by measured levels of contaminants, growth stimulants and gross pollution in the field.

Please comment on why this problem is important:

While it is relatively easy to measure contaminant levels in the ecosystem, it is difficult to relate these measurements to laboratory bioassays and to predict effects on living resources based on field measurements of toxic substances. It is necessary, for multiple use management of coastal ecosystems, to assess the effects of contaminants and gross pollution loading on the living resources in situ. It is imperative to thrust in situ techniques into the forefront of monitoring programs rather than relying on descriptive and static techniques which have not been effective in previous monitoring programs.

Is this a site specific local problem, a regional, national, or global one?
Global

What, in your estimate, is the immediacy of the threat or need for information?
One year (as soon as possible)

Identified non-federal research development and monitoring on this subtopic:
PRIMA program

WD 27

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name Waste Disposal

Sub-topic Recovery Phase of Dump (Acid or Sewage)

Specific identified problem or issue (describe in a short narrative statement):

The rate of biotic recovery at acid or sewage ocean dump sites is unknown. To date most studies have focused on the effects of dumping. Recovery rates have been studied in oil spill sites and dredge and disposal studies, providing valuable information on the stability and resiliency of communities to human impacts.

Key information required for action or problem resolution:

Tractable hypotheses should be posed emphasizing in situ methodology and focusing on processes rather than merely acquiring data. Monitoring should be cast in terms of physical oceanography. Without integrating physical oceanography such as local upwelling, frontal systems and shelf-slope water intrusions in monitoring studies, our research perspective and subsequent data base will be inadequate to resolve ecological problems. Ecological data might include growth, reproduction, behavior and pathology.

Please comment on why this problem is important:

This problem is important for health and economic reasons, i.e., when can fishing beds be safely opened after dumping ceases? How long before dominant (abundance, standing crop, frequency of occurrence) biota purge themselves from pollutants after cessation? Recovery studies might help assess the validity of monitoring activities and determine whether monitoring is worthwhile or relatively ineffective.

Is this a site specific local problem, a regional, national, or global one?

Site specific

What, in your estimate, is the immediacy of the threat or need for information?

Five years

Other comments:

The whole problem of recovery has received uniform treatment. Oil spills and dredge disposal sites have been monitored by many recovery studies, while other pollutants have received little attention.

WD 28

Worksheet for Outlining Problems and Identifying Needs
(use separate sheet for each problem)

Panel name: Waste Disposal

Sub-topic: Response of plankton to dispersing waters

Specific identified problems or issue (describe in a short narrative statement)

When certain wastewaters are disposed of at sea from moving barges, the organisms most immediately affected are the plankton population. However, even drastic die-off affects a very small portion of the total population in the disposal area. Information is needed on the speed with which such populations "repair" themselves by reproduction and dilution, i.e., bringing in new previously unexposed organisms. Assessments should also be made of the significance of varying degrees of "die-off" on the higher trophic levels in the disposal area.

Key information required for action or problem resolution:

1) Evaluate reproduction rates of plankton after being subject to "shock" effects of disposed wastewater.

2) Develop procedures for evaluating effects of different concentrations of plankton on the populations of higher trophic level organisms.

WD 29

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name Waste Disposal

Sub-topic Biological Effects

Specific identified problem or issue (describe in a short narrative statement):

-Reoccurring summer and fall kills of bottom forms of marine life because of reduced dissolved oxygen levels
-Long term toxic effects on higher order marine organisms
-Modification to established environment (eg light levels)
-Disease in marine life
-Disruption of food chains
-Behavior modification (e.g. migration)
-Particulate clogging of the gills

Key information required for action or problem resolution:

-Pull together existing data on sources and levels of artificially introduced nutrients (outfalls, dumping, rivers)
-Nutrient loading effects on plankton blooms and subsequent chain of events leading to stress conditions and kills
-Ocean dynamics (currents, wind visibility, pH?)

Please comment on why this problem is important:

-Loss of commercially valuable marine resources
-Possible health problems for humans
-Changes in the character of marine life forms
-Yearly cumulative (carry-on) effects on surf clams, ocean pout

Is this a site specific local problem, a regional, national, or global one?

New York Bight

What, in your estimate, is the immediacy of the threat or need for information?

Now

Other comments:

-Need a comprehensive model to display the dynamics of the problem:
-At least demonstrate how major effects (i.e., the 3000m^2 bottom kill of 1976) occur.
-Biological effects on marine life forms need predictive capability.
-Tradeoffs between sludge dumping, weather, distance of dump rate from land
-Determine critical levels of nutrients, other substances
-It appears that there are significant limitations now in available data and perhaps computer resource availability to construct a model as outlined above. But perhaps improving technology (eg. microprocessor controlled

pressure sensors, satellite techniques, larger computer capacitors, more biological data availability) will allow a statement to be made on: 1) Limitations of pertinent resources available to us now; 2) What we can do now with what is available; 3) What is potentially feasible to accomplish over the next few years.

-The ongoing stress and kill cycles observed over the last 13 years are clearly not a natural phenomenon. The cycles are caused by excessive pollution (nutrient & other chemical effects) with the relative severities controlled or aggravated by seasonal weather patterns. (Where else do these kills occur outside the NY Bight? The marine ecosystem certainly did not evolve in the present polluted, low light environment. The public deserves more responsible answers about the underlying causes of these episodes than "we cannot say for sure" or "it's due entirely to natural causes". The relatively meager results from past modeling efforts should not be interpreted as predicting failure but, rather, as opportunities for more resourceful future endeavors.

WD 30

Worksheet for Outlining Problems and Identifying Needs

(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Living resources processing waste disposal

Specific identified problem or issue (describe in a short narrative statement):

1) Concentrations of hydrocarbons including polynuclear aromatic hydrocarbons are almost unknown in sediment (and dumpsites) in the Bight.
2) No useful information is available to define the rate of input of toxic materials to the Bight in the net estuarine flow.
3) The quantitative data on sources of toxic materials is sketchy.
   a. Need data on sources of materials which are found in dredge spoils.
   b. Need studies of pathways from sources to the sediments, biota, and net estuarine outflow.
   c. Need data showing past and future trends in source terms.

Key information required for action or problem resolution:

1) Data concentrations of PNAH's in Bight sediments.
2) A careful study must be designed to determine mass flows over the entire year for selected toxic materials (see recommendations of the 1979 Panel).
3) a. Data must be developed regarding concentrations and mass or volume inputs of sources including the Hudson, Passaic, Hackensack and Raritan Rivers.
   b. Transport pathways must be defined.
   c. Literature or other sources must be accumulated to develop this information.

Please comment on why this problem is important:

Prevention of further degradation or the eventual restoration of the quality of both the estuary and the Bight depend on accurate decisions on controls of toxic materials. Continuing regulatory efforts cannot be accurate with the information cited. Risks remain poorly defined and may be increasing for both the biota and the public because of the inadequate data presently available.

Is this a site specific local problem, a regional, national, or global one?

The New York Bight is representative of similar problems all over the world.

What, in your estimate, is the immediacy of the threat or need for information?

Threat: 5-10 years; Information - 1 to 5 years

WD 31

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel name: Waste Disposal

Subtopic: Ocean transport of pollutants

Specific identified problems or issue (describe in a short narrative statement)

At the Crystal Mountain Conference (August, 1979),* estimates were made of the assimilative capacity of the 106-mile wastewater disposal site. This work needs to be pursued by a combination of experimental studies in the area and mathematical modeling of the Middle Atlantic Bight. This will serve as a pilot study for developing methodology to evaluate the assimilative capacity of other areas.

Key information required for action or problem resolution:

1) Develop procedures for tracing "tagged" parcels of ocean water over periods of several days (weeks, if possible).
2) Conduct tracer studies under different oceanic regimes (seasonal, etc.) for durations of at least a month.
3) Develop verified mathematical models for predicting the transport and residence times of materials disposed of in selected portions of the offshore coastal waters.

Please comment on why this problem is important

Ocean disposal of waste products should be considered as an alternative to land-based methods of disposal. For certain materials it may prove to be the least harmful, environmentally, alternative.

Is this a site specific, local problem, a regional, national or global one?

What, in your estimate, is the immediacy of the threat or need for information?

Five years

Other comments:

* Csanady, G.; Flierl, G.; Karl, D.; Kester, D.; O'Connor, T.; Ortner, P.; Philpot, W., "Deepwater Dumpsite 106," in Proceedings of a Workshop on Assimilative Capacity of U.S. Coastal Waters for Pollutants, ed. E. D. Goldberg, NOAA Environmental Research Laboratories, Boulder, CO (Dec. 1979) pp 123-147.

WD 32

Worksheet for Outlining Problems and Identifying Needs

(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Wetland Assessment Methodology

Specific identified problem or issue (describe in a short narrative statement):

Wetlands are known to be the irreplaceable base of the biological productivity in aquatic systems of the North and Mid-Atlantic region. They are extensive in area, widespread in the region, and extremely difficult to monitor or even inspect on a regular and frequent basis.

Techniques are needed which define the effects of various impacts, indicate assimilative capacities, and rapidly show wetland degradation or any non permitted uses such as filling.

Key information required for action or problem resolution:

The extensive program of satellite photography and other imaging techniques carried out in the 1960s and 1970s provide an historic record of the wetland areas. These records potentially show the extent and quality of changes in these areas. A program must be initiated to utilize this information and to optimize the collection of these data in the future.

1) Existing satelite imaging must be examined to
   a) define the geographic record of wetlands in the images
   b) examine the image changes vs seasonal and long term periods
   c) seek evidence of impacts of any type
   d) seek evidence of assimilative limits
   e) evaluate the existing frequencies or photographic images available and develop optimum evaluation methods or suggest potential improvements in satellite technology.

2) Where useful observations are made in the first evaluations, effective programs must be designed to best utilize the records available.

3) The program should include examination of the current data on a regular ongoing basis.

4) Useful suggestions for improvements in imaging should be investigated and developed as appropriate.

5) As rapidly as possible these techniques should be converted to a standardized methodology for use by state and federal regulatory agencies.

Please comment on why this problem is important:

A large fraction of the original wetland areas have been destroyed around our major seacoast cities. While existing regulations restrict further encroachments it is almost impossible to enforce these other than through voluntary cooperation. An effective surveillance system on a broad scale would offer the best hope for an affordable enforcement method.

Is this a site specific local problem, a regional, national, or global one?

Global

What, in your estimate, is the immediacy of the threat or need for information?

Needs are ongoing until solved. One to five years.

WD 33

Worksheet for Outlining Problems and Identifying Needs
(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Fine-Grained Particle Dispersal Systems

Specific identified problem or issue (describe in a short narrative statement):

The fine-grained particle dispersal system of each major estuary in the region of the New York Bight should be characterized.

Key information required for action or problem resolution:

-What are the sources of fine particles, the routes and rates of dispersal, and the sites and rates of accumulation in each major estuary in the region and in the New York Bight?
-What are the characteristics of the particles, including associated contaminants, and how do these change in different parts of the system? How do physical (e.g. mixing) and chemical (e.g. salinity) characteristics affect the state of agglomeration of particles, their hydraulic behavior, and their sites of deposition? How do biological processes of filter feeding organisms affect agglomeration and deposition?

Please comment on why this problem is important:

Most of the more insidious contaminants, e.g. metals, chlorinated hydrocarbons and radionuclides, are relatively insoluable in water and are rapidly scavenged near their points of introduction by fine particles. From that time, their transportation and accumulation are controlled by the fine particle sediment system.

Is this a site specific local problem, a regional, national, or global one?

Global

What, in your estimate, is the immediacy of the threat or need for information?

Five years

WD 34

Worksheet for Outlining Problems and Identifying Needs

(Use separate sheet for each problem)

Panel Name: Waste Disposal

Sub-topic: Estuarine Sedimentary Systems

Specific identified problem or issue (describe in a short narrative statement):

Identify the parameters by which a fine-grained estuarine sedimentary system can be classified and compared to other systems. This requires a holistic approach to the study of sedimentary processes. We can find out a great deal about specific sedimentary processes with flume studies or field experiments, but gain little insight into the long-term manifestations of estuarine sedimentation or learn to identify the processes that control sedimentation in an estuary. This kind of information is what is ultimately needed to address dredging and disposal problems.

Key information required for action or problem resolution:

Estuarine systems must be studied to describe the sources, pathways and sinks of fine-grained sediment and to characterize the rates at which particles are exchanged among these three pools. Several different systems may be compared based on the rate of sediment supply, amounts of sediment stored in the water or in deposits, rate of transport, partitioning of material between the ocean and permanent estuarine deposits.

Please comment on why this problem is important:

Many of our problems with the disposal of fine-grained dredged sediment arise because we can't predict its fate in the marine environment. Many of the most troublesome contaminants are associated with fine-grained sediment. This fraction can also degrade water quality in other ways such as by lowering the dissolved oxygen levels or increasing turbidity.

Is this a site specific local problem, a regional, national, or global one?

Regional and global

What, in your estimate, is the immediacy of the threat or need for information?

Ten years

Other comments:

Few holistic studies of sedimentary systems have been done, and then usually in response to some crisis. Much more effort has been devoted to the study of specific sedimentary processes rather than classifying and comparing natural systems.

WD 35

Worksheet for Outlining Problems and Identifying Needs

(Use separate sheet for each problem)

Panel Name: Waste Disposal

Subtopic:

Specific identified problems or issue (describe in a short narrative statement)

In regard to monitoring techniques in assessing pollutant disposal in New Hampshire marine environment the following suggestions need be addressed:

1) the State of NH needs to work with industry and UNH in collecting data and completing an inventory of biological resources in the Great Bay estuary and the Piscataqua River.

2) technology exists to develop sophisticated electronic monitoring techniques to qualitate and quantitate the pollutants as well as to standardize instrumentation.

Key information required for action or problem resolution:

3) Alternative disposal methods should be discussed prior to dumping into the final solution--the environment.

4) Existing federal regulations should be reviewed to see the economic limitations placed on industries regarding waste disposal. Perhaps we need to recommend less regulation and a more logical approach to the endless inaccurate monitoring techniques currently used.

4.3 Discussion of Report Preparation

The basis of this Conference Report are the problem/issue statements developed by the five Conference Panels and the summary reports prepared by the Panel Chairmen presented above. The synthesis of these data presented in Section 3 and the balance of the Report, are the result of a comprehensive, two-month, analysis, writing and review process.

The first draft of the Conference Report prepared by the Conference Chairman, Conference Coordinator, and Conference Editor was forwarded to twenty-eight individual reviewers consisting of the Panel Chairmen, the Panel Rapporteurs, the Conference Steering Committee members attending the Conference (plus one member unable to attend who requested a review copy) and all attendees who requested in writing, before July 11, 1980, to review the report. Specific comments or recommended changes were received from the following fifteen persons:

Dr. Weldon Bosworth, Executive Vice President, Normandeau Associates
Ms. Trudy Coxe, Executive Director, Save the Bay
Ms. Bronwyn Davies, Rapporteur
Ms. Charlene Dunn, Rapporteur
Dr. John Farrington, Associate Scientist, Woods Hole Oceanographic Institute
Mr. Robert Green, Deputy Port Administrator, Maryland Port Administration
Mr. John Harmon, Bureau of Mineral Resources (New York)
RADM R. W. King, USN (ret), Executive Officer, National Academy of Engineering
Dr. Lee Koppelman, Director, Long Island Regional Planning Board
Mr. Edward Langlois, State of Maine Bureau of Waterways
Dr. Don Maurer, University of Delaware
Dr. Frank Monastero, Vice President, Environmental and Ocean Services, Raytheon Corporation
Dr. Bruce Neilson, Virginia Insitute of Marine Sciences
Dr. Curt Rose, Director, Aquatic Science Division, Energy Resources, Inc.
Dr. Jerry Schubel, Director, Stonybrook Marine Sciences Center
Ms. Anna Warrock, Rapporteur

All reviewer comments and recommendations received were divided into two categories by the Conference Chairman, Coordinator and Editor; viz., (1) editing and typographical corrections and (2) substantive changes. All items in category one were incorporated as appropriate. The substantive changes were then made the subject of a one-day meeting of the Conference Chairman, Coordinator and Editor with the Panel Chairmen. Each substantive change was discussed, accepted and incorporated when not inconsistent with the panel findings and consensus of reviews. Acknowledgements and replies have been sent to the reviewers apprising them of the actions taken on their comments.

APPENDICES

Preliminary copies of the final report, as submitted to NMPPO, have been distributed to all Conference Attendees (Appendix A) and to all members of the Conference Steering Committee (Appendix B). Recipients of these preliminary copies have been invited by a covering letter to present their comments or dissenting opinions directly to:

Dail Brown, Director
NMPPO, NOAA
US Department of Commerce
6010 Executive Blvd.
Rockville, MD 20852

All such comments and opinions received in NMPPO by October 10, 1980 will be considered for inclusion in Appendix D of the final report when published by NMPPO.

APPENDIX A

Conference Attendees
(Note: ** Indicates Panel on which served)

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APPENDIX C: KEYNOTE ADDRESS

TOWARD A FIVE YEAR PLAN TO UNDERSTAND MARINE POLLUTION

Frank Gregg
Director, Bureau of Land Management
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I am pleased to represent the Department of the Interior at this North and Mid-Atlantic regional conference on needs and problems for research in marine pollution. As a member of COPRDM - the Interagency Committee on Marine Pollution Research, Development, and Monitoring - I am looking forward to reviewing the results of your work and will, therefore, be particularly interested in the insights developed at this conference.

First, let me outline the committee charter and our past accomplishments. In May 1978, the National Ocean Pollution Research, Development and Monitoring Planning Act became law. On May 30th of this year, the Congress enacted legislation, which among other things changed the title to the National Ocean Pollution Planning Act. The law calls for establishment of a five-year plan to coordinate and disseminate information on ocean pollution research, development and monitoring, and for development of information relevant to use and conservation of ocean and coastal resources. Responsibility for preparing the plan was assigned to the National Oceanic and Atmospheric Administration.

The first Federal Ocean Pollution plan was the result of initial work carried out through the Committee's twelve member agencies. The Congress received this report last December. I hope you have all had an opportunity to review the report and the associated working papers.

The organizational effort that must precede any planning is indeed prodigious and we consider the first plan a success simply because it was able to identify the many projects being done in government in the ocean pollution field. Approximately one thousand projects totaling $165 million were supported by seven Departments and four Agencies in FY 1978. The analysis showed that the Department of the Interior is firmly committed to an effective national program in the understanding of marine pollution. In fact, the first plan demonstrated the depth of our commitment by showing the Department to be the single largest funding agency; we accounted for 34% of the FY 1978 program. Across all agencies, approximately one third of the Federal effort is directed at problems related to petroleum as an ocean pollutant. Within that sector, the largest single effort is the OCS Environmental Studies Program conducted by the Bureau of Land Management. Thus, COPRDM's interest in an effective program is also ours by virtue of our large financial commitment.

After preparing Federal Plan No. 1, the Interagency Committee realized that there were inherent limitations on the capability of a planning process, such as that mandated by the Act, to accommodate the wide range of legislatively mandated missions of Federal agencies in meeting national ocean pollution research, development and monitoring objectives. Because some missions are diverse and not always compatible, it is not possible to develop

in specific detail one single rigid program which would direct all ocean pollution-related research, development and monitoring activities. I think the most productive results can be obtained by setting goals and objectives which are or should be important to all ocean pollution programs regardless of agency, by identifying similar activities or support systems which could be coordinated, by resolving problems which are common to many projects, and by assuring that critical knowledge gaps are addressed.

The first 5-year Federal Plan was, therefore, intended to give overall policy guidance to efforts to plan and coordinated the Federal activities related to ocean pollution research, development and monitoring. Of course, individual agencies need flexibility and autonomy to respond to their own specific missions; thus, it is the intent of the Federal Plan to encourage agencies to meet their own needs, to the maximum extent possible, within the context of an overall Federal direction, and also to develop mechanisms for linking together the many efforts which address the problem of ocean pollution.

Because of the difficulties encountered in preparation of the first version, the Committee, with the help of the National Marine Pollution Program Office, has enlarged the scope of work to meet and, we hope, ultimately surmount the earlier obstacles. You are here today to assist in this effort which will lead to the second Federal Plan. To give you an idea of the complexity of our overall undertaking, let me identify just a few of the other activities. First, an update of the federal inventory of projects will be prepared. Second, each agency has prepared a prospectus of its own plans which appears in summary form in your meeting materials. Each prospectus is particularly important because it identifies the obligations that each agency must meet individually. Third, there are special activities such as a quality assurance working group, a measurement technology working group and a pollution policy workshop that will potentially provide additional material.

Fourth is the National Petroleum Study that will examine both research and technology as it relates to petroleum-derived marine pollution. I am particularly pleased that the BLM OCS Scientific Committee that advises us in structuring the BLM OCS environmental studies program has consented as individuals to assist COPRDM in reviewing programs of other agencies' activities in resarch and studies. A separate review is being conducted to assess technological opportunities associated with control of petroleum-derived marine pollution.

The review of petroleum research and studies will be conducted through meetings in Boston, Seattle, and Boulder. The overall objectives of those specific conference are:

1. to learn about the content of federally-funded pollution programs in the past and present and to examine their future plans,
2. to define the most promising areas for research on fates and effects of petroleum and petroleum associated pollutants in the marine environments, and
3. to consider what federal programs are or should be emphasizing in their efforts to meet these challenges.

A fifth and obviously timely topic to the people assembled here today is the regional conferences. The law (Section 4(b)(1)) specifies the content of

the plan and further charges our Interagency Committee with overseeing an assessment and ordering of national needs and problems. In the first plan, the issues were identified by a conference held in December 1978 and a subsequent paper that has been included as Working Paper Two in the first plan.

This year, to provide a more complete description of needs and problems with special attention to particular regional issues, we have planned five conferences around the country. This is one of them. Our purpose in each is to identify significant present and potential marine pollution problems in the region, and to develop a regional policy statement regarding areas where research, development and monitoring can provide information needed for effective policy, regulation, and resources management decisions relative to marine pollution. This regional input will be given careful consideration by the Interagency Committee as it develops this next Federal Plan.

From my perspective an important part of this process is the Bureau of Land Management's role in ocean pollution research. As I noted earlier, the Department of the Interior is the single largest ocean pollution research funding agency in the Federal government. The BLM's Environmental Studies Program comprises the largest portion of the Department's program. The Environmental Studies Program was initiated in 1973 by the Secretary of the Interior through a commitment to perform investigations of certain environmental features of the Gulf of Mexico. From its original focus in the Gulf and a budget of $500,000, the program has expanded to include the entire outer continental shelf of the United States. Our studies budget during the past few years has averaged $35 million annually. The program was formalized in Section 20 of the Outer Continental Lands Act Amendments of 1978 (P.L. 95-372) which required the Secretary to conduct a study of any area or region included in any oil and gas lease sale in order to establish information needed for environmental assessment.

Since its inception, the Environmental Studies Program has invested approximately $35,000,000 in studies of the North and Mid-Atlantic OCS areas. Study topic supported by the Bureau have included geological hazards, physical oceanography, cultural resources, endangered species, effects oil and gas activities on the fishing industry, and studies related to pipeline routing. These studies have supported decisions for past sales and will provide a basis for future pre- and post-lease decisions.

The Environmental Studies Program is currently included under the direction of the Bureau's Assistant Director, Energy and Mineral Resources. The program consists of an environmental studies group in each of the Bureau's Outer Continental Shelf offices (New York, New Orleans, Los Angeles, and Anchorage) and the Branch of Offshore Studies in Washington, DC. The New York OCS office is responsible for BLM activities in the North and Mid-Atlantic.

During its early years, the Environmental Studies Program included multi-million dollar "benchmark" studies. Studies of this type were initiated in both the North and Middle Atlantic. In 1978, the Bureau determined that benchmark studies were not providing information on a schedule which could support local, state and Federal decisionmakers involved with OCS activities. The studies program was redesigned with the assistance of the National Academy of Sciences and several advisory groups. The new design directly links the

studies performed as part of the program to the Secretary's 5-year leasing schedule and the decisions it incorporates. This design is included in a program guidance document known as the "Blue Book" and entitled "Study Design for Resource Management Decisions: OCS Oil and Gas Development and the Environment."

Each year the BLM assesses its study needs through a detailed process. First, Regional Study Plans are submitted by the four OCS regional offices. These plans are developed with the assistance of the public, as I'll mention later. The New York OCS Office is currently preparing its draft plan for FY 1982 for submission to Washington by July 1, 1980. Then a preliminary National Study Plan is compiled from the four Regional Plans. This Plan includes all studies proposed for funding. The studies are ranked using a set of five criteria. These criteria are used by the OCS offices to rank their respective regional studies and by the Branch of Offshore Studies to combine the studies of all offices into a single list. The National Study Plan is reviewed and approved by all four OCS managers, and then submitted to the Assistant Director for formal approval. Upon his approval, each OCS office is formally notified of its list of approved studies and its studies allocation. Each OCS office then provides Washington with a schedule for the procurement of the approved studies. The OCS offices are required to procure the studies on the approved studies list unless a proposed change is approved by the Assistant Director.

The development of the National Study Plan is a public process. The principal opportunity for public involvement is available through the Regional Technical Working Groups of the Bureau's Intergovernmental Planning Program. Several people here today are members or are involved in the work of the North and mid-Atlantic Technical Working Groups. The Regional Technical Working Groups are involved in the development of regional study programs. These groups are involved in the determination of issues which require study and their importance to regional decisionmakers. They may become involved in ranking the candidate studies using the Bureau's criteria. The Working Groups may also be involved in the design of approved studies. This involvement may include suggesting study techniques, defining critical products and the schedule of their delivery, establishing the study's scope, and suggesting an appropriate level of funding for the study.

Other groups, such as the Biological Task Force for Georges Bank, may also become involved in the Environmental Studies Program. These groups may present studies for inclusion in the Regional Study Plan. The Regional Technical Working Group is called upon in such instances to advise the OCS manager of the appropriateness of the proposed study. Georges Bank is not the only area with a Biological Task Force. A similar body was formed to monitor activities resulting from the recent Beaufort Sea sale. We anticipate a close relationship developing between these and future task forces and the technical working groups.

The Environmental Studies Program is also reviewed by the Scientific Committee of the OCS Advisory Board. This committee has the responsibility to review the appropriateness, feasibility and scientific merit of the program's component studies. The committee may comment on any study in the program including those nominated by the Regional Technical Working Groups. The

Scientific Committee may recommend a change in any study's scope, techniques, or cost. Last week that committee reviewed the North and Middle Atlantic studies program and the role of the Georges Bank Biological Task Force during a formal meeting in Woods Hole, Massachusetts.

The Environmental Studies Program contains checks and balances designed to support both regional and national needs. Although the system is still in an evolutionary phase, we are encouraged with the results to date.

As you can surmise from my remarks, BLM is more than casually interested in the proceedings of this meeting.

We support a broad ocean sciences program. Even though we are a resource management agency, the scope of our commitment to the studies program and to this interagency ocean pollution effort indicates our need for ocean sciences research results. Consequently, we are especially interested in your advice on the effective utilization of funds and types of studies and will apply this information consistent with our mission as identified in the prospectus summary that each of you received.

With my overview of the entire process as background, consider your mission here at this conference. A number of panels have been established to reflect different resource uses. They include Marine Energy, Waste Disposal, Coastal Land Use & Recreation, Mineral Resources and Marine Transportation.

Each panel is asked to accomplish four objectives:

1. Develop a series of statements identifying significant marine pollution problems in the region.
2. Define a set of information needs for each problem area which can be met through ocean pollution research, development and monitoring.
3. Recommend the priority in which the sets of information needs should be met.
4. Provide a justification (rationale) for the priority order assigned to the sets of information needs.

We on the Interagency Committee are vitally interested in the results of these conferences and we wish you success in your deliberations.

APPENDIX D: DISSENTING OPINIONS