

OCEAN POLLUTION

HEARINGS

BEFORE THE

SUBCOMMITTEE ON OCEANOGRAPHY

OF THE

COMMITTEE ON

MERCHANT MARINE AND FISHERIES

HOUSE OF REPRESENTATIVES

NINETY-EIGHTH CONGRESS

FIRST SESSION

ON

SEWAGE DISPOSAL IN NEW YORK BIGHT

(Joint Hearing With Subcommittee on Fisheries and Wildlife
Conservation and the Environment)

MAY 25, 1983

ENVIRONMENTAL OVERSIGHT OF GEORGES BANK
EXPLORATION

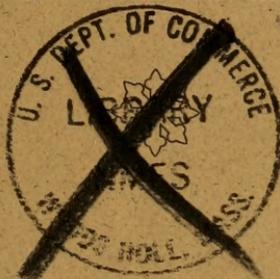
JUNE 27, 1983—BOSTON, MASS.

RADIOACTIVE WASTE DISPOSAL OVERSIGHT

NOVEMBER 2, 1983

Serial No. 98-26

Printed for the use of the Committee on Merchant Marine and Fisheries



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SEWAGE DISPOSAL IN NEW YORK BIGHT

WEDNESDAY, MAY 25, 1983

HOUSE OF REPRESENTATIVES, SUBCOMMITTEE ON OCEANOGRAPHY, AND SUBCOMMITTEE ON FISHERIES AND WILDLIFE CONSERVATION AND THE ENVIRONMENT, COMMITTEE ON MERCHANT MARINE AND FISHERIES,

Washington, D.C.

The subcommittees met, pursuant to call, at 9:45 a.m., in room 1334, Longworth House Office Building, Hon. Norman E. D'Amours (chairman of the Subcommittee on Oceanography) presiding.

Present: Representatives D'Amours, Boxer, Hughes, Hutto, Dyson, Carper, Ortiz, Biaggi, and Forsythe.

Staff present: Howard Gaines, Darrell Brown, Mary Pat Barrett, Tom Kitsos, Will Stelle, Susan Wade, Debbie Storey, Barbara Wyman, and George Pence.

Mr. D'AMOURS. The Joint Subcommittee on Oceanography and Fisheries will come to order.

I want to begin by apologizing to those people who were here on time at 9:30 for my tardiness. If you were on time at 9:30, I would have to say that the staff did a better job of advising you of the starting time than they did of advising me.

Today's joint hearing of the subcommittees is concerned with the question of ocean dumping of municipal sewage sludge in the New York Bight. This hearing has three main purposes, first, to examine current dumping volume, and practices in the bight; second, to evaluate the environmental condition of the bight; and third, to look at waste management alternatives for the bight.

This subject isn't new to the Congress nor certainly to this subcommittee. We have had an active interest in the environmental condition of the bight for some time. In fact, since I became chairman in 1981, we have held 10 hearings on ocean dumping, 9 of these related in some way to dumping in the bight.

This is a very complex, somewhat technical, and often frustrating issue. One thing is clear, the bight is unacceptably degraded, unreasonably polluted, and we cannot abide continuing the practices that have led to such a deplorable condition.

Hopefully, the witnesses before us today will assist these subcommittees to reach some consensus as to our most appropriate course of future action. I welcome the witnesses.

We look forward to receiving your testimony.

Mr. Forsythe, the ranking minority member of this full committee, has been unavoidably detained and the minority staff has agreed that we could start the hearings without Mr. Forsythe's

presence, but I am going to now ask and recognize other members who may have hopefully brief opening statements.

Mr. HUGHES. Mr. Chairman, if I may.

Mr. D'AMOURS. Mr. Hughes.

Mr. HUGHES. Mr. Chairman, I have a formal statement which I will not read. I will just, if I may, with the subcommittee's permission, put it in the record.

Mr. D'AMOURS. That will be appreciated. Without objection, so ordered.

[The statement of Mr. Hughes follows:]

STATEMENT OF HON. WILLIAM J. HUGHES, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY

Mr. Chairman: I am pleased that you have scheduled today's hearings to address the complex issues associated with the continued ocean dumping of sewage sludge in the New York Bight.

As you know, in 1977, this committee reported out legislation calling for a complete cessation by December 31, 1981, of ocean dumping that unreasonably degraded the marine environment. Despite the enactment of that legislation by nearly unanimous votes in the House and the Senate, ocean dumping in the New York Bight apex continues off our coasts. Each year we delay in resolving this issue, more than 7.5 million tons of sewage sludge is barged to an area 12 miles off the coast of northern New Jersey and dumped overboard.

There is no doubt that New York Bight is one of the most severely degraded coastal areas in this country and clearly deserves the special attention of Congress. NOAA scientists have testified before this committee that sludge dumping in the bight apex has altered benthic communities in an area 240 square kilometers around the apex site. In addition, EPA scientists have gone on record saying that sludge dumping in the bight apex has resulted in "significant" degradation to the area.

Recent studies by the New Jersey Department of Environmental Protection point to the fact that unacceptably high levels of PCBs are beginning to show up in several species of fish taken from coastal waters, including striped bass, white perch, and bluefish. NOAA indicates that fin rot, gill erosion, skin tumors, parasite infestations, microbial infections, chemical contamination, and developmental abnormalities are rampant in fish and shellfish inhabiting this area.

Clearly, the bight apex has reached its capacity to assimilate the tremendous amount of pollutants coming into the area, not only from ocean dumping but from other sources as well. Ocean dumping is just one part of a very large problem which also involves pollutant inputs resulting from runoff, industrial discharges, and the release of untreated sewage into the Hudson-Raritan estuary. In order to assure the overall improvement of water quality off the New York and New Jersey coasts, we will have to address these other sources as well.

The time has come for this committee to make a commitment to address the address the very severe problems in the mid-Atlantic region. Terminating sewage sludge dumping at the 12-mile site is absolutely essential if we wish to see an overall improvement in the water quality of the New York Bight apex. In addition, we must begin to lay the foundation for regional planning in order to meet the area's waste disposal needs and to insure an overall improvement in water quality off our coasts.

Among other things, the committee will today explore several proposals aimed at ending ocean dumping off the New Jersey shore and developing a comprehensive plan to achieve water quality improvements in the New York-New Jersey coastal area. In order to develop acceptable longterm alternatives to ocean dumping, it may also be necessary to implement "ocean disposal" fees which would help the municipalities in developing new technologies and facilities to help solve their waste disposal problems.

Local, State and Federal coordination coupled with regional planning is essential to solving these complex problems. I believe that if we can get beyond the question of whether ocean dumping should be allowed to continue indefinitely at the 12-mile site, we can begin to solve these more complex problems.

Congressman Forsythe and I have made a commitment to work with the State of New Jersey and others in working toward a resolution of this controversial matter. I hope you and other concerned members of the Subcommittees on Oceanography

and Fisheries and Wildlife Conservation and the Environment will join with us in developing a proposal that will bring about an improvement in the water quality of this severely degraded area, and bring about a phaseout of harmful ocean dumping. Thank you.

Mr. HUGHES. I know I speak for my colleague from New Jersey, Mr. Forsythe, I thank the subcommittee for promptly scheduling this hearing. Ocean dumping has been one of our major concerns, at least in the 9 years that I have been in the Congress. It is an issue that creates probably as much frustration for my district as any issue.

The bight has become a literal cesspool. Recent studies by the DEP indicate that we are seeing serious traces of PCB's in certain types of fish.

We have a major commercial fishery that is at risk because of what is occurring in the bight. We have a major tourist industry that will be directly impacted if we continue to pollute this area at the rate of 7.2 million tons a year.

I look forward to hearing the testimony today on a number of proposals that are floated to deal with this in a comprehensive fashion.

Mr. Chairman, I again thank you and look forward to working with you and my colleagues from the adjoining States who share my concerns over the impact of ocean dumping on our area. Thank you.

Mr. D'AMOURS. I thank the gentleman for his comments and for his brevity. We will now recognize the gentleman from Maryland, Mr. Dyson.

Mr. DYSON. Mr. Chairman, I, too, would join with my colleague from New Jersey and thank you for holding this hearing today. I think there is no issue more controversial for our tourist industry and we are just down the coast, a little south of the gentleman from New Jersey.

If the New York Bight is closed and I join my colleague from New Jersey on many occasions in attempting to do that, there is no other alternative, probably, but to go to a site off the coast of Delaware which would jeopardize, in my opinion, the nearly \$1 billion a year business that we have at Ocean City, Md.

I don't want to see that. That is why about 2 weeks ago, in a markup of the full Committee of Merchant Marine, I supported an amendment by my colleague from Delaware, Mr. Carper, who will probably explain that rather thoroughly before that hearing is over today.

I welcome the EPA here, these individuals are not totally unfamiliar to me. I saw them a couple weeks ago in Ocean City when we were debating the question of incinerator ships. Thank you for holding these hearings, I think they are well and meaningful. Thank you.

Mr. D'AMOURS. Mr. Carper.

Mr. CARPER. Thank you, Mr. Chairman.

Although I have been a member of this committee for a short time, I think the tenor of the hearing is quite different from the past several years. We will receive testimony focusing not on whether or not sewage sludge should be dumped in the ocean, but on where and how this dumping should occur.

We are continuing ocean dumping even though great strides have been made in feasible and economically attractive land-based alternatives. Furthermore, there seems to be an overwhelming drive to move this dumping further to sea, out of financial reach of our monitoring and environmental protection agencies and beyond the Coast Guard's meager surveillance capabilities.

We have a tendency to rely on blind faith with respect to environmental protection and then to have to pick up the pieces when we have made a shambles of things. Unfortunately, once we have made the mistakes in the deep ocean, we will not be able to pick up the pieces.

In spite of these risks, responsible people will urge us to move forward with site designations, knowing that Federal oversight will be a token effort. These points should cause us to pause and reflect on the ocean dumping policy.

The fundamental question should not be whether we can ocean-dump more safely at one place than another, but whether we should be ocean-dumping at all.

Thank you.

Mr. D'AMOURS. I thank the gentleman.

I would like to assure the gentleman from Delaware, Mr. Carper, that everything is open for question at this hearing. We have not precluded ourselves from taking some action that might result in total abolition of sewage sludge dumping in our oceans, contrary to what the gentleman has implied.

That question is open, wide open. The failure to appeal the decision by EPA has made those options more difficult to pursue than they should have been, but that is fair game in these hearings.

The gentlelady from California.

Mrs. BOXER. Very briefly, Mr. Chairman, I am pleased you have scheduled these hearings. Ocean dumping is a serious issue. On the west coast, the Navy wants to dump used reactors from submarines into our oceans. It is very controversial.

We have put a ban on that. I think what will come out of this hearing will help us on both coasts. I am very pleased you are having these hearings today.

Mr. D'AMOURS. Thank you.

Mr. Ortiz.

Mr. ORTIZ. I don't have any opening statement, thank you, Mr. Chairman.

Mr. D'AMOURS. We will now recognize the ranking full committee minority member for his opening statement, which I was just about to ask unanimous consent that it be admitted to the record. The gentleman is recognized.

Mr. FORSYTHE. Thank you, Mr. Chairman. I ask unanimous consent that my full statement be entered in the record.

Mr. D'AMOURS. Without objection, so ordered.

[The statement of Mr. Forsythe follows:]

STATEMENT OF HON. EDWIN B. FORSYTHE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY

Thank you, Mr. Chairman. I must commend you, Mr. Chairman, for scheduling this separate hearing to fully consider the ocean disposal of municipal sewage sludge in the New York Bight. The disposal of sewage sludge by dumping in the

ocean is probably the single most controversial issue in the implementation of the Marine Protection, Research and Sanctuaries Act.

The scheduling of this hearing is particularly timely in view of EPA's ongoing deliberations concerning site designation issues.

My distinguished colleague, Mr. Hughes, and I have circulated a proposal drafted by our staffs in response to what we perceive to be a serious degradation of the New York Bight Apex—which results, at least in part, from the ocean dumping of some seven and one-half (7½) million wet tons of municipal sewage sludge per year. This proposal is intended to foster discussion of a number of steps which we believe are reasonable measures to begin the cleanup of the New York Bight Apex.

Part I of the concept paper would end the ocean disposal of sewage sludge at the 12-mile site on December 31, 1986, or such sooner date as the Administrator determines reasonable. In the interim period no additional sludge, over the levels dumped in 1982, would be allowed. Also in the interim period, dumpers using the site would be assessed an escalating fee based roughly on the cost differential between disposal at the 12- and 106-mile sites. The revenues from this special dumping fee would be used for activities of EPA and the municipalities, sewage authorities, and states which are directed towards the management of the 12-mile site and the development of long-term disposal options.

The measures described concerning ocean disposal are based on the presumption that—based on the information that we will receive today and such other input as we may receive—the Congress will be willing to state that the degradation which has occurred at the 12-mile site is “unreasonable” in the context of the Ocean Dumping Act.

The concept paper also contains a requirement for the development of a comprehensive multi-media assessment. EPA would be required to analyze the various land-based alternatives, as well as continued ocean disposal, and assess the environmental impacts and potential human health risks resulting from each such disposal option.

It is clear from the testimony which this Committee has received over the years, concerning the degradation of the New York Bight, that no single source of pollution can account for the decreased environmental quality. The concept paper would require the development of a “New York Bight restoration plan” which would identify: The water quality problems in the New York Bight; the contaminants constraining uses; the individual inputs of such contaminants; the fate and effect of pollutants from those inputs; and the available technologies and costs for treatment, along with the impediments to cleanup of those inputs. The end result of this study would be implementation schedules for those sources, which will result in the restoration of all uses—to the maximum extent possible. It is time that we look to the total problem in the New York Bight instead of taking a piece-meal approach.

The final portion of the concept paper includes a number of general provisions which would apply to ocean dumping no matter where it occurred. First, pre-treatment programs, in accordance with the Clean Water Act, would be required as a prerequisite for ocean dumping of sewage sludge after December 31, 1986. Second, EPA would be required to develop a sludge quality standard applicable to sewage material to be disposed of in the marine environment. Third, EPA would be authorized to prescribe and collect fees to recover the costs actually incurred for activities that are directly associated with a permit or the dumping authorized by a permit. And finally EPA would be requested to recommend to the Congress special disposal fees to be applied to all materials disposed of in the ocean, or in the coastal waters of the United States, to be used for implementing recommendations resulting from regional “multi-media assessments” and other water quality improvement purposes deemed appropriate by the Administrator.

This concept paper has been circulated to the witnesses who will be testifying today and is contained in the Members' folders. I hope that the intended purpose of fostering discussion is fruitful. Thank you, Mr. Chairman.

Mr. FORSYTHE. I would just comment that we certainly welcome these hearings. We hope that the results of today's hearings and those of following days will produce a record permitting an ultimate solution to problems in the New York Bight with which we have been struggling with so many years.

Thank you, Mr. Chairman, for holding these hearings, and let's proceed.

Mr. D'AMOURS. I very much appreciate the ranking minority member's brevity.

Now, we will proceed with the witnesses.

Our first witnesses will consist of a panel of witnesses from NOAA and from the Environmental Protection Agency. We have Mr. Charles Ehler, Acting Chief, Ocean Assessments Division of NOAA, accompanied by others; and Mr. Steve Schatzow from EPA Office of Water Regulations and Standards.

Gentlemen, welcome. If you do want to introduce people who are accompanying you, feel free to do so.

STATEMENTS OF CHARLES N. EHLER, ACTING CHIEF, OCEAN ASSESSMENTS DIVISION, NATIONAL OCEAN SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ACCOMPANIED BY HAL STANFORD, MANAGER, STONYBROOK OFFICE OF OCEAN ASSESSMENTS DIVISION; THOMAS O'CONNOR, MANAGER, NOAA RESEARCH PROGRAM AT THE 106-MILE DUMP-SITE; AND CAPT. LAWRENCE SWANSON, NOAA, CURRENTLY ASSIGNED NATIONAL SEA GRANT PROGRAM; AND STEVEN SCHATZOW, DIRECTOR, OFFICE OF WATER REGULATIONS AND STANDARDS, ENVIRONMENTAL PROTECTION AGENCY, ACCOMPANIED BY TUDOR DAVIES, DIRECTOR, POLICY OFFICE OF THE OFFICE OF WATER; AND PETE ANDERSON, CHIEF, MARINE POLLUTION BRANCH, ENVIRONMENTAL PROTECTION AGENCY REGION II

Mr. EHLER. Thank you, Mr. Chairman, and members of the committee. I am pleased to be here to present the views of the National Oceanic and Atmospheric Administration on marine pollution problems in the New York Bight.

Accompanying me are Hal Stanford, manager of the Stonybrook office of the Ocean Assessments Division; Tom O'Connor, who is manager of our research program at the 106-mile dumpsite; Betty Hackley, who is the national coordinator for microconstituents research in the National Marine Fisheries Service; Bob Read, ecologist from the Sandy Hook Laboratory; and Capt. Larry Swanson, who is now with NOAA's national sea grant program, located in Stonybrook, N.Y.

Mr. D'AMOURS. If I may, before you begin, we have a long day of hearings today. I am sure there will be many questions, maybe even many rounds of questions from the subcommittee members.

Most subcommittee members have read your testimony already. So, to the extent that you can do so, we would appreciate your hitting the highlights of your testimony. The full testimony of all the witnesses will be included as they are submitted in the record.

Mr. EHLER. Thank you, Mr. Chairman.

I will be happy to summarize my testimony and submit the full statement for the record.

Growth and development in the New York region have inevitably resulted in certain negative impacts on a significant portion of the New York Bight and its resources. However, opportunities now exist to reverse some of the damage and improve its environmental quality.

To place my remarks in context, I would like to state that NOAA believes that waste management practices should be designed and implemented to minimize significant risk of harm to living and nonliving resources in any environmental medium: the oceans, land, ground water, fresh water, and the atmosphere.

If it is determined that disposal, as opposed to any alternative such as recycling, is the preferred option to solve the waste problem, then disposal practices, including the specification of the quantity and quality of wastes, location of disposal sites, timing of the sites, and the disposal technology least likely to cause significant harm should be chosen.

NOAA does not oppose selection of the ocean as a medium for disposal if a rigorous comparative assessment of all reasonable options indicates that choice poses the least risk of significant harm.

We believe that the current practice of dumping municipal sewage sludge at the 12-mile site is causing, or at least contributing to, conditions that damage the marine environment of the New York Bight and its resources. We believe that the environmental quality of the New York Bight can be improved by changes in sludge-disposal practices combined with increased control of other pollution sources.

The Environmental Protection Agency will describe other source controls in its testimony today.

I would like to characterize, the New York Bight and some of the resources at risk, and describe environmental effects observed to date. Then I will outline recommendations for improving environmental quality in the area and conclude with our position on alternative ocean-disposal sites.

The New York Bight Apex, the nearby Hudson-Raritan Estuary, and western Long Island Sound are degraded marine environments. Considering their proximity to the most populated and industrialized urban area in the Washington-Boston corridor, it is not surprising that these ecosystems are strained. Rates of contaminant input to the bight are the highest observed in the world.

In 1976, NOAA published a comprehensive examination of the location and magnitude of contaminant inputs into the bight. The report indicated the relative importance of various inputs and identified gaps in data. Since then a number of studies have added to, confirmed or clarified portions of those data. NOAA and EPA are presently compiling and assessing the results of these studies in order to update estimates of contaminant input to the bight. Some of these updated estimates will be provided in EPA's testimony today.

The most important documented contaminant effects are on individuals or given species of living marine resources. Anatomical or physiological abnormalities and localized losses of species have been reliability attributed to contaminants. There are fewer illustrations of how communities and entire ecosystems have been influenced by contaminants, because such effects are subtle and generally require more sophisticated field sampling.

Among the obvious impacts of ocean dumping is the closure of virtually all the apex to the taking of bivalve mollusks for human consumption. This closure is based on contamination by coliform bacteria and prohibits harvesting. It centers on the sewage dump-

site, closed to shellfishing by the FDA in 1970, and was expanded to the Long Island and New York-New Jersey shorelines in 1974. The later extension of the closure area was caused by bacterial contamination from municipal sewage treatment plants and seaward flow from the Hudson-Raritan Estuary. There is no information that this contributes to bacterial concentrations on New Jersey beaches or Long Island beaches of the bight.

Toxicants from sewage sludge disposal in the bight have been identified as contributing causes of environmental degradation and ecological effects. The relative importance of sewage sludge remains uncertain. It is probable that the contaminant contribution of sewage sludge to environmental loadings, body burdens, and ecological effects for a given toxicant is approximately proportional to the sludge input to the bight as a whole.

Approximately 0.3 tons of mercury enter the estuary bight ecosystem per day. Seventy percent of this is contributed by municipal wastewater, 4.5 percent by sewage sludge dumping, 4.5 percent by dumping of dredged material, 13 percent by rivers, and the remainder by various sources.

Sewage sludge may contribute more than 10 percent of total loadings for two toxicants. At least in the recent past, this appeared to be true for PCB's. A second possible exception is DDT and its metabolites. However, there are insufficient data on total loadings of this family of compounds to be certain of the relative contribution of these materials made by sewage sludge.

During the late seventies, ocean dumped sewage sludge was estimated to contribute roughly 30 percent of total PCB's to the bight and dredge material approximately 70 percent. Recent information suggests that decreased PCB's in the late seventies may not be reflected in lower PCB levels in municipal sewage sludge.

The city of New York has recently analyzed PCB levels in the samples from 12 sewage treatment plants. If these PCB values are representative of all 19 New York-New Jersey sewage sludges, the mass loading of PCB's to the bight region from ocean-dumped sewage sludge may now be comparable to that of other contaminants, that is, within the 1 to 12 percent range.

PCB's have been found in tissues of fish which live totally within the bight apex as well as in migratory forms taken up to 200 km's offshore. Concentrations in organisms seaward of the Hudson-Raritan Estuary are generally low compared to those of the estuary per se. Based on existing data, the flesh of organisms collected in bight water and commonly found in the human diet contain low levels of PCB's and present no health hazard to the average person. A recently completed study for the New Jersey Department of Environmental Protection substantiates this with the exception of bluefish. Several bluefish taken in the apex exceeded the FDA action level. However, because of the highly migratory nature of this species, body burdens of PCB's cannot be directly associated with areas of capture.

The incidence of disease in fish and shellfish is elevated in the New York Apex relative to other sites in the mid-Atlantic. Diseases include fin erosion in a range of demersal and pelagic species, ulcers in red hake, and skeletal anomalies in shellfish including crabs, lobsters, and shrimp. A link has been postulated between fin

erosion and elevated sediment-PCB levels for Dover sole and starry flounder from the Southern California Bight and Puget Sound areas, respectively. A similar relationship has not been demonstrated for fin erosion in flatfishes from the New York Bight. Frequency of fin rot in flatfishes from the bight region has declined both in impacted and comparison areas since the early 1970's.

The reason for the decline is unclear. Chromosomal aberrations and elevated mortalities have been found in the eggs and larvae of Atlantic mackerel—*Scomber scombrus*—taken from the New York Bight Apex. Among early embryo stages, for example, samples with the lowest mortalities were those most distant from the shoreline or from major dumping sites.

As was suggested earlier, toxicant effects such as fish diseases, skeletal anomalies, and developmental failures reflect the total contamination of the bight, rather than the result of sewage sludge disposal alone. Sewage sludge disposal is likely to contribute to these problems, but is not the sole or major cause at present.

As the national ocean agency with responsibility for managing and protecting living marine resources, we are hesitant to recommend use of the oceans for waste disposal purposes. Nonetheless, we recognize that under certain circumstances, this medium could pose the least risk to human health and overall environmental quality. Our comments addressing the relative advantages of one ocean dumpsite over another should not be construed to mean that NOAA advocates ocean dumping or supports its use unconditionally.

We have stated in past years that our findings showed sewage sludge disposal to contribute only a small percentage to the total contaminant loading of bight waters, and that a truly long-term solution to the problem of marine environmental quality in this region could be achieved by development and implementation of a comprehensive, regional waste management strategy. This strategy could include reduction of wastes at their sources, as well as other Federal and State environmental management measures such as pretreatment, pollutant discharge permit requirements, and controls on combined sewer overflows.

We continue to believe that a comprehensive regional strategy of this kind is desirable, but we also believe that improvement of conditions in the bight need not await implementation of such a plan.

There are two basic reasons for this position: One, we believe that enforcement of existing laws and regulations will continue to improve measurably environmental conditions in the bight; and, two, a decision to cease dumping at the 12-mile site would help to upgrade the quality of bight waters, sediments, and biota.

Mr. D'AMOURS. I have to stop you at this point, Mr. Ehler. We have a recorded vote pending with about 8 minutes remaining, and you do have a little left to to go in your testimony.

We will suspend so that Members may make this recorded vote on approving the Journal. It's not terribly vital to the Nation's future, but most Members like to make these things to keep their batting averages up.

We will resume right after this vote. I intend to come right back.
[Recess.]

Mr. D'AMOURS. Mr. Ehler, I regret having to interrupt you when I did. It was at a rather important part of your testimony when I had to interrupt you, but the voting machines wait for no one.

You had just testified that there were two basic reasons for your position, the second of which was a decision to cease dumping at the 12-mile site would help to upgrade the quality of the bight waters, sediments, and biota, which I think is a very important statement.

Would you pick it up from that point?

Mr. EHLER. Thank you, Mr. Chairman, I will.

A decision to discontinue dumping at the 12-mile site should give due consideration to complex environmental, legal, economic, and jurisdictional factors. If it is determined, however, that some degree of improvement in the environmental quality of the New York Bight is the overriding consideration, then, in our view, moving the sludge to the 106-mile site is the preferred alternative.

Disposal of sewage sludge at the 106-mile site can probably be conducted with little or no permanent harm to the marine environment and its resources or to human health. Preliminary studies indicate that wastes disposed at the 106-mile site would be dispersed quickly and effectively, with little probability of permanent impact on either commercial fishery or other ocean resources.

The studies also indicate that wastes should not wash up on the shores of adjacent mid-Atlantic States. However, the long-term effects of ocean disposal on deep ocean benthic organisms are generally unknown and, therefore, it must be monitored carefully.

Studies of the possible longer term impact of sewage sludge disposal should be continued, and a realistic monitoring plan developed jointly by NOAA and EPA prior to such dumping at the 106-mile site. We have already agreed to make such an effort if the decision is reached to initiate sewage-sludge dumping in that area.

In sum, restoration or at least significant improvement of environmental quality in the New York Bight is a realistic and desirable goal. Valuable though a long-term, comprehensive plan for accomplishing this goal would be, we don't have to await its development before conditions in the bight could be improved. If ocean disposal of sewage sludge is to be continued, then available data show that use of the 106-mile site is environmentally preferable to continued use of the 12-mile site. Continued ocean dumping research is of utmost importance, as is development and implementation of a monitoring plan for the 106-mile site if sewage dumping is initiated there.

Mr. Chairman, this concludes my prepared remarks. My colleagues and I will be glad to respond to the committee's questions.

[The statement of Mr. Ehler follows:]

PREPARED STATEMENT OF CHARLES N. EHLER

Mr. Chairman and Members of the Committee

I am pleased to be here today to present the views of the National Oceanic and Atmospheric Administration (NOAA) on marine pollution problems in the New York Bight. Accompanying me are Hal Stanford, Manager of the Stony Brook Office of the Ocean Assessments Division, and Tom O'Connor, manager of our research program at the 106-mile dumpsite.

The New York Bight is owned by none but used by all. The Bight and its resources have been exploited as the surrounding region has grown and developed. This has inevitably resulted in certain negative impacts on a significant portion of the Bight and its resources. However, opportunities now exist to reverse some of the damage and to improve its environmental quality.

To place my remarks in context, let me state that NOAA policy is waste management practices should be designed and implemented to minimize significant risk of harm to living and nonliving resources in any environmental medium -- the oceans, land, groundwater, fresh water or atmosphere. If it is determined that disposal, as opposed to an alternative such as recycling, is the preferred option to solve a waste problem, then disposal practices likely to cause the least risk of significant harm should be chosen. NOAA does not

oppose selection of the ocean as a medium for disposal if comparative assessment of all reasonable disposal options indicates that choice poses the least risk of significant harm.

We believe that the current practice of dumping municipal sewage sludge at the 12-mile site is causing, or at least contributing to, conditions that damage the marine environment of the New York Bight and its resources. We believe that the environmental quality of the New York Bight can be improved by changes in sludge disposal practices coupled with improved control of other sources of pollution. The Environmental Protection Agency will further describe these other source controls in its testimony today.

I will first characterize the Bight, note the resources at risk from marine pollution and describe some of the environmental effects observed to date. Then I will outline recommendations for improving environmental quality in the area and conclude with NOAA's position on alternative ocean disposal sites.

Sources and Fates of New York Bight Contaminants

The New York Bight Apex, the nearby Hudson-Raritan Estuary and Western Long Island Sound are degraded marine environments. Considering their proximity to the most populated and industrialized urban center within the Boston to Washington corridor,

it is not surprising that these ecosystems are stressed. Significant fractions of the total waste generated within the region are released to these marine waters, some deliberately and some inadvertently. Once contaminants enter marine waters control becomes impractical. They are subject to dispersal and to biological, chemical and physical modification. Wastes released in dispersive environments may augment direct contaminant loadings in other closely coupled environments. Since the Bight, Estuary and Sound are linked to one another, waste management for one must take into account the other two as well.

Wastes enter the Bight from the Hudson-Raritan Estuary, through land runoff and atmospheric fallout, by way of sewer and industrial waste outfalls, and via the ocean dumping of acid and industrial wastes, dredged material and sewage sludge (Figure 1). The rates of contaminant input to the New York Bight are among the highest observed when compared with inputs to waters off the most industrialized coasts of the world. Most of the wastes are initially discharged to the Harbor of New York and New Jersey (a large portion of the Hudson-Raritan Estuary) which functions as a partial trap for both nutrients and toxicants.

In April 1976 NOAA published a comprehensive examination of the location and magnitude of contaminant inputs into the New York Bight. The report indicated the relative importance

of the various inputs and identified gaps in data. Since publication of that report, a number of studies have been conducted that add to, confirm or clarify portions of those data. NOAA and EPA are presently compiling and assessing the results of these studies in order to update the estimates of contaminant inputs to the New York Bight. The updated estimates will be provided in EPA's testimony today.

Generally, where comparisons are possible, the data indicate a decrease in total loadings to the Estuary since our 1976 study. For example, suspended solids have been reduced by 30%, mercury by 66% and chromium by 10%. Whether these reductions are real or are attributable to better data cannot be determined at this time. Assuming that some of the decreased inputs to the Estuary are real, they are probably consequences of upgraded treatment of wastewater discharges. Upon completion of the aforementioned studies, data analysis will allow refinement of estimates of pollutant inputs into the Apex from the Estuary.

Effects of Contaminants on New York Bight Resources

The most important contaminant effects documented in the Bight are upon individuals or particular species of living marine resources. Anatomical or physiological abnormalities and localized losses of species have been reliably attributed to contaminants. There are fewer illustrations of how

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communities and the entire ecosystem have been influenced by contaminants, because such effects are subtle and they generally require more sophisticated, expensive field sampling.

Among the most obvious impacts of ocean dumping is the closure of virtually all of the Apex to the taking of bivalve mollusks for human consumption (Figure 2). This closure is based on contamination by coliform bacteria and precludes harvesting of surf clams and ocean quahogs. A circular area 11 kilometers in radius, centered on the sewage sludge dumpsite, was closed to shellfishing by the Food and Drug Administration (FDA) in 1970 and expanded to the Long Long Island and New Jersey shorelines in 1974. The later extension of the closure area was caused primarily by bacterial contamination via ocean outfalls from municipal sewage treatment plants and the seaward flow from the Hudson-Raritan Estuary. There is no evidence that bacterial loads from ocean dumped materials contribute directly to bacterial concentrations on Long Island or New Jersey beaches of the Bight.

Other pathogen indicators also suggest the influence of sewage sludge across extended portions of the inner Bight. Sewage sludges dumped at the 12-mile site contain the indicator bacteria Escherichia coli and Clostridium perfringens. Pathogenic Vibrio spp. and a pathogenic protozoan, Acanthamoeba, have also been isolated from the sludge dumpsite. Recently,

the spores of C. perfringens, a bacterium consistently found in the feces of man and some other warm-blooded animals, were used to trace the movement of sewage in the Apex. Highest spore densities were found in sediments in the Christiaensen Basin to the immediate west of the sewage sludge dumpsite. Spore densities in sediments extending from the Basin toward the Long Island coast decreased exponentially with shoaling water depth to the 18-meter isobath. Sewage solids appear to be translocated to the southeast from the Christiaensen Basin along the course of the Hudson Shelf Valley. Elevated spore densities were detected at least 105 kilometers down the Hudson Shelf Valley. Similar distributions of the protozoan, Acanthamoeba, have also been observed.

Areas receiving settled sewage sludge and other fine-grained material are characterized by benthic populations dissimilar from those of the less contaminated continental shelf. Populations of contaminant-tolerant species are high and more sensitive species are nearly absent. The most heavily affected areas are those adjacent to the dredged material and sewage sludge (12-mile) dumpsites, the Christiaensen Basin and the Hudson Shelf Valley. These areas are characterized by finer, muddier sediments (Figure 3), however, which normally support very different bottom communities than more coarse, sandy or rocky bottoms. These same areas would be expected to accumulate contaminants of coastal or estuarine origin even if dumping

at the 12-mile site were discontinued. It is not clear, therefore, to what extent benthic community composition is determined by sewage sludge dumping at the 12-mile site. Faunal changes may be of ecological and economic significance because the bottom fauna that currently dominate the Christiaensen Basin do not include the preferred prey of commercially important Bight finfish. The implication is that areas impacted by high carbon loadings (and associated toxicants) probably reduce the production of Bight fisheries. At this time, however, it is impossible to judge the magnitude of such reductions.

Toxicants from sewage sludge disposal in the Bight have been identified as contributing causes of environmental degradation and ecological effects. However, the relative importance of sewage sludge remains uncertain. It is probable that the contaminant contribution of sewage sludge to environmental loadings, body burdens and ecological effects for a given toxicant is approximately proportional to the sludge input to the Bight as a whole. For most contaminants, the proportion added to the New York Bight region via sewage sludge dumping is generally small (i.e., 1-12% of the total) (Figure 4). For example, approximately 0.3 tons of mercury enter the Estuary Bight system per day. Some 70% of this is contributed by municipal wastewater, 4.5% by sewage sludge dumping, 4.5% by dumping of dredged material, 14% by rivers and the remainder by various sources.

Sewage sludge may contribute more than 10% of total loadings for two toxicants. At least in the recent past, this appeared to be true for PCBs. A second possible exception is DDT and its metabolites; however, there are insufficient data on the total loadings of this family of compounds to be certain of the relative contribution of these materials made by sewage sludge. During the late 1970s, ocean-dumped sewage sludge was estimated to contribute roughly 30% of the total PCB loading in the New York Bight, with dredged materials contributing approximately 70%. (Some fraction of the PCBs in dredged materials is probably sequestered in the dumpsite mound.) Recent information suggests that decreased PCB usage in the late 1970s may now be reflected in lower PCB levels in municipal sewage sludges. The City of New York recently analyzed PCB levels in sewage sludge samples from 12 New York City sewage treatment plants. The range of average concentrations for these 1982 samples was 0.56 - 2.88 micrograms per gram, i.e., five parts per million, dry weight. If these PCB values are representative of all 19 New York-New Jersey sewage sludges, the mass loading of PCBs in the New York Bight Region from ocean-dumped sewage sludge may now be comparable to that of other contaminants in these sludges (i.e., within the 1-12% range).

PCBs have been found in tissues of fish which live totally within the Bight Apex as well as in migratory forms taken up to 200 kilometers offshore. Concentrations in organisms

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seaward of the Hudson-Raritan Estuary generally are low compared to concentrations in fishes and invertebrates of the Estuary. Based upon existing data, the flesh of organisms collected in Bight waters and commonly found in the human diet contain low levels of PCBs (below the current FDA action level of 5 micrograms per gram, i.e., five parts per million), and present no health hazard to the average person. A recently completed study for the New Jersey Department of Environmental Protection substantiates this with the exception of bluefish (Pomatomus saltatrix); several specimens taken in the Bight Apex exceeded the FDA action level. Because of the highly migratory nature of this species, body burdens of PCBs cannot be directly associated with areas of capture.

The incidence of disease in fish and shellfish is elevated in the New York Apex relative to other sites in the mid-Atlantic. Diseases include fin erosion in a range of demersal and pelagic species, ulcers in red hake and skeletal anomalies in shellfish including crabs, lobsters and shrimp. A link has been postulated between fin erosion and elevated sediment-PCB levels for Dover sole and starry flounder from the Southern California Bight and Puget Sound areas, respectively. A similar relationship has not been demonstrated for fin erosion in flatfishes from the New York Bight. Frequency of fin rot in flatfishes from the Bight region has declined both in impacted and comparison areas since the early 1970s (Figure 5). The reason

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for the decline is unclear. Chromosomal aberrations and elevated mortalities have been found in the eggs and larvae of Atlantic mackerel (Scomber scombrus) taken from the New York Bight Apex. Among early embryo stages, for example, samples with the lowest mortalities were those most distant from the shoreline or from major dumping sites.

As was suggested earlier, toxicant effects such as fish diseases, skeletal anomalies and developmental failures reflect the total contamination of the Bight, rather than the result of sewage sludge disposal alone. Sewage sludge disposal is likely to contribute to these problems, but is not the sole or major cause at present.

Waters flowing from the Hudson-Raritan Estuary and smaller local estuaries sometimes support extremely high levels of primary production and standing stocks of chlorophyll. Of particular concern is biological oxygen demand (BOD) in bottom waters of the Apex resulting from this productivity versus BOD associated with ocean dumping and particulate matter washed out of the Estuary. Recent analyses clarify the relationships among these sources.

Prior to the onset of stratification in May, most of the primary production that occurs in the plume of the Hudson-Raritan Estuary is exported from the Apex across the continental shelf. Production during this period is not a source of oxygen

demand or nutrient regeneration in or beneath the plume later in the year. Once the seasonal thermocline forms, most phytoplankton production is utilized within the river plume; 20 to 25 percent is transferred directly to zooplankton food chains. Under these conditions, about 10 percent of phytoplankton production is transported into bottom water in the form of copepod fecal pellets. These pellets account for about 37% of the oxygen demand below the pycnocline. Most of the remaining oxygen demand appears to be supported by organic inputs from estuarine runoff (33%) and ocean dumping (30% -- the total of sludge and dredged material).

The extensive anoxic episode in the New York Bight during 1976 was the result of the coincidence of rare but natural oceanographic, meteorological and biological conditions. However, in the summer months of normal years, localized areas of low dissolved oxygen regularly occur in the bottom waters of the Apex. Reductions in any of the three sources of BOD are likely to produce some improvement.

Use of 12-Mile and 106-Mile Sites

As the national ocean agency with responsibility for managing and protecting living marine resources, we are hesitant to recommend use of the oceans for waste disposal purposes. Nonetheless, we recognize that under certain circumstances this medium could pose the least risk to human health and overall

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environmental quality. Our comments addressing the relative advantages of the use of one ocean dump site over another should not be construed to mean that NOAA advocates ocean dumping or supports its use unconditionally.

We have stated in past years that our findings showed sewage sludge disposal to contribute by only a small percentage to the total contaminant loading of Bight waters, and that a truly long-term solution to the problem of marine environmental quality in this region could be achieved by development and implementation of a comprehensive, regional waste-management strategy. This strategy could include reduction of wastes at their sources, as well as other Federal and state environmental management measures such as pretreatment, pollutant-discharge permit requirements and controls on combined sewer overflows. We continue to believe that a comprehensive regional strategy of this kind is desirable, but we also believe that improvement of conditions in the Bight need not await implementation of such a plan. There are two basic reasons for this position: 1) we believe that enforcement of existing laws and regulations will continue to improve measurably environmental conditions in the Bight; and 2) a decision to cease dumping at the 12-mile site would help to upgrade the quality of Bight waters, sediments and biota.

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A decision to discontinue dumping at the 12-mile site should give due consideration to complex environmental, legal, economic and jurisdictional factors. If it is determined, however, that additional improvement in the environmental quality of the New York Bight is the over-riding consideration, then, in our view, moving the sludge to the 106-mile site is appropriate.

Five or six years ago, there was virtually no reasonable alternative to use of the 12-mile site if ocean disposal were to continue. Since then we have learned that the disposal of sewage sludge at the 106-mile site may be conducted with little or no permanent harm to the marine environment and its resources or to human health. Preliminary studies indicate that wastes disposed at the 106-mile site would be dispersed quickly and effectively, and would not cause a permanent impact on either commercial fishery or other ocean resources. The studies also indicate that wastes would not wash up on the shores of neighboring mid-Atlantic states. However, the long-term effects of ocean disposal at the 106-mile site are generally unknown and, therefore, its use must be monitored carefully.

Studies of the possible longer-term impact of sewage sludge disposal should be continued, and a realistic baseline characterization should be completed and the monitoring plan developed

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jointly by NOAA and EPA prior to such dumping at the 106-mile site. We have already agreed to make such an effort if the decision is reached to initiate sewage sludge dumping in that area.

In sum, restoration or at least significant improvement of environmental quality in the New York Bight is a realistic and desirable goal. Valuable though a long-term, comprehensive plan for accomplishing this goal would be, we don't have to await its development before conditions in the Bight could be improved. If ocean disposal of sewage sludge is to be continued, then data show that use of the 106-mile site is environmentally preferable to continued use of the 12-mile site. Continued ocean dumping research is of utmost importance, as is development and implementation of a monitoring plan for the 106-mile site if sewage dumping is initiated there.

Mr. Chairman, this concludes my prepared remarks. My colleagues and I will be glad to respond to the Committee's questions.

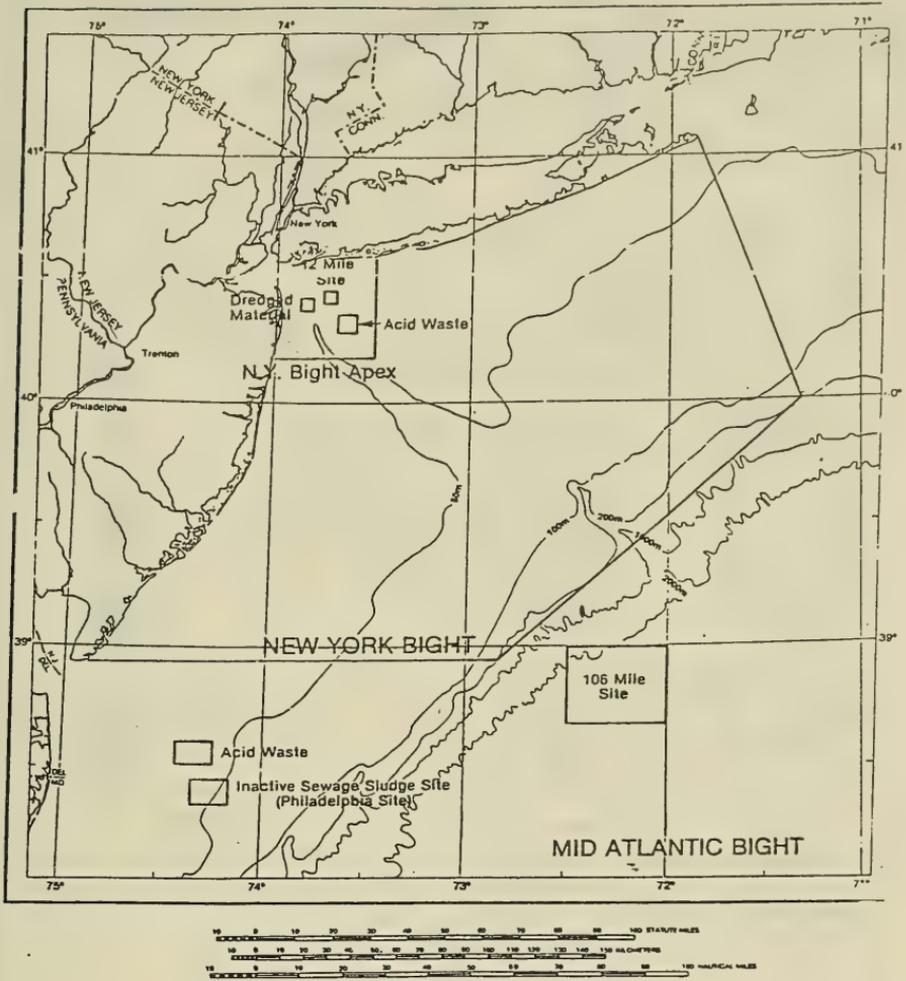


Figure 1. Ocean Dumpsites in the Mid-Atlantic Bight,

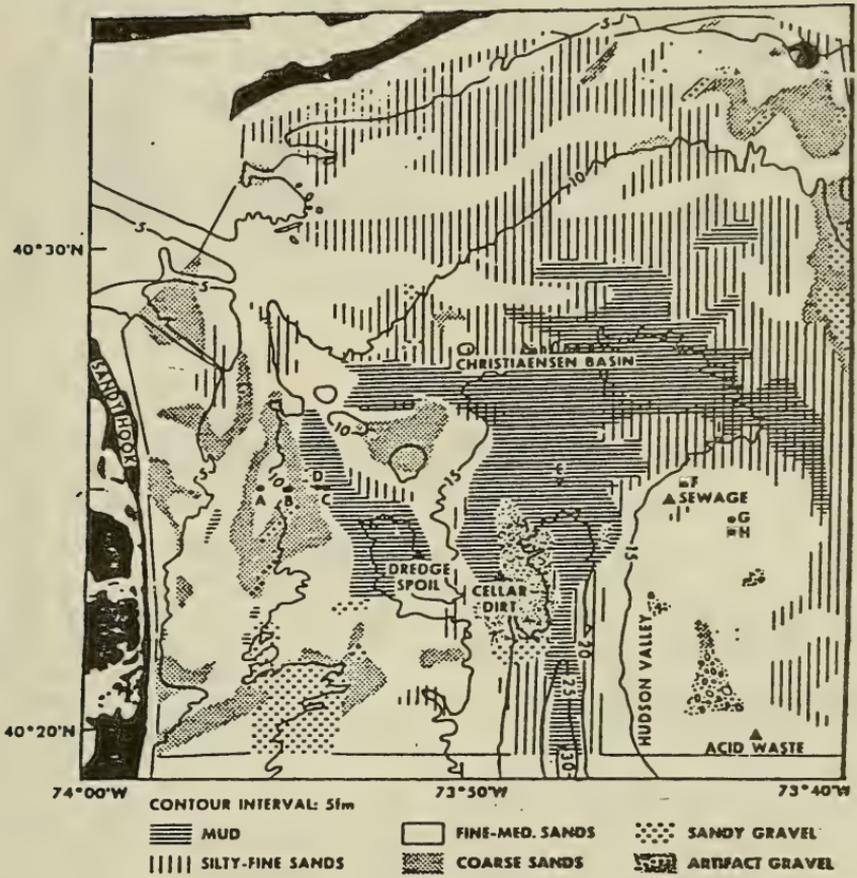
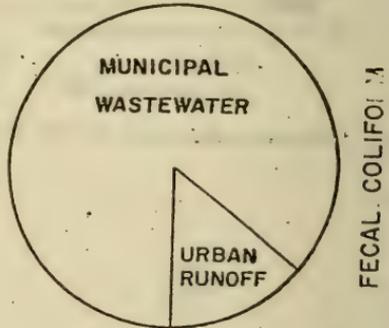
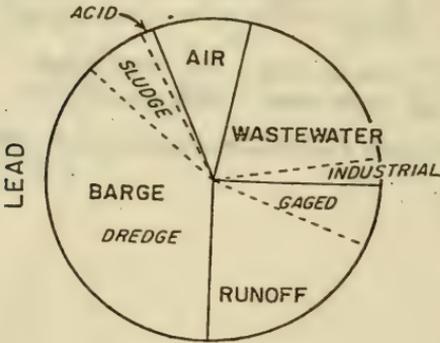
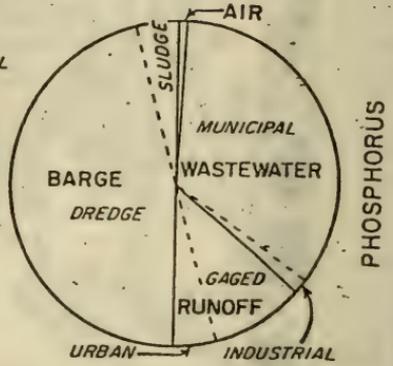
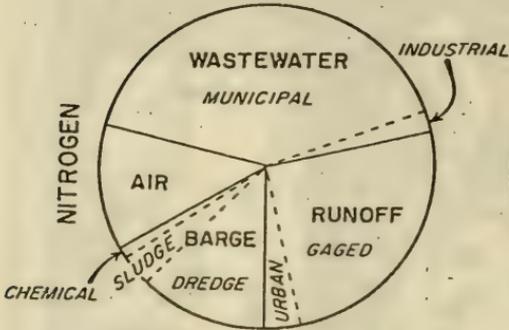
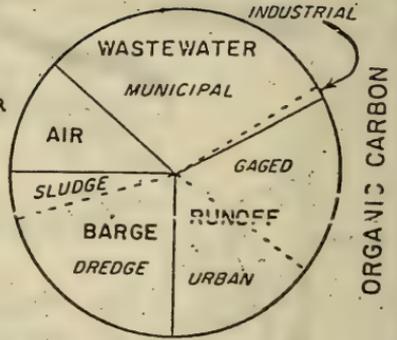
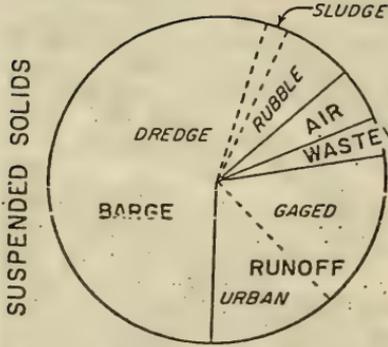


Fig. 3. Surficial sediments in the New York Bight Apex (from Freeland and Swift, 1978).



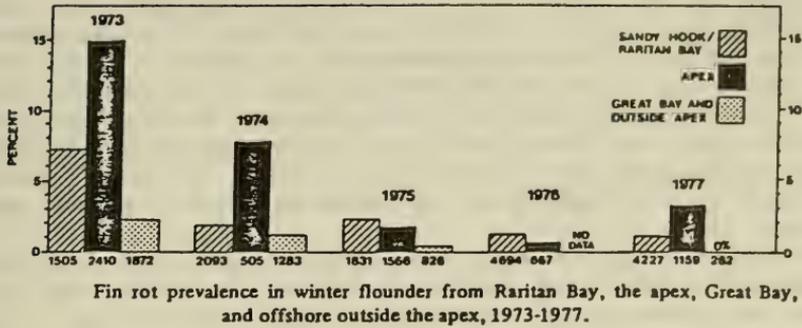


Figure 5

Mr. D'AMOURS. We thank you, Mr. Ehler, for your testimony and we will hear from Mr. Schatzow now.

We request that you please be as brief as possible.

STATEMENT OF STEVEN SCHATZOW

Mr. SCHATZOW. I will be, Mr. Chairman.

Let me introduce my colleague who is with me at the table, Dr. Peter Anderson, who is the Chief of EPA's Region II Marine and Wetlands Protection Branch.

Many of you know he has been involved in the issues from a scientific and policy point of view for 10 years or probably longer.

I will summarize much of my testimony. There are portions of it that I would like to read. I think it might be beneficial just to summarize than to go through page by page as to who is on the page.

That may be helpful if the committee would go with me. The beginning of our testimony discussed briefly the bight apex. Page 2 lists the sources of pollution in the bight apex. There is a reference to table 1 which is attached to the testimony; table 1 provides estimates which have been provided by NOAA of contaminant inputs to the apex.

We begin on page 3 by discussing the fact that the largest contributions of contaminants are those coming out of the Hudson Estuary and the fact that the ocean dumping of municipal and industrial waste and dredged material is the second major class of pollutant input.

We then continue on page 3 to discuss the various pollution control requirements on the discharges to the Hudson Estuary and requirements for cleanup governed by the Clean Water Act.

We continue over to page 4 with that. We talk about controlling the municipal sources of discharge into the estuary and the efforts that have been undertaken and are underway for getting appropriate treatment for those municipal wastewaters.

On page 5, we discuss the industrial discharges, pretreatment programs required under the Clean Water Act, and the deadlines and what is going on to implement those programs for indirect industrial discharges, that is industrial contributors to publicly owned treatment works.

On page 5, we discuss that in addition to the technology based requirements of the Clean Water Act, the Clean Water Act also authorizes the States to develop water-quality standards. These standards consisting of designated uses of State waters and the necessary criteria to protect aquatic life and human health. We explain that the States of New York and New Jersey have established water quality use classification and criteria for the territorial waters. This only applies to the 3-mile limit. It does not apply beyond that.

We point out that these criteria and uses are utilized in determining what additional treatment beyond the technology minimums are necessary to protect water quality within that 3-mile area.

Noted on page 6 are some of the improvements that have taken place as a result of controlling some discharges to the Hudson Estuary. At the bottom of page 6, are some of the sources, point and nonpoint sources, of the Hudson Estuary which are among the most difficult to control. These include nonpoint source runoff, storm water outfalls and combined sewer outfalls.

On page 7, we discuss some of the activities which continue to be the more difficult problems. We note on the bottom of page 7 that the need is to focus not merely on cleaning up the 3-mile area, and the territorial seas, but on the bight apex. It is our concern that we be assured that the point source and nonpoint source controls being implemented will also protect the bight and the bight apex.

On page 8, we then discuss the direct ocean dumping inputs of dredged material, acid wastes, cellar dirt and sewage sludge. We get into the dredged materials, and what is being done now to get a better handle on the dredge material problem. The EPA is currently working with the Corps of Engineers to develop a comprehensive plan to manage the disposal of dredged material.

Page 10 discusses sewage sludge dumping and notes that while on the one hand, the quantity of sewage sludge has increased over the last 10 years, the number of treatment plants that are actually ocean dumping has decreased dramatically.

We note, that even within the last year, three municipalities that have traditionally ocean-dumped sewage sludge have stopped, or as in the case of Glen Cove are expected to go out of the ocean dumping business soon.

On the bottom of page 10, I will read some parts of the testimony and summarize other parts, Mr. Chairman.

A number of questions have been raised by Members of the Congress, by the news media, by environmental groups and others, as to why EPA continues to allow the ocean dumping of sewage sludge. Didn't Congress explicitly require the cessation of all sewage sludge dumping in the ocean by the end of 1981?

Yes, it did.

However, Congress specifically defined "sewage sludge" in the act as "any solid, semi-solid, or liquid waste generated by a municipal wastewater treatment plant the ocean dumping of which may unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, and economic potentialities."

Nowhere does the act ban the ocean dumping of all municipal treatment residues, only those which "unreasonably degrade."

Now, what is this unreasonable degradation? It is a term of the act. Our regulations which were promulgated in 1977, contained a conclusion that the dumping of any material which passes EPA's environmental impact criteria does not "unreasonably degrade."

Now, as many of you are aware and certainly this committee is aware, Judge Sofaer held that our presumption that materials which fail the environmental criteria will "unreasonably degrade" was arbitrary and capricious and not in accord with the act.

While some Members of Congress have objected to the Agency's decision not to appeal Judge Sofaer's decision to the best of my knowledge, there has been no expressed disagreement in the assertion that materials that do pass the environmental criteria can be ocean-dumped, given a demonstrated need and unavailability of environmentally sound alternatives.

It is our best judgment that most, if not all, sludges presently ocean-dumped will be able to demonstrate compliance with EPA's 1977 environmental impact criteria if dumped at an appropriate dump site.

Because of the significant volume of sludge dumping, the relative toxicity of the sludges dumped, the limited size of the dump site, significant concern for navigational hazards, and other technical reasons, it is not possible for all dumpers, or even a majority, to comply with EPA's environmental impact criteria at the 12-mile site.

However, it is expected that many of the present sewage sludge dumpers can demonstrate compliance with these criteria at the 106-mile site.

For a number of these sludge dumpers there will probably be a requirement for additional pretreatment and/or provide additional treatment in order to meet the criteria.

Now, the act clearly allows the ocean dumping of a variety of materials, including acid waste, dredged material, and municipal residues which pass the environmental criteria where the applicant can demonstrate a need for ocean dumping.

Certainly, the existing municipal sludge generators have expressed an interest in continued ocean dumping and therefore, we believe that it is appropriate to designate a site where there is this clear interest in ocean dumping.

Let me make clear that there are two processes involved in the ocean dumping program. One process is for site designation, the other for permit issuance. In the site designation process, the agency looks at the available scientific and technical information, in view of statutory and regulatory criteria which I will discuss in a minute, to determine the adequacy of the site for disposal of specific wastes.

In the permitting process, which I will discuss later, the applicant must demonstrate compliance with EPA criteria on the impacts of the proposed dumping on the marine environment. The applicant must also demonstrate the need for ocean dumping and address the availability and impact of alternate disposal methods. This demonstration is made on a case-by-case basis in the permitting process.

I want to reiterate, because I think it is important to understand in terms of the structure of the act and the implementing EPA regulations that a decision to designate a particular site is not a decision to allow anyone specifically to use that site.

For instance, if the agency were to designate the 106-mile site, that is not a decision that the site is appropriate for either the existing dumpers at the 12-mile site or any other dumpers to use that site.

That decision has to be made in the permit context, based on an analysis of that specific waste and on an analysis of the land-based alternatives.

On pages 12 and 13, we discuss the general criteria for site designation. On the bottom of page 13, we compare the characteristics of the 12-mile site and the 106-mile site in terms of what we believe to be some major criteria.

In the interest of saving time, I am going to skip that, Mr. Chairman, because it is in front of the committee members.

We conclude, after having gone through many of those characteristics on the bottom of page 16, that our preliminary findings, which I might add is supported by NOAA, is that the 106-mile site is environmentally acceptable for the disposal of sewage sludges and that it has a variety of characteristics that make it much more environmentally acceptable than the 12-mile site.

I also note on the bottom of the page that participating municipalities contend that the use of the 106-mile site would increase their current disposal cost by three to four times.

Beginning on page 17, we talk about the history in terms of what is going on now, the fact that the New Jersey and New York dumpers are dumping under court order; what the requirements of that court order are in terms of EPA; and we go through some of the things we are doing now, specifically responding to a petition from the municipal dumpers to redesignate the 12-mile site, and through some of the specifics of our solicitation of comments, the fact we have received additional materials from the dumpers.

We note on page 18 that EPA proposed in December 1982 the designation of the 106-mile site for the continuing disposal of aqueous industrial waste and for municipal sewage sludges.

The EPA had a public hearing on May 10 in Rehobeth, Del. I know Congressman Carper was there, and along with a number of other people, to receive comments on the designation of the 106-mile site. As a result of the concerns expressed at the public hearings there and our evaluation of the public comments, there are a number of specific things that we are not thinking about in terms of the 106-mile site.

On page 18 I mentioned briefly a few of the comments that are mentioned. One is that we will not complete any site-designation until we have what we believe to be an adequate and complete long-term monitoring program.

We have the outlines for such a program that has been developed by EPA and NOAA. We will work as I commented at the public hearing with the coastal States to assure that this monitoring plan adequately reflects their concerns and needs.

We also mentioned that we are considering excluding the use of those areas of the site which lie on the Continental Shelf. This

would limit potential conflicts with long-line fishing interests along the Continental Slope and the oil and gas exploration that is possible there.

We are also considering the separation of industrial and municipal waste dumping within the site in order to both minimize potential synergistic effects and more importantly, to facilitate our ability to monitor separately the two types of dumping.

We note on the bottom of page 18 the types of comments we have received on the two notices having to do with the petition to redesignate the 12-mile site and with the proposal to designate the 106-mile site.

Discussed on page 19 is the work we are doing with NOAA, the task team that was set up to review the information on the 12- and 106-mile sites. We have dates in there that we plan to meet in terms of completing our technical evaluation of the 106-mile site by July 31, and to complete our evaluation of the scientific information on the 12-mile site by August 31.

We begin again, on page 20, discussing in somewhat more detail the point I had made earlier that the authorization to use a site is independent of site designation, and that a permit is required. We briefly discussed the criteria for the permit process.

We note, beginning on the bottom of page 20, that within the permit context in dealing with each of these expected permit applications, a major difficulty that we expect to face, is the availability of alternative disposal methods.

We note, especially when we talk about densely populated, heavily urbanized areas, consideration of both economic costs as well as environmental impacts, concerns about institutional problems and developing land-based alternatives.

We note, specifically at the bottom of page 20 and over to 21, the difficulty of implementing land-based alternatives especially when States impose their own rather specific requirements such as a moratorium on sludge application to land.

We note that we have been successful in the past, we noted earlier, I believe about at page 10, when we talked about the number of dumpers there were previously, there were 250 municipalities dumping 10 years ago, and there are only 28 treatment plants today.

So we express our hope that for most of the ocean-dumped residues, that we will be able to find land-based alternatives.

We tried to respond, continuing on page 21, to the concerns expressed by some that the relocation of the site out to the 106-mile site makes it out of sight, out of mind, and we note that of the roughly 100 industries which are ocean-dumping their wastes at the 106-mile site, only 2 remain, and therefore, we believe that although they were out of sight, they are not out of mind, and that we have a track record not only of reducing the number of municipalities dumping but reducing the number of industries dumping even at the 106-mile site.

We say, and I would like to read this, we intend to carefully scrutinize the applications of existing sludge dumpers. Ocean dumping will be allowed only if these applicants can demonstrate that there is a need for ocean dumping. What of new applicants? Nothing forbids a new applicant from proposing the ocean dumping of municipi-

pal sludges not now dumped. However, the "burden of proof" that such dumping will not "unreasonably degrade" the environment is entirely on the applicant.

It would be a heavy burden of proof to demonstrate why the land-based alternative could not continue to be used in the future.

We conclude by saying that through combined efforts to substantially improve the estuary, to provide alternative disposal sites for contaminated dredged materials, and our efforts to resolve the sewage sludge and other ocean dumping issues, we believe that a substantial improvement in both the estuary and the bight apex is attainable, and we are actively working toward that goal.

The second conclusion is that the 106-mile site is environmentally acceptable for receipt of sewage sludges. The administrative processes have been initiated to deal with the question of the 12-mile site and the 106-mile site.

Finally, I wish to emphasize that the site designation and permit issuance are two separate and independent processes. Site designation is a process by which it is determined that a given area of the ocean is acceptable for receipt of a particular waste.

The permit issuance is the process by which it is determined on a case-by-case basis that an applicant has demonstrated the need for ocean dumping and that it is environmentally acceptable.

Thank you, Mr. Chairman, and obviously, Dr. Anderson and I will be pleased to respond to any questions.

[The statement of Mr. Schatzow follows:]

PREPARED STATEMENT OF STEVEN SCHATZOW

Good morning, Mr. Chairman and members of the Subcommittees. My name is Steven Schatzow. I am the Director, Office of Water Regulations and Standards of the U.S. Environmental Protection Agency (EPA). It is my pleasure to be here today to discuss marine pollution problems in the New York-New Jersey metropolitan area. Accompanying me is Dr. Peter W. Anderson, Chief of Region II's Marine and Wetlands Protection Branch.

We have been asked to respond to the following questions regarding the New York Bight:

- Is it realistic to adopt the stated goal of environmental restoration?
- If so, what steps need to be taken to achieve this goal?
- If it is determined that ocean disposal is the appropriate option for disposal, is it best to continue dumping at the 12-Mile Site or to move to a deep water site such as the 106-Mile Site?

The objective of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters, with an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water. Further, the stated policy under the Marine Protection, Research, and Sanctuaries Act is to prevent or strictly limit the dumping into ocean waters of any materials which would adversely affect human health, welfare, or amenities, or the marine environment, ecological systems or economic potentialities. If these goals are what is meant by "the stated goal of environmental restoration", then we believe that a substantial restoration is possible through a combination of pollution control efforts.

The ocean offshore of New York City, commonly referred to as the New York Bight (Figure 1), is one of the most heavily contaminated coastal areas in the United States. The 11,000 square nautical mile area is contiguous to a major densely populated urban center which also serves as a major center of commercial and recreational activity. The Bight Apex, which is a 1,100 square nautical mile area of the Bight adjacent to the New York Harbor entrance, receives contaminants from a number of sources, including municipal and industrial wastewater discharges, combined sewer outfall discharges, ocean dumping, storm water runoff, nonpoint source runoff, and atmospheric deposition. Estimates of contaminant inputs to the Apex have been reported by the National Oceanic and Atmospheric Administration (NOAA); the most recent update of estimates for selected pollution parameters are presented in Table 1.

The largest percentage contributions by weight of these contaminants of concern are generally those associated with discharges from the Hudson estuary. The ocean dumping of municipal and industrial wastes and dredged materials is the second major class of pollutant input. The remaining sources, atmospheric and other direct inputs, provide relatively minor contributions to the Apex. All of these estimates are based on assumptions and extrapolations, particularly with regard to estuarine inputs to the Apex. They also represent the amount of material inputted by each source, and not necessarily the relative environmental impact.

Pollution-control requirements on discharges to the Hudson estuary are governed mainly by provisions of the Clean Water Act. This Act establishes a dual system of technology-based controls supplemented with water-quality limits to assure adequate protection of our Nation's waters. The Act provides for:

- secondary treatment of municipal wastewaters;
- imposition of "best available technology" for industrial discharges;
- imposition of pretreatment requirements for industrial users of municipal treatment plants;
- establishment and implementation of water-quality standards;

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- regulation of combined sewer outfalls;
- regulation of other point sources and stormwater outfalls; and
- control of non-point sources, such as river flow, overland runoff, and groundwater inflow.

Controlling municipal sources of discharge into the estuary is of primary importance, since these sources represent a significant portion of the pollutant input to the Bight Apex. Figure 2 shows the location of municipal sewerage treatment plants in the metropolitan area. Currently, 2.02 billion gallons per day of treated sewage are discharged from these plants; 133 million gallons of which receive primary treatment prior to discharge; 517 million gallons, modified secondary treatment; and 1,366 million gallons, secondary treatment. In addition, about 250 million gallons a day are discharged untreated (raw) in the North River and Red Hook areas of New York City. Major efforts have been made to meet the Clean Water Act's requirement of secondary treatment for municipal wastewaters. Funds spent (both Federal and local) for the planning, design, and construction of new or upgraded sewerage treatment facilities in the metropolitan area have totalled nearly \$6 billion. Also, the ongoing construction of sewerage treatment facilities to service the North River and Red Hook areas of New York City where untreated sewage is discharged, is being completed under court order.

Industrial dischargers accounting for an estimated 275 million gallons per day (excluding cooling waters) directly to the estuarine system are being required under the Clean Water Act to implement technology-based effluent limits in NPDES permits to control the discharge of pollutants into the estuary. Furthermore, pretreatment programs are being developed to remove toxic constituents from industrial discharges to municipal systems. Approved local pretreatment programs to protect the treatment system from upset due to these toxic constituents and to improve the quality of both the effluent and sludge are required by July 1, 1983. As well, categorical pretreatment standards which set limitations on toxic pollutant discharges for specific industries are being promulgated by EPA in accord with a court-approved timetable.

Concurrent with the technology-based requirements, the Act authorizes States to develop water-quality standards to ensure aquatic life and human health protection. In order to meet these water-quality standards, States may require more stringent effluent limits or levels of treatment by municipalities and industries.

Pursuant to these provisions, the States of New York and New Jersey have established water-use classifications and criteria necessary for each use, for the estuary and coastal waters in the metropolitan area (Figure 3). Note these standards only apply to territorial waters (up to 3 miles) and not to ocean waters. These use classifications and criteria, which have

been determined by the States to be economically attainable, can and have been used in the decision-making process to determine what reductions in pollutant loading are needed and over what time period they may be reasonably made.

The types of pollution abatement already discussed have produced significant water-quality improvements in the Hudson estuary during the past decade. Dissolved-oxygen levels have increased in most parts of the estuarine complex. Shellfishing has been partially reopened in some areas of Raritan Bay, Sandy Hook Bay and the Navesink and Shrewsbury Rivers. Anadromous fish and crustaceans have returned to areas long devoid of such organisms.

However, much remains to be accomplished in order to meet our water-quality goals. The regulation and control of non-point sources of pollution, stormwater outfalls, and combined sewer outfalls are issues addressed by the Act requiring a significantly greater focus by EPA in the future. This is especially important in light of findings by NOAA that combined outfall discharges, stormwater discharges, streamflow, and non-point sources account for over 50 percent of the pollutant loads to the Hudson estuary. The identification of specific sources and potential control measures have been initiated through Section 208 and other planning processes. However, if treatment is to be provided, elaborate storage facilities will be required. Also, because of the low concentrations of pollutants involved, specialized treatment processes, often innovative, will

be necessary. The decisions on the cost-effectiveness of these further controls will be complex and tough to make.

Several demonstration projects (financed by EPA and New York City) are underway to investigate methods to control, store, and treat combined sewer outfall discharges. For example, a project to demonstrate the feasibility of a floating pontoon storage device in the tidal Fresh Creek (Brooklyn) is in the initial stages of design. This device, developed for use in Swedish freshwater lakes, is estimated to cost 1/10 of concrete storage. Another project, on Staten Island (Port Richmond), is investigating the use of ultra-violet light in the disinfection of both combined sewer outfall discharges and treated effluents from a sewerage treatment plant.

These regulatory processes and feasibility studies are important to the improvement of water quality in the Hudson estuary, and thereby the Bight Apex. They are continually being evaluated by EPA and the two States with the stated goal of attaining the water uses as illustrated on Figure 3. EPA, New York and New Jersey are committed to utilize all legal means to attain water-quality standards established for the estuary and coastal waters (up to 3-mile limit).

In order to attain the established standards, an improvement in water quality is necessary. Our focus in the past has been on restoring the quality of the estuary. We have not really focused on the impacts that these decisions have had on the Bight Apex. This will change

in the future. For instance, the opportunity exists under Section 301(h) of the Clean Water Act for several municipalities (Figure 2) in the area to apply for a waiver of the secondary treatment requirement. Initial determinations of the effect of a waiver of secondary treatment on compliance with water-quality standards are being formulated by the States of New Jersey and New York and the Interstate Sanitation Commission. These determinations are expected to be received by EPA by mid-June. EPA will only begin to consider these waiver requests when the States certify compliance with their standards. The applicant must then demonstrate compliance with all statutory and regulatory factors, but most importantly, the protection of the environment in the estuary and the Bight Apex. I want to emphasize this point. EPA's determination will not be made entirely on water-quality issues in State waters (i.e., the estuary and coastal waters within the 3-mile limit). Our determinations will be made to provide adequate protection to the marine environment of the entire Bight Apex and beyond. Two waiver requests have already been tentatively denied by the Agency (Newtown Creek and Mamaroneck), and four others returned as either insufficiently described (Perth Amboy) or in non-saline waters (North Bergen, Secaucus, Patchogue).

Of course, the Apex, in addition to receiving inputs from the Hudson estuary complex, receives contaminants from the direct ocean dumping of dredged materials, acid wastes, cellar dirt (construction debris), and sewage sludges (Figure 4). The quantities of materials dumped since enactment of the Marine Protection, Research, and Sanctuaries Act at the

four active dump sites are summarized in Table 2. The quantities of dredged materials, acid wastes, and cellar dirt ocean dumped have gradually declined, for the most part due to a general decline in the economy of the region. The major acid waste generator, NL Industries, shut down its titanium-dioxide facility in Sayreville, New Jersey, in October 1982 and, therefore, is not expected to resume dumping in the foreseeable future, if ever.

As indicated in Table 1, a large contaminant input to the Bight Apex is associated with the dumping of dredged material. A significant fraction of this contaminant load is sequestered in the mound built up at the dump site over the years and, therefore, is not readily available to marine organisms. Also, since the toxic metal load in dredged materials is generally associated with inorganic materials, it is often inert and not readily available to the biota. EPA's present policy with regard to dredged material dumping in the Bight Apex is to assure no further degradation. We are working with the U.S. Army Corps of Engineers to develop a comprehensive plan to manage the disposal of materials (including contaminated) dredged from channels and berths in the Port of New York and New Jersey. The Corps' \$5 million effort, initiated in 1980, will address the technical feasibility of alternative disposal options and is scheduled to be completed in 1985. A draft Environmental Impact Statement addressing these issues was released last month by the Corps' New York District. The implementation of alternate disposal or mitigation (e.g., capping) technology is expected to improve the quality at and near the dump site.

The quantity of ocean dumped sewage sludges has increased from 4.6 million wet tons in 1973 to 7.6 million in 1982. While the number of treatment plants ocean dumping their sludges has decreased from roughly 250 in 1973 to 28 today, the quantity dumped has increased significantly due to the upgrading of treatment provided at most of the remaining facilities. A listing of the remaining plants, as well as the quantities dumped during 1982, are summarized in Table 3. Note that Middletown Township (NJ) ceased ocean dumping effective January 1, 1983, after implementing composting as an alternative disposal method. Northeast Monmouth (NJ) is landfilling dewatered sludges and plans to cease dumping June 1. The City of Glen Cove is currently testing an innovative co-disposal incineration system. This system, scheduled to be fully operational in late summer, will dispose of solid wastes from the City and several nearby communities and sewage sludges generated at the City's treatment plant, and will generate power in excess of that required to operate the City's treatment plant.

A number of questions have been raised by members of the Congress, by the news media, by environmental groups and others, as to why EPA continues to allow the ocean dumping of sewage sludge. Didn't Congress explicitly require the cessation of all sewage sludge dumping in the ocean by the end of 1981? Yes, it did! However, Congress specifically defined "sewage sludge" in the Act as "any solid, semisolid, or liquid waste generated by a municipal wastewater treatment plant the ocean dumping of which may unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, and economic potentialities."

Nowhere does the Act ban the ocean dumping of all municipal treatment residues, only those which "unreasonably degrade."

"Unreasonable degradation" is a term of art. How is the term "unreasonably degrade" defined? EPA's ocean dumping regulations, promulgated in January 1977, contains a conclusion that the dumping of any material which passes the environmental impact criteria found at 40 CFR Part 227, Subpart B does not "unreasonably degrade." Judge Sofaer, as most of you are aware, in the City of New York v. EPA, held that the Agency's conclusive presumption that materials which fail the environmental impact criteria will "unreasonably degrade" was arbitrary and capricious and not in accord with the Act. While some members of Congress have objected to the Agency's decision not to appeal Judge Sofaer's decision, to the best of our knowledge, there has been no expressed disagreement in the assertion that materials which pass the criteria can be ocean dumped, given a demonstrated need and unavailability of environmentally sound alternatives.

It is our best judgment that most, if not all, sludges presently ocean dumped will be able to demonstrate compliance with EPA's 1977 environmental impact criteria if dumped at an appropriate dump site. Because of the significant volume of sludge dumping, the relative toxicity of the sludges dumped, the limited size of the dump site, significant concern for navigational hazards, and other technical reasons, it will not be possible for all dumpers, or even a majority, to comply with EPA's environmental impact criteria at the 12-Mile Site. However, it is expected that many of

the present sewage sludge dumpers can demonstrate compliance with these criteria at the 106-Mile Site. Some may have to impose significant pretreatment requirements and/or provide additional treatment in order to meet the criteria.

The Act clearly allows the ocean dumping of municipal sludges, acid wastes, dredged materials, and other wastes which pass the environmental criteria, and where the applicant can demonstrate a need to ocean dump. Several municipal sludge generators have expressed an interest in continued ocean dumping. Thus, it is appropriate to designate a site where there is a clearly expressed interest in ocean dumping.

In the ocean dumping program there are two processes; one for site designation and the other for permit issuance. In the site-designation process, available scientific and technical information is evaluated in terms of statutory and regulatory criteria to determine the adequacy of the site for the disposal of specific wastes. In the permitting process, which I will discuss in more detail later, the applicant must demonstrate compliance with EPA's criteria on impacts of the proposed dumping on the marine environment, the need for dumping, and the availability and impact of alternate disposal methods. This demonstration is made on a case-by-case basis.

In response to your question regarding the use of the 12-Mile or 106-Mile Sites for continued use for the dumping of sewage sludges, I should

like to offer our preliminary finding. This finding is based on our review of existing reports, on discussions with scientific experts in NOAA, and on comments received in response to two Federal Register notices published in December 1982. The reports submitted by the petitioners have not been fully reviewed.

Section 102(c) of the Act provides that the Administrator may, considering the criteria established pursuant to Section 102(a) (Attachment A), designate recommended sites or times for dumping. Pursuant to these provisions, EPA has promulgated implementing regulations which provide criteria both for the designation and management of approved sites for the ocean dumping of wastes. These criteria are found at 40 CFR Part 228. Section 228.5 (Attachment B) includes the general criteria and Section 228.6 (Attachment C) the specific criteria.

A comparative review of selected criteria indicate the following:

- ° The 12-Mile Site is located in the heavily trafficked entrance to New York Harbor. It is within the precautionary zone established by the U.S. Coast Guard due to the high level of commercial and recreational ship traffic in the area. Some 7,000 ocean going vessels arrive and depart the Port each year. The Coast Guard and waste transporters have both expressed serious concern over potential hazards to navigation resulting from dumping activities at the Site.

The 106-Mile Site is not located in major shipping lanes.

- NOAA reports that valuable living marine resources (fish, shellfish, etc.) are associated with the 12-Mile Site and adjacent areas. These resources are substantial and heavily utilized by the commercial and recreational fishing industries and public. The area is utilized by fish and shellfish for breeding, spawning, nursery, feeding, and passage in both juvenile and adult phases.

Living marine resources associated with the 106-Mile Site are reported by NOAA to be far less valuable than those associated with nearshore, on-the-Shelf areas.

- The 12-Mile Site is less dispersive than are sites located farther offshore. Oceanographic conditions are such that dumping operations cause temporary perturbations in water quality and other environmental conditions. Elevated levels of bacteria and viruses in the water column and bottom sediments have resulted in the area being closed by the Food and Drug Administration to shellfishing. Levels of toxic metals and organohalogens in bottom sediments are increased over normal ambient levels. Changes in relative abundance and diversity of species in areas affected by sludge discharges have been observed as have indications of sublethal effects, including bioaccumulation.

The much greater depth (6000-9000 ft.) of the 106-Mile Site provides for greater dispersion and dilution of wastes. Previous research by NOAA at the 106-Mile Site has indicated that sludges disposed of at the Site would be dispersed relatively quickly, with little probability of any permanent impact on marine resources, including bottom organisms.

- ° The 12-Mile Site is not located beyond the edge of the Continental Shelf.

The 106-Mile Site is located beyond the edge of the Continental Shelf. The Act expresses a preference for sites located off the Shelf, where feasible.

- ° The 12-Mile Site is located within 12 nautical miles of coastal beaches and resorts of New Jersey and Long Island. Public perception and concern for degraded quality of these coastal areas is evident, although monitoring by EPA of beach quality has not shown any degradation directly attributable to sludge dumping. However, since identifiable waste constituents, detected above normal ambient values, have been observed in bottom sediments within 5 nautical miles of the Long Island coastline, the concern for potential future impacts remains.

All technical information available indicates that any waste transport from the 106-Mile Site would not have any impact on coastal beaches of New York, New Jersey, Delaware, Maryland or Virginia.

- o The cumulative effects of current and previous discharge and dumping in the area of the 12-Mile Site have been observed by NOAA to result in increased occurrence of fin rot in fish, lobster die-off, decay of crustacean shells, gill fouling, and protozoan parasites on gill tissue. A decrease in catches of bony fishes in the area also has been observed. Increase phytoplankton blooms, periods of depressed oxygen levels, and fish and shellfish kills have been observed as well.

Cumulative effects such as those observed in the Bight Apex are not expected at the 106-Mile Site. Potential conflicts with industrial waste dumping and possible offshore oil and gas explorations are manageable.

Thus, our preliminary finding, which I might add is supported by NOAA, is that the 106-Mile Site is environmentally acceptable for the disposal of sewage sludges. However, the petitioning municipalities contend that the use of the 106-Mile Site would increase current disposal costs by 3-4 times.

Sewage sludge dumping at the 12-Mile Site by New York City, Nassau and Westchester Counties, and six New Jersey sewerage authorities is currently authorized under provisions of Federal court orders. Under the final judgments issued by the court, EPA is required to:

- revise its ocean dumping regulations to require a "balancing" of environmental risks associated with land-based and ocean disposal methods;
- respond to petitions by existing municipal dumpers to redesignate the Bight Apex (12-Mile) Sewage Sludge Dump Site; and
- take action (only after completion of action on the petitions) on permit applications for continued ocean dumping.

The Agency initiated action on the petitions to redesignate the 12-Mile Site late in 1982. EPA notified the petitioners on December 9 that insufficient information had been submitted to support redesignation of the site. Since the "burden of proof" is on the petitioners, additional information was requested to be supplied by May 2, 1983, to support the contentions raised in the petitions and to address EPA's site designation criteria (40 CFR Part 228). On December 20, 1982, EPA solicited public comments in the Federal Register on the petitioners' request for rulemaking to amend the ocean dumping regulations to redesignate the 12-Mile Site.

In a separate notice, EPA, on December 20, 1982, also announced the proposed final site designation of the 106-Mile Ocean Waste Dump Site for the disposal of aqueous industrial wastes and municipal sewage sludges. Industrial wastes have been dumped at this site since 1961, and small quantities of sewage sludges since 1974. A hearing on this proposal was held on May 10, 1983, to receive public comment. As I stated at the recent public hearing in Rehoboth Beach, Delaware, on the 106-Mile Site designation proposal, some innovative surveillance techniques -- permittee supported shipriders, "black boxes", navigational overlays -- are being considered by the Agency to augment those currently employed by the U.S. Coast Guard. As well, the site designation process will not be completed until an adequate short- and long-term effects monitoring plan has been developed by EPA and NOAA. EPA will work with the nearby States to insure that this monitoring plan adequately reflects their concerns and needs. This plan will, of course, be further modified as individual wastes are identified. Also, the Agency is considering excluding use of those areas of the Site which lie on the Shelf. This would limit possible conflicts with long-line fishing interests along the Continental Slope (northwest corner) and oil and gas exploration. We are also considering the separation of industrial and municipal waste dumping within the Site in order to minimize potential synergistic effects and facilitate monitoring activities.

Comments received to date on these two notices and at the public hearing generally fall into two categories. First, current users support site designation and prefer the nearshore to offshore sites. Second,

environmental groups, fishing and resort interests, and the general public for the most part are strongly opposed to any ocean dumping. In some cases, where a preference is expressed, the temporary use of the 106-Mile Site pending implementation of a land-based alternative is grudgingly accepted. I might note that since EPA did not propose the implementation of any specific land-based disposal facility, few comments were received from the public in areas serviced by the municipalities which currently ocean dump their sludges. Our experience would indicate that had we done so, there would be a strong opposition as well to the use of land-based disposal sites.

An interagency (EPA and NOAA) Task Team has been formed to review and evaluate the complex scientific and technical information, both available prior to the comment period and provided through public comment on the site designations. This Task Team, made up of scientific, legal, and policy experts, will consider the available information in terms of statutory and regulatory requirements and several pending legal actions, and integrate them into recommendations. The Task Team has been charged to evaluate information dealing with the proposed designation of the 106-Mile Site and formulate its recommendation on site designation by July 31. This report will in turn undergo intra-agency review prior to the announcement of final Agency action. Concurrently, the Task Team will consider the data submitted concerning the 12-Mile Site and will complete its report by August 31.

Authorization to use a site for dumping is independent of site designation. Such authorization is granted only by a permit issued pursuant to Section 102 of the Act. In order to issue a permit, EPA must make a determination, based on information submitted by the applicant, as to whether the proposed ocean dumping will "unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities." As noted earlier, in City of New York, the court held that the Agency's conclusive presumption that materials which fail to satisfy the environmental impact criteria will "unreasonably degrade" the environment was arbitrary and capricious and not in accord with the statute. The determination of "unreasonably degrade" must consider all relevant statutory factors found in Section 102(a) of the Act. These nine (9) factors are listed in Attachment A and include an evaluation of impacts on the marine environment, the need for dumping, the availability and impact of alternate disposal methods, and the feasibility of dumping at sites off the Continental Shelf. The Agency will soon issue proposed revisions to the 1977 Ocean Dumping Regulations in response to the City of New York decision.

In determining the availability of alternative disposal methods, EPA will be faced with some rough decisions. What alternative disposal or reuse techniques are feasible in a densely populated, heavily urbanized area? What are the environmental and economic costs? What about the institutional problems? Can the waste cross State or county borders? What happens when an action (or sometimes inaction) by a State or local government agency is

inconsistent with an EPA determination? For example, a State imposed moratorium on sludge application to land. These are difficult issues, but we have been successful in the past. Many previous sludge dumpers have implemented alternative means of disposal, including recycling/reuse technology. It is our hope, given time, that many more will cease ocean dumping in the future.

There are those who claim that relocation of sludge dumping further offshore would result in an "out of sight, out of mind" reaction. Let me state that this is inaccurate. Of the roughly 100 industries which ocean dumped their wastes at the 106-Mile Site, only two remain. Even though they were "out of sight", they were not "out of mind". We intend to carefully scrutinize the applications of existing sludge dumpers. Ocean dumping will be allowed only if these applicants can demonstrate that there is a need for ocean dumping. What of new applicants? Nothing forbids a new applicant from proposing the ocean dumping of municipal sludges not now dumped. However, the "burden of proof" that such dumping will not "unreasonably degrade" the environment is entirely on the applicant.

In conclusion, therefore, though the combined effort to substantially improve the water quality of the Hudson estuary, the efforts to find alternate disposal sites for contaminated dredged materials, and our efforts to resolve the sewage sludge and other ocean dumping issues, we believe that a substantial improvement in both the estuary and the Bight Apex is attainable, and we are actively working towards that goal.

Also, our preliminary finding regarding continued ocean dumping in the Bight is that the 106-Mile Site is environmentally acceptable for the receipt of sewage sludges. The administrative process has been initiated on petitions to redesignate the 12-Mile Site and a proposed rule for final approval of the 106-Mile Site. Decisions on these proposals will be extremely difficult, but we intend to pursue them within our goal of environmental improvement in the Apex.

In addition, I wish to emphasize that site designation and permit issuance are two separate and independent processes. Site designation is a process by which it is determined that a given area of the ocean is acceptable for the receipt of a specific waste. Permit issuance is a process by which it is determined on a case-by-case basis that an applicant has demonstrated that there is a need for ocean dumping and that such dumping is environmentally acceptable.

Thank you. That concludes my prepared remarks. Dr. Anderson and I would be pleased to respond to questions.

Table 1. Estimated Contaminant Input, in Percentage Contribution Except as Noted, to the New York Bight Apex (After Ecological Analysts and SEAMOcean, 1983)

	Hudson Estuary	Dredged Material Dumping	Sewage Sludge Dumping	Other Dumping	Atmospheric Input	Coastal Discharges	Annual Load (tons/yr)
Total Solids	25.6	65.5	2.8	5.3	—	0.8	7.03×10^6
Oil and Grease	62.1	15.4	8.1	>0.1	—	14.4	206,300
Arsenic	54.7	43.1	2.1	—	0.1	—	133.5
Cadmium	55.0	31.4	8.4	0.3	0.3	4.7	105.5
Chromium	45.3	39.4	9.5	0.9	>0.1	5.0	1,636.5
Copper	41.3	45.6	11.1	0.2	—	1.8	3,002.2
Lead	48.0	40.0	9.2	0.1	1.2	1.5	2,125.9
Mercury	53.3	30.7	3.0	>0.1	—	13.0	52.5
Zinc	50.1	38.6	8.2	0.4	0.5	2.2	6,841.2

Table 2. Quantities of Materials, in Thousands Tons, Ocean Dumped at Sites Located in the New York Bight Apex (EPA Region II)

Year	Sewage Sludge Site	Dredged Material Site	Cellar Dirt Site	Acid Waste Site
1973	4578	13347	974	2762
1974	4203	10405	770	2338
1975	4270	12317	396	2083
1976	4375	9838	315	1412
1977	4485	5691	379	698
1978	4974	9821	241	1389
1979	5932	8778	107	1539
1980	7184	3422	89	1947
1981	6682	2914	0	1756
1982	7632	4742	0	833

Table 3. Facilities That Ocean Dump Their Sewage Sludges in the New York Bight Apex: 1983 (EPA, Region II)

<u>Facility</u>	<u>Quantities Dumped-1982</u>	
	<u>Wet Tons</u>	<u>Dry Tons</u>
<u>NEW YORK</u>		
New York City	3,206,000	100,553
Bowery Bay		
Coney Island		
Hunts Point		
Jamaica		
Newtown Creek		
Oakwood Beach		
Owls Head		
Port Richmond		
Rockaway		
Tall man Island		
26th Ward		
Wards Island		
Nassau DPW	413,000	12,388
Bay Park		
Belgrave		
Cedar Creek		
Inwood		
Long Beach		
Roslyn		
West Long Beach		
Glen Cove (1)	22,000	1,368
Westchester DEF	433,000	10,366
Yonkers		
<u>NEW JERSEY</u>		
Bergen County UA	289,000	9,912
Jt. Mtg. Essex/Union	421,000	10,520
Linden Roselle SA and Rahway Valley SA	269,000	7,830
Middlesex County UA	820,000	32,116
Middletown Twp. SA (2)	9,000	366
NE Monmouth Reg. SA (3)	56,000	1,910
Passaic Valley SC	1,694,000	105,227

(1) Scheduled to cease dumping by September 1, 1983

(2) Ceased dumping on January 1, 1983

(3) Scheduled to cease dumping by June 1, 1983

ATTACHMENT A

STATUTORY CRITERIA
SECTION 102(a) and (c)

- (A) The need for the proposed dumping.
- (B) The effect of such dumping on human health and welfare, including economic, esthetic, and recreational values.
- (C) The effect of such dumping on fisheries resources, plankton, fish, shellfish, wildlife, shorelines and beaches.
- (D) The effect of such dumping on marine ecosystems, particularly with respect to:
- (i) the transfer, concentration, and dispersion of such material and its by-products through biological, physical, and chemical processes;
 - (ii) potential changes in marine ecosystem diversity, productivity, and stability; and
 - (iii) species and community population dynamics.
- (E) The persistence and permanence of the effects of the dumping.
- (F) The effect of dumping particular volumes and concentrations of such materials.
- (G) Appropriate locations and methods of disposal or recycling, including land-based alternatives and the probable impact of requiring use of such alternate locations or methods upon considerations affecting the public interest.
- (H) The effect on alternate uses of oceans, such as scientific study, fishing, and other living resource exploitation, and nonliving resource exploitation.
- (I) In designating recommended sites, the Administrator shall utilize wherever feasible locations beyond the edge of the Continental Shelf.

ATTACHMENT B

GENERAL CRITERIA FOR THE SELECTION OF SITES
SECTION 228.5

(a) The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.

(b) Locations and boundaries of disposal sites will be so chosen that temporary perturbations in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery.

(c) If at anytime during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in §§228.5-228.6, the use of such sites will be terminated as soon as suitable alternate disposal sites can be designated.

(d) The sizes of ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and permit the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as part of the disposal site evaluation or designation study.

(e) EPA will, wherever feasible, designate ocean dumping sites beyond the edge of the Continental Shelf and other such sites that have been historically used.

ATTACHMENT C

SPECIFIC CRITERIA FOR SITE SELECTION
SECTION 228.6

(a) In the selection of disposal sites, in addition to other necessary or appropriate factors determined by the Administrator, the following factors will be considered:

- (1) Geographical position, depth of water, bottom topography and distance from coast;
- (2) Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile phases;
- (3) Location in relation to beaches and other amenity areas;
- (4) Types and quantities of wastes proposed to be disposed of, and proposed methods of release, including methods of packing the waste, if any;
- (5) Feasibility of surveillance and monitoring;
- (6) Dispersal, horizontal transport and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any;
- (7) Existence and effects of current and previous discharges and dumping in the area (including cumulative effects);
- (8) Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance and other legitimate uses of the ocean;
- (9) The existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys;
- (10) Potentiality for the development or recruitment of nuisance species in the disposal site; and
- (11) Existence at or in close proximity to the site of any significant natural or cultural features of historical importance.

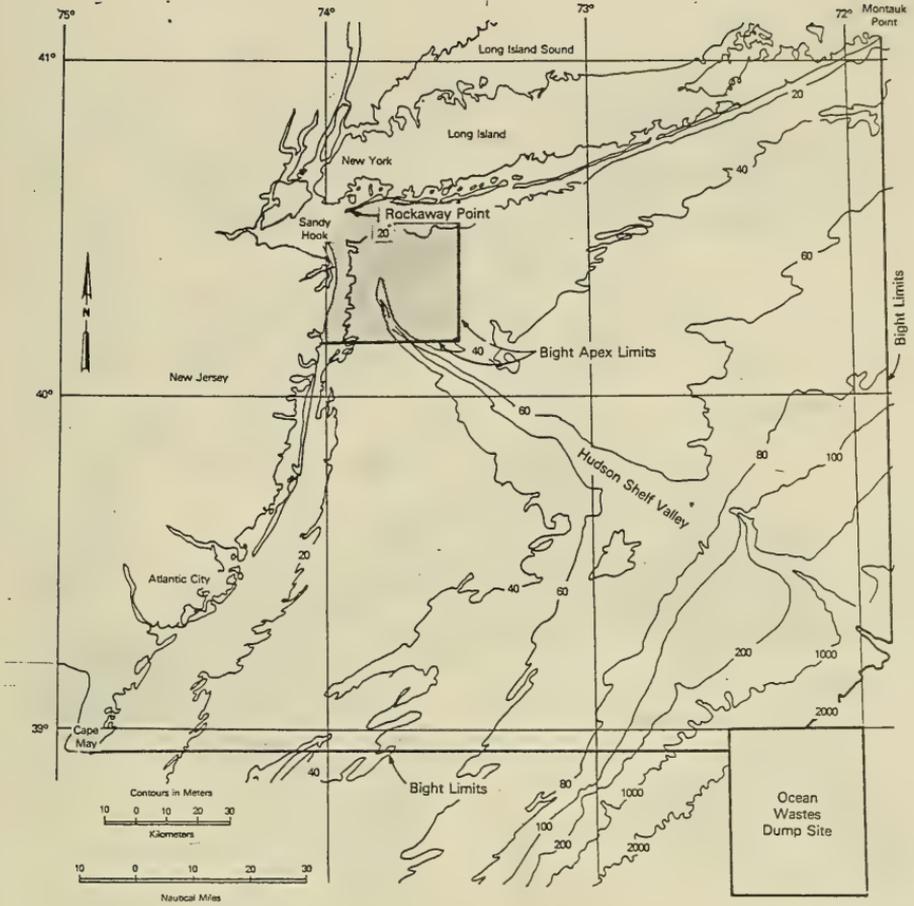
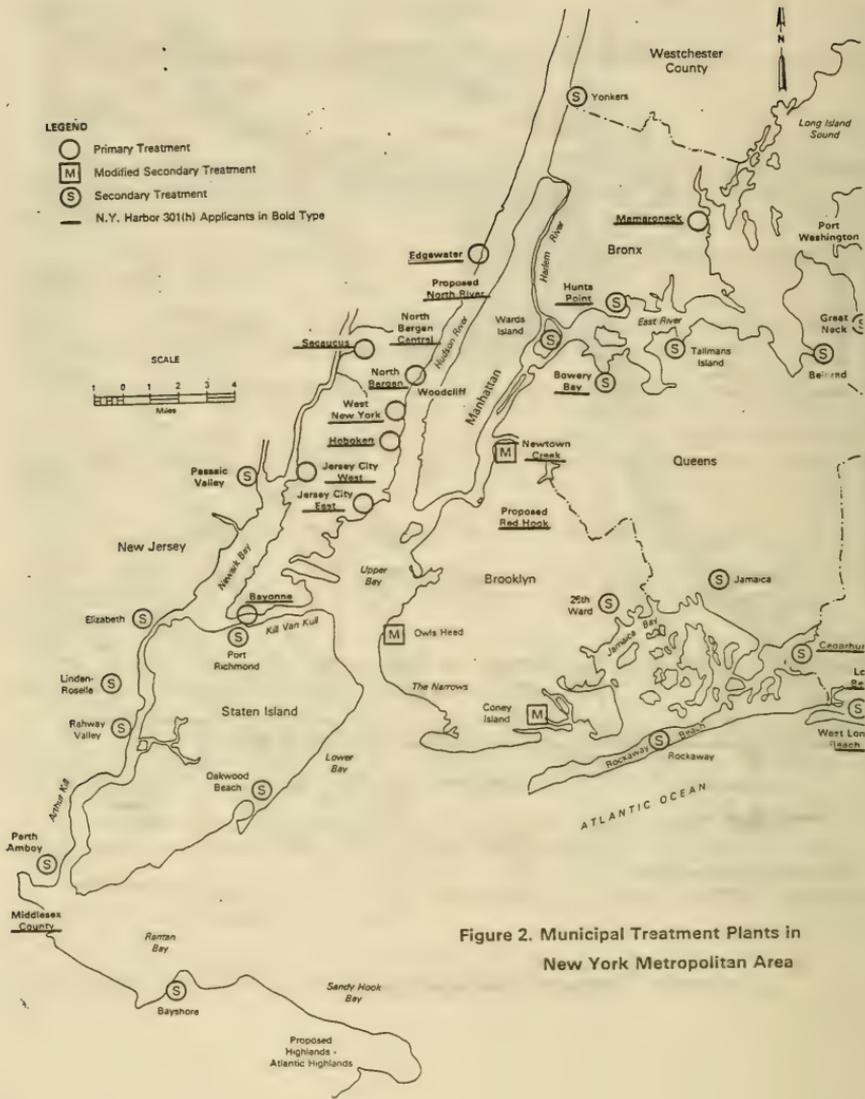


Figure 1. The New York Bight



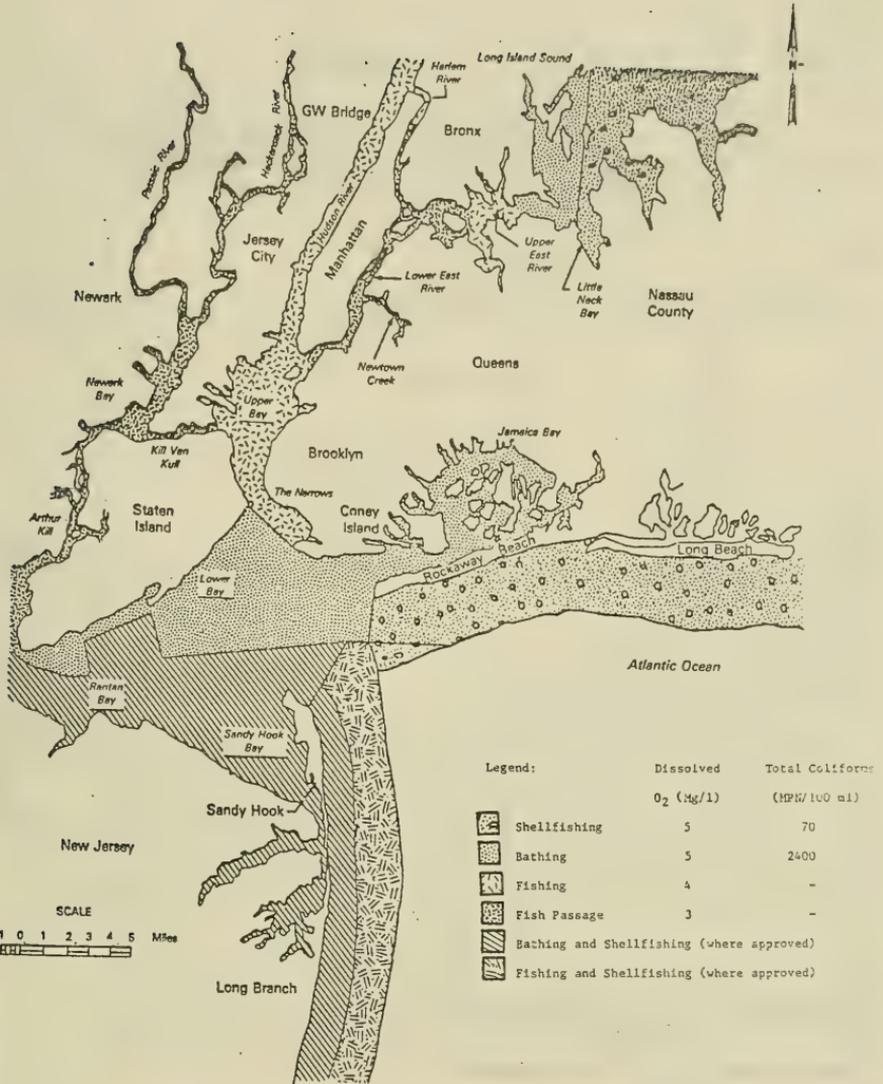


Figure 3. Water Quality Classification and Critical Standards for the New York Bight Apex

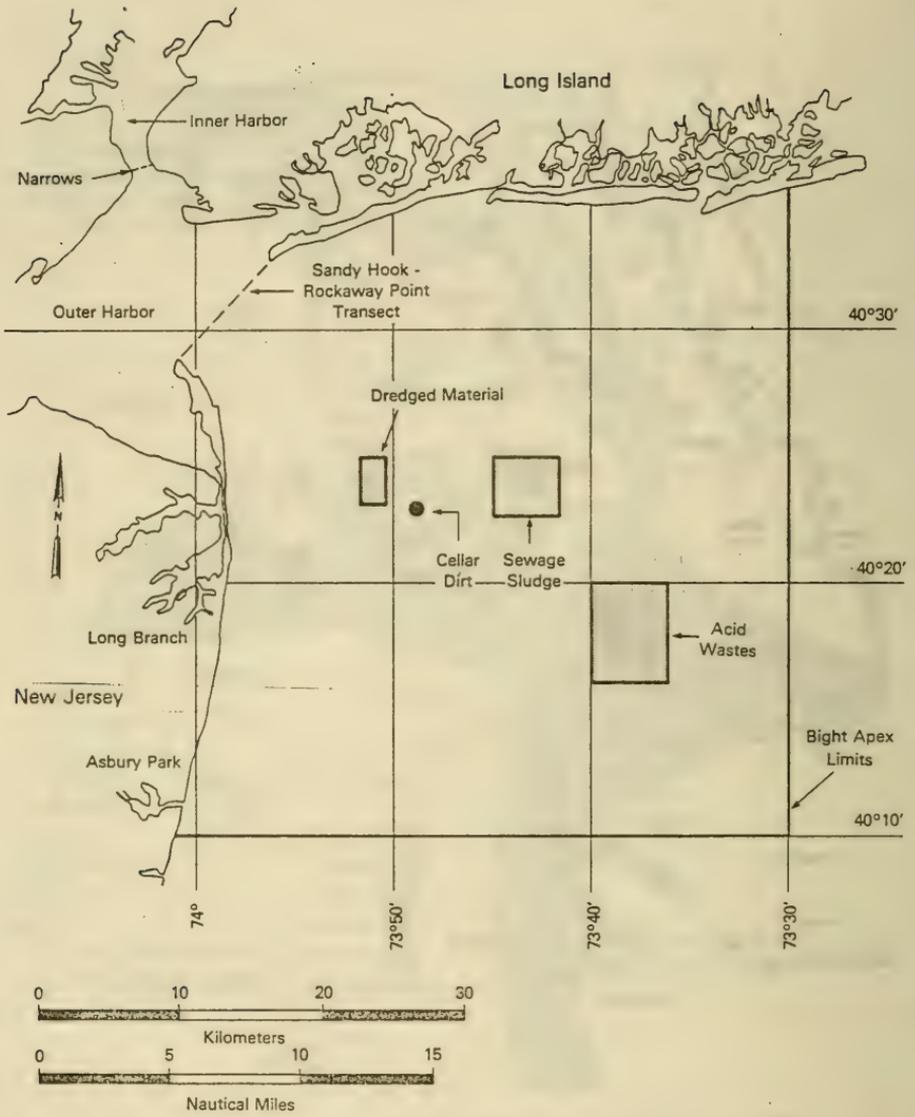


Figure 4. Bight Apex and Existing Dump Sites

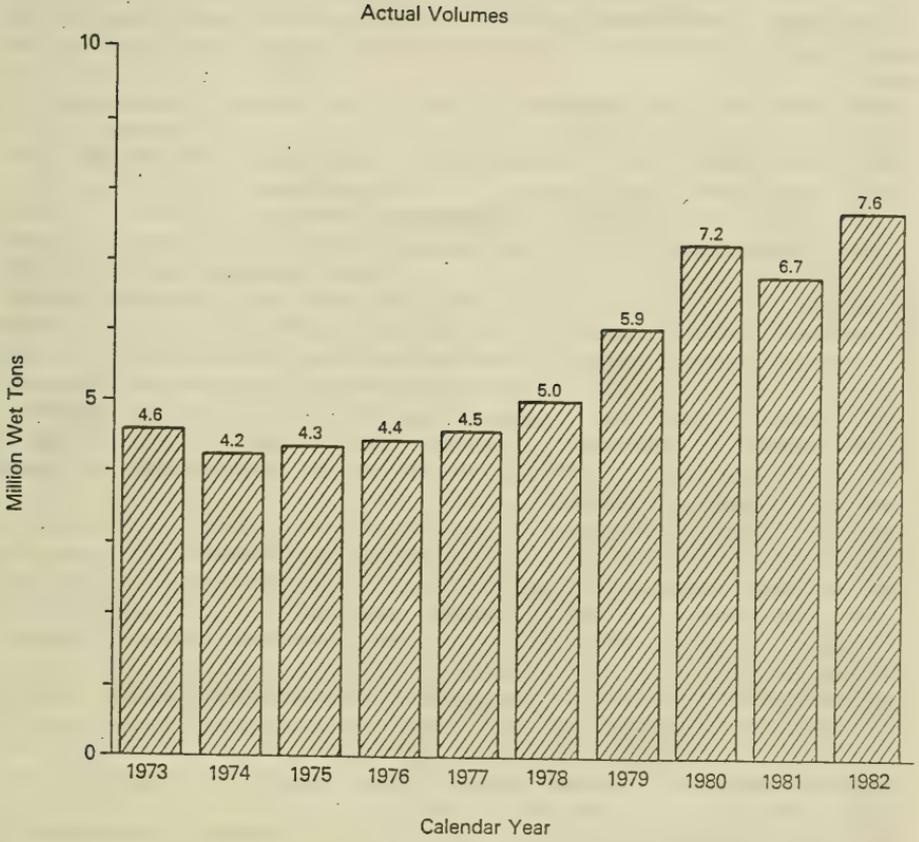


Figure 5. Ocean Dumping — Municipal Sludge, 1973-1982

Mr. D'AMOURS. We thank you, Mr. Schatzow, and thank you, Mr. Ehler.

To get right into it, I understand from your testimony, and I would just like to make this absolutely clear, you both did say in your testimony that stopping the dumping at the 12-mile bight apex site would result in improvement of that site and a cleansing of that site, did you not? I raise this specifically because I understand that New York City is going to testify here later, given their written submitted testimony, that there would be no significant improvement in the site even if dumping were halted at the 12-mile site.

Do I take it you both disagree with the city's testimony since you both say in your testimony that if dumping were stopped at the 12-mile site, there would be improvement in the condition of that area?

Mr. Schatzow, would you go first on that since I think you just said it a few minutes ago.

Mr. SCHATZOW. Yes. I think again it depends on the words. You said cleansing of the site.

Mr. D'AMOURS. Cleansing and improvement.

Mr. SCHATZOW. We testified clearly there would be improvement. We testified again, I think, it is difficult to isolate the sewage sludge dumping at the 12-mile site and specifically measure in any quantitative way the exact level of the improvement. I think what we testified to and what NOAA has testified to is that there are a variety of other efforts underway and the combination of these efforts, that it would be in terms of control of a variety of different point sources, control of nonpoint sources and control of ocean dumping sewage sludge, better handle on dredge material, will give us very significant improvement.

Mr. D'AMOURS. So you believe there are actions that can be taken with respect to all of these pollutant sources? The jurisdiction of these subcommittees is limited to the dumping.

Mr. SCHATZOW. I think our point was that not only could there be action taken but most of the actions have been taken. They are underway.

Mr. D'AMOURS. But the question is we can't improve the area if we don't stop dumping, can we?

Mr. SCHATZOW. I don't think we said that.

Mr. D'AMOURS. I am asking you now, asking you to testify now as to that.

Mr. SCHATZOW. My answer would be that we will have significant improvements with the various point source and nonpoint source controls. I am unable at this point to say that there is any specific one of these sources that if not controlled, the precise impacts of not controlling any of these particular sources.

Mr. D'AMOURS. You are saying they should all be controlled?

Mr. SCHATZOW. Yes, I am.

Mr. D'AMOURS. Would you reply to that, Mr. Ehler.

Mr. EHLER. My response would be similar.

Mr. D'AMOURS. Would you label it a significant improvement? Or would you call it an insignificant improvement?

Mr. EHLER. Again, we testified that mass loading from ocean-dumped materials for most pollutants is less than 10 percent. The

associated improvement in environmental quality would probably also be in that range. It is difficult to pinpoint it to exact percentages of improved quality. But certainly there would be an improvement.

Mr. D'AMOURS. The gentleman is going to have his own time, but if there is something that needs to be said, I would yield to the gentleman from New Jersey.

Mr. FORSYTHE. Just for a moment. I think Mr. Ehler said that sludge dumping is perhaps 10 percent of the pollutant problem. If you don't do something about the other 90 percent, it may be difficult to detect a 10-percent improvement.

Mr. EHLER. That is correct.

Mr. D'AMOURS. In 1981, NOAA testified that, "Nearly one-fourth of the PCB's and nearly half of the mercury entering the bight come from sludge dumping."

Now, you testify here today that the amount is considerably less. What happened in the last few years to change this?

Mr. EHLER. We have obtained additional data. I think the testimony in 1981 was based on our 1976 studies, which as we testified today, have been updated continually. If you would like a more complete explanation of the changes in those numbers, I would defer to one of my associates.

Mr. D'AMOURS. I would very much like that. My time for questioning has expired. We have a vote now, but I think that will allow some of the 5-minute rounds to continue before that vote.

I will recognize Mr. Forsythe.

Mr. FORSYTHE. Thank you very much.

I thank both NOAA and EPA for your testimony this morning. I guess the thing that impresses me is that if we look solely at sludge dumping at the 12-mile site as the major problem for the bight, we are fooling ourselves. Unless we undertake comprehensive control measures, addressing all sources of contamination into the bight, we are going to do little by mandating elimination of the 12-mile site for sludge dumping. Is that right?

Mr. SCHATZOW. I think that is generally true. I guess one of the things to point out is that if you look at the bight apex area, we are dealing to some extent with some geographical differences, that is to say that the estuarine inputs, river inputs are those closer to the shore so I think we would just by eliminating the sludge dumping itself see some significant improvement in the more eastern area of the bight where the sludge dumpsite is located, that that improvement is somewhat independent of the control of the river estuarine inputs.

I would emphasize again, though, and where I guess I get concerned about comprehensive studies is that the mandate to control the other sources, particularly the river estuarine sources, is there in the Clean Water Act. Those efforts are underway to a very substantial extent. So I guess I get somewhat nervous when people say let's do a big study, because I think the question of the dredge material which is contributing a significant mass loading, as we attempted to point out in our testimony, the combination of the packing of that material, the inorganic form of it, means that we think it probably has a lesser contribution in volume than suggested.

Mr. FORSYTHE. Mr. Ehler, would you agree generally with that?

Mr. EHLER. I would agree with you, Mr. Forsythe, that in fact the integrated strategy would be a desirable goal. I would clarify that by saying, I think as Mr. Schatzow said in his testimony, that in fact the basic components of that strategy do exist within existing laws and regulations. We could obviously do a better job of putting them together.

Mr. FORSYTHE. There are a few major problems that will be difficult to solve, such as contamination input from surface runoff and combined storm and sewage systems. The latter situation alone would be a massive problem to resolve.

If we stopped dumping at the 12-mile site I believe there will be a change there. How significant it is, in terms of the total bight, is debatable. My main thrust is that I think we have wasted a lot of time around here on maybe 10 percent of the problem and perhaps we want the other 90 percent to be addressed too.

Before my time runs out, Mr. Chairman, I would like to ask you, Dr. Anderson, as to the status of my request to EPA to hold a hearing in Toms River, N.J., concerning site designations once tentative determinations have been made. Can you respond to that request?

Mr. ANDERSON. I have been authorized by my regional administrator to grant that request, that we will schedule a hearing in Toms River with your assistance after the agency does publish its decisions with regard to the 12/60 issue.

Mr. FORSYTHE. Thank you.

I guess we will have to break.

Mr. D'AMOURS. We will break pending the vote.

I would request that members come back immediately after having voted and I intend to resume the questioning immediately upon my return.

[Brief recess.]

Mr. D'AMOURS. The hearing will be in order.

Mr. Forsythe's questioning is terminated on this round. The questioning now turns to the gentleman from New Jersey, Mr. Hughes.

Mr. HUGHES. Thank you, Mr. Chairman.

I, too, want to welcome the members of the panel to the hearings. As I understand the bottom line for the testimony of both EPA and NOAA, is that at least the preliminary recommendation is that we close down the 12-mile site and move the site out to the 106-mile limit? Is that the bottom line basically?

Mr. SCHATZOW. Well, Mr. Hughes, I think the bottom line is that we believe from an environmental point of view that the 106-mile site is an environmentally preferred site.

Mr. HUGHES. The statute you would concede has a built-in bias for the deepwater site.

Mr. FORSYTHE. Certainly, Congressman, as we noted in our testimony, the statute shows a preference for sites beyond the Continental Shelf.

Mr. HUGHES. From the scientific standpoint, you concur with that bias, everything else being equal?

Mr. SCHATZOW. I will turn to the scientists, but I think it is true in this case.

Mr. EHLER. Yes.

Mr. HUGHES. I didn't hear all the responses to the chairman of the committee, but he was pursuing an area dealing with just what impacts sludge has in the overall bight area. I think everybody acknowledges that sludge is one of the polluters, one of a series.

Mr. SCHATZOW. Right.

Mr. HUGHES. A series of acts take place everyday which contribute to the distress of the New York Bight.

In the past, the testimony has been we are not really certain with any of the scientific aspects of it as to how much each of the different media contribute. We don't know how much runoff contributes, we know it contributes to the pollution in the bight, though. We don't know how much the raw sewage may contribute, but it is contributing.

Mr. SCHATZOW. I think we have been able in the past as we have today been able to give reasonably good estimates in terms of each of these sources in terms of weight or volume of representative interests.

Mr. HUGHES. But they are estimates. We can't with certainty tell how much sludge is contributing. But we have estimates.

Mr. SCHATZOW. No, I think we are fairly close. Again, I think we are close within a range that is adequate to give that information. That doesn't answer the question, obviously, Congressman, of if we take out one source what will be the level of improvement? We can say if you take out one source that we can get rid of x percent of the PCB's or get rid of x percent of solids.

To go from that point and say, OK get rid of x percent of the PCB's, what does that mean in terms of aquatic life or what does it mean in terms of the environmental improvement, that is a much more difficult task.

Mr. HUGHES. You anticipated where I was trying to take you.

Mr. SCHATZOW. But the numbers we have are generally fairly good. I don't think there is substantial disagreement within the ranges we are talking about when we say it is sewage sludge dumping at about 10 percent, it doesn't seem to me we have to do a hell of a lot more studies to figure out whether it is really 7 percent or 9 percent. I don't think that is relevant.

Mr. HUGHES. I think that you probably have summarized what I think is a fair statement, but the point I am aiming for—and you have anticipated it—is the question of how much are we going to improve the New York Bight if we cease dumping sewage sludge? Is it going to be a substantial improvement? Is it going to be a significant improvement?

Mr. SCHATZOW. Again, I guess my perception is those are terms of art and I don't know scientifically if we can define them well. I think what we have said, what NOAA has said, is that the combination of a variety of cleanup activities, many of which are statutorily required under the Clean Water Act in terms of pretreatment programs and point source controls as well as getting a better handle on dredge material dumping and by moving the—stopping the sewage sludge dumping at the 12-mile site, that the combination of these activities gives us a very significant improvement in the water quality and uses of the bight apex.

Mr. HUGHES. My 5 minutes has expired. I will approach the next round from another perspective.

Thank you.

Mr. D'AMOURS. I thank the gentleman from New Jersey.

The gentleman from Delaware, Mr. Carper.

Mr. CARPER. Thank you, Mr. Chairman. I want to welcome the panel and publicly thank the members of the panel who were at Rehoboth earlier this month for the hearing and for your cooperation in extending to the citizens of my State of Delaware the opportunity to be heard on a very important issue to us.

There was mention during Mr. Schatzow's testimony of the proposed separation of dumping of industrial wastes in one portion of the 106-mile site and dumping of sewage sludge in another portion of the site. With that background, I would ask the following question: The ocean-dumping criteria specify that sites designated for ocean dumping of dredge materials shall be used only for the ocean dumping of dredge material. Is there a reason for restricting use of a site to a particular class of waste materials?

Both Mr. Ehler and Mr. Schatzow, if you would comment on that.

Mr. SCHATZOW. I think there are two types of responses. I think first of all different types of materials have different types of potential for environmental deregulation which makes different sites acceptable or not acceptable for different types of materials. I can give you examples of that.

In addition to that question, I think the other point is that in terms of monitoring and monitoring impacts, it is preferable to separate site designations so that when you are monitoring, you know what you are monitoring, if a problem is caused, you know where the problem is coming from.

Mr. EHLER. I would agree there is some need to keep the wastes somewhat separate from the standpoint of monitoring. Once you have dumped things in the water column in proximity to each other, they are difficult to separate out.

Mr. CARPER. What magnitude of separation are we talking about at the 106-mile site?

Mr. SCHATZOW. The 106-mile site is a very large site. It is 450 square miles. So I think what we are talking about is different quadrants, and again we are working on that right now with NOAA in terms of defining some much smaller site boundaries and clearly isolating the two sites.

Mr. CARPER. Mr. Ehler and Mr. Schatzow, in your testimony you acknowledged that the long-term effects of ocean disposal at the 106-mile site are generally unknown and therefore careful monitoring must be undertaken. The EPA notice of the proposed designation of the site proposes a 5-year environmental study. There is an obvious need for this and substantial cause to question whether it can be done adequately and we must have details of the monitoring plan for the site.

What sort of monitoring program do you have in mind for the 106-mile site? I know you spoke to this briefly in your comments, but could you elaborate just a bit.

Mr. SCHATZOW. Dr. Anderson.

Dr. ANDERSON. In developing the monitoring plan, our current strategy is to base the monitoring strategy on the MARMAP, and maybe Mr. Ehler can help me with what the acronym is for. It is a

program that has been in effect by the National Marine Fisheries Service for over 20 years along the North Atlantic coast looking at the impacts of overfishing and environmental aspects on the fishing resources on and just off the Continental Shelf. This plan would be added to in terms of additional studies of environmental aspects. Most of the MARMAP's work has been in terms of fisheries and in terms of catch rather than environmental aspects, but we can add to that. Going on into specific wastes that are being or are proposed to be dumped, we would add to the monitoring plan such evaluations necessary for those specific wastes.

Mr. CARPER. When will those actually be spelled out?

Dr. ANDERSON. We would spell it out prior to our final determination on site determination.

Mr. CARPER. Thank you.

Mr. SCHATZOW. Congressman, we would be happy when we have that plan together after we have met with NOAA and with the States, to brief you personally or brief the committee on that plan and get your reaction and ideas about it before we made that plan final. We would be happy to do that.

Mr. CARPER. Thank you for that.

What would be NOAA's and EPA's responsibilities under that monitoring program? Mr. Ehler?

Mr. EHLER. Again, I think it is a little premature to spell out the specifics of that plan because we have not worked out the details. Our contribution to such a program would initially be the continuation of certain kinds of monitoring programs that we currently have in that area. Pete Anderson mentioned the MARMAP program; that is the stock assessment program, potentially of use to assessing the long-term, large-scale effects on fishery resources. We have had the northeast monitoring program working in the region for 3 years. We would certainly build on the baseline data that program has established.

Mr. CARPER. Thank you, Mr. Chairman. I would like to return to this line of questioning. My time is expired for now.

Thank you.

Mr. D'AMOURS. Thank you, Mr. Carper.

Gentlemen, I would like to return to the question I referred to earlier and the question Mr. Hughes got into to some extent. New York City essentially is saying, "Look, if you stop dumping at the 12-mile bight apex site, there will be no significant improvement to that area." I take it you are saying that New York is incorrect because NOAA is recommending and EPA seems to be on the verge of recommending a cessation of dumping at the 12-mile site.

The quantification of the pollution caused by dumping is therefore critical. If New York is correct and there is no quantifiable, no substantial, no significant improvement ecologically to the area if you stop dumping, that is one thing.

If they are not correct, it is quite another.

Now, how do you respond to that? I can't seem to get anybody to agree that there would be a significant improvement. The figures that this committee has been given have varied. In 1981, NOAA was saying that.

Over 40 percent of the mercury entering the bight came from sludge dumping and 25 percent of the PCB's came from sludge

dumping. Now, 20 years later, EPA indicates in table No. 1 of its submitted testimony that the estimated contaminant input in percentage contribution, which I understand, was prepared by New York City consultants, went all the way down to 3 percent in terms of mercury.

There is no figure for PCB's. But that is an enormous jump in a few years. I just think it is extremely difficult for this committee to act when we seem to be dealing with figures that change radically and are very slippery. What is the answer to this? How do we determine whether or not stopping dumping in the bight apex would or would not significantly improve the area, and have you concluded that it would significantly improve it?

Could you answer that? Could you answer first the question or have you concluded there would be significant improvement if we stopped dumping?

Mr. Schatzow, could you answer that?

Mr. SCHATZOW. Mr. Chairman, I have tried to answer it a number of times.

Mr. D'AMOURS. I know that and I have been listening to the answer to that question for a number of years and I still don't get an answer.

Mr. SCHATZOW. I am not sure I can answer it better. I am not sure it is a question of numbers. Whether mercury from sewage sludge is 10 or 25 percent of the mercury contribution to the bight, I don't think we are prepared to tell you to convert to environmental terms as we discussed with Congressman Hughes, what exactly that means.

What exactly it means in environmental terms to decrease the amount of mercury going into the bight by 10 or 25 percent. I don't know that.

It is very difficult scientifically to do that, to be able to plot those kinds of numbers——

Mr. D'AMOURS. If you don't know that, how can you make a determination that we should cease dumping?

Mr. SCHATZOW. Well, we have not made the determination that we should cease dumping. I think what we have presented in our testimony, Mr. Chairman, is a notion of a variety of sources to the bight and to the pollution of the bight and a variety of programs that are underway to substantially reduce that pollution and an expectation with coordination in development of those different responses we will see a very significant reduction in pollutant loads and a significant improvement in the water quality of the bight.

Mr. D'AMOURS. Mr. Ehler, how would you approach that?

Mr. EHLEER. Let me approach that shortly after I explain the differences in PCB contaminant loadings. From the time our initial study took place in the mid-seventies and was published in 1978, significant controls have been placed on the use of PCB's both in terms of pretreatment in municipal sewage treatment plants and bans of PCB's in industrial operations. So I think the reason we see significantly reduced levels of PCB's is simply that we have caused that to happen through regulations and law.

In terms of the specific improvement in environmental quality from a given single action such as a cessation of sewage dumping, again I have to say what we have all said before. It is very difficult

to quantify that down to exact figures. We know that if 10 percent is significant, and if we took 10 percent away, we would see a significant improvement. If 10 percent were not considered significant, then obviously we wouldn't define the result as significant.

Mr. D'AMOURS. I appreciate those answers. Do I understand that in response to the question from Mr. Hughes, you indicated that NOAA was advocating cessation of dumping at the apex?

Mr. EHLER. Yes.

Mr. D'AMOURS. Thank you.

Mr. Forsythe.

Mr. FORSYTHE. Thank you, Mr. Chairman.

First, Mr. Schatzow, could you give us your schedule for action on the designation decisions on a site-by-site basis?

Mr. SCHATZOW. I can give you my—I have given this committee so many schedules in the past I hate to give any more.

Mr. FORSYTHE. We will accept a tentative schedule,

Mr. SCHATZOW. Tentative, my personal schedules, we would have in terms of the 12- and 60-mile site, we would expect to have the task team recommendations as I mentioned, by the end of August. We would hope to have a proposed decision in the Federal Register by November and plan to hold a public hearing or number of public hearings obviously including the one that you have requested at Toms River, in December, and have a final decision in the Federal Register by March 1984.

Mr. FORSYTHE. Thank you for the 12-mile and 60-mile site schedules. What about the 106-mile site schedule?

Mr. SCHATZOW. The 106 would be at least as rapid and might be done in conjunction with that or could be done more rapidly.

Mr. FORSYTHE. At the present time, am I correct in assuming that the decision on the 106-mile site is nearer to completion?

Mr. SCHATZOW. We have a proposal obviously out on 106. We have had public comment, we have had a public hearing. Our next step is final designation. The question becomes whether we will go ahead with the final decision on the 106-mile site or whether we will wait and make the decision jointly with the 12 and 60. But it will be no later—the 106-mile site decision will be no later than the decision on the 12 and 60.

Mr. FORSYTHE. Thank you.

In your testimony dealing with bacterial contamination, I think you referred to the point that if there is any active bacterial contamination existing in sewage sludge as deposited, there definitely has been a failure in the treatment process. Would that be a correct statement?

Dr. Anderson?

Dr. ANDERSON. Mr. Forsythe, no, the treatment process that is presently used by most of the generators of sludge is disinfection for the effluent to the river but not disinfection of the sludge.

Mr. FORSYTHE. So there is no final chlorination treatment, for instance?

Dr. ANDERSON. There is some digestion which does take care of some of the pathogens but not all.

Mr. FORSYTHE. I just want to make sure I understood what you referred to in that area.

Thank you very much, Mr. Chairman.

Mr. D'AMOURS. Mr. Hughes.

Mr. HUGHES. Thank you, Mr. Chairman.

Just to pick up again on the colloquy concerning the Federal input into the New York Bight Apex. I wonder if you can tell me where the contaminant input estimates found on table 1 of your statement came from, Mr. Schatzow?

Mr. SCHATZOW. The contaminant estimates that are found on table 1 came from SEAM Ocean Motion, a consultant to New York City. They have not been at this point peer reviewed by EPA or by NOAA. They take off from an original study done in 1976 by NOAA and they will be—EPA and NOAA will be scrutinizing this material.

Mr. HUGHES. Why do we have to rely on a consultant for the city of New York? Don't we have an independent source of data that would give EPA and NOAA direction on this total input question?

Mr. EHLER. Yes, we do. We have our own work in this area. To my knowledge the numbers presented in this table are not significantly different.

Mr. HUGHES. Do you have a copy of the table?

Mr. EHLER. Yes, I do.

Mr. HUGHES. I wonder if we can make that part of the record, Mr. Chairman.

Mr. D'AMOURS. Without objection, I am sure we can.

[A copy of the table was not available at the time of printing.]

Mr. HUGHES. You say the table represents no significant difference?

Mr. EHLER. I would not say we have rigorously examined the table. I might ask Hal Stanford. The table does appear in the EPA testimony. We have not reviewed it from—

Mr. HUGHES. How about EPA? Will you review the previous criteria and compare that with the consultant's testimony?

Mr. SCHATZOW. As I believe I mentioned in my testimony, this is part of the volumes and volumes of material that we received from the municipalities in the beginning of May. We have not yet had the opportunity to give that material more than a cursory view. We will obviously look at it and review it carefully before we make the tentative decision in terms of the 12- and 60-mile sites.

Mr. HUGHES. Does EPA or NOAA have any way of independently verifying this criteria? It is critical to this whole case being made. It seems to me that we have quibbled about what is substantial and what is significant and now we find that we are comparing it with some information supplied by a consultant to the city of New York. That gives me some concern. Don't we have any way of independently attempting to verify what is the contaminant input?

Mr. SCHATZOW. We do and we will. I guess what I am saying is we have not done it to this point. The point Bud Ehler just made was those general numbers are within the general range of our previous estimates and our—NOAA's previous estimates from NOAA's work. Hal, you may want to respond.

Mr. HUGHES. My time is running out. Let me move on. I have to presume that under the criteria established by EPA, whatever dumping takes place at the 106-mile site will be reasonable deregulation, obviously, you will not prevent unreasonable deregulation.

Now, compare for me if you will the prospective deregulation that will take place at the 106-mile site with that which has already taken place at the 12-mile site. Using that as a standard, is the 12-mile site unreasonable?

Mr. SCHATZOW. Well, I would—we have tried to refer the Congressman to our testimony where we tried—

Mr. HUGHES. Don't waltz around the maypole on me. I am asking a very direct question. You know, you hesitate to classify anything as reasonable or unreasonable. We argue about whether or not we are going to factor in economic circumstances. I am asking you from a—maybe Mr. Anderson has to answer the question.

Mr. SCHATZOW. Maybe I can answer it somewhat differently or try to.

Mr. HUGHES. Try to be direct, if you will. I don't have a lot of time.

Mr. SCHATZOW. I will try to be direct. I believe if we were approaching this issue fresh, in other words, if there had not been dumping at the 12-mile site in the past, if there were not the other contaminants' contribution to that area, and we were looking at the question of does the 12-mile site meet our criteria in terms of an appropriate site for the ocean dumping of municipal residues and sewage sludge, the answer would be it does not.

Mr. HUGHES. That is fair enough.

Now, does the 106-mile site represents less direct risk to the population centers along the coast or more than the 12-mile site?

Mr. SCHATZOW. I think because of the distance from shore and because of the fact that there is not a commercial fishery in the area, for a variety of reasons, it represents less risk.

Mr. HUGHES. That wasn't too painful, was it?

Thank you, Mr. Chairman.

Mr. D'AMOURS. Mr. Dyson, do you have further questions?

Mr. DYSON. My first questions, Mr. Chairman.

How can you say less risk at the 106-mile site when you admitted this morning yourself you have not even had that much opportunity to monitor it and I believe you did indicate to Congressman Carper that is what you would do if this permit process is successful? I understand it would mean final release in March 1984.

Mr. SCHATZOW. Well, I—

Mr. DYSON. I share the concern of my colleague from New Jersey about the New York Bight, but—

Mr. SCHATZOW. We went over in some fairly great detail at public hearings in Rehoboth the testimony from a number of different scientists reporting both on the monitoring that had been done at the 106-mile site in terms of the industrial waste dumping, as well as a substantial amount of information dealing with oceanographic processes—

Mr. DYSON. That is a case by case basis. Dumping is approved on a case-by-case basis.

Mr. SCHATZOW. That is correct.

Mr. DYSON. Whereas the rule EPA proposed would open that to, I assume, the same fashion the way the New York Bight is open?

Mr. SCHATZOW. I am sorry you missed my testimony, Congressman, because I think it was made very clear that there are two separate decisionmaking processes and any designation of the 106-

mile site for ocean dumping of municipal residues would not give anyone permission to dump there. In order to make that determination, we will go through a case-by-case permitting as we now do at the 106-mile site for industrial dumpers.

I think the general point I was making was that we have substantial amounts of information on the characteristics of the 106-mile site, of what is there biologically, where the currents go and don't go, the pollution we get, the buildup and potential buildup, which enables me to say it is "less risk."

Mr. DYSON. That leads to another question. Fifteen days ago at the hearing in Rehoboth Beach—and I was not able to be there because we had a full committee markup that morning in this committee—but the State of Maryland testified that the State is opposed to the dumping there at the 106-mile site, but not strongly opposed. But they are strongly opposed to the general designation of the 106-mile site as a municipal sludge dumping site.

Their concern is about potential dumpers such as this city, Washington, D.C., possibly Philadelphia and others, who might apply for permits which again, the individual representing our State said, that Maryland would strongly oppose that.

I think it would be well documented that the Coast Guard doesn't have the resources to adequately monitor even some of the current ocean dumping activities, and that spills are certainly commonly accepted risks associated with ocean dumping. My question is—that sludge dumping permits to the city of Washington, for instance, would present a very clear and present danger to the environmental capacity of the Chesapeake Bay since they would have to travel down the Potomac and use the bay to reach the site.

Has the District of Columbia expressed an interest in a permit for that area?

Mr. SCHATZOW. The District of Columbia has submitted to EPA Region III a preliminary application. It is an incomplete application.

Mr. DYSON. For dumping at the 106-mile site?

Mr. SCHATZOW. For dumping at the 106-mile site. It is not clear to me the extent to which they are now pursuing it. In order to pursue it, they would have to provide a substantial amount of information which has not yet been provided to the agency before the agency would even consider it.

Mr. DYSON. Clearly, you are more aware than I that they have had tremendous problems at Blue Plains with trying to dispose of their sludge properly and in fact they have approached local governments in my district, Queen Annes County, Charles County, Md., and numerous others about land disposal. None of those have been accepted, both by the county government and I believe not by you, either. So they have a critical problem here in this city.

My question is, of course, as you can appreciate at a time when we are attempting to clean up the Chesapeake Bay, the transportation of sludge from here in the city and out into the site presents difficulties. That will be my question since I know we are coming to a vote.

Mr. SCHATZOW. Again, that is something that would be of very great concern to us as well and that is something that would be addressed in the permit process assuming that Washington, D.C.,

pursued its permit application. As I said, it is unclear to me that they are actively pursuing it.

Mr. DYSON. Mr. Chairman, if I could just have one short question. I know you don't have time to enhance that answer now, but if you would for the record explain how that all works out, what EPA is going to look at on the transportation, and I understand you are concerned, but I need more than just concern.

Mr. SCHATZOW. I would be happy to respond for the record as to the exact status of Washington, D.C.—

Mr. DYSON. Or others, Philadelphia, whatever.

Mr. SCHATZOW. Philadelphia has not applied. I will respond for the record as to what our review process is.

[See question 2 of insert on p. 328.]

Mr. DYSON. Thank you, Mr. Chairman.

Mr. D'AMOURS. I would like to continue the questioning with Mr. Carper because that may allow us to move on after Mr. Carper's questioning to the next panel.

I don't mean to curtail any further questions, but unless I am advised by other members of the subcommittee that they have further questions for this panel, I will recognize Mr. Carper for his 5 minutes of questioning. This will give him time to make the vote which is, by the way, a recorded vote on the rule of the supplemental appropriations.

There being no objection to that, I will now recognize Mr. Carper and then we will terminate this panel.

Mr. CARPER. Thank you, Mr. Chairman.

I would like to follow up on the line of questioning I pursued earlier. We were talking about the monitoring plan for the sites being designated. I was asking the witnesses for their comments regarding NOAA's and EPA's responsibilities under the monitoring plan. I understand that this monitoring plan would be tied to the larger Northeast monitoring program. Given that monitoring at the 106-mile site will require additional ship time and that additional research facilities will be necessary to adequately assess contaminant effects of the organisms of that area, could you give me some idea of what the magnitude of the costs are that we are talking about?

Mr. EHLER. Again, Congressman, without working out the details of that plan, it is difficult to estimate the costs. Initially we would certainly try to make maximum use of our existing monitoring program in that area, which you correctly stated is the Northeast monitoring program. We would want to visit the sites more frequently, and we will make tradeoffs probably from other stations that we currently sample. There are, I believe, 140 stations in the Northeast monitoring network.

I suspect that we could probably establish a fairly rigorous monitoring program without significant additional resources.

Mr. CARPER. How much was requested in the fiscal year 1984 budget for the Northeast monitoring plan?

Mr. EHLER. The Northeast monitoring program is funded at the level of approximately \$2 million; \$1.2 million comes from the National Marine Fisheries Service and the National Ocean Service contributes roughly \$800,000.

The \$800,000 NOS contribution has been identified as one of the cuts we would make in the 1984 budget. That is not to say that no

money would flow to the Northeast monitoring program because we would obviously make tradeoffs in terms of other kinds of research that we support.

Mr. SCHATZOW. I might note, Congressman, that the administration has requested authority for a general user fee system which would raise additional money for just exactly this kind of purpose, for the purpose of site designation and monitoring. So if this committee were to take favorable action on the administration's request—

Mr. CARPER. Has legislation been submitted for that purpose?

Mr. SCHATZOW. The administration has submitted legislation, yes.

Mr. CARPER. To whom?

Mr. SCHATZOW. To the Speaker, and to this committee.

Mr. CARPER. OK.

Mr. SCHATZOW. March 15.

Mr. CARPER. What effort is underway between EPA and the Coast Guard to insure adequate surveillance of ocean dumping activities, especially in the event that the 106-mile site is ultimately designated?

Mr. SCHATZOW. We have had conversations with the Coast Guard, we mentioned some of the techniques to be used. The other thing we are discussing with the Coast Guard is the possibility of requiring ship riders to be on all the vessels that go out to the 106-mile site or at least some representative number of those independent ship riders that would be paid for by the dumpers and yet would report directly to the Coast Guard.

Mr. CARPER. Finally, I understand that EPA has given to New York City and northeastern New Jersey municipalities which are still dumping substantial amounts of money to develop land-based alternatives. Could you give us your assessment as to why those options are not being pursued?

Mr. SCHATZOW. In 5 minutes? I am not sure. I think they vary from municipality to municipality. I know there have been problems in some of the technical mechanisms that were developed or underway. I think there were obviously substantial institutional and political resistance to land-based alternatives in the Metropolitan New York area.

Mr. CARPER. Mr. Chairman, I believe my time has just about expired. I would like to submit in writing additional questions.

Mr. D'AMOURS. Without objection, so ordered.

[The information follows:]

QUESTIONS OF MR. D'AMOURS, AND ANSWERS BY NOAA

Question 1. If all municipal sewage sludge currently being dumped at the 12-mile site was dumped at the 106-mile site, would the states of New Jersey, Delaware, Maryland, and Virginia be more impacted by the new dumping at the 106-mile site or continued dumping at the 12-mile site?

Answer. The environmental effects of ocean dumping on Delaware, Maryland, Virginia, and most of New Jersey are non-existent regardless of which site is used. However, the quality of the coastal waters of northern New Jersey bordering the New York Bight Apex would improve as a result of relocation of dumping to the 106-mile site. Since the 12-mile site is closer to shore, is shoreward of the 50-meter isobath (demarking a point where bottom waters have a shoreward trajectory), and since its water flows southward on average, use of the 12-mile site poses greater risk to the coastal environment. Waters leaving the 106-mile site also flow southward

on average, but their distance from shore prevents their having an effect on coastal water quality.

NOAA's recommendation to use the 106-mile site, rather than the current 12-mile site, is based solely on improving environmental conditions in the New York Bight Apex. Although sludge dumped at the 12-mile site could theoretically affect areas off southern New Jersey and further south, no evidence exists that it has. The probability of effects on these areas resulting from use of the 106-mile site is even more remote.

Question 2. Assuming it is desirable to require any sewage sludge which is ocean-dumped to be dumped in deepwater, at a site further offshore than the current 12-mile site, would you agree—as EPA noted in a December 20, 1982 Federal Register notice—that such a shift in dumping location should occur under conditions that permit “further studies of the site and careful monitoring of the impacts of disposal at the site”?

Answer. We agree that dumping of sewage sludge at the 106-mile site should occur under conditions that permit appropriate monitoring. The monitoring program being developed by NOAA and EPA—as provided in response to a similar question from Congressman Carper—includes the following:

The monitoring program to assess the effects of dumping sewage sludge at the 106-mile site will measure: (1) changes in water quality downstream of the site; (2) the increased flux of settling material onto the seafloor; (3) possible effects on planktonic organisms in the upper water column; and (4) possible effects upon benthic organisms on the seafloor. The program will include chemical analyses of seawater samples to detect the presence of sludge and the area extent of its detectability. Planktonic organisms will be collected within and outside of the affected area to determine whether chemical changes induced by sludge result in any measurable response. An array of sediment traps will be deployed to measure the rate and a real extent of sludge particles falling to the seafloor. Benthic organisms will be collected within and beyond the seafloor area influenced by dumping to determine whether dumping alters the community structure of the area.

NOAA's responsibilities include the design and implementation of the oceanographic activities described above. EPA will require short-term compliance monitoring including periodic analysis of the quantity and quality of the sludges dumped and the physical fate of the sludge up to four hours of its disposal.

A first estimate of annual costs for the oceanographic monitoring described above, based on roughly 30 days of ship time throughout the year and support for senior investigators and their staffs for water chemistry, planktonic biology, fish tissue analysis, sediment trap work, and benthic biology, is about \$750,000.

Regional fisheries resource surveys carried out under the Marine Resources Monitoring, Assessment, and Prediction (MARMAP) program of the National Marine Fisheries Service (NMFS) and regional environmental quality monitoring programs, such as the Northeast Monitoring Program (NEMP) of NMFS and the National Ocean Service, could provide information useful for assessing the large-scale, long-term effects on fisheries productivity in the Northwest Atlantic from ocean dumping at the 106-mile site. These existing programs could be modified to include additional work at the 106-mile site. However, ocean dumping even 7 million tons of sewage sludge at the 106-mile site is a small-scale event relative to the dynamics of fish populations. The effects of ocean dumping would be more apparent in the types of measurements detailed above, rather than from large-scale monitoring and assessment programs like MARMAP and NEMP.

Question 3. Would you also agree that some important conditions upon which the ability to meet study and monitoring objectives may depend is the distance separating sewage sludge and industrial waste dumping activities, the opportunities for initial mixing with seawater before commingling of the affected water masses occurs, and generally the potential for interaction of the different wastes?

Answer. Given the relative volumes of industrial and sewage wastes and their different chemical characteristics, the sewage sludge monitoring program should be unaffected by simultaneous industrial and sewage sludge dumping at the 106-mile site.

Question 4. The National Wildlife Federation, at the May 25th hearing, stated that, to get an acceptable degree of dilution of a conservative sewage sludge contaminant like PCBs so that interaction could be minimized would require an initial dilution on the order of a million-fold. This is sludge at the part-per-million level, and on an assumed acceptable water quality requirement of ambient marine water column PCB levels in the part-per-trillion range. Do you agree with NWF's estimate of the degree of initial dilution required to ensure sufficient separation of nearby

dumping activities? If not, please provide your own best estimate, and indicate the basis for this estimate.

Answer. Initial dilution of one million-fold cannot be achieved. Such dilution would be achieved, in time, due to oceanic mixing, so long as there was an adequate rate of water renewal at the site. Sludge dumped at the 106-mile site would be diluted one million-fold about one week after dumping (unless a storm occurs and hastens the mixing process).

If the criterion for sufficient dilution is to decrease chemical concentrations below water quality standards, it would be necessary to dilute sludge containing 0.5 parts per million PCB on a wet weight basis (a high estimate) by 17,000-fold to meet the 30 parts per trillion criteria. At that dilution, other components of sludge for which there are criteria would be diluted to below those criteria. The two elements which would be closest to their criteria levels would be copper at 3 parts per billion (with the criterion at 4 parts per billion) and mercury (at the criterion level of 25 parts per trillion). If the criterion for sufficient dilution were based on sludge concentrations being 1% of measured LD50 levels (a criterion within the ocean dumping regulations), the necessary dilution would be 30,000-fold (based on results of toxicity tests required of dumping permittees).

Both of these dilution factors are relatively small. They would be achieved within less than 10 hours after dumping and would require a sludge distribution over a very small part of the site. Biological responses in the water column on those small scales would be of little consequence because they would occur among planktonic organisms which, at the population level, recover quickly as waste plumes are further diluted by mixing with surrounding waters. The monitoring program previously outlined is concerned with sludge distributions and effects over large scales in the water and on the seafloor. We estimate that sludge will be dispersed sufficiently to avoid any large-scale effects.

Question 5. The suggestion was made at the May 25th hearing that the 106-mile deepwater industrial waste dumpsite is sufficiently large that a large separation between industrial wastes and sewage sludge could be achieved within the boundaries of this site (e.g., by requiring the two types of wastes to be dumped at opposite corners and minimum (i.e., worst-case) initial dilutions (i.e., within 1 hour) that could be anticipated in the course of a year (or longer) for wastes dumped at various locations within the 106-mile site. How confident can we really be that sludge containing 1 ppm of PCBs, if dumped in one quadrant of the 106-site, will undergo a millionfold (or other required degree of) dilution within an hour, or before impinging on other quadrants of the dumpsite?

Answer. We are confident that sludge will impinge on other quadrants of the site before being diluted a million-fold. On occasion, sludge plumes diluted about 50,000-fold will migrate from their original quadrant undergoing further dilution. As discussed previously, this in itself would not be a compelling reason for dumping sludge at a deepwater site other than the 106-mile site.

Question 6. At least 2 other deepwater ocean dumpsites located to the north of the 106-mile site have been historically used for explosive and/or chemical wastes (see attachments). As you know, the 106-mile site is itself a former explosives dumping site. For each of the indicated alternative sites, please indicate if there is any basis for believing, by virtue of prevailing current patterns or the distribution of fishery or other biotic resources, that that site would be a less suitable repository for ocean-dumped sewage sludge than the 106-site? Also, for each such site, would locating sludge dumping there likely increase or decrease the possibility of interaction with industrial wastes dumped at the 106-site, in comparison with having both types of wastes dumped within the 106-mile site?

Answer. Many sites north of Cape Hatteras and seaward of the continental shelf reflect dispersive characteristics and resources-at-risk similar to the 106-mile site. If another site were chosen, it should, however, be of comparable dimension to the 106-mile site to enhance dispersion of the fast-settling component of sewage sludge particles.

The 106-mile site is "special" only in an historic sense. There is no technical reason to favor the 106-mile site over other deepwater sites. Segregation of industrial wastes from sewage sludge is not a reason to dump sludge at one of the alternative sites indicated in the question.

On average, sludge, or any other waste which remains primarily in the upper water column and which is dumped at any site off the northeast continental shelf, will move with currents paralleling the shelf contour and become entrained within

the Gulf Stream near Cape Hatteras. The current will move waste, as it is being diluted, at a rate of about 5 nautical miles per day. Along the line of current flow, the closer of the indicated alternative sites to the 106-mile site is 30 nm (site center to site center); the more distant site is 80 nm away. Water and waste at the closer and more distant site would require 6 and 15 days, respectively, to reach the 106-mile site. In either case, this would be sufficient time to dilute sludge by a factor of one million. However, on average, the additional travel time from the farther site would yield significantly greater dilution of sludge. As discussed previously, a tenfold increase in dilution requires a tenfold increase in time. If 4 days are required for a million-fold dilution, 40 days would be needed to achieve a ten-million-fold dilution. On that time scale entrainment into the Gulf Stream will occur regardless of which of the three sites is used.

For these reasons we do not see a compelling need to use either alternative site even though we have no technical objection to their use. If the objective is to achieve a million-fold dilution of sludge before it even enters the 106-mile site, the further of the two sites is slightly preferable. Another option that could be considered is for sewage sludge to be dumped instead at a site south of the 106-mile site. On average, water from that site would flow away from the 106-mile site and the 106-mile site could receive industrial waste in waters generally free of sludge.

BACKGROUND INFORMATION ON THE DILUTION OF SEWAGE SLUDGE IN THE MARINE ENVIRONMENT

Dilution of neutrally buoyant, primarily liquid wastes (sewage sludge and most industrial wastes) once discharged to the marine environment occurs in three phases. The first phase is referred to as initial mixing and is due to the discharge process. The second phase is slow dilution under oceanic conditions due to low level, oceanic turbulence. The third phase, also due to oceanic processes, is rapid dilution under the influence of storms.

Dumping liquid wastes from barges initially dilutes the wastes by a factor directly proportional to the distance the barge travels per unit of waste discharged. Common practice is to discharge industrial wastes at deep ocean sites at a rate of about 80 m³ of waste per km of dumping track. Typically, barges carry about one million gallons (3785 m³) and discharge it over 25 nautical miles (46 km). Dumping at that rate achieves initial dilution factors of about 5000. This initial dilution is higher than is achievable with discharge pipes (basically because pipes do not move) and is higher than sludge receives now in the New York Bight (where discharge is more than 80 m³ per km).

The extent of initial dilution is controllable. If, for example, one million gallons were dumped over 2.5 miles the initial dilution factor would be 500, or if the dumping distance was 250 miles the initial dilution factor would be 50,000. However, it is impractical to dump over 250 miles because—at a typical vessel speed of 5 knots—it would require 50 hours (two days) to release a single load of waste. Initial dilutions of one million are for all practical purposes impossible; this would require dumping one million gallons over a distance of 5000 miles.

Initial dilution results in the creation of long, thin ribbons of waste in the ocean. Remotely-sensed images of waste plumes show these ribbon-like structures of freshly dumped wastes. Oceanic mixing under calm conditions forces these ribbons to widen at a relatively slow rate, so that about 10 hours are required for initial dilution to be increased by a factor of 10 (e.g. increasing an initial dilution factor of 5000 to a factor of 50000). Under calm conditions, a further 10-fold dilution would require about 4 days. However, very rapid dilution of wastes does occur under the influence of storms. This has the effect of tearing the ribbons into small pieces, each of which is mixed into the surrounding seawater more quickly than the larger ribbon could be mixed. As a point of reference, one can expect wastes to be diluted by a factor of about 100 times beyond the initial dilution within a week or less of their being dumped. Therefore, if the initial dilution factor achieved by the dumping rate is 5000, that waste will have been diluted approximately one million times in about one week.

A limitation to the achievable dilution is the availability of water. It has been estimated that at the 106-mile site flow of water available for diluting wastes is 10¹⁰m³ or about 2.5 trillion gallons per day. This estimate of water renewal rate is low because it is derived from the average current speed and distance across the

site. The water available in the upper 20 m is, because of a seasonal density gradient (pycnocline), the vertical limit to most waste mixing. Although that water is available, wastes cannot mix into it immediately. At the 106-mile site enough water exists to dilute each million gallons of daily waste input by a factor of about 2 million. Any site north of Cape Hatteras and at about the same distance from the continental shelf as the 106-mile site would have similar dispersive characteristics. This includes the two sites indicated in question 5.

We see no compelling reason to use different sites in an attempt to segregate industrial waste from sewage sludge. To address this point, it is necessary to consider the physical dimensions of waste plumes, the amount of anticipated dumping, and the dumping strategy. Diluting waste by factors of 5000 (initial mixing), 50,000 and 500,000 requires 5-, 50-, and 500-billion gallons of seawater, respectively, for each million gallons of waste. During summer when mixing is limited to the upper 20 m, the areas required to accommodate those volumes of water are 1, 10, and 100 km², respectively. Since the 106-mile site encompasses 1500 km², patches of waste diluted 50,000 fold or less would be relatively small features while areas containing waste diluted by about a million-fold might cover up to about 10 percent of the total site.

If sewage sludge were dumped at the 106-mile site in one million gallon increments, five dumps per day would be required to dispose of the 2 billion gallons now annually dumped in the New York Bight. On a comparative basis, the annual industrial waste input to the site is now about 60 million gallons (or a little more than one dump per week). If industrial and sewage wastes were both dumped at the 106-mile site, provisions would presumably be made for them not to enter the same quadrant of the site simultaneously. When more than one industrial dumper used the site, each permittee was assigned a quadrant for a three-month period. Over a year's time each permittee used the entire site. It would be beneficial to use most or all of the site for sewage sludge dumping during a year, because a small fraction of the solids in sludge might sink quickly enough so that it does not receive much dispersion in the water column. Using the whole site over a year would ensure that those particles are spread over at least 1500 km² which should be sufficient to avoid affecting benthic organisms. Most sludge particles will, however, fall very slowly and be widely dispersed before reaching the seafloor.

Sludge dumped into one quadrant of the 106-mile site probably will not undergo a million-fold dilution before impinging on other quadrants of the site. Industrial waste plumes containing waste diluted by only a factor of about 50,000 are small-scale (i.e., compressed) features which move with the current, and have been observed to migrate from the quadrant in which they originated. Nevertheless, these are finite features which most likely would remain separate from another patch of waste created in any other quadrant.

The residence time of water and waste within the 106-mile site is about four days. The projected dumping of five barge loads of sludge per day would therefore produce twenty patches of sludge at various stages of dilution within the site whenever a dump of industrial waste was to occur (in a quadrant not used for sludge over the prior few days). If the weather was calm over those few days prior to the industrial dump, the sludge patches would be small-scale features covering, in total, about half the site (one can assume that sludge patches will intermingle since they will be created near one another). Some of that sludge is likely to be in the industrially used quadrant, but it will not cover it completely. The industrial waste plume, over its first day, will grow to only about 10 km² and will most likely remain in sludge-free water.

If, on the few days preceding an industrial dump, a storm occurs, the sludge within the site will become well mixed and be diluted extensively to a factor of about one million. At that point, the industrial dump will certainly occur in water containing diluted sludge. However, essentially the same consequence would result from dumping sludge at either of the two alternate sites north of 106-mile site. Sludge reaching the 106-mile site would be diluted by a factor of about one million (in the absence of a storm), and an industrial dump would be made into this water mass.

The short-term monitoring of industrial waste in the water column would therefore not benefit from sludge being dumped elsewhere. Monitoring would not be affected by industrial waste entering water already containing extensively-diluted sludge. If the 106-mile site were used for both waste types, there would be occasions when the industrial waste entered sludge-free water even though small-scale patches of sludge existed within the same quadrant. It is only when industrial wastes remain on small scales at dilution of less than 50,000-fold that they have been observed to affect marine organisms. Since industrial wastes presently discharged at

the 106-mile side do not reach the bottom, there would be no interference between the two wastes in terms of bottom effect.

The issue of sludge dilution and its influence on monitoring industrial waste has so far been addressed without reference to PCBs. However, to argue that a million-fold dilution of sewage sludge is needed to decrease PCB concentrations below the former EPA water quality limit of one part per trillion (now 30 parts per trillion), requires that the undiluted sludge contain about 20 parts per million PCB on a dry weight basis. Published concentrations are in the 3 to 9 parts per million (dry weight) range as indicated by the National Wildlife Federation during the May hearing on sludge dumping. At that hearing, NOAA cited that recent sludge analysis for New York City yielded dry weight concentrations in the 0.5 to 2.5 parts per million range. Since sludge is 95 to 97 percent water the solids within it are essentially diluted by a factor of 20 before entering the sea. If a value of 5 ppm (dry) is assumed, this equates to .25 ppm (wet) which would require a dilution of 250,000-fold to reduce the concentration to one part per trillion, or about 8,300-fold to get to 30 parts per trillion.

If sludge was dumped at the 106-mile site, it would be the sole direct source of PCBs. Industrial wastes result from processes which do not use or produce PCBs (new uses or production of that compound are prohibited). Monitoring in the context of sludge dumping would include determination of its large-scale (not just small-scale) plume distribution, and PCBs are considered one possible chemical indicator of sludge. Others include the elements iron, zinc, lead, and organic compounds, such as steroids or high molecular weight polyaromatic compounds. None of these chemicals are characteristic of the one industrial waste now routinely dumped at the site. The chemical signature of this waste is due to organic solvents which are not in sewage sludge. Other industrial wastes which have been dumped in the past did contain elements which are common to sludge. However, given the projected large volumes of sludge, an industrial waste would either have to be very concentrated or dumped in exceedingly large volumes to alter the chemical content of seawater beyond that due to sludge dumping.

The EPA-NOAA monitoring program previously outlined omits the consideration of industrial wastes; there is simply insufficient industrial waste dumped, and it is not chemically similar enough, to affect the detection of sludge. Biological responses to sludge will almost certainly not be altered by the presence of industrial waste. Conceivably industrial wastes could become somewhat less toxic when dumped into water containing sludge. This would occur for a waste whose toxicity is due to its heavy metal content and if those metals form complexes with common organic compounds provided by the sludge. As discussed above, small-scale monitoring of industrial waste could proceed as in the past even if sewage sludge were dumped at the 106-mile site.

QUESTIONS OF MR. CARPER AND ANSWERS BY NOAA

Question. What type of monitoring program would be needed to assess the effects of dumping at the 106-mile site (details, please)?

What will be NOAA's and EPA's responsibilities under this program?

What costs are to be anticipated in conjunction with the program described above? (If an expanded MARMAP program is envisioned, what will be the additional costs incurred to adequately monitor the 106-mile site over existing expenditures?)

Answer. A monitoring program to assess the effects of dumping sewage sludge at the 106-mile site would be designed to measure: (1) changes in water quality downstream of the site; (2) the increased flux of settling material onto the seafloor; (3) possible effects on planktonic organisms in the upper water column; and (4) possible effects upon benthic organisms on the seafloor. The program will include chemical analyses of seawater samples to detect the presence of sludge and the areal extent of its detectability. Planktonic organisms will be collected within and outside of the affected area to determine whether chemical changes induced by sludge result in any measurable response. An array of sediment traps will be deployed to measure the rate and areal extent of sludge particles falling to the seafloor. Benthic organisms will be collected within and beyond the seafloor area influenced by dumping to determine whether dumping alters the community structure of the area.

NOAA and the U.S. Environmental Protection Agency are working closely on the design of a monitoring program for sludge dumping at the 106-mile site. NOAA's responsibilities include the design and implementation of the oceanographic activities described above. EPA will perform short-term, compliance monitoring including

periodic analysis of the quantity and quality of the sludges dumped and the physical fate of the sludge up to four hours of its disposal.

A first estimate of annual costs for the oceanographic monitoring described above, based on roughly 30 days of ship time throughout the year and support for senior investigators and their staffs for water chemistry, planktonic biology, fish tissue analysis, sediment trap work, and benthic biology, is about \$750,000.

Regional fisheries resource surveys carried out under the Marine Resources Monitoring, Assessment, and Prediction (MARMAP) program of the National Marine Fisheries Service (NMFS) and regional environmental quality monitoring programs, such as the Northeast Monitoring Program (NEMP) of NMFS and the National Ocean Service, could provide information useful for assessing the large-scale, long-term effects on fisheries productivity in the Northwest Atlantic from ocean dumping at the 106-mile site. These existing programs could be modified to include additional work at the 106-mile site. However, ocean dumping even 7 million tons of sewage sludge at the 106-mile site is a small scale event relative to the dynamics of fish populations. The effects of ocean dumping would be more apparent in the types of measurements detailed above, rather than from large-scale monitoring and assessment programs like MARMAP and NEMP.

Mr. HUGHES. One additional thing, if I may.

Mr. D'AMOURS. Yes.

Mr. HUGHES. I wonder if the panel would also submit for the record some comments on the question of whether or not Delaware, Maryland, and Virginia, in particular, would be more impacted by continued dumping at the 12-mile site or the 106-mile site. That seems to be a very key issue. There are misperceptions about that and that would be helpful.

Mr. SCHATZOW. We would be happy to do that.

[The information follows:]

DUMPING IMPACT ON DELAWARE, MARYLAND, AND VIRGINIA

As to the question of whether or not Delaware, Maryland, or Virginia would be more impacted by continued dumping at the 12-mile site or by dumping at the 106-mile site, it is of our opinion that the coastlines of none of these sites would be impacted by dumping at either site. We base our reason on the historical data available from the extensive monitoring of the former Philadelphia sludge dumpsite.

From 1973 to 1980, the City of Philadelphia dumped sewage sludge at a site 35 miles due east of the Delaware/Maryland state line. The area around this dumpsite was monitored quarterly by EPA during this entire period. While some effects were detected at the dumpsite, there was no impact on any state shoreline from this dumping. Since the 12-mile site and the 106-mile site are much further removed geographically from the shorelines than the Philadelphia dumpsite, EPA believes that there would be no shoreline impacts on these states from either site.

Mr. D'AMOURS. We have finished with this panel. We will return immediately after this vote. I am required to be somewhere else for a short period of time. Mr. Hughes will chair when we return.

We will hear the next witnesses, Mr. Kamlet, and Mr. Lahey, as a panel. After we finish the questioning of that panel, we will break until 2 for lunch. So if you would all come right back, I would very much appreciate it.

[Brief recess.]

Mr. HUGHES [presiding]. The committee will come to order.

Our next witnesses will consist of a panel comprising Mr. Kenneth Kamlet, Director, Pollution and Toxic Substances Division, National Wildlife Federation; and William Lahey, research fellow, marine policy and ocean management program, Woods Hole Oceanographic Institution.

STATEMENTS OF KENNETH KAMLET, DIRECTOR, POLLUTION AND TOXIC SUBSTANCES DIVISION, NATIONAL WILDLIFE FEDERATION; AND WILLIAM L. LAHEY, RESEARCH FELLOW, MARINE POLICY AND OCEAN MANAGEMENT PROGRAM, WOODS HOLE OCEANOGRAPHIC INSTITUTION

Mr. HUGHES. We welcome you today. We have your statements which we will make part of the record. We hope you can summarize for us and we can begin with you, Ken.

STATEMENT OF KENNETH KAMLET

Mr. KAMLET. Thank you, Mr. Chairman.

Although we are convinced that Congress intended that the ocean dumping of harmful sewage sludge be entirely terminated by the end of 1981 and that such a result is eminently desirable from an environmental standpoint, we nevertheless support the Hughes-Forsythe proposal which provides for terminating sludge dumping at the 12-mile site by the end of 1986.

We take this position with some reluctance because the legislation would not mandate an end to all ocean dumping of harmful sewage sludge. But despite this shortcoming we believe the proposal represents a giant step in the right direction and deserves the full support of this committee and the Congress.

Our decision, I might add, to support this proposal was made vastly easier by its incorporation of two provisions we regard as critical, first, the requirement of a plan to restore the environmental quality of the New York Bight Apex as a whole, and second, the imposition of a special fee to reduce the economic attractiveness of ready access to a convenient near-shore ocean dumping site.

Let me comment on a few specific points if I might, Mr. Chairman.

First, it is clear that the New York Bight Apex is a highly degraded environment and ocean dumping of sewage sludge and other materials contributes significantly in our view to this degradation. Exhibit 1 prepared by Dr. Paul Ringold, a marine biologist on my staff, summarizes and documents some of the pertinent scientific evidence concerning the condition of the bight apex and the factors contributing to that condition.

My prepared statement indicates that anywhere from half to more than two-thirds of the PCB contamination of the bight is attributable to ocean dumping, at least based on figures of the 1970's, as are close to 40 percent of the bight's petroleum hydrocarbon contamination. And virtually all of its cadmium contamination and although municipal waste water appears to be a more important source than sewage sludge of disease-producing microorganisms and the heavy metal mercury, my statement indicates that the widely cited estimates of contaminant inputs to the bight are systematically understating the contributions of ocean-dumped materials generally and of ocean-dumped sewage sludge in particular; consequently, while it is true that ultimate rehabilitation of the apex will require measures beyond simply controlling ocean dumping, it is clear also that the simple expedient of ending ocean dumping of sewage sludge at the 12-mile site is likely to have a significant and positive impact on the environmental quality of the

bight apex, including the prospect of reopening the eastern third of the apex to commercial shellfishing.

Other measures as part of an overall bight apex restoration plan are obviously also desirable and in our view are entirely feasible.

It should also be noted that under EPA's ocean dumping regulations the 12-mile site certainly represents an impact category 1 location. As such, the regulations mandate action by the administrator to modify the conditions of site use to restore conditions to an acceptable status, which may include termination of dump site use, and such might well be the action necessary here.

Accordingly, the Hughes-Forsythe proposal could be viewed as simply ratifying the mandate contained in EPA's own regulations.

A second key point is that while relocating the sludge dumping site to a deepwater site is far less desirable than keeping harmful sludge out of the ocean entirely, a shift of this kind particularly if temporary, will almost certainly yield net environmental benefits. In addition to permitting shellfish beds in part of the apex to be reopened to commercial harvesting, such a change is also likely to reduce the probability of dumping-related contamination of the human food chain.

We do not, however, favor a shift to deepwater dump site 106 at which industrial wastes are currently disposed. We believe along with EPA that any change in dumping location must be accompanied by "further studies of the site and careful monitoring of the impact of disposal at the site."

Dumping sewage sludge along with industrial waste at the 106 site would in our judgment frustrate this monitoring and management objective. It would set an undesirable precedent in making the 106-mile site the first of some 140 interim approved dump sites at which more than one category of waste was permitted to be dumped.

Indeed EPA's current regs make clear in the case of dredged material that sites designated for the ocean dumping of dredged material may only be used for the ocean dumping of dredged material. A similar rule would make good sense for sewage sludge and industrial waste. We accordingly urge this committee to consider an amendment which would preclude a decision by EPA to allow sludge and industrial wastes to be dumped at the same site.

It should be noted however that the 3-year period specified in the Hughes-Forsythe proposal for phasing out the use of the 12-mile site would provide ample time for the selection and designation of an alternative deepwater site for sewage sludge currently dumped at the 12-mile site.

The third point is that we would not support a moratorium on designation of the 106-mile site because designation of the 106-mile site is not the issue in our view. The real issue is whether sewage sludge and industrial wastes should be permitted to be jointly ocean dumped at any site. As I have indicated, we think the answer is no, and we favor an amendment to accomplish this result.

Point four, we do not favor an across-the-board congressional review process to precede the designation of all ocean dump sites because the vast majority of sites subject to final designation are in active use already; interposing a process of this kind therefore

would serve only to delay completion of the process of upgrading present practices.

This kind of review process would perhaps make more sense and be more constructive where it is proposed to designate a brand new ocean dump site which was never dumped at before and was not simply taking the place of a nearby historical dump site.

Point five, something more needs to be done to redress the imbalance created by the so-called balancing analysis mandated by a single judge at the lowest level of the Federal judiciary in the city of New York litigation. The problem is that the ocean is usually so much cheaper than any competing disposal alternative that any analysis that gives a premium to economic cost will invariably favor ocean dumping.

The ocean will lose every time. The user fees incorporated in the Hughes-Forsythe proposals represent a commendable effort to address this. But even if a sufficient fee schedule were enacted into law it would still remain politically attractive in many cases to avoid antagonizing voters by use of land-based disposal, instead of going to the ocean which harbors very few voters.

We would therefore advocate strongly an amendment which would make clear that the dominant factor to be considered in assessing the suitability of sludge or any other waste for ocean dumping is the resultant harm to the environment and human health. An alternative's costs should play a decisive role only where all other factors were equal.

Harmful ocean dumping must once again become a last rather than a first resort disposal option.

Six, there needs to be an amendment prohibiting or significantly constraining the ocean dumping of contaminated sewage sludge from sources not currently engaged in this practice. Fully 96 percent of all U.S. sewage sludge is currently managed or disposed of by means other than dumping or discharge into the ocean. We ought to be encouraging pretreatment and other steps to decontaminate sludges in the first place and sound management rather than dumping or dispersal in the second instance.

Finally, as we testified on May 12 in indicating our support for the Breaux-Forsythe hazardous waste bill, H.R. 1700, ocean dumping and dumping in landfills are short-term palliatives. They solve nothing but merely transfer risks and costs to those downstream or down current and to the future. It is far less costly in the long run, both economically and environmentally, to deal effectively with contaminated wastes at the very outset once and for all.

In conclusion, Mr. Chairman, EPA Administrator William Ruckelshaus, when he first held that position a dozen years ago, told this committee that in administering the ocean dumping law EPA would be guided by the objective of "terminating all ocean dumping which is damaging to the marine environment," including the expeditious discontinuation of sewage sludge ocean dumping with no new sources of such dumping allowed.

These objectives and the concerns which motivated them were appropriate in 1971 and they remain so now.

Thank you.

[The statement of Mr. Kamlet follows:]

PREPARED STATEMENT OF KENNETH S. KAMLET

Messrs. Chairmen and Members of the Subcommittees:

I am Kenneth S. Kamlet, Director of the National Wildlife Federation's Pollution and Toxic Substances Division. I appreciate the opportunity to appear before these subcommittees on behalf of the National Wildlife Federation and its more than 4.2 million members and supporters throughout the United States on the important topic of the prospects for continued sewage sludge ocean dumping in the New York Bight.

In accordance with Chairman D'Amours' letter of invitation, I will address myself to the following issues:

- Whether it is realistic to adopt as a goal the environmental restoration of the New York Bight.
- If so, what needs to be done to achieve this goal?
- If ocean disposal is to continue, is it better to continue dumping at the 12-mile site or to move to a deep water site such as the 106-mile site?
- Whether it is appropriate to legislatively mandate a phase-out of sludge ocean dumping at the 12-mile site.
- Whether a moratorium should be placed on final designation of the 106-mile site.

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--Whether prior notice should be provided to Congress before EPA finalizes the designation of any ocean dumpsite.

--Whether other measures should be taken to avoid over-exploitation of the ocean for waste disposal.

Feasibility of Restoring the Environmental Quality of the New York Bight Apex

The deteriorated condition of the New York Bight Apex is attributable to several types of human-derived contaminants, which are susceptible--at greater or lesser expense--to clean-up. The major categories of contamination are pathogenic microorganisms, synthetic organic compounds such as PCBs, petroleum hydrocarbons (notably the carcinogenic polynuclear aromatic hydrocarbons), and heavy metals (such as mercury and cadmium).

Rough estimates have been made of the contributions to the Bight Apex of these contaminants from various sources. These estimates are summarized on page 2a.

Although the apparent contribution of ocean-dumped sewage sludge seems small for most of these contaminants (PCBs being the most noteworthy exception), there are a number of reasons for regarding the sludge estimates presented in the table as underestimates and, in some cases, as extreme underestimates. Specifically:

-2a-

	Pathogens	<u>PCBs</u>	Petrol. HC	Heavy Metals		
	(fecal coliforms)		(oil & grease/PAH)	Hg	Cd	Pb
Ocean Dumping						
Sewage Sludge	*	25-30%	3%/X	5%	2%	9%
Dredged Mat.	*	31-39%	35%/41X	5%	98%	37%
Other	-	-	-	-	-	1%
Wastewater						
Municipal	87%	4-23%	22%	71%	-	19%
Industrial	-	?	1%	2%	-	3%
Runoff						
Gauged (Stream)	-	?	16%	13%	-	6%
Urban	13%	3-4%	23%	5%	-	19%
Atmospheric	-	23-30%	-/	-	-	9%

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- Not all pollutants entering the lower Hudson-Raritan estuary from outfalls, upstream sources, and runoff are washed into the Bight since particle-associated contaminants settle out in the estuary. The runoff and wastewater contributions in the table (which were based on the assumption of total entry into the Bight) are, therefore, higher than they should be (and the direct Bight sources--i.e., ocean dumping and atmospheric deposition) are smaller than they should be. It has been estimated, for example, that only about 20% of the petroleum hydrocarbons entering the lower Hudson-Raritan estuary are washed into the Bight.
- The estimates on which the table is based considered ocean-dumped dredged material to be a separate source of contaminants despite the fact that much of the contaminant burden of such spoils is of estuarine or riverine origin. This double-entry bookkeeping exaggerates the total inputs to the Bight and results in an underestimation of percentage contributions from ocean dumping and atmospheric deposition sources.
- There may also be some double accounting between municipal wastewater sources (generally discharged into streams) and gauged runoff (riverine flow).
- Most of the data on which the estimates in the table are based are 9-13 years old. Since that time, wastewater treatment plants have been upgraded (i.e., reducing contaminant levels in effluent and increasing them in sludges) and the total amount of sewage processed has increased. Quantities of ocean-dumped sewage sludge currently are nearly double what they were a decade ago.
- Contaminants in ocean-dumped sewage sludge are much more biologically available than those of most other sources because most sludge contaminants adhere to tiny particulates which settle very slowly onto a "fluffy" bottom layer of sediments. In the case of dredged material, particularly for heavy metals, biological availability is likely to be exceedingly limited given the high proportion of metals that are an integral component of the sediment's geochemical matrix. Actual dredged material contributions of metals are, therefore, greatly exaggerated, while effective sludge contributions should be much higher than specified.

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--In terms of pathogens, municipal wastewater (which, according to the table, contributes 87% of indicator coliform bacteria--during the winter) is at least subject to disinfection. Sewage sludge is not and is, therefore, likely to present a more significant pathogen hazard, especially to seafood-eaters and especially during the summer months, than is sewage wastewater.

What are the implications of all this to the feasibility of restoring the environmental quality of the Bight?

It suggests that curbs on ocean dumping, even without other steps, would be expected to yield significant benefits, especially in reducing impacts due to PCBs and cadmium (and, probably, pathogens). Enhanced sewage treatment, including industrial pretreatment, would especially influence mercury inputs. Oil and grease and lead inputs would be more difficult to completely control (given the diversity of sources involved), but even for these contaminants, eliminating ocean dumping inputs to the Bight Apex would be expected to yield significant reductions.

One important point to note, based upon the table, is the significance of ocean-dumped dredged material as a source of many key contaminants (even after adjustment to take account of the factors mentioned above, it would remain a significant contributor of PCBs, oil and grease--including PAH, etc.). Consequently, the ultimate rehabilitation of the Bight Apex may to a significant degree depend upon our ability (and willingness) to reduce dredged material-derived inputs of contaminants (through reducing dredged material ocean dumping, moving it out of the Bight Apex, taking steps to reduce the contamination of ocean-dumped sediments, and/or taking measures to sequester dredged material contaminants).

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It is our conclusion that significant improvements in the environmental quality of the New York Bight Apex are, indeed, feasible, given the will to move in that direction.

Merits of 12-Mile Site Versus Deepwater Site

The table below lists what I would consider the most pertinent arguments for and against relocating sludge dumping from the 12-Mile Site to a Deep Ocean Site (based upon my testimony at the EPA Public Hearing at Toms River, New Jersey, May 31-June 1, 1977):

Arguments in Support of Relocation to a Deep Ocean Site	Arguments Against Relocation to a Deep Ocean Site
1. Greater productivity and density of marine life on the shelf; more direct link to human seafood-eaters.	1. Impaired biodegradation of organic matter; greater sensitivity of deep-sea marine organisms; greater foraging and bioconcentration ability of deep-sea organisms.
2. Would permit restoration of commercial shellfishing at sites closed by FDA; would reduce human health impacts associated with shellfish contamination; would help avoid future fishkills and beach closings.	2. Would increase the likelihood of undesirable and hazardous "short dumping" into productive fishery areas; would preclude monitoring and corrective measures.
3. Would increase the cost of ocean dumping and provide dumpers the incentive to expedite land-based alternatives.	3. Would promote an out-of-sight, out-of-mind philosophy about ocean dumping and further reduce political resistance to continued ocean dumping.

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A few of these points deserve amplification.

With regard to the productivity of nearshore versus offshore waters, there are recent indications that traditional oceanographic techniques may have systematically underestimated, by as much as a factor of ten, the productivity of the central oceans. (Kerr, R.A., "Are the Oceans' Deserts Blooming?," Science 220: 397-98, April 22, 1983). And studies using baited automatic cameras dropped to the bottom of the ocean have revealed a surprising population of large fishes and other scavengers that find and consume dead animals and other organic matter that fall from the waters far above. (Isaacs, J.D. and R.A. Schwartzlose, "Active Animals of the Deep-Sea Floor," Scientific American 233: 85-91, Oct. 1975). Nevertheless, the general proposition, reflected in the table, that nearshore ocean dumping represents a more direct and immediate threat to the human food chain than offshore dumping, and stands to more seriously affect marine productivity, almost certainly remains valid.

On the issue of the ability to reopen closed shell-fishing beds if sludge dumping were relocated out of the 12-Mile Site, EPA has recently acknowledged that ending sludge dumping at the 12-Mile Site would, indeed, allow at least a partial reopening of shellfish beds in and around that dumpsite: "[I]t is believed that shellfishing may be reopened in the eastern third of the Apex if dumping at the 12 Mile Site were discontinued." (Notice of Petition to Redesignate the 12 Mile Site, 47 Fed. Reg. 56665, 56667, Dec. 20, 1982).

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Finally, as to the potential easing of anti-dumping pressures if the sludge dump were moved further offshore, recent events might afford a basis for giving less emphasis to this concern. Specifically, the degree and intensity of public and congressional interest in evidence at EPA's May 10, 1983, public hearing on the proposed final designation of the 106-Mile Site as an EPA-approved ocean dumping site, suggests that significant political resistance does exist even to ocean dumping carried out a hundred miles from the nearest land. While such resistance may not be as strong as for dumping closer to shore (and is certainly not as strong as resistance to dumping on land, particularly in populated areas), the fact that such intense feeling persists may give cause for hope that an unbridled out-of-sight, out-of-mind mentality will not be the principal driving force in a choice between ocean dumping options.

A few general points should be made.

First, as a legal matter, under both the Ocean Dumping Law and the London Dumping Convention, the crucial inquiry must be whether a given sewage sludge (or other waste) proposed for ocean dumping can be shown to be inherently suitable for ocean dumping--quite apart from where in the ocean the dumping occurs. Under the Ocean Dumping Law, for example, mandatory evaluation factors include such waste-specific factors as "the persistence and permanence of the effects of the dumping" and "the effect of dumping particular volumes and concentrations of such materials." (This is even

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more apparent under the Ocean Dumping Regulations, where the key screening tests relate to the intrinsic toxicity and bioaccumulation potential of ocean-dumped wastes, independent of dumping location.) Similarly, the London Dumping Convention bars the dumping of wastes containing "Annex I" constituents "as other than trace contaminants"--without regard to dumping location. The LDC also specifies (in Annex III(A)) a number of factors to be employed in the evaluation of materials proposed for ocean dumping (even where Annex I constituents are not present) that revolve around the "characteristics and composition of the matter [to be dumped]."

This is not, of course, to say that an otherwise acceptable material might not be rendered unacceptable for ocean dumping by virtue of a proposal to dump it in an inappropriate location. It is simply to emphasize that the threshold determinant is and must be the characteristics and properties of the material itself.

The relevant point is that a sewage sludge whose properties made it unacceptable for ocean dumping at the 12-Mile Site (e.g., by virtue of flunking the toxicity tests under the Ocean Dumping Criteria) would, as a rule, not suddenly become acceptable for ocean dumping as a matter of law simply by shifting the location of the dumping to another ocean site. Consequently, our premise is that sewage sludge to be considered for relocation to a deep ocean site must first satisfy applicable screening tests and legal requirements.

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Second, in addition to waste-specific considerations, the Ocean Dumping Regulations also contain procedures for evaluating disposal impacts on a particular site (as part of overall site management regulations). Among other things, these regulations specify that "when the EPA management authority determines that activities at a disposal site have placed the site in Impact Category I, [EPA must] place such limitations on the use of the site as are necessary to reduce the impacts to acceptable levels." (40 C.F.R. § 228.11(c)).

This is important, because in our view a strong case can be made that the 12-Mile Site possesses not one, but several, attributes of an "Impact Category I" site--which, under EPA's own regulations, would compel the Agency to take steps, including possible termination of dumping at the site, to reduce these impacts to acceptable levels. The Impact Category I characteristics present, and reasonably attributable to sludge dumping, at the 12-Mile Site include (40 C.F.R. § 228.10(b)(1)):

- "identifiable progressive... accumulation, in detectable concentrations above normal ambient values, of any... waste constituent from the disposal site within 12 nautical miles of any shoreline"
- "biota, sediments, or water column of the disposal site, or of any area outside the disposal site..., are adversely affected by the toxicity of such waste or waste constituent to the extent that there are statistically significant decreases in the populations of valuable commercial or recreational species, or of specific species of biota essential to the propagation of such species, within the disposal site and such other area as compared to populations of the same organisms in comparable locations outside such site and area."

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--"any toxic waste, toxic waste constituent, or toxic byproduct of waste interaction, is consistently identified in toxic concentrations above normal ambient values outside the disposal site more than four hours after disposal."

--"solid waste material disposed of at the site has accumulated at the site or in areas adjacent to it, to such an extent that major areas of the site or of adjacent areas are significantly impaired and the Federal or State agency responsible for regulating such use certifies that such significant impairment has occurred and states in its certificate the basis for its determination of such impairment."

The evidence for the existence of these and other impacts at the 12-Mile Site and throughout the New York Bight Apex has been compiled by a marine biologist on my staff, Dr. Paul Ringold, and is appended to this testimony as EXHIBIT 1.

Lastly, we believe there is merit in a proposal we made to EPA on February 10, 1983 (attached as EXHIBIT 2), which would permit sewage sludge ocean dumping to continue on a limited interim basis at the 12-Mile Site, but only if the dumpers paid a "refundable user fee" for the privilege. This fee would be based on the dumpers' own estimates of the increased costs of relocating their dumping to the 106-Mile Site. Thus, the fee would be designed to eliminate any economic advantage associated with ready access to a convenient, nearshore ocean dumping site. We were pleased to note that the "Special Dumping Fee" contemplated in the Hughes-Forsythe proposal was designed on the basis of a similar rationale and with a similar purpose.

In short, although a comparison of the pros and cons of continued sludge dumping at the 12-Mile Site versus a shift

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to a deepwater location does not yield a completely clearcut choice, there is ample legal and scientific justification for terminating use of the 12-Mile Site, and at least some basis for optimism that temporarily shifting the dumping to a deepwater site will yield net environmental benefits (especially when coupled with a comprehensive plan for restoring the environmental quality of the New York Bight Apex). Accordingly, the National Wildlife Federation is prepared to support a shift in the location of sludge dumping from the 12-Mile Site to an alternative deepwater site as contemplated in the Hughes-Forsythe proposal.

Need for a Legislative Phase-Out of Dumping at the 12-Mile Site

In a Federal Register notice issued late last year (47 Fed. Reg. 56663, Dec. 20, 1982), EPA proposed to designate the 106-Mile Site as approved for the ocean dumping of sewage sludge (in addition to the industrial wastes currently disposed there). In connection with this notice, EPA Region II Administrator Jacqueline E. Schafer noted that, "The burden of proof is on the [municipalities] to show that continued use of the 12-mile site will not cause unreasonable degradation to the marine environment." (EPA Region 2 News Release #82(63), "EPA Seeks Public Comments on Ocean Disposal of Municipal Sewage Sludge," December 10, 1982.) An earlier (April 7, 1981) directive from then Acting EPA Administrator, Walter C. Barber, noted that "available data indicate that environmental and navigational conditions

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at [the 12-Mile] site make it unacceptable for use for the ocean disposal of [sewage sludge]" and that EPA supported a resolution of the issue "which restricts the ocean dumping of municipal wastes to the '106 mile ocean dump site'" pending the development of "data... to determine whether ocean disposal of municipal wastes may be authorized under Agency regulations." A copy of this directive is attached as EXHIBIT 3.

In October 1980, the Chief of EPA Region 2's Marine and Wetland Protection Branch stated in a sworn affidavit (copy attached as EXHIBIT 4) that "the Agency believes that significant degradation of the marine environment has taken place at the sewage sludge dumpsite, commonly referred to as the 12 Mile Site, and surrounding areas impacted by activities at the site, and that this degradation is caused, at least in important part, by the ocean dumping of sewage sludge." (p. 2).

In short, there are a number of indications that EPA is itself disposed to administratively de-designate the 12-Mile Site and to require sludge dumping to be shifted (on an interim basis) to a deepwater dumping site.

So why is it necessary or even appropriate for Congress to intercede and itself mandate the phased termination of sludge dumping at the 12-Mile Site?

For several reasons. First, an administrative decision by EPA to require sludge dumping municipalities to incur the added expense of moving their dumping further offshore will

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inevitably be challenged in court by the municipalities. If relocation of the dumping is an appropriate step to take, it serves no one's interests to have a relocation decision deferred for several years, with uncertainty during the interim, while a court considers the matter. If such a decision is to be made, it is better to give it the force of law through congressional action.

Second, an administrative decision to relocate sludge dumping to a deepwater site is likely to designate the 106-Mile Site for this purpose. This is undesirable because combining municipal and industrial waste dumping at the same site will frustrate EPA's stated objective of managing dumping at the 106-Mile Site in a manner which permits "further studies of the site and careful monitoring of the impacts of disposal at the site" (47 Fed. Reg. 56664). Congressional action could (and should) preclude a decision by EPA to allow sludge and industrial wastes to be dumped at the same ocean dumpsite. (The Ocean Dumping Regulations already specify that "sites designated for the ocean dumping of dredged material... shall be used only for the ocean dumping of dredged material" 40 C.F.R. § 228.4 (e)(3)). Secondly, selection of a different deepwater site--for example, a deepwater site which retains the present equidistant relationship of the 12-Mile Site to the coasts of New York and New Jersey--could alleviate the concern of Maryland and Delaware residents that new wastes were being introduced into the ocean off their coasts (albeit a hundred

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miles offshore). (While such perceptions alone would not warrant rejection of the 106-Mile Site option, all else being equal it is foolish to unnecessarily stir up public opposition. In this case, not only is it unnecessary-- because an equally good site could be designated elsewhere-- but it is counterproductive, because adding sludge to the existing industrial waste site will serve only to frustrate and complicate monitoring and management of both types of wastes).

A third reason could also be ventured. One might ungenerously note the significant probability that an administrative relocation decision is likely to be insufficiently justified or otherwise flawed, in a way that makes it vulnerable to judicial reversal. This is attributable to EPA's overworked staff and to problems of communication (or lack thereof) between headquarters and the regions and between the program office and relevant research and development office staff. This is especially the case during the current transition period, in which the Agency is likely to be somewhat schizophrenic, being torn between what might be perceived as conflicting mission statements (i.e., the old and the new). Congressional action, it is to be hoped, would be more resolute and definitive (and much less vulnerable to judicial reversal).

For all of these reasons, we support congressional action to phase-out use of the 12-Mile Site as both appropriate and necessary.

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Desirability of a Moratorium on Final Designation of the 106-Mile Site

We would not support a moratorium on designation of the 106-Mile Site, because designation of the 106-Mile Site is not the issue. The real issue is whether sewage sludge and industrial wastes should be permitted to be jointly ocean-dumped at any ocean disposal site.

We, therefore, favor a more direct approach to this issue: namely, an amendment which expressly limits site designation authority under the Act to the designation of single-purpose (i.e., single waste-type) and non-interactive dumpsites. Specifically, while dredged materials derived from multiple channels could all be dumped at the same dredged material dumpsite, and similar industrial wastes (e.g., acids) derived from multiple manufacturing processes could be dumped at the same industrial waste site, industrial wastes and sludges, or dredged material and anything else, could not be dumped together at the same site.

Of course, separate dumpsites for different waste types must be spaced sufficiently far apart to avoid interaction of contaminants from one site with those of other sites.

Desirability of Prior Congressional Notice of Final Site Designations

In principle, the idea of active congressional involvement in the process of ocean dumpsite designation makes eminent good sense. Since designation of a new dumping site frequently

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represents an all-but-permanent writing off of an area of ocean for waste disposal, it is logical that Congress, as representatives of all our citizens, have a role in the irreversible resource commitment that this entails. The parallel to the situation with marine sanctuaries would seem pretty close.

The flaw in this logic has to do with the realities of the site designation process. The overriding reality is that the vast majority of site designation actions represent merely the ratification of historical dumping practices. Even where new sites are designated, they are designated in close proximity to historical, "interim-designated," dumpsites. Most significantly, as the designation process proceeds, so does the dumping, so that completion of the site designation process seldom represents the dedication of a new areas of the ocean for ocean dumping.

The inescapable consequence of this is that, making provision for congressional review of prospective site designation actions is unlikely to forestall or even temporarily delay undesirable siting decisions and resource allocations. To the contrary, it will merely perpetuate a status quo of active ocean dumping--either at the same site which is to be finally designated, or at an inferior site which the proposed designation seeks to upgrade.

Consequently, an across-the-board congressional review process is likely to be counterproductive in the vast majority of cases. On the other hand, a more limited

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congressional review process--confined to brand-new site designations (i.e., never dumped at before and not simply taking the place of a nearby historical dumpsite)--could be constructive and would be worthy of support.

Other Desirable Measures

There are two overriding issues regarding prospects for the continued ocean dumping of sewage sludge that are only partially addressed in the Hughes-Forsythe proposal.

The first issue is whether "harmful" sewage sludge should be permitted to be ocean-dumped at all, regardless of the dumping location. The current state of the law, as dictated by a single judge at the lowest level of the federal judiciary, is that sewage sludge no matter how devastating to the marine environment may not be barred from ocean dumping as long as any marine environmental degradation can be justified as "reasonable" based upon the higher costs of land-based alternatives. While the notion of using a "balancing test" to decide among alternatives is superficially appealing (isn't "balance" better than extremism or imbalance?), the problem is that the ocean is usually so much cheaper than any competing alternative that any analysis that gives a premium to economic costs will yield a very "unbalanced" result. The ocean will lose every time.

The user fees incorporated in the Hughes-Forsythe proposal represent a commendable effort to redress this imbalance. But, even if a sufficiently stringent fee schedule

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were to emerge unscathed through the legislative process, it is unlikely that the ocean's many enticements as a first-resort disposal option can be fully neutralized in this fashion. For example, even with the cost advantage removed, it would remain politically attractive in many instances to avoid antagonizing voting constituents by use of land-based disposal options by going to the ocean-- which harbors very few voters.

Consequently, we would advocate very strongly a further amendment which would make clear that the dominant factor to be considered in assessing the suitability of sludge (or any other waste) for ocean dumping is the resultant harm to the marine environment or human health. (We would not object to a comparative harms analysis, wherein the impacts on human health and the environment were evaluated for each disposal medium and method, as long as a comparison of costs for the different alternatives was not allowed to skew the outcome). The costs of an alternative should be decisive only where the least risky land-based alternative offers no colorable environmental advantages over ocean dumping (i.e., costs would come into play only where all other factors were equal).

In short, where ocean dumping is reasonably likely to cause or contribute to harmful impacts on the marine environment, it should be a last-, rather than a first-resort disposal option.

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The other overriding issue is what U.S. policy should be toward municipalities (and industries) that seek to introduce contaminated sludges and other wastes to the ocean for the first time. At least one set of NOAA estimates projects that, if present policies continue, the level of sewage sludge ocean dumping could increase by 300 percent or more over the next few years. Even assuming the ocean's capacity to accommodate present waste loadings, this capacity is clearly not unlimited. But if you tolerate present sludge inputs, how do you say no to future sources? This "floodgates" problem is one of the most serious side-effects of present ocean dumping policies.

Since 96 percent of all U.S. sewage sludge (by weight) is managed or disposed of by means other than dumping or discharge in the ocean, it is clear that placing constraints on access to the ocean by new sources of contaminated sewage sludge should not cause great hardship.

Accordingly, the National Wildlife Federation would strongly support an amendment prohibiting or significantly constraining the ocean dumping of contaminated sewage sludge from sources not currently engaged in this practice.

Conclusion

As EPA's first Administrator, William Ruckelshaus (now also EPA's new Administrator) told this Committee in 1971 that:

In administering the [Ocean Dumping] act, EPA would be guided by the ultimate objective of terminating all ocean dumping which is damaging to the marine environment.

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In the specific context of sewage sludge, Mr. Ruckelshaus stated that:

The dumping of... materials, such as sewage sludge... would be discontinued as soon as possible, and no new sources of such dumping would be allowed.

These objectives and the concerns that motivated them were appropriate in 1971, and in our view they remain appropriate now.

As we testified two weeks ago (on May 12), in indicating our support for the Breaux-Forsythe hazardous waste bill (H.R. 1700), ocean dumping and dumping in landfills are no more than short-term palliatives. They solve nothing. For persistent toxic materials, of the sort present in contaminated sewage sludges, dumping practices merely transfer risks to those downstream or downcurrent, and to the future. In the long-run it is far less costly from both an economic and an environmental standpoint to deal effectively with such wastes at the very outset, once and for all.

We hope these Subcommittees (and the full Committee) will adopt both the Hughes-Forsythe proposal and (the ocean dumping-related aspects of) the Breaux-Forsythe bill. And we hope the Subcommittees will also consider the additional amendments I have advocated in my testimony.

Thank you for the opportunity to present these views.



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EXHIBIT I

A SUMMARY OF INFORMATION ON THE STATUS OF THE NEW YORK BIGHT

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National Wildlife Federation

EXHIBIT I

Attached is a brief summary of information on the status of the New York Bight. There are several sections on elements or compounds which may present threats to the Bight and users of the Bight. These sections summarize sources (many of which underestimate the contributions of sewage sludge for reasons given in Mr. Kamlet's testimony), report on concentrations in the water column, in sediments, and in animal tissue. These concentrations are compared to standards where standards exist.

An important question to ask, based on the available data, is whether or not areas of the New York Bight should be classified under Impact Category I. To fall into this category, the site must fail any one of five tests. The failure of these tests must be reasonably attributable to ocean dumping. I shall first consider the status of the area, and then the causes of that status. The first test calls for identifiable progressive accumulation of waste or waste constituents within 12 nautical miles (nmi) from the shoreline. Bight measurements are most often adequate at only one point in time, and so the progressive nature of any accumulation which may occur is generally not possible to consider. However, there are significant accumulations of many waste constituents within 12 nautical miles of the shoreline of New Jersey and New York. The shellfish closures of 1970 and 1974 due to high concentrations of fecal coliforms (see Figure H) are within 12 miles of the shoreline. Figures D, E, and F show high concentrations

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of lead, cadmium, and mercury in Apex sediments within 12 nmi of the shoreline. The concentrations of these constituents fall as one moves shoreward. Thus, the status of the Apex near the dumpsite falls within the definition of Impact Category I.

The second test asks whether there are statistically significant decreases in the population of biota essential to the propagation of valuable commercial or recreational species (or decreases in those valuable species). The answer to this question is that the benthos near the dumpsite area has been affected to the detriment of species which would normally be fed upon by a variety of fishes. Swanson (16) and Boesch (14) agree that it appears that the ability of the Apex to sustain living resources harvested by man has been impaired. A NOAA report (15) found statistically significant higher levels of fin rot, a chronic disease that may cause mortality, in the high carbon area of the Apex (near the dumpsite) than in the low carbon areas, and more fin rot inside the Apex than outside the Apex. Thus, portions of the Apex near the sewage dumpsite fail this second test and so they should be placed into Impact Category I.

The fifth test asks whether toxic materials are present in toxic concentrations more than four hours after disposal. The average concentration of PCBs in the Bight is 7 or 17 parts per trillion (3, 4). Either of these levels is in excess of the 1976 EPA water quality criteria of 1 ppt, and in excess of the even lower recommendations of the American Fisheries

Society (24) of .1 ppt. At least 25 to 30% of the PCBs comes from sewage dumping (2). Thus, the Bight Apex should be placed under Impact Category I.

While the status of the Bight and portions of it clearly fall under the status of Impact Category I, the regulations require these impacts to be "reasonably attributed to ocean dumping activities." Direct cause and effect is usually difficult to determine in ocean ecosystems even in simple cases, let alone in the more complex case of the New York Bight. One can posit several sources as being reasonably responsible for some or all of the input which would cause portions of the Bight Apex near the sewage sludge dumpsite to be placed under Impact Category I. However, the dumping of sewage sludge is a significant input of material which could reasonably cause the impacts seen. These impacts are close to the dumpsite and often tend to minimize as one moves shoreward. Therefore, we must conclude that it is not unreasonable to attribute a significant portion of the Impact Category I status to ocean dumping of sewage sludge.

PCBs

A study panel convened by the U.S. Department of Commerce (1) concluded that of the halogenated hydrocarbons evaluated, PCBs appear to be the class of compounds of greatest present concern in the ecosystem of the New York Bight. Twenty-five to thirty percent of the total input of PCBs in the Bight Apex comes from sewage sludge dumping (2). Studies report that the

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PCB concentration of sewage sludge is either 9 or 3 parts per million (ppm) (6, and see Table A in this summary). A 1979 report prepared for the New York District of the Corps of Engineers (3) stated that the ambient concentration of PCBs in Bight water is 7 parts per trillion (ppt). A Corps of Engineers' study (4) concludes that the average concentration of PCBs in the Bight Apex is 17.3 ppt (excluding one very high PCB concentration). EPA's Water Quality Criterion for the protection of marine life was 1 ppt (5), although the 1980 version sets this level at 30 ppt. In contrast, the American Fisheries Society (24) recommended that the PCB concentration should be set at 0.1 ppt. Thus, the ambient concentration of PCBs in the Bight exceeds the more conservatively determined safe levels.

PCBs are found not only in the water column, but also in the sediment of the New York Bight area. The Outer Bight has a sediment concentration of .4 ppt of PCBs (see Table A). The sewage sludge dumpsite has a concentration of 2 ppm--5,000 times higher than the Outer Bight.

PCB contamination is present in animals throughout the Bight. The Corps of Engineers (based on small sample sizes) reports (4) that the Atlantic mackerel has a mean PCB tissue concentration of 0.20 ppm. Similar values for other species, according to the same report, are: 0.20 ppm, windowpane; 0.07 ppm, red hake; 0.27 ppm, silver hake; 0.13 ppm, winter flounder; .144 ppm, lobster; .214 ppm, cancer crabs; .247 ppm, mussel. Figures A and B show PCB values in surf clams and winter flounder, respectively.

A more recent study (7) by the New Jersey Department of Environmental Protection found that the concentration of PCBs in striped bass from the New York Bight area adjacent to New Jersey is 2.2 ppm (average of six fish). The concentration of PCBs in bluefish from the same area is 1.4 ppm (average of eight fish).

The FDA action level for total PCBs is currently 5.0 parts per million, although consideration has been given to reducing this to 2.0 ppm (7).

PCB and chlorinated hydrocarbon pesticides in fishes of the Bight are present in concentrations sufficient to initiate the action of enzymes (mixed-function oxidases) which metabolize pollutants. These enzymes also attack steroid hormones in fish and so may cause significant impact on their reproductive function (16).

A NOAA study panel (21) concluded that if they were interested only in restricting the PCB level to a maximum of 0.5 ppm in edible finfish, a level the panel considered the maximum safe level for human consumption, that "present inputs to the Bight could safely increase in the future but definitely not by an order of magnitude." The panel constrains this conclusion by noting: "Other animals of the Bight Apex ecosystem, such as bivalves and raptorial birds, would require a much lower level of PCB to be fully protected. We are also aware that any body burden of PCB may be deleterious to the finfish of the Bight."

METALS

The National Advisory Commission on Oceans and Atmosphere (NACOA) reported in 1981 (8) that cadmium and mercury may be at or near the levels of metal contamination that may affect marine organisms. A NOAA report (1) states: "Mercury, lead, arsenic, and cadmium appear to be potentially significant threats that should be evaluated more fully. These metals in fish and shellfish from the Bight could increase adult body burdens to 10% or 20% of toxic levels, assuming exceptionally high intakes of these marine foods. ..." A NOAA workshop held in 1978 concluded "cadmium and lead inputs are so high that public health and ecological damage effects cannot be ruled out with existing information."

Mueller et al. (9) discussed the input sources of these metals to the New York Bight (see Table B). Barging (sewage sludge, dredge spoil, and chemical dumping) accounts for 82% of the input of mercury to the Bight. The sources of lead input to the Bight are more diverse: 44% is barged in, while 19% is discharged from municipal wastewater, and another 19% comes from urban runoff. Mueller (9) gives no data on arsenic input. A 1982 report by Mueller (10) describes inputs to the Bight only from the Hudson-Raritan Estuary and not from all sources as he did in his 1976 report. The 1982 report indicates that about half of the arsenic potentially entering the Bight from the Hudson-Raritan estuary comes from municipal or industrial wastewater. This report (10) also shows that wastewater is a significant source of cadmium

(more than 38% of the Hudson-Raritan total), lead (more than 39%), and mercury (more than 60%).

Lee and Jones (11) report on the mean concentration of these four metals in the vicinity of the mud dumpsite. Table C shows that the concentrations near the mud dump of three of the four metals exceed natural ocean levels by as much as 129 times. However, their concentrations all fall short of EPA Marine Water Quality Criteria.

These metals are found in the sediment of the Bight Apex. During a survey over the summer of 1980, NOAA found (12) that the peak concentration of cadmium (3.68 ppm), and lead (134.9 ppm) was found at a station in the Christiansen Basin about 5 km west of the sewage sludge disposal site. Figures D through F show this pattern in detail. (Also refer to Figure C which shows the location of the dumpsites and the Basin.)

Elevated levels of mercury, lead, and cadmium are found in the tissue of animals living in the New York Bight Apex. Saila and Segar in a 1979 NOAA report (1) review information on the levels of heavy metal in the tissue of animals in the New York Bight. This information, along with levels generally considered to be safe, is given in Table D. The maximum levels observed are all in excess of the levels considered to be safe. The average levels of contamination (given in Table D in parentheses) are 20 to 50% of the safe levels. Given that the sampling for many metals in fish and shellfish tissue is so limited, one would not be surprised if further

sampling were to demonstrate even higher levels of contamination in some cases than those presently observed.

BIOTA

Benthos

The status of the benthic biota is important as an indicator of the extent to which the sea floor has been affected by activities in an area. Its status is also important because in coastal waters benthic organisms should provide an important source of food for fishes. Figure G shows the pattern of benthic diversity in the New York Bight. There are two areas of clearly depressed diversity. One is just east of the dredged material dumping site, and the other just west of the sewage sludge dumpsite. Swanson, then Director of NOAA's Office of Marine Pollution Assessment, stated in 1979 that the benthic fauna of the Christiaensen Basin is considerably different from that which might be expected in an unimpacted environment. He reported an extremely depauperate zone of 10-15 Km². A surrounding area of about 240 Km² is impacted, probably as a result of organic enrichment contributed by sewage sludge dumping, although other factors associated within the Bight such as hypoxia or toxicants may also lead to this impacted zone.

The change in patterns of species distribution is to the disadvantage of fishes in the area. Boesch (14) (Table E) describes the benthic species whose distribution or abundance has been affected by waste discharges into the New York Bight

Apex. Most of the species favored are unimportant as food for fishes. All of the species disfavored by waste discharges are important sources of food for fish. Boesch concludes, " ... it appears that the ability of the Hudson-Raritan estuary and the Bight Apex to sustain living resources harvested by man has been impaired." Swanson (16) agrees with this conclusion.

FISH AND SHELLFISH

The health of fishes that reside in the Bight area has suffered. Murchelano and Ziskowski in an NMFS study (15) showed that 5.1% of winter flounder collected over the course of seventeen months in the high carbon area of the Bight Apex had fin rot. This was a level seven times as high as fish collected outside of the Apex but still in the Bight. Fin rot appears to be a chronic disease that may cause mortality or decrease survival (16).

Crabs and lobsters of the Bight suffer from blackgill, a disease which may impair respiration and affect survival. Blackgill is most prevalent in the most contaminated areas of the Bight near the sewage sludge dumpsite (16).

A large area in the Bight Apex has been closed to commercial shellfishing for 9 years or more (17) (see Figure H). Sewage sludge dumping was undeniably a factor in the 1970 380 Km² closure (16). A 1971 study showed 100,000 coliform bacteria (MPN) per gram of sediment in the area surrounding the sewage sludge dumpsite (17). "When increasing bacterial

pollution from Metropolitan New York expanded the area of contamination to the inshore waters of New York and New Jersey, FDA, in joint action with the states, extended the closure in April 1974." (17). In 1970, 101 ships had been harvesting sea clams in the area and these closures have forced them to harvest the sea elsewhere or for other species.

While fecal coliforms in low concentrations are not pathogenic, they do indicate the presence of other contaminants which may be harmful. Dr. Peter Anderson, Chief of the Marine Protection Branch of EPA's Region II, stated (18) that sewage sludge represents an important source of pathogens (such as bacteria, viral particles, fungi, and parasites) to the Bight Apex. Dr. Anderson notes that EPA has isolated viruses of the picornavirus group from waters at the dumpsite. Viruses of this group comprise the most important group of human pathogens.

The input of such pathogens to the Bight and the consequent potential for human infection is only one side of the microbe problem. Studies by Timoney (19) have shown that some species of bacteria are resistant to, and may in fact metabolize, metal compounds in sediments. However, in concert with their resistance to metals is a resistance to one or more antibiotics. Bacterial resistance to metals is rare elsewhere in the area. Resistance to antibiotics or to metals in some populations of bacteria "poses a special hazard, since these donors can so readily transfer their genetic capability to so many other bacterial species, including fish pathogens. ..." (20).

PETROLEUM HYDROCARBONS

Petroleum hydrocarbons (PHCs) enter the Bight from a variety of sources. The total input of oil and grease is 870 metric tons per day. Table B shows that 38% of this total comes from barge dumping, 23% from urban runoff, and 22% comes from municipal wastewater. However, not all oil and grease is classified as PHCs. For example, only 75% of urban runoff is assumed to be PHCs (1).

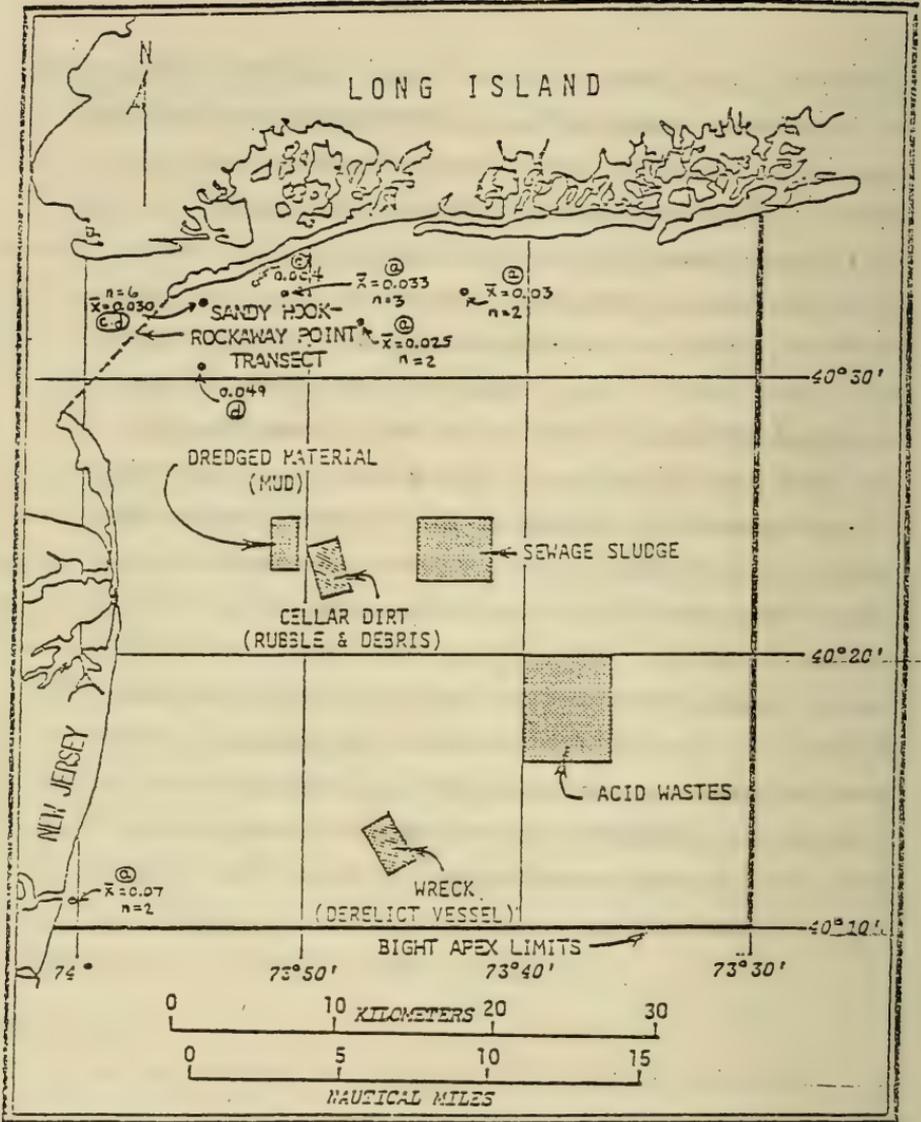
An important component of PHC is the polynuclear aromatic hydrocarbon (PAH) fraction. PAHs are of concern because many PAH compounds or their metabolites are potent carcinogens (6). Sewage sludge contributes 4,100 kg of PAH annually to the New York Bight and dredged material contributes 67,000 kg annually (6).

PAHs are found in the sediments of the Bight and the Hudson Raritan Estuary. Total PAH concentration in Christiaensen Basin sediments is 273 times the concentration in Outer Bight sediments. Total PAH concentration in sewage sludge dumpsite sediments is 50 times the concentration in Outer Bight sediments (see Table G). PAHs are also found in fishes throughout the Bight (see Table H).

OTHER INPUTS

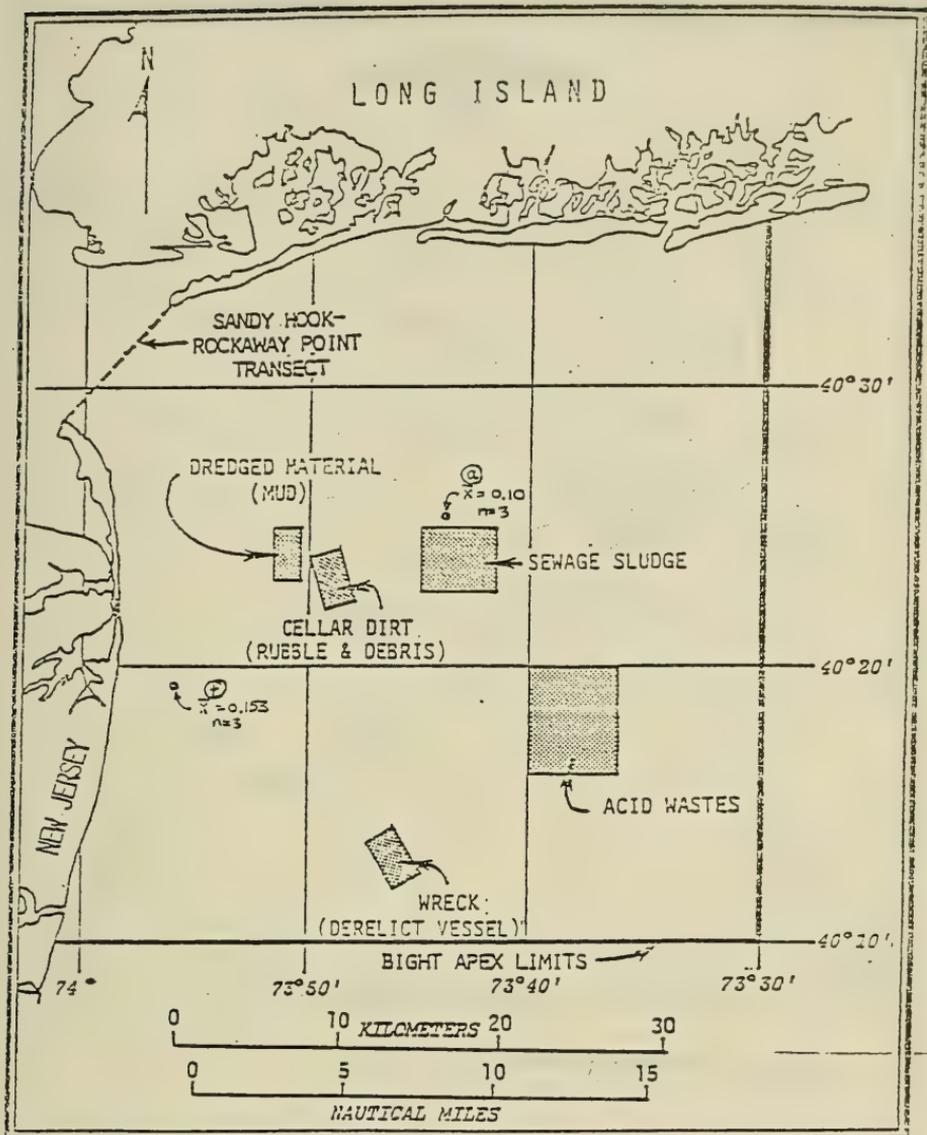
There are a number of other inputs to the New York Bight beyond those discussed in this brief paper. Boesch, for example, summarizes the organic carbon inputs of three studies (14). All three studies indicate that primary production

provides a large input of organic carbon (from 37 to 77% of the total). Sewage sludge and dredged materials provide much less of the total input (less than 23% combined). However, the organic carbon resulting from primary production is initially distributed over a larger area (1,250 km²), while the organic carbon inputs resulting from barge dumping of sewage sludge and dredged materials are initially input into a much smaller area. The area of the sewage and mud dumpsites combined is less than 30 km², or less than 3% of the total area of the Apex. Table H shows organic carbon inputs adjusted for the area of initial input. These oversimplified calculations show that barged-in organic carbon inputs are 5.3 to 105 times as concentrated as inputs from primary production. (Estuarine inputs are the other major source of organic carbon input, but area calculations are difficult to do with estuarine inputs, because the appropriate area over which they should be initially distributed is not clear.) This adjustment for the area of initial input is one that should be kept in mind while looking at other data on inputs to the Bight.



Distribution of surf clams (*Spisula solidissima*) with known concentrations of PCB in whole body tissue (mg/kg wet weight, shell excluded).

Figure A From (4)



Distribution of winter flounder (*Pseudopleuronectes americanus*) with known concentrations of PCB in edible flesh (mg/kg wet weight).

Figure B From (4)

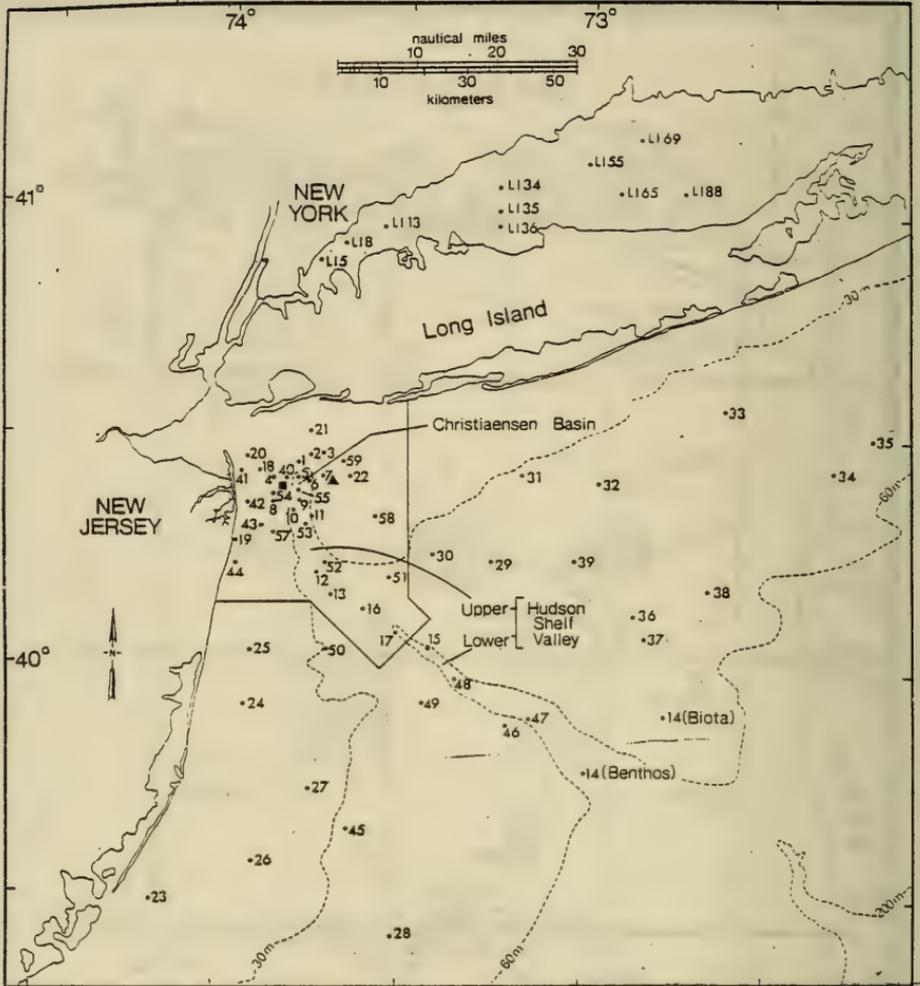
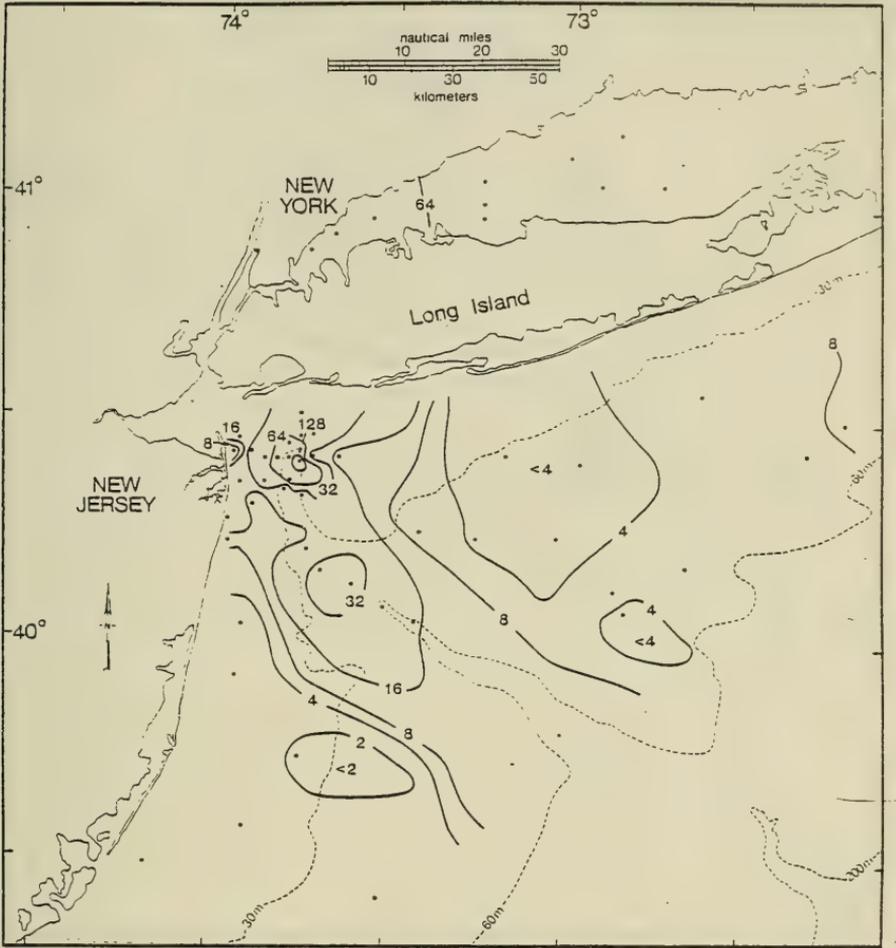


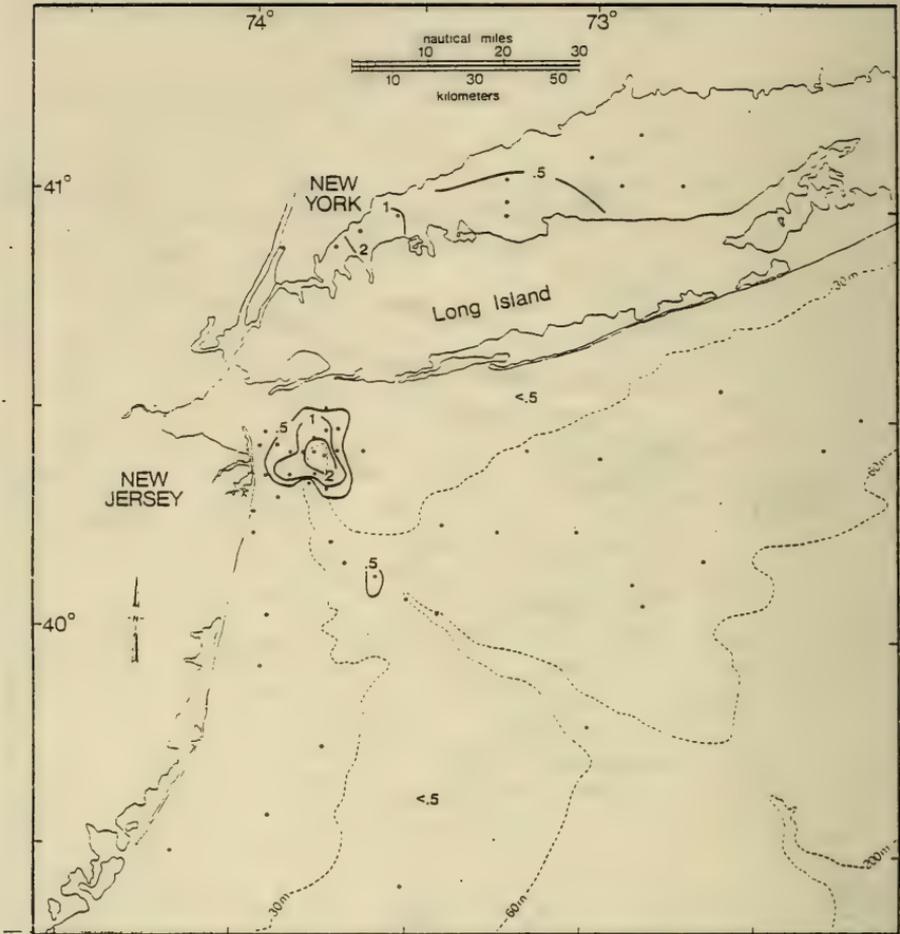
Figure C. Station locations used for acquiring data in figures D, E, and F. From (12)

▲ = Sewage sludge disposal site; ■ = Dredged material disposal site.



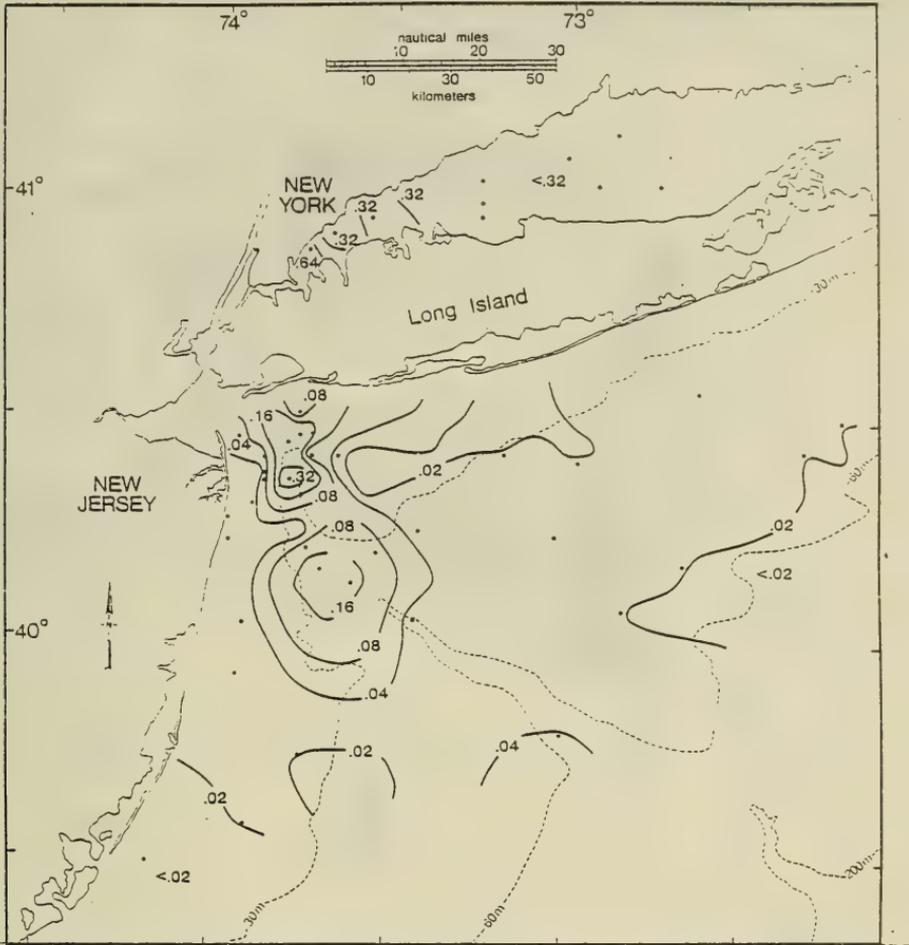
Distribution of Pb (ppm, dry wt.) in surface sediments.

Figure D From (12)



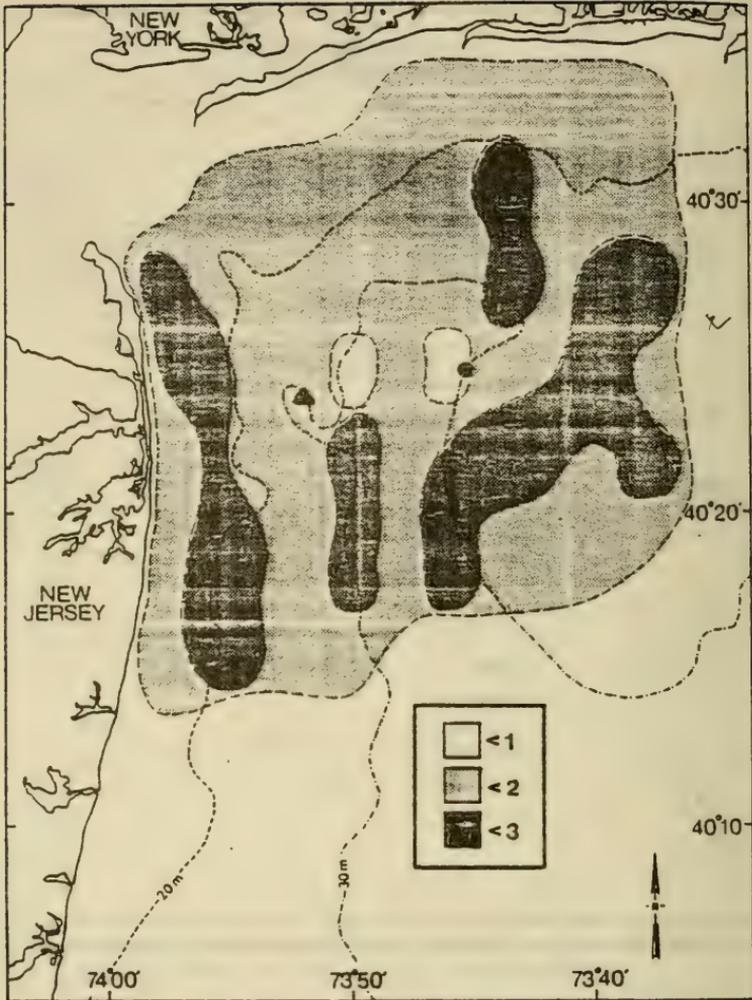
Distribution of Cd (ppm, dry wt.) in surface sediments.

Figure E From (12)



Distribution of Hg (ppm, dry wt.) in surface sediments.

Figure F From (12)



Average species diversity (H') distribution. Locations of dredge spoil (▲) and sewage sludge (●) dumpsites are indicated.

Figure G From (13)

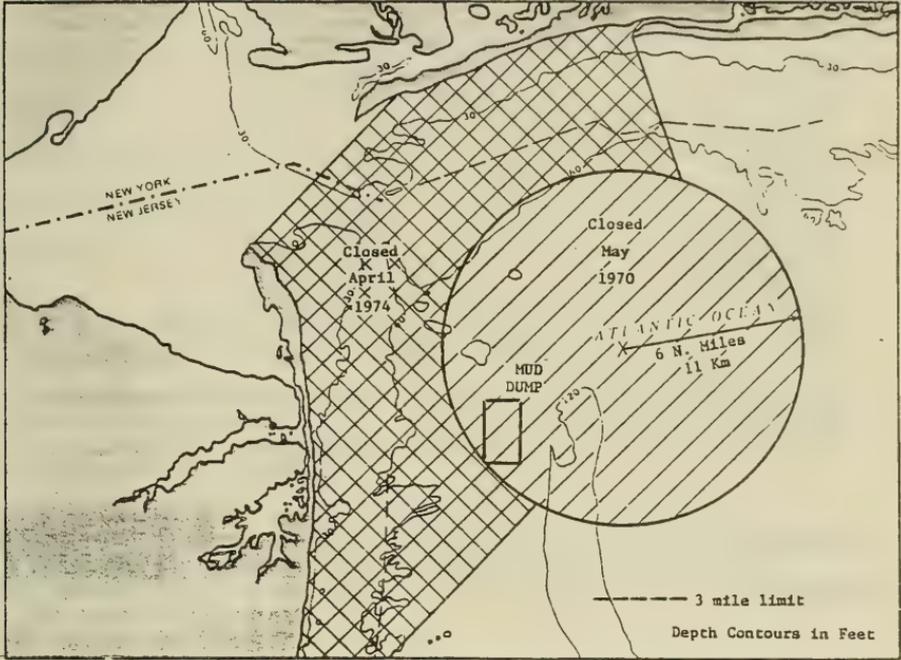


Figure H. Commercial Shellfishing Closure Areas
From (3)

Total PCB concentrations ($\mu\text{g/g}$, dry wt) in sediments from the Hudson River and New York Bight region, and in sewage sludge.

Material Location or number	Total PCB's ($\mu\text{g/g}$ dry wt)
Sediment	
Hudson River (km 240) ^a	60
Hudson River (km 15) ^b	0.5
Hudson River (N.Y. harbor) ^a	6
Pierhead Channel ^b	1
Gowanus Canal ^b	2
Newtown Creek ^b	0.4
Raritan Bay ^c	0.2
Sandy Hook transect ^d	0.0009
Christiansen Basin ^b	0.7
Dredged materials dumpsite ^d	0.4
Sewage sludge dumpsite ^a	2
Outer Bight ^b	0.0004
Sewage sludge	
Sample 1 ^b	9
Sample 2 ^d	3

^aData from Horn *et al.* (1979).^bData from O'Connor *et al.* (in press a).^cData from Stainken and Rollwagen (1979).^dData from West *et al.* (1976).

TABLE A

From (6)

	Coastal zone						
	Direct bight		Wastewater		Runoff		
	Barge	Atmospheric	Municipal	Industrial	Gauged	Urban	Groundwater
Flow	0.02	59	5	0.4	33	2	0.4
SS	63	5	4	0.2	16	12	0
Alk	1	0	35	0.3	59	5	0.03
BOD ₅	21	9	48	2	11	9	0.01
COD	32	10	35	1	13	9	0.01
TOC	25	12	29	1	18	15	0.02
MBAS	—	—	86	—	5	9	0.05
O & C	38	—	22	0.7	18	23	—
NH ₄ -N	24	4	35	3	10	4	0.04
Org-N	19	9	45	2	21	5	0.02
TKN	21	6	51	2	15	5	0.02
NO ₃ +NO ₂ -N	0.07	33	6	0.3	60	0.8	0.7
Total-N	18	13	40	2	25	4	0.2
Ortho-P	—	1	72	—	18	9	0
Total-P	50	0.7	35	1	9	4	0
Cd	82	2	5	0.8	5	5	0.001
Cr	50	1	22	0.8	10	18	0
Cu	51	3	11	9	10	18	0.006
Fe	79	3	5	0.5	6	6	0.01
Hg	9	—	71	2	13	5	—
Pb	44	9	19	3	6	19	0.004
Zn	29	18	8	2	21	22	0.009
F. coli winter	<0.01	0	87	0.2	0.01	13	0
summer	<0.01	0	85	0.2	0.01	15	0
T. coli winter	<0.01	0	91	0.1	0.05	9	0
summer	<0.01	0	84	0.2	0.1	16	0

TABLE B. Contaminants entering the New York Bight: Percent of loads by source. From (10).

	<u>A/B</u>	<u>A/C</u>
Metal:		
Arsenic	1.55	0.12
Cadmium	5.36	0.06
Lead	128.99	0.05
Mercury	0.54	0.008

A is mean ambient concentration in the water at the dredge spoil disposal site in ppb

B is concentration in natural marine waters in ppb

C is EPA water quality criteria in ppb

TABLE C. Comparison of ambient concentration of metals in waters of the New York Bight to the concentration in natural marine waters and to EPA criteria. Adapted from (3)

	Highest and (Mean) Concentrations in Bight Fish and Shellfish Tissue PPM ^{1/}	Safe ^{2/} Levels PPM ^{2/}
Cadmium	0.81 (.1)	0.5
Mercury	2.3 (.5)	1.0
Lead	4.1 (1)	2.0

TABLE D Levels of heavy metal concentration in New York Bight fish and shellfish compared with safe levels.

^{1/} From (1); ^{2/} From (21)

Important species of macrobenthos whose distribution or abundance apparently has been affected by waste discharges into the New York Bight apex.

Species	Importance as prey for fishes	Feeding type and effect on sedimentary processes
Species advantaged in most heavily contaminated sediments		
<i>Capitella capitata</i>	Unimportant	Deposit-feeding, surface tube dweller; pelletizes surface sediments
Species advantaged in the Christiaensen Basin		
<i>Ceriantheopsis americanus</i>	Unimportant	Surface contact predator; forms heavy mucous tube that penetrates deeply into the sediment, but is not ventilated
<i>Nephtys incisa</i>	Moderately important, skates, flatfishes, and gadoids	Motile predator or deposit feeder; ventilates temporary burrows and mixes surface sediments
<i>Pherusa affinis</i>	Occasionally important	Surface deposit-feeding, motile burrower; active in mixing sediments
<i>Mediomastus ambiseta</i>	Unimportant	Subsurface deposit-feeding, shallow dweller
<i>Tharyx</i> spp.	Unimportant	Surface deposit-feeding, motile burrower; possibly active in mixing sediments
<i>Asabellides oculata</i>	Unimportant	Surface deposit-feeding, tube dweller; possibly ventilates tube
<i>Nucula proxima</i>	Unimportant	Subsurface motile deposit feeder; mixes surface sediments
Species disadvantaged in the Christiaensen Basin		
<i>Ampelisca</i> spp.	Occasionally important, especially for flatfishes	Seston-surface deposit-feeding, shallow infaunal tube dweller; stabilizes sediments
<i>Erichthonius rubricornis</i>	Very important for a wide variety of fishes	Seston-feeding, epifaunal tube dweller; stabilizes sediments
<i>Unciola irrorata</i>	Very important for a wide variety of fishes	Surface deposit-feeding shallow infaunal tube dweller; stabilizes sediments
<i>Cancer irroratus</i>	Very important for a wide variety of fishes	Motile epibenthic predator; causes small scale disturbances in surface sediments

TABLE E

From (14)

Selected PAH and total PAH concentrations (ng/g, dry wt) in sediments from the Hudson-Raritan estuary and New York Bight region, and in sewage sludge. Total PAH is the total polynuclear aromatic hydrocarbons detected as target compounds by MacLeod *et al.* (in press) (see O'Connor *et al.*, in press a for additional details). N.D. indicates compound not detected.

Material Location	Naphthalene	Phenanthrene	Anthracene	Benz (a) anthracene	Total PAH
SEDIMENT					
Hudson-Raritan estuary					
15 km north of the Battery	60	120	60	330	2,000
Pierhead Channel	200	300	200	500	3,200
Gowanus Canal	100	1,000	500	3,000	16,400
Newtown Creek	120,000	14,600	9,600	5,600	182,000
Lower Bay	100	600	300	2,000	9,900
New York Bight region					
Christiaensen Basin	800	500	300	1,000	6,000
Sewage sludge dumpsite	80	70	40	200	1,100
Outer Bight	0.6	3	N.D.	3	22
SEWAGE SLUDGE	2,200	4,400	1,100	1,100	20,400

TABLE F

From (6)

Selected PAH and total PAH concentrations (ng/g, wet wt) in flesh of various fishes and shellfishes from the Hudson River and New York Bight region. Total PAH is the total polynuclear aromatic hydrocarbons detected as target compounds by MacLeod *et al.* (1981) (see O'Connor *et al.*, in press b for additional details). Sample locations are as indicated. N.D. indicates compound not detected.

Species (location)	Naphthalene	Phenanthrene	Anthracene	Biphenyl	Total PAH
Atlantic mackerel (<i>Scomber scombrus</i>) (New York Bight apex)	N.D.	10	N.D.	N.D.	10
Winter flounder (<i>Pseudopleuronectes americanus</i>) (Christiansen Basin)	2	N.D.	N.D.	6	8
Winter flounder (<i>P. americanus</i>) (Raritan Bay)	2	1	N.D.	N.D.	5
Striped bass (<i>Morone saxatilis</i>) (Montauk Point)	7	N.D.	N.D.	N.D.	19
Striped bass (<i>M. saxatilis</i>) (Hudson River)	4	N.D.	N.D.	4	8
Lobster (<i>Homarus americanus</i>) (New York Bight)	7	N.D.	N.D.	N.D.	7
Lobster (<i>H. americanus</i>) (Raritan Bay)	5	5	N.D.	N.D.	25
Lobster (<i>H. americanus</i>) (Raritan Bay)	7	N.D.	N.D.	N.D.	77
Blue mussel (<i>Mytilus edulis</i>) (Sandy Hook)	6	6	N.D.	4	250
Blue mussel (<i>M. edulis</i>) (Shark River)	20	10	1	40	120

TABLE G

From (6)

Source	Area of Initial Input (km ²)	Metric tons Organic C/day/km ² (Metric tons Organic C/day)		
		Study A	Study B	Study C
Sewage Sludge	22.7	4.8 (110)	10.4 (235)	4.8 (110)
Dredged Material	5.7	94.7 (540)	66.7 (380)	- (-)
Primary Production	1250	0.9 (1146)	1.0 (1266)	1.0 (1300)
Estuarine Inputs	?	? (1073)	? (1501)	? (280)

TABLE H. Organic carbon inputs to the Bight Apex. The upper number is on a unit area basis, and the lower number in parentheses is the total input to the Bight. ? reflects uncertainty about the relevant area over which to distribute estuarine inputs. Adapted from (14) which provides references for the three studies, A, B, and C.

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- EXHIBIT II -



NATIONAL WILDLIFE FEDERATION

1412 Sixteenth Street, N.W., Washington, D.C. 20036

202-797-6800

February 10, 1983

Mr. T. A. Wastler, Chief
 Marine Protection Branch (WH-585)
 Environmental Protection Agency
 401 M Street, S.W.
 Washington, D. C. 20460

Re: Comments on Proposed Rule to Designate the 106 Mile Site
 as an Approved Ocean Dumping Site for the Authorized Disposal
 of Municipal Sludge, 47 Fed. Reg. 56663-65, December 20, 1982

Dear Mr. Wastler:

Pursuant to the invitation to comment on the above-referenced notice of proposed rulemaking, the National Wildlife Federation offers the following views:

1. Suitability of the 106 Site to Receive Sewage Sludge

In our view (notwithstanding the contrary implication in the City of New York case) there is no basis under the Marine Protection, Research, and Sanctuaries Act, under the international London Dumping Convention, or under EPA's Ocean Dumping Regulations and Criteria for regarding sewage sludge which may not be lawfully dumped at the 12-Mile Site to be any more legally acceptable for dumping at the 106-Mile Site. Specifically, the Ocean Dumping Criteria specify (§ 227.8) that "no wastes will be deemed acceptable for ocean dumping unless such wastes can be dumped so as not to exceed the limiting permissible concentration as defined in § 227.27." Yet, under § 227.27, only for the "liquid phase" does the "limiting permissible concentration" ("LPC") incorporate an "initial mixing" component as to which one might expect a difference between the 12-Mile and 106-Mile sites. By contrast, for the suspended particulate and solid phases--which, for sewage sludge, is where most of the environmental impact potential resides--the LPC is defined strictly on the basis of laboratory toxicity and bioaccumulation tests, the results of which are uninfluenced by the choice of disposal site. Since the proposed site designation action properly and necessarily would restrict sludge dumping at the 106-Mile Site to sludge which is determined to not cause "unreasonable degradation and endangerment," the real issue is whether any of the sewage sludge currently dumped at the 12-Mile Site can satisfy the "unreasonable degradation" test.

Mr. T. A. Wastler, Chief, Marine Protection Branch
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If not, it may be premature to designate a site to receive hypothetical future sludges. If there is sludge which is not unreasonably degrading, the question should be whether it makes sense to place relatively uncontaminated sewage sludge at the 106-Mile Site rather than at the closer-to-shore 12-Mile Site--or, for that matter, whether it makes sense to put such sludge in the ocean at all.

Although the District Court in the City of New York case concluded that the "unreasonable degradation" determination encompasses factors beyond environmental impact considerations (including factors, such as comparative economics, which might differ as between the 12- and 106-Mile sites), this interpretation appears to be at odds with the legally binding mandates of the London Dumping Convention (a factor not addressed by the court in the City of New York case). This very issue is currently under adjudication in National Wildlife Federation v. Gorsuch, Civ. Action No. 82-4314F, D.N.J. (complaint filed December 22, 1982).

2. Appropriateness of Dumping Sludge and Industrial Wastes at the Same Site

In view of EPA's desire (and legal obligation) to manage dumping at the 106-Mile Site in a manner which permits "further studies of the site and careful monitoring of the impacts of... disposal at the site" (47 F.R. 56664), one may well question whether combining municipal and industrial waste dumping at the same site will further or frustrate this monitoring objective. Elsewhere, the Ocean Dumping Criteria wisely specify that "sites designated for the ocean dumping of dredged material... shall be used only for the ocean dumping of dredged material..." (§ 228.4(e)(3)). Mixing of different waste classes as proposed in the notice may be no more defensible in the present instance.

3. Need to Avoid Premature Foreclosure of Options

As a result of the City of New York litigation, and of consent orders in six New Jersey cases (which did not address the legal merits), ocean dumping of sewage sludge at the 12-Mile Site has been authorized to continue unless and until EPA decides: (a) not to extend the designation of the 12-Mile Site; (b) to relocate sludge dumping to the 106-Mile Site; or (c) to require current sludge dumpers to implement land-based alternatives.

The full range of EPA's legal options and obligations is unclear, however, because: (a) EPA is in the process of revising its Ocean Dumping Criteria (which will largely determine which sludges, if any, are suitable for ocean dumping); (b) the outcome of the National Wildlife Federation litigation will determine the legitimacy of considering non-environmental impact criteria in selecting ocean dumpsites and in approving individual ocean dumping proposals (it may also have a major bearing on the practical ability of New Jersey municipalities to implement land-based alternatives

Mr. T. A. Wastler, Chief Marine
Protection Branch
Page 3

to ocean dumping); (c) Congress has indicated its intention to reexamine and amend the Marine Protection, Research, and Sanctuaries Act during the 98th Congress; and (d) ongoing and proposed studies may shed new light on the relative merits of alternative sludge management techniques.

In light of these circumstances, and in the interest of avoiding premature foreclosure of EPA's options and the too-hasty redistribution of resources by either EPA or the sludge-dumping municipalities, we propose another course.

4. A Modest Proposal

Each of the sludge dumping municipalities has provided estimates of how much more it believes it would cost for its sewage sludge to be ocean-dumped at the 106-Mile Site as opposed to the 12-Mile Site. All of the municipalities, not surprisingly, vehemently oppose such a dumpsite shift and the attendant increased costs, because they see no great environmental advantage to dumping further offshore.

In our view, EPA can and should defer deciding this question on its environmental and legal merits, pending resolution of some of the uncertainties identified under item #3, above. EPA could take such an approach and still not lose much momentum in promoting a final resolution of the sludge dumping question, by pursuing the following steps:

a. Designate the 106-Mile Site for industrial wastes, but conditionally designate it (for 5 years) for sewage sludge--pending the resolution of the aforementioned uncertainties.

b. Take no immediate action with respect to extending the designation of the 12-Mile Site, allowing use of that site for sludge dumping to continue on an interim basis (under operation of various court orders).

c. Call upon the sludge dumping municipalities to deposit a refundable "user fee" in an "escrow account" or other "reserve fund" or "trust fund" account. The size of the fee should be based on the municipality's estimate of the cost differential of dumping at the 106-Mile Site versus the 12-Mile Site. (Municipalities might be given the opportunity to reduce their cost estimates based on medium- and long-term economies of scale, etc.). These funds would be earmarked for the exclusive use of the municipalities that had contributed them, as long as they were used for sludge management purposes. Specifically, if EPA (or Congress) were to ultimately mandate a halt to ocean dumping, the funds could be used to defray the costs of implementing land-based alternatives. If the decision were made to allow dumping at the 12-Mile Site to continue, the funds could be used to reduce the contaminant content of the sludges (e.g., via industrial pretreatment) and to defray monitoring costs. Finally, if the decision were made to shift dumping to the 106-Mile

Mr. T. A. Wastler

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Site, the funds could be used to offset the additional costs involved and for monitoring purposes. Etc. The purpose of the "fee" would in no sense be punitive. Rather, it would be analogous to purchase of an option to buy land (except that the funds would all be returned eventually, with interest). In this case, what would be "bought" would be the option to spend money in furtherance of an ultimate sludge management objective, rather than of an interim objective which might later be shown to have been unnecessary or unwise.

Although the Marine Protection, Research, and Sanctuaries Act does not specifically authorize imposition of the kind of "fee" proposed, the statute does give the EPA Administrator broad authority to "prescribe such processing fees for permits...as he deems appropriate" (§ 104(b)), and to "limit or deny the issuance of permits..." (§ 104 (d)). And in view of the Administrator's far-reaching discretion to withhold permit issuance where insufficient information exists to permit him or her to confidently conclude that proposed dumping will not "unreasonably degrade" the marine environment, we believe there is ample legal authority to sustain the proposed course of action. Of course, legalisms aside, if it became clear to the municipalities that EPA was committed to either immediately shifting all dumping to the 106-Mile Site, or adopting our refundable fee proposal, it seems likely that the municipalities would be inclined to voluntarily agree to the fee approach.

The opportunity to convey these views is appreciated.

Sincerely,



Kenneth S. Kamlet, Director
Pollution & Toxic Substances
Division

KSK/eh

cc: NWF Affiliate Organizations
in NY, NJ, DE, and MD

- EXHIBIT III -

APR 7 1981

MEMORANDUM

SUBJECT: Directive to Seek Resolution of Disputes Over Ocean Dumping of Municipal Wastes in the New York Bight

FROM: Walter C. Barber
Acting Administrator (A-100)

TO: Richard T. Dewling
Acting Regional Administrator
Region II

Steven Schatzow
Deputy Assistant Administrator
for Water Regulations and Standards (WH-551)

President Reagan recently directed this Agency to explore possible resolutions to disputes with New York City over disposal of municipal waste in the New York Bight. In response to the President's directive I have reviewed this situation and have determined that, because of the environmental and legal complexities of this matter, the interests of all concerned would best be served by securing a period of time in which to assess whether the ocean dumping of some or all of their wastes is a permissible alternative to land-based disposal. It is important that during this period of review any disposal of wastes be done in a manner which is both environmentally sound and which does not foreclose future alternatives.

Consequently, I am directing you to attempt immediately to arrange a meeting with representatives of New York City and other affected municipalities to explain that the Agency's position is as follows:

- the Agency believes that it does not have the authority to authorize dumping of sewage sludge after December 31, 1981, the statutory deadline for cessation of ocean dumping of sewage sludge contained in the "Ocean Dumping Act" and that there is no satisfactory administrative action which EPA can take which will provide relief before the 1981 deadline;

-2-

- ocean dumping of sewage sludge at the current "12 mile" site must be ended as soon as possible, but no later than December 31, 1981. Available data indicate that environmental and navigational conditions at this site make it unacceptable for use for the ocean disposal of such wastes;
- we would be willing to join New York City and other municipalities with which we are in litigation in seeking a solution which authorizes the continued dumping of sludge while data are developed to determine whether ocean disposal of municipal wastes may be authorized under Agency regulations;
- the appropriate method to implement such a solution is a consent judgment which restricts the ocean dumping of municipal wastes to the "106 mile ocean dump site," is for a limited period of time, and contains schedules for development of additional data;
- the Agency believes that this is the appropriate resolution for all municipalities currently disposing of wastes at the "12 mile" site and which will not have ceased ocean dumping by December 31, 1981; and
- in the absence of an appropriate resolution, EPA will commence enforcement actions against municipalities which are ocean dumping wastes without an approved ocean dumping permit.

Prepared by: JGABA:cjw:OGCW:A-131:Rm.511WT:X50753:4/7/81

EXHIBIT IV

PP:ee
20-9492

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

THE CITY OF NEW YORK, :

Plaintiff, :

-v- :

UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY, et al., :

Defendants :

DECLARATION OF
PETER W. ANDERSON
80 Civ. 1677 (ADS)

----- -x
PETER W. ANDERSON affirms and declares under penalty
of perjury as follows:

1. I am the Chief of the Marine and Wetland Protection Branch of the United States Environmental Protection Agency, Region II ("EPA, Region II" or the Agency"), a position I have held since February 1980. My previous position with EPA, Region II was Chief of the Marine Protection Program, a position I held since July 1974. In these management/supervisory positions, I have been and am responsible for the evaluation of the impacts of waste disposal on the marine environment offshore of New York, New Jersey, Puerto Rico, and the Virgin Islands.

2. Prior to my employment with EPA, from July 1957 to June 1974, I worked for the U.S. Geological Survey, Water Resources Division in supervisory/professional positions involving studies of the fate and effect of contaminants in surface and ground waters of New Jersey, Pennsylvania, and Delaware. I hold a Ph. D. and an M.S. degree in Environmental Sciences from Rutgers University, and an A.B. in Natural Sciences from the University of Pennsylvania.

PP:ee
10-3492

3. As a result of my responsibilities at EPA, Region II, I am familiar with the facts and circumstances surrounding New York City's practice of dumping municipal sewage sludge into the New York Bight Apex of the Atlantic Ocean and with the data regarding the impact of this practice on the marine environment. I have read the affidavit of Francis X. McArdle, Commissioner of the New York City Department of Environmental Protection, dated September 10, 1980, and submitted by the City in support of its motion for partial summary judgment. I am familiar with the studies and research to which he refers throughout his affidavit. Commissioner McArdle concludes that currently available information provides "an overwhelming body of evidence that the dumping of sewage sludge has not, in fact, resulted in any significant degradation of the ocean environment." McArdle Aff. ¶11. It is the view of EPA, Region II that this statement is inaccurate. Indeed, the Agency believes that significant degradation of the marine environment has taken place at the sewage sludge dumpsite, commonly referred to as the 12 Mile Site, and surrounding areas impacted by activities at the site, and that this degradation is caused, at least in important part, by the ocean dumping of sewage sludge.

4. In October 1979, Dr. R. Lawrence Swanson, Director of the National Oceanic and Atmospheric Administration (NOAA), Office of Marine Pollution Assessment, testified at an EPA hearing on the City's application for a renewal of its dumping permit. Dr. Swanson is responsible for the management and oversight of NOAA's research and monitoring activities with regard to the impacts of ocean dumping under Title II of the Marine Protection, Research, and Sanctuaries Act (PL. 92-532, as

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amended). As such, Dr. Swanson is a noted authority in ocean pollution assessment, in particular with respect to the New York Bight area. His testimony clearly and concisely summarizes available knowledge regarding the adverse environmental impact of the City's sludge dumping activities. A copy of Dr. Swanson's testimony is annexed hereto as Exhibit A.

5. Dr. Swanson accurately articulated the variety of adverse impacts caused by the City's sludge dumping. (Ex. A, pp. 4-17.) Among the items he discussed, the following are, in my view, extremely important:

a) Bacterial contamination in the New York Bight Apex, caused in part by sewage sludge dumping, has resulted in the closure of all shellfish beds within 6 miles of the sewage sludge dump site since 1970. The Food and Drug Administration (FDA) extended this ban in 1974 to areas to the north and west of the original closure site, so that the closed area extends all the way to the New Jersey and New York City beaches.* One protozoan genus, Acanthamoeba, has been identified in the vicinity of the dump site and at monitoring stations to the north of it. A pathogenic species, A. culbertsoni, has been isolated from sewage-associated sediments off New York. As noted by Dr. Swanson, "Although it has not been demonstrated whether sewage-related materials are the source of the Acanthamoeba that infect the dumpsite and adjacent sewage-impacted areas, it is apparent that such amoebae are potential residents of ocean sediments where bacteria, including those of the coliform group, are available as food." (Ex. A, p. 13.) Additionally sewage sludge represents an important source of pathogens to the Apex, including bacteria, viral particles, fungi, and various parasites. (Ex. A, p. 7). For example EPA, in studies conducted in 1976, isolated several viruses in waters at the dump site, including Coxsackie (B2, B3, B4, B5),

* Data provided by the City indicate that fecal coliform levels in its sludges ranged from 20 to 790 MPN/100 ml during 1979.

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Echovirus (ECHO 15), and Poliovirus. These viruses are members of the picornavirus group which comprises the most important group of human pathogens. They can result in anything from common cold to gastroenteritis to paralysis to death. I would point out also that, although the FDA has closed the area to commercial shellfishers, enforcement by the Coast Guard is minimal and the public does shellfish for lobster and crabs in areas adjacent to the dump site.

b) Toxic pollutants that are known to bioaccumulate are present in the water and sediments at the sewage sludge site and the adjacent areas impacted by dumping, including the Christiaenson Basin. Such substances as polynuclear aromatic hydrocarbons (these represent the most toxic components of oil), halogenated hydrocarbons such as DDT and particularly PCBs, and heavy metals such as cadmium and mercury are present in the City's sewage sludges. (Ex. A, pp. 5-7). Although sewage sludge dumping is not the only source of such contaminants in the Bight Apex, it is not an insignificant factor.

c) Due to the high loading of decomposable organic material, the sewage sludge dumped in the Bight Apex has played a role in lowering bottom dissolved oxygen concentrations in and adjacent to the dump site. (Ex. A, pp. 10-12). EPA studies indicate that oxygen levels during late summer are normally below 4 mg/l at and adjacent to the dump site. Oxygen levels below 4 mg/l impose stress on fish and shellfish, alter benthic productivity and respiration, and result in death of bottom organisms if severely below 4 mg/l.

d) The dumping of sewage sludge has altered the benthic community in the areas in and adjacent to the sewage

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sludge dump site. The community is atypical, with few macro-benthic species present and an otherwise rare polychaete, Capitella capitata, in abundance. Several important species are absent, particularly amphipods which are among the most important prey species known for demersal fishes in the Bight region. This community alteration may result from organic enrichment contributed by sewage sludge dumping, although other factors also may contribute. Dr. Swanson pointed in particular to one such factor: the reduction in cropping by predators excluded from the area by factors such as hypoxia or toxicants. (Ex. A, pp. 8-10). As was noted previously, the dumping of sewage sludge contributes to the presence of these factors which might exclude predators.

6. Dr. Swanson also mentioned several other impacts that may be attributable to a polluted environment to which sludge dumping contributes. These include the possible impairment of the capacity of the Bight Apex to sustain living resources harvested by man; the development of bacterial strains resistant to antibiotics and heavy metals; the development of fish and shellfish diseases including fin rot, shell disease, black gill and ulcers; and the development of organismic and sublethal effects such as disruption of respiratory and glycolytic patterns, impairment of physiological control mechanisms, lowered resistance to disease, decreased survival of offspring, reduction or inhibition of reproductive functions and early deaths of individuals organisms. (Ex A, pp. 10, 12, 14-17).

7. With regard to the goal of environmental rehabilitation of the Bight Apex, Dr. Swanson noted that continued sludge dumping "will almost certainly retard ... future recovery." (Ex. A, p. 17). He noted further, however, that

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cessation of sludge dumping alone will not be likely to lead to immediate recovery in view of the other materials disposed there, and that even if all major contaminant inputs are curtailed, a rapid recovery is improbable. (Id.) Dr. Swanson's testimony clearly reflected his awareness of the fact, of which the City makes a great deal, that sewage sludge is not the only source of pollution in the Bight Apex (Ex A, pp. 17, 22-24). Nevertheless, it was his considered opinion that termination of sludge dumping by the end of 1981 remains an environmentally worthy objective. (Ex. A, p. 24). The EPA fully concurs with Dr. Swanson's views on this subject.

8. In paragraph 14 of his affidavit, Commissioner McArdle reviews a number of points alleged to be found by Ecological Analysts, Inc., the group commissioned by the City to study the effects of its sludge dumping. I have studied the report to which reference is made, and I take issue with each statement presented. I address them in turn below:

a) Commissioner McArdle notes that "there is virtually no significant accumulation of sewage sludge on the ocean bottom at the existing dump site." (Aff. ¶ 14). That is, a mound of material has not built up at the sludge site, as it has at the dredged material site about 5 miles to the west. I would note, however, that solids related to such sludge have been found to have impacted the surficial sediments in a 10-15 km² area in and adjacent to the dump site. Thus, the site itself has not shown huge accumulations because the solids have been spread by physical processes (currents, dilution, dispersion) over a much greater area of impact. It would be inaccurate to conclude from this that there is no adverse impact to the marine environment.

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b) With respect to the concentration of contaminants in fish and lobsters, it may be true that levels in fish and biota found at the dump site do not exceed those found in other areas of the Bight Apex. The marine organisms cited are mobile. As such, they do not spend their entire lives at the dump site, but live in all areas. However, if the levels of contaminants in such species are contrasted with organisms in less contaminated areas farther offshore, the City's assertion is incorrect. Fish and shellfish in the Bight Apex are reported by NOAA to bioaccumulate cadmium. The maximum concentration in finfish species is reported as 0.2 mg/kg (wet weight); however, concentrations in nonmobile shellfish in the inner Bight are substantially higher: 0.1-0.2 mg/kg in surf clams, up to 0.8 mg/kg in hard clams, and up to 2.9 mg/kg in oysters. The levels of cadmium measured in surf clams are below the 0.5 mg/kg level considered safe by NOAA scientists (in terms of ecological health and public health); however, maximum levels in both hard clams and oysters already exceed this safe level. The NOAA studies also indicate that the eastern Christiaensen Basin (nearest the dump site) acts as a sediment trap for cadmium and contains the highest levels in the Bight Apex (5-25 mg/kg dry weight). Similarly, while the data are limited, elevated concentrations of organohalogens, including PCB's, have been measured in fish and shellfish in Bight Apex. Maximum concentrations of PCB's observed in the Bight Apex are: lobster, 0.32 mg/kg; crab, 1.8 mg/kg; mussel, 0.78 mg/kg; surf clam, 0.07 mg/kg; polychaete worm, 0.18 mg/kg; and finfish, 0.39 mg/kg. The FDA limit for PCB's in edible fish and shellfish is 0.5 mg/kg. It should be noted that in a non-contaminated area PCB's would not be present.

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c) The City's statement that the sludge dump site is not a "dead sea" is correct. I disagree, however, with the implication that there is a normal population in the area. As Dr. Swanson pointed out, the benthic community is far from normal. (Ex. A, p. 8-10). Dr. Swanson stated that studies have "found an extremely depauperate macrobenthic community in muddy sediments near the sewage sludge and dredged material disposal sites. This most impacted zone typically exists in a 10-15 km² area just west of the sewage sludge disposal site on the margin of the [Christiaensen] basin. The area supports few macrobenthic species and is characterized by dense populations of the otherwise rare polychaete, Capitella capitata. Most of the Christiaensen Basin beyond this zone is populated by a very dense but atypical community of animals characteristic of muddy fine sands and 'enriched' sediments... Coupled with this is the absence of several important macrobenthic species, particularly amphipods, which normally occur in topographic lows of the middle Atlantic continental shelf." (Id., p. 8).

d) With respect to fecal coliform counts in the water column, up to 1,300 MF/100ml have been measured by EPA near the dump site. FDA is reported to have measured 2.4 million MPN/100ml behind a discharging barge. Both of these values exceed the marine water quality criterion, when evaluated individually. Moreover, the City's statement only applies to fecal coliform in the water column. Fecal coliforms are also found in bottom sediments associated with sewage sludge. These sediments provide nutrients for bacteria to grow on. Fecal coliform counts in sediments at and near the site have been measured as high as 7,900 MF/100g. It should also be pointed out that fecal coliforms are used as an indicator organism to determine the safety of water for swimming and

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shellfish harvesting. In the case of the New York Bight Apex, NOAA has identified a pathogenic amoeba and EPA several viral strains, as discussed above, that may be associated with sewage sludge. Therefore, even if fecal coliform counts in the water column on occasion do comply with the criteria, this does not indicate the absence of pathogens. The presence of pathogens has been confirmed independently.

e) Commissioner McArdle also notes that dissolved mercury and cadmium concentrations in the water column are below the levels set in EPA's marine water quality criteria. While true, the City does not discuss the levels of other toxic pollutants nor the elevated levels of mercury, cadmium or other toxic pollutants in the suspended particulate phase of its sewage sludges which, when dumped, result in elevated levels in the sediment. Recent NOAA studies indicate that dissolved cadmium levels (0.1-7.0 micrograms/l) in the Bight Apex are considerably higher than in non-contaminated areas (4-7 nanograms/l), and that levels in sediments in and adjacent to the sludge dumpsite range from 5-25 mg/kg (dry wgt.). Once in the sediments, elevated levels of toxic pollutants are available for bioaccumulation, bioconcentration, and biomagnification in the food chain of marine organisms and man. Marine water quality criteria set levels for pollutants only in the water column, not in bottom sediments. As noted above, NOAA studies show elevated concentrations of cadmium in fish and shellfish, with some already exceeding the 0.5 mg/kg level considered safe for human consumption and marine health.

(f) With respect to evidence suggesting the contribution of sewage sludge dumping to fin-rot and other sub-lethal effects, Dr. Swanson's testimony (Ex. A, pp. 14-17)

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is relevant and has been summarized above. I would add that recent data indicate an occurrence of fin-rot at a digested sewage sludge ocean dump site used by the Federal Republic of Germany.

(g) Data provided by Ecological Analysts reflect that, contrary to the assertion of Commissioner McArdle, the City's sludges do fail the limiting permissible concentrations criteria for both liquid and suspended particulate phases, particularly during critical stratified summer conditions (Ecol. Anal., p. 3, Chap. 3). Since the City's monitoring program is concerned mainly with bacteria, nutrient, and oxygen levels, it is difficult to extrapolate these data to the acute and chronic toxicity or bioaccumulation potential of the City's dumping activities. EPA can only agree that the City's data confirm that such dumping (at present levels) is not contravening the recreational quality (as indicated by coliform levels) on nearby coastal beaches. Also, in performing their computation of LPC, Ecological Analysts used mean bioassay toxicity values rather than individual "worst case" values. Thus, it must be assumed that additional contravention of the LPC criteria would result if worst case values were used.

9. In paragraph 15 of Commissioner McArdle's affidavit, he indicates that the City does not comply with interim limitations for heavy metals in the solid phase of sewage sludge, but that it meets all other EPA requirements. As noted by Commissioner McArdle, however, if no solids settle out within one hour, the sludges are considered not to have a solid phase. Based on data provided by the City in 1979, EPA agrees that the City's sludges do not settle in laboratory tests and, accordingly, they do not fail the solid phase criteria. It is incorrect, however, to conclude that the City's sludge meets all

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the other environmental impact criteria. It fails the bacteria and virus criteria and, as noted above, the limiting permissible concentration criteria for liquid and suspended particulate phases. Additionally, the City has not demonstrated compliance with the bioaccumulation criteria for cadmium, mercury, and organohalogenes. (It should be noted that most of the test species died in a 10-day test performed by the City in 1979 on the suspended particulate phase). Under the International Convention on Prevention of Marine Pollution by Dumping of Waste and Other Matter, an international treaty to which the United States is a contracting party, cadmium, mercury, and organohalogenes may not be present as other than trace contaminants in materials to be ocean dumped. The bioassay and bioaccumulation tests for determining whether they are present only as trace contaminants are the same tests EPA uses to determine compliance with EPA's criteria, i.e. the tests the City's sludge has been unable to pass.

10. I would hope that several facts are apparent from the foregoing statement. First, the Agency does not operate under the misconception that cessation of the City's sludge dumping will solve the problems of the New York Bight Apex. We recognize, as articulated by Dr. Swanson, that there are indeed other significant causes of pollution in the area. (See e.g., Ex. A, pp. 22-24). The Court should be aware that the Agency is involved in a wide variety of plans and programs designed to eliminate or substantially mitigate the pollution caused by these other sources. (For example, since 1976 the Agency has provided over \$874 million for the planning, design, and construction of publicly-owned treatment works in the New York

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Harbor area under Section 201 of the Clean Water Act, including over \$447 million to New York City. In addition, over \$13 million have been provided for water-quality management planning under Section 208 of the Clean Water Act, including over \$8 million to the City. While not funded by EPA, a \$4 million, 2-year program to develop alternate dredged material disposal techniques by the U.S. Army Corps of Engineers is actively supported by the Agency.) It does not follow, however that ocean dumping of sewage sludge is innocuous or harmless. On the contrary, as detailed above, there are a number of identifiable adverse impacts attributable to the City's sludge disposal. Accordingly, the Agency requires that sludge dumping be terminated by the end of 1981, unless the sludge can meet the requirements for a "Special Permit." See 40 C.F.R. 220.3(b). This requirement was adopted and strengthened by Congress in the 1977 Amendments of the Marine Protection, Research, and Sanctuaries Act of 1972, which incorporated the 1981 deadline into the statute itself. It is an environmental goal we believe to be wholly worthy of respect.

I declare under penalty of perjury that the foregoing is true and correct.

¹⁵¹

PETER W. ANDERSON

Executed at New York, New York
on the 31st day of October, 1980.

Mr. HUGHES. Thank you very much, Mr. Kamlet.
Mr. Lahey.

STATEMENT OF WILLIAM L. LAHEY

Mr. LAHEY. Thank you, Mr. Chairman.

As indicated I am William Lahey, with the Woods Hole Oceanographic Institution. I am pleased to be here to discuss fee systems for ocean dumping.

I would like to take a few minutes to summarize my written testimony which is submitted for the record.

Environmental charge systems are often designed to achieve one of two purposes: To raise revenues or to discourage activities that degrade the environment. In practice, however, many systems have a regulatory effect and revenue generating function.

Indeed, there are a number of examples of pricing mechanisms designed both to generate revenue and regulate pollution—what can be called a dual purpose charge system.

There are a number of reasons for considering a dual purpose charge system for ocean dumping. The fee could be structured to achieve important regulatory goals. The fee moreover, could provide a source of revenue which could be used for waste management activities.

The fee proposal contained in the May 16, 1983, staff draft, in other words the Hughes-Forsythe proposal, is commendable in terms of how the revenue would be distributed. But it could go further in incorporating important regulatory uses of fees.

Earmarking a large percentage of the revenue from the 12-mile site to State and local governments for development of long-term disposal options is sensible. Such a scheme could spawn a wide variety of approaches to waste disposal. It may be wise, however, to amend the revenue distribution ratio to provide for more funding for Federal programs including research and development of alternative disposal methods. Funding a comprehensive multimedia assessment of options for municipalities in the New York-New Jersey region is a sound idea.

The staff's fee proposal could incorporate many potential beneficial regulatory uses of pricing mechanisms which it does not now include. There are no provisions for varying the fee level to create incentives for sound waste disposal practices. The staff proposal, for instance, could vary the fee level according to types and concentrations of contaminants in the wastes. The present staff draft instead relies on waste quality standards. And past experiences with numerical standards suggests that we should consider an alternative approach. A variable fee system may be a wise alternative.

I wonder whether we want another deadline for dumping at the 12-mile site. If Congress wishes to terminate dumping at the site it should consider doing so with the use of escalating dumping fees.

I am skeptical of efficacy of another so-called firm phaseout date for ocean dumping even if all municipalities were able to comply with the deadline experience with other deadlines suggest they often result in hasty adoption of inefficient or inappropriate technologies. A fee system on the other hand, could be designed to gradually reduce or terminate dumping at a given site. It could

give individual municipalities the opportunity and the incentive to develop long-term practical waste disposal alternatives.

Finally, it is unclear why the staff proposes a special dumping fee for the 12-mile site but not other sites. Such a provision implies that dumping at other sites poses no environmental problems or risks. Existing scientific evidence does not seem to justify the assumption. This fee system, moreover, would not create an incentive to search for innovative uses of waste or alternative disposal methods.

In conclusion, a carefully designed fee system could be the cornerstone of a sound program to manage waste in the ocean. Fees are a versatile regulatory and revenue generating tool which deserves serious congressional attention.

This concludes my prepared statement. Mr. Chairman, I would be happy to answer any questions.

[The statement of Mr. Lahey follows:]

PREPARED STATEMENT OF WILLIAM L. LAHEY

My name is William Lahey. I am a research fellow in the Marine Policy and Ocean Management Program at the Woods Hole Oceanographic Institution. I have published a number of articles, including law review articles, on ocean dumping. My testimony focuses on ocean dumping fees generally and the user fee proposal drafted by the Subcommittees' staff in particular.

Briefly, my testimony makes the following points. First, environmental charge systems can be designed to accomplish different objectives, ranging from simply generating revenue to creating incentives for sound disposal practices. Second, there are number of strong arguments for establishing a dual-purpose ocean dumping charge which would both generate revenue and create incentives. Third, the staff's current fee proposal, while containing commendable provisions for revenue distribution, could go further in incorporating important regulatory uses of a fee system.

REVIEW OF ENVIRONMENTAL CHARGE APPROACHES

Past discussions of fees for ocean dumping suggest that there are many different notions of what this mechanism can and should do, even among the proponents. This lack of agreement is due, in part, to the fact that charges can be used in a variety of purposes. Indeed, pricing mechanisms are used in a variety of environmental contexts in the United States and other countries. This diversity is reflected in the myriad of labels given to these mechanisms—pollution taxes, effluent charges and user fees to name but a few.

In an effort to resolve some of the disagreement over ocean dumping fees I have developed a simple classification scheme which differentiates charge approaches according to the economic variable used to calculate the charges. This process also provides an opportunity to examine a number of existing environmental charge systems both here and abroad. Much can be learned from these charge systems which can be applied to devising a fee system for ocean dumping.

Environmental charges are designed for two basic purposes—to accomplish regulatory objectives and raise revenue. Let us first look at charges designed primarily to regulate behavior. Two methods for calculating a regulatory-based charge which are widely advocated are the social cost approach and the ambient standards approach.

First, the charge can be calculated to reflect the cost imposed on society by the pollution; this can be called the social cost approach. This method requires a user of common property resources, such as air or water, to bear the full costs of his activity. In other words it internalizes the external costs.

This method of charge assessment requires two difficult steps. First, the amount of environmental damage caused per unit of emission must be calculated. In other words, a dose-response curve needs to be calculated. This is difficult because there are a number of complicating factors including possible synergistic effects from various combinations of pollutants. It can also be difficult distinguishing between natural fluctuations in the environment and man-induced changes. The latency of some pollution effects is but another complicating factor. Second, the damage must be monetized. This is very difficult because economists have not yet devised an effective way of quantifying environmental damage.

It should be noted, however, that the traditional approach to environmental problems, standards and enforcement, does not solve the problem of qualifying the damage, rather it merely obscures the issue. Standards, if they are to be efficient, are based on judgments, albeit implicitly, of the magnitude of environmental damage and the value of reducing it.

The second way to calculate a regulatory-based charge focuses on the desired air or water quality—what can be labeled the ambient standard approach. This approach begins with a predetermined level of air or water quality, presumably established through an administrative or legislative process, then imposes effluent charges sufficient to bring about this ambient standard. This approach encourages the polluter to reduce emissions to the level where the cost of reducing another unit of pollution, the marginal treatment cost, is greater than or equal to the unit emission charge. Under the ambient standard approach the fee-setting authority must be able to predict the discharger's reaction to the fee in terms of their level of clean-up. To do this the authority would need detailed data on the relative costs of abatement technologies and alternative disposal measures.

The second basic purpose that a charge can fulfill is to generate revenue. Revenue-oriented charges are calculated in light of the revenue needs of the particular governmental entity. These charges are widely used in the United States and other countries. Examples of revenue based charges can be classified into three subgroups according to the use to which the resulting income is put: to finance environmental protection efforts; to compensate victims damaged by the discharges; or to reimburse the government entity for providing special services.

There are a number of examples of charges designed to finance environmental protection efforts. The Outer Continental Shelf Lands Act, for instance, imposes a three cent a barrel tax on oil extracted from outer continental shelf lands; this revenue is put into a fund for oil spill clean-up. Superfund is another example of a revenue based charge.

Revenue-oriented charges are also used to finance victims of environmental contamination. The Federal Black Lung Act taxes coal mine operators according to the amount of coal produced. The revenue from this charge is put into a fund used to compensate miners who contract black lung disease. The Japanese charge industries which emit air pollutants to raise revenue to compensate for health injuries associated with air pollution.

Finally, charges can be used to recoup the expenses incurred by providing special governmental services to identifiable recipients. These charges are commonly referred to as user fees. Federal agencies are given authority to charge a fee for their services under the Independent Offices Appropriations Act. The Act sets out criteria as to when a fee can be imposed. While the Act has been subject to extensive litigation the basic test of when an agency can impose a fee is: when the government provides a service to an identifiable recipient who receives a benefit not shared by the general public.

The distinctions among the above approaches are, to some extent, artificial. In practice these pricing mechanisms often accomplish more than one goal. A revenue based charge, for instance, such as the Japanese health compensation levy, has been shown to have regulatory effects by encouraging the reduction of air pollutants. There are a number of examples of pricing mechanisms designed to both generate revenue and regulate polluting behavior.

The French, for example, have a complex system which exemplifies the dual purpose charge. Charges for discharges into water bodies have a revenue generating function since the income is used to fund water quality improvement projects. Moreover, the charge is adjusted to encourage sound waste disposal practices. The charge is lowered, for instance, for dischargers who adopt efficacious pollution control techniques. These variable fees, therefore, create a regulatory or incentive effect.

A number of states have recently adopted a dual-purpose charge system for hazardous waste disposal. Kentucky, for example, taxes hazardous waste facility owners according to the efficacy of the disposal process used—the more effective the treatment the lower the fee. The income from this fee is put into a fund used to monitor and clean up abandoned hazardous waste sites.

An ocean dumping charge designed to achieve both revenue and regulatory objectives could be a very effective tool. The following discussion highlights the rationale for adopting a dual purpose charge system for ocean dumping.

ARGUMENTS FOR A DUAL PURPOSE OCEAN DUMPING CHARGE

An ocean dumping charge could accomplish a number of significant regulatory functions. First, a charge system could be used to reduce the overall amount of

ocean dumping in a much more efficient way than direct regulation. Instead of requiring all dumpers to meet the same discharge requirements as is done under the current regulatory approach, charges would allow individuals to reduce their dumping according to their particular pollution control costs. Dischargers with lower treatment costs or alternative disposal costs would reduce the volume of waste dumped more than those with high control costs. In other words, the charge system would take advantage of the differences in the marginal treatment or abatement costs for dumpers. The net effect is reduced overall cost for a given level of ocean dumping reduction.

Second, the amounts of harmful chemicals entering the marine environment could be reduced by designing a charge system which varied according to the type and concentration of contaminants in the waste. Under such a system innocuous material, such as cannery waste, would be ascribed a low dumping fee. This graduated fee based on contaminant concentrations would create an incentive for dumpers to reduce the contaminant levels in the waste or reduce the volume of waste dumped. For instance, municipalities with high contaminant loading from industry, would have the incentive to use their legal authority under the Clean Water Act to establish local industrial pretreatment requirements.

Third, charge system could also be designed to encourage the use of appropriate dumpsites. Dumping at sites with a large capacity to assimilate wastes could be charged less than dumping at accumulative sites. This charge system would reduce the net environmental effects of ocean dumping without curtailing the volume of dumping by encouraging waste dumping at appropriate sites.

Fourth, a charge system could act as an important counterbalance to the growing pressure to dispose our wastes in the ocean. The oceans, unlike our backyards and local groundwater supplies, do not have strong political constituencies. Thus, there often is pressure to dispose of wastes in the ocean because it is the path of least political resistance. Ocean disposal is generally the path of least economic resistance as well. A significant percentage of the cost of land-based disposal is for the land. The oceans, on the other hand, are a common property resource for which our market exchange system does not attach a price for its use. A charge system on waste disposal in the ocean attempts, therefore, to bring this disposal method into political and economic parity with other disposal methods. By so doing waste disposal decisions are more likely to be made on the basis of relative environmental risk rather than on political or economic expediency.

An ocean dumping charge would also provide a source of revenue which could be used for a number of important functions. First, the revenue generated from the fee could help finance the ocean monitoring program. A point repeatedly emphasized by marine scientists is that ocean dumping must be accompanied by a monitoring program to assess its effects especially if the volumes dumped continue to increase. These scientists reason that, although past studies suggest the ocean is capable of assimilating a significant amount of waste, our current knowledge of the marine environment is very rudimentary and incapable of accurately predicting the long-term effects of ocean dumping. The problem, however, is that while dumping is increasing there are no increases expected in monitoring efforts. In fact, cutbacks in federal funding will significantly reduce the amount of scientific work conducted in this area. Revenue generated by an ocean dumping user fee, therefore, could be a vital source of funding for these monitoring programs.

Second, revenue from dumping fees could help minimize the environmental effects of this activity if it was used to help finance site designation studies. As was discussed earlier the deleterious effects of ocean dumping could be reduced by dumping at sites with the appropriate characteristics. The EPA has failed to make significant progress in conducting the studies necessary to determine appropriate dumpsites. One of the major stumbling blocks has been the cost of these site designation studies. In an era of declining federal expenditures on environmental programs, it seems unlikely that adequate federal funding will be made available for these studies. On the other hand, it seems equitable to require those who make it necessary to conduct the studies in the first place—the dumpers—to incur the costs. Indeed, there is extensive precedent for requiring parties who receive special governmental services to pay the cost of those services. Financing site designation studies through ocean dumping fees is therefore both necessary and reasonable.

Third, part of the revenue from the ocean dumping charge could be valuably used to fund research and development of sound alternative waste disposal techniques. A number of environmentally benign and potentially cost effective waste disposal measures have been developed with the help of federal research and development monies. Federal monies, for instance, provides crucial support for the researchers who are developing Ecorock, a road paving material made out of sewage sludge and

incinerator residue. Moreover, a number of significant advances in waste processing, such as in the area of industrial pretreatment, have occurred only recently. These factors suggest that recent and projected cutbacks in federal research and development monies could retard the implementation of safe and useful waste disposal techniques.

There are also other reasons for adopting a dual purpose charge system for ocean dumping. A dumping charge would likely be more equitable than the current regulatory system. The enforcement history of the ocean dumping regulations, for instance, has been inconsistent; while the EPA systematically phased out the small volume municipal dumpers during the 1970s most of the large volume dumpers continue to ocean dump. This unequal treatment has been more the result of the vagaries of direct regulation than a response to differences in the merits of dumping applications. This inequity would be eliminated under a charge system since it would be relatively easy to ensure uniform imposition of a fee.

Finally, a charge approach to ocean dumping also offers valuable regulatory flexibility. Since our knowledge of the effects of waste disposal in the ocean is rudimentary, future scientific findings may prompt us to completely rethink our ocean disposal policy. The need for disposing wastes in the ocean will not remain static. Factors such as advances in alternative disposal technologies and demographic changes will alter the need for ocean dumping in the future. Given these uncertainties it seems important to adopt a regulatory program which is able to respond to changing conditions.

IMPLEMENTATION ISSUES

While there are a number of compelling justifications to developing a multi-purpose charge system, translating the theory into a viable federal program requires that a number of implementation issues be addressed. The following section develops and frames the questions which must be addressed prior to implementing an ocean dumping charge. It does not, however, attempt to design a fee system. Instead, the implementation issues are presented and the salient arguments associated with these questions are analyzed.

First, what institutional body sets the fee level? The charge could be determined by Congress, much as is done for traditional taxes; the federal agency which currently has regulatory authority, the EPA or Corps of Engineers; or by a specially created body. A charge system which requires modifications in the charge to be approved by Congress would be a very inflexible regulatory tool. Such a system would negate one of the primary assets of a dumping charge—an ability to respond easily to environmental, economic or technological changes.

Charges could be set and the revenue managed by a special institutional body. Indeed, a quasi-governmental commission to manage revenue generated from ocean dumping user fees was proposed in congress in 1982. A special charge-setting authority has both advantages and drawbacks. If the charge authority is made up of representatives from both industry and government this institutional structure may inspire wider political acceptability and cooperation from industry. The fee-setting and collection authority for the Japanese emission tax, for instance, is a quasi-governmental agency that is made up of representatives from industry. Students of the Japanese system have found that this institutional structure encourages industry cooperation and political acceptability. The Germans, moreover, have a pollution charge system which is managed by an independent agency made up of representatives from the polluting industries and affected cities. Commentators have concluded that, on the whole, this institutional structure functions well.

A possible drawback to creating a special fee-setting authority, on the other hand, is that it would unnecessarily duplicate many of the activities now being conducted by Federal agencies. Setting the charge level, especially if the charge varies according to waste characteristics and environmental conditions, will entail the collection and evaluation of large amounts of technical information. These activities are already being conducted by three federal organizations: Environmental Protection Agency, National Atmospheric and Oceanic Administration; and the Corps of engineers. The National Advisory Committee on the Oceans and Atmosphere also provides policy and technical advice on ocean dumping.

In terms of administrative flexibility and institutional competence there are advantages to giving fee-setting authority to the EPA. Under this proposal Congress would delegate authority to set the level of charge to EPA. Delegation of authority to EPA in vague legislative language, however, will likely result in litigation over the reasonableness of the charge EPA subsequently sets. A possible solution to this problem is to build some sort of arbitration arrangement into the legislation.

A legislative proposal giving both charge-setting authority and a significant portion of the revenue generated to EPA may be criticized for what some commentators have called a danger of "revenue addiction". This concern is based on the belief that the charge system will be perverted if the institution that sets the fee also receives a percentage of the revenue it generates. This may not be a significant problem, however, in the context of ocean dumping. If in trying to maximize its income EPA made the cost of ocean dumping more expensive than alternative disposal methods, dumpers would stop clean dumping and EPA's income would decline.

Second, who should be charged? Last year there was a ocean dumping fee proposal before this subcommittee, for instance, which proposed to levy a fee against industrial and municipal waste dumpers but not against federal agencies. This bill therefore excluded the largest volume of ocean dumping—dredge spoils. The current Corps of Engineers policy requires local sponsors of dredging projects to provide the property and easements for land disposal of dredge material or pay the cost for these facilities. In other words, the costs of land based disposal of dredge material are borne by the local sponsors of navigation projects. It seems entirely reasonable, therefore, to pass the costs associated with ocean disposal to these local sponsors. This would create a parallel responsibility and minimize the Corp's bias toward ocean dumping.

Third, how should the charge be structured? This question involves determinations such as whether the charge is fixed, in other words uniform, or variable, and how often the charge should be adjusted. Uniform charges, such as a dollar per pound fee, are attractive because they are easy to establish and administer. A variable fee, however, could be designed to accomplish a number of significant objectives not attainable with a fixed charge. The benefits of a variable charge should be weighed against the increased administrative cost of such a system compared to a uniform fee structure.

A dumping charge could vary according to a variety of different factors such as contaminant concentrations in the waste and the assimilative capacity of the dumpsite. A dumping charge scaled to the presence of different types of contaminants in the waste as well as to the concentrations of these contaminants acknowledges that different substances affect the environment in different ways. Ocean dumping a pound of mercury, for instance, could cause significant acute and chronic effects whereas a pound of acidic waste would likely cause no detectable effects. Basing the charge on the presence and concentration of contaminants in the waste would encourage dumpers to reduce contaminant levels. This would, for instance, create an incentive for municipalities to establish industrial pretreatment requirements. Higher dumping charges for substances which pose more serious threats to the marine environment also reflects the higher administrative costs for dumping these substances because of the need for more extensive environmental monitoring. The charge could also be varied according to the assimilative capacity of the dumpsite as a means of minimizing the environmental damage caused by dumping without reducing the amount of waste dumped. France, for instance, has a pollution charge system which varies according to the geographical location of the discharge.

While a dumping charge which varies according to the chemical constituents in the waste and the characteristics of the receiving waters can be a sensitive regulatory tool, the basis for variable charges must not be too complex. The Organization for Economic Cooperation and Development, an organization which has closely watched the use of pollution charges in Europe, has suggested that one of the essential elements of any charge system is simplicity. The dumpers must be able to understand why the particular parameters have been selected to determine the charge. This simplicity not only facilitates administration of the charge but will also minimize lengthy legal disputes over the charge.

The argument that a detailed system of charges would require major administrative expenditures is not supported by the experiences with similar systems. Excise taxes, for instance, are often based on a complex set of parameters. An EPA study which looked at costs of administering several complex federal excise tax programs concluded that the administrative costs were, on the average, less than one percent of the revenue collected. The administrative costs of managing the pollution charge system in France, a relatively complex system based on a number of parameters, has been estimated to be less than five percent of the revenue generated.

An ocean dumping charge would be easier to administer than an effluent charge since dumping is a discrete event while effluents are usually discharged continuously. Moreover, because the chemical constituency of wastes to be ocean dumped is already assessed under the existing permitting procedure, calculating a dumping charge based on chemical parameters will not require extensive additional administrative expenditures.

With regard to structuring the charge it is also necessary to determine how flexible the amount to be collected from an individual dumper should be. While one of the primary virtues of the charge approach is its flexibility, frequent adjustments in the charge may be counter-productive. Most waste treatment technologies and process charges require large capital expenditures and long-term planning. A climate of economic uncertainty created by frequently fluctuating dumping charges would, therefore, create a disincentive for dumpers to invest in alternative waste disposal measures. Thus a balance must be struck between an unpredictable, frequently changing charge system and one that is unable to adjust to significant environmental, technological or economic changes.

Fourth, what should the revenue be used for? A number of possibilities exist: the money could be merged with general federal revenue, be turned over to the EPA and the Corps or earmarked for certain activities. The concept of a user fee suggests the revenue be turned over to the federal agencies which provide special services to the dumpers; EPA and the Corps of Engineers would get money for administering the dumping program and NOAA would receive money for monitoring and research. Part of the revenue could be used productively, as previously discussed, for research and development of alternative waste disposal methods. Such a distribution scheme is analogous to a number of state hazardous waste programs which use part of the revenue generated by a fee on hazardous waste site operators to fund waste recycling and research on disposal alternatives. Another possible use of the revenue is redistribution. Redistribution is used in a number of European countries to reduce the net cost of pollution control by giving part of the charge income to polluters with low treatment costs. This technique has been found to be more acceptable to dischargers and hence enhances the political acceptability of the charge system generally.

COMMENTS ON THE STAFF DRAFT FEE PROPOSAL

The fee proposal contained in the May 16, 1983 Subcommittee Staff Draft is commendable in terms of how the revenue will be distributed but is deficient with respect to creating incentives for sound waste disposal practices.

Earmarking a large percentage of the revenue generated from the 12-mile site dumping fee to state and local governments for the development of long-term disposal options is sensible. Such a decentralized distribution scheme should spawn a wider variety and diversity of approaches to waste disposal. As the experience of many municipalities, including Philadelphia, attest there is rarely one single solution to municipal waste disposal. Instead the solution often involves a combination of different methods and approaches, some large-scale some small.

The 12-mile site revenue distribution provision, however, may favor state and local activities too much. As mentioned earlier, there have been a number of significant advances in alternative waste processing due, in part, to the input of federal research monies. These research projects, such as the development of Ecorock, have been capital intensive and arguably beyond the financial reach of most local or even state governments. It may be wise, therefore, to increase the federal percentage, especially in light of the large number of purposes to which the federal government's 25 percent share is to be put such as monitoring and effects research.

Funding a comprehensive multi-media assessment of disposal options for municipalities in the New York and New Jersey region with dumping fee revenues is also a sound idea. Multi-media assessment is now useful for defining the general concerns associated with each waste disposal option. But before it can become useful as a decision-making tool many questions associated with its use need to be answered. A federally funded multi-media management study could significantly improve the utility of this approach.

The staff's fee proposal could incorporate many potentially beneficial regulatory uses of pricing mechanisms which it does not now include. There are no provisions for varying the fee level to create incentives for sound waste disposal practices. The staff proposal, for instance, could vary the fee level according to the types and concentrations of contaminants in the waste. Different wastes effect the marine environment in different ways. Adjusting the fee level to these differences would internalize the social cost of ocean dumping and would create an incentive for reducing the loading of contaminants of concern. The present staff draft relies instead on quality standards. The past experience with numerical standards suggests that we should seriously consider an alternative approach—such as a variable fee system based on the contaminant levels in the waste.

By confining the special dumping fee to the 12-mile site the staff proposal implies that dumping at other sites poses no environmental problems. This inference is un-

underscored by the provision to terminate all dumping at the 12-mile site after December 31, 1986. If Congress does wish to reduce or even terminate dumping at the 12-mile site, or any other site, it should consider doing so with the use of escalating dumping fees. I am very skeptical of the efficacy of another so-called firm phaseout date for ocean dumping. Even if all municipalities are able to comply with this deadline, experience with other regulatory deadlines suggests that they often result in hasty adoption of inefficient or inappropriate technologies. A fee system, on the other hand, could be structured to gradually reduce or terminate dumpings at a given site. The three year fee system for the 12-mile site proposed by the staff, for instance, could easily be modified to reduce or terminate dumping at this site. This could be done by continuing the annual incremental increases in the fee per ton until the desired level of dumping was achieved. This system would give individual municipalities the opportunity and incentive to develop long-term, practical waste disposal alternatives.

Finally, the fee system proposed by the staff is unnecessarily complicated. I believe a more straight forward fee system, albeit more detailed, could be designed. Under such a system, for instance, the dumping fee level would be based on three factors: costs associated with ocean dumping incurred by federal agencies, the location of the dump site and the characteristics of the wastes to be dumped. This fee structure would be well suited to include other sources of ocean dumping, such as dredge material and fly ash, if so desired in the future.

CONCLUSION

A carefully designed fee system could be the cornerstone of a sound program to manage wastes in the ocean. The fees could be structured to encourage sound waste disposal practices. The revenue generated by the levy, moreover, could be used to address many of the scientific uncertainties associated with ocean waste disposal. In short, it is a versatile regulatory and revenue generating tool which deserves serious consideration. The staff fee proposal contains commendable provisions with respect to revenue distribution but fails to address regulatory uses of fee systems.

I appreciate the opportunity to present my views and am pleased to respond to any questions.

Mr. HUGHES. Thank you very much, Mr. Lahey.

Let me start with you, Mr. Lahey.

One of the things you recommend and we thought about is the variable fee system. Is it your feeling that it would be practically possible and feasible to develop that fee and not get into a morass of problems associated with the quantity and degree of pollutants?

Mr. LAHEY. When we speak of the variable fee we could talk about variable according to different sites or variable according to the contaminant constituents in the waste.

Admittedly one could conceive of a fee which varied according to the constituents of the waste that would be complex and indeed perhaps unenforceable.

My suggestion would be to initially consider a simple fee structure; perhaps based on three parameters. Examples of parameters to consider are bioassay tests or concentration of certain contaminants of concern, such as PCB's or mercury.

The current permitting process requires relatively detailed information on the types and amounts of contaminants in the waste to be ocean dumped. Since this information is already available to the EPA I do not foresee any major problem arising from a fee which is indexed to key contaminants in the waste. This view is underscored by the detailed variable charge system for pollution control used in France. The Organization for Economic Cooperation and Development recently concluded that the French system worked quite efficiently and did not create burdensome administrative expenses.

I wouldn't contemplate initially adopting a variable fee based on five or six different parameters in the wastes. So you could design

a relatively simple variable fee system without having to incorporate a number of different parameters.

Mr. HUGHES. Thank you.

Mr. Kamlet, thank you for your testimony and your support of a number of the features of the staff draft. One of the things that you recommended is that any deep water site be separate and apart from any chemical dump site.

Mr. KAMLET. Right.

Mr. HUGHES. My question is, Did you have some area in mind that you recommended? Your concern, I presume, is that you would not want to mix the sludge and the chemicals at one dump site. You would have no opposition I presume to having another 106-mile site or 104-mile site, it is just that you don't want to mix the two?

Mr. KAMLET. Yes, that is basically correct. I wouldn't say that I would have no concern. It obviously goes against the grain for me to support any sort of ocean dumping site for harmful sludges. We don't have a particular alternative site in mind but I might point out that there happens to be an historical explosives dumping site which is what the 106-mile site at one time was, located in rather similar deep water approximately the same distance from shore that is somewhat closer to New York and New Jersey, and maintains the geographic relationships of the 12-mile site and is somewhat further removed from Maryland and Delaware.

It might be a way to meld the concerns of the members of the committee from Maryland and Delaware with those of the New Jersey members. I think the key considerations ought to be potential for impacts on fisheries resources and the extent to which the separation between any new site and the existing sites are sufficient to avoid interaction of wastes from one site with waste at another site.

Mr. HUGHES. So it is the separation you are concerned about.

Mr. KAMLET. That is correct.

Mr. HUGHES. On the subject of the concern of Maryland and Delaware in particular, do either one of you want to comment on the potential risk that is faced by Delaware or Maryland if we continue with the 12-mile site as opposed to a deep water dump site? There is concern obviously in both those states that they face more of a threat from moving to a deep water site.

Do you have any views on that?

Mr. LAHEY. Mr. Chairman, my concern is that in designating the deep water site for dumping we are impliedly assuming that the site is suitable for extensive, long term-dumping. Such a designation would not create any built-in incentives for cities to search for alternative disposal areas. I think Mr. Kamlet and I agree that safe and feasible land-based alternatives are available or can be made available through research and development. Allowing the 106 site to be used without incentives to look for these land-based alternatives seems to be unwise.

Mr. HUGHES. How about where incentive is provided by a fee system or some other system which suggests that we are talking about an interim dump site until we are able to develop land-based alternatives.

Do you have the same feeling with that?

Mr. LAHEY. About the feasibility—

Mr. HUGHES. In other words, in your testimony you suggest that there is no fee schedule for the deep water site. That is essentially correct. However, there is a built-in mechanism through EPA to recommend to the Congress a fee schedule for the deep water site.

Mr. LAHEY. I endorse doing so. I don't mean to say it has been entirely overlooked, I just mean to suggest that developing a fee system for the 106 site deserves serious consideration.

Mr. KAMLET. Let me attempt to respond to your questions, Mr. Hughes. It seems to me that the risks connected with use of the 106-mile site increase with time as the 106-mile site continued to be used.

The short-term risks, it seems to me, whether it is residents of Maryland and Delaware or residents of New York or New Jersey would be less in my judgment at the 106 site than the 12-mile site. The longer dumping continued at the 106-mile site the greater the possibility of risks to seafood eaters up and down the coast, in my judgment, would be.

So I endorse what Mr. Lahey says in terms of the desirability of incentives to get ultimate and hopefully land-based alternatives considered as expeditiously as possible.

Mr. HUGHES. Thank you.

The gentleman from New Jersey.

Mr. FORSYTHE. Thank you, Mr. Chairman.

Thank you both for your testimony.

Mr. Kamlet, you talked about separation of sites. The 106-mile site is, I understand 636 square miles. If you were to use opposite corners of the site for dumping different materials, you could get a 10-mile or better separation between materials there. Do you believe that would be adequate?

Mr. KAMLET. I have not done the calculations. What would be required if you look at a conservative pollutant like PCB's to get an acceptable degree of dilution so that interaction could be minimized, would be on the order of a million-fold dilution, a million-fold initial mixing of the material that was dumped.

Whether or not one could get that at the 106 site at locations that are separated by 10 miles is not clear. But there certainly are numerous other sites much further separated that would be possible at the edge of the shelf or near the edge of the shelf within that general area.

Mr. FORSYTHE. I fully agree that there may be more attractive sites in terms of shorter distance and so on. However, one of my concerns is the question of again starting a new site designation process again. That has been a very long, drawn out process to date. If we want to move with dispatch, we would be probably delaying our ability to make any move toward eventual cleanup if we attempt to designate new sites.

So again we can say that even though the 106-mile site is treated as interim rather than final, I don't think anything we come up with will be the final solution. There are all the other ramifications that we have talked about. If we think that what we are able to do today is going to be final, I think we are going to be kidding ourselves. There are just so many things coming out in terms of new data.

You mentioned something about the time on when the data in table 2a of your testimony was based. I would like to hear that.

Mr. KAMLET. There is some indication that the concentrations of PCB's in sewage sludge have gone down over the past several years but I think it is also important to note that with respect to a number of other contaminants, notably heavy metals and such things as oil and grease which includes some rather dangerous polynuclear aromatic hydrocarbon constituents that there is reason to believe that these figures and probably also the ones that Mr. Schatzow referred to—although I have not seen the basis for those numbers—underestimate and perhaps greatly underestimate the significance of contributions from sewage sludge in relation to other sources of contamination of the bight.

I outline on page 3 of my prepared statement some of my reasons for believing—and these are concerns that are shared by others in the scientific community and Mr. Schatzow indicated before he left that he endorsed the view that in terms of the relationship between sewage sludge and dredged material the two principal dumping sources within the bight apex, that although the quantitative contribution of heavy metal seems to be vastly greater for dredged material that such a comparison probably significantly understates the fraction of heavy metals that are biologically available in sewage sludge in relation to dredged material.

I think if corrections were made of the sort that we outline on page 3, one would find that rather than representing only 8 or 10 percent of contaminant inputs that sewage sludge ocean-dumped in the bight apex constitutes perhaps double that amount or even greater.

Mr. FORSYTHE. How recent is the data base for this statement?

Mr. KAMLET. The initial data base utilized in my table on page 2A is the 1976 Mueller and Jeris study. Some of the PCB information is based on Joseph O'Connor's more recent work but he relied on PCB concentrations going back to the early to mid-1970's.

I think there has been some significant improvement in sludge quality since then in terms of PCBs. I don't think the picture is quite as good for other contaminants.

Mr. FORSYTHE. This is typical of the problems I have in dealing with the bight. I will be back, I see my first 5 minutes is up.

Mr. HUGHES. The gentleman from Delaware.

Mr. CARPER. Thank you, Mr. Chairman.

I would like to welcome Mr. Kamlet and Mr. Lahey to the hearing today. I have a question about land-based alternatives. If either of you gentlemen would answer I would appreciate it.

Can industrial pretreatment in your judgment make New York City or northern New Jersey municipalities' sludge clean enough for at least some useful land application or composting purposes?

Mr. KAMLET. Mr. Carper, I think the answer is yes. Clearly the heavy metals that are present in the sludge are much more directly amenable to industrial pretreatment than contaminants like PCB's and oil and grease that are more diffuse. But in terms of heavy metal contamination cadmium seems to be the metal of principal concern from a land application standpoint in terms of human health, and I think there is good basis for believing that in-

dustrial pretreatment can significantly reduce the cadmium content of the sludges in the New York metropolitan area.

So, yes, there is I think great potential regardless of the ultimate disposal option utilized for greatly reducing environmental risk, and enhancing benefits through aggressive and maximum pretreatment efforts.

Mr. CARPER. Is that industrial pretreatment onerously expensive?

Mr. KAMLET. I wouldn't think so. You have to recognize that industries that do not currently discharge into municipal systems are required to directly treat their materials before they discharge them into navigable waterways. So in large part the ability to discharge into municipal treatment plants has represented a subsidy for many years over the costs of treatment of the direct dischargers.

So particularly if you take that subsidy into account and even if you don't, it seems to me the technology is there and the costs are not prohibitive by any means.

Mr. CARPER. How is it that Philadelphia and a number of other cities are actually selling their compost? Is their sludge cleaner? Isn't Philadelphia's sewer system typical of the type of system used perhaps in New York City? What specifically is the relevant difference which enables Philadelphia to find reasonable uses for its sludge whereas New York City cannot?

Mr. KAMLET. The most relevant difference is that EPA Region 3 in whose jurisdiction Philadelphia falls, started out and continued to be much more aggressive than Region 2 in holding Philadelphia's feet to the fire. There seems to have been a greater Federal will there. I think that was the most significant contributing factor.

But in terms of cadmium contamination and quality of the sludge, I think you are right, Philadelphia sewage sludge was pretty badly contaminated with cadmium and other contaminants, perhaps not as badly contaminated as a few of the dozen separate sewage treatment plants that New York City has but certainly more badly contaminated than the majority of New York's plants.

Yet through aggressive pretreatment they were able to significantly reduce the cadmium levels so that Philadelphia sludge is currently applied beneficially to reclaim stripmined areas in Pennsylvania, a soil conditioner fertilizer agent known as Phil-Organic is marketed very successfully currently; farmers in the surrounding area come from miles around to cart away truckloads of dewatered Philadelphia sludge and there is a very promising pilot project underway that shows a lot of potential for converting sewage sludge from Philadelphia into a paving material that can be used by the streets department of Philadelphia in connection with some city paving projects.

So, yes, I think it is clear that there are other options available. The vast majority of the municipalities have resorted to them. Ninety-six percent of the sludge generated is dealt with by means other than ocean disposal. That surely suggests that there are better things to do with the sludge than put it in the ocean.

Mr. CARPER. Thank you very much for the answers to those questions.

Mr. HUGHES. Mr. Forsythe, round two.

Mr. FORSYTHE. Thank you, Mr. Chairman.

Mr. HUGHES. You are recognized for 5 minutes.

Mr. FORSYTHE. On page 3 of your testimony you indicate that not all pollutants from the lower Hudson-Raritan Estuary are washed into the bight. You indicate that only 20 percent of the petroleum hydrocarbons entering the estuary are washed into the bight. What happens to the rest of them?

Mr. KAMLET. Well, a significant amount of particularly particle-borne contaminants gets trapped in the estuary itself.

Mr. FORSYTHE. I am referring to the petroleum hydrocarbons.

Mr. KAMLET. That is right. Much of the petroleum hydrocarbons and other pollutants that are problems in the New York Bight are associated with suspended particles that come down the Hudson-Raritan Rivers and those particles tend to settle out in the area of the estuary. Many settle out within the New York Harbor complex and contribute to the need to periodically dredge those harbor areas. So they never directly enter the bight.

The point I was making on page 3 is that there is a certain amount of double accounting that has been done in some of the earlier estimates of contributions of different contaminants by the various sources to the bight apex in the sense that petroleum hydrocarbons or other things that are deposited in the harbor and then are dredged and that dredged material is then ocean dumped in the bight, you count it—both sources have been counted in the computation of contributions.

The direct dredged material inputs and also the indirect introductions into the rivers are counted.

I think if one made the adjustment that you are suggesting in your question there would be a reduction of the total loading to the bight and therefore you would increase the proportionate contribution of each contaminant of direct ocean dumping both sewage sludge and dredged material.

That is one of the reasons we feel that the statistics presented, particularly the 1976 evaluations, understate the relative significance of direct ocean dumping inputs of both sewage sludge and dredge material.

Mr. FORSYTHE. On the same page you indicate that the contaminants in ocean-dumped sewage sludge are more biologically available than those of other sources. Would you elaborate on that?

Mr. KAMLET. Yes, I refer primarily to heavy metals as opposed to organic contaminants. The Corps of Engineers through its dredged material research program of dredge material—and this is confirmed by others not associated with the corps—have rather persuasively demonstrated that a very large proportion of the heavy metals associated with dredged material are very tightly bound within the crystalline sediment matrix of the basic sand, silt, or clay that constitutes dredge material as opposed to being man-derived contamination that was subsequently added.

Those metals tend to remain tightly bound to the sediment particles and are effectively not available for biological uptake or for contamination of the environment.

So I think to make across-the-board comparisons of the total heavy metal content of dredged material with the total heavy

metal content of sewage sludge is very misleading. The sewage sludge heavy metal composition with its enriched organic component is vastly more readily available to organisms than the heavy metals in dredged material.

Mr. FORSYTHE. Have you had an opportunity to review New Jersey's six-point program? How does the Federation feel about it?

Mr. KAMLET. I have not. I understand it was not officially released until 12 o'clock today. From what I understand of it, it does not differ in a tremendous degree from the Hughes-Forsythe proposal. There are details that I would like to study. I would be glad to respond for the record with our reactions to that proposal.

There are elements of it including more aggressive resort to industrial pretreatment that make a great deal of sense and other aspects that coincide closely with elements of the Hughes-Forsythe proposal that we have already indicated we support. I would be happy to respond for the record.

[The information follows:]

NWF'S ANALYSIS OF NEW JERSEY'S SIX-POINT PROGRAM

New Jersey DEP has proposed a six-point program which it believes "may form a basis for decision-making on disposal of sewage sludge into the New York Bight Apex." The six points are:

(1) Congressional designation of the 12-Mile Site for continuing use for up to 5 years.

(2) A Congressional mandate that EPA prepare within three years a "comprehensive multi-media assessment" of the various land-based and ocean-based alternatives "to determine the most environmentally acceptable disposal method and the technological, economic, and legal requirements necessary to produce acceptability," with implementation of the most acceptable disposal method or methods to begin within five years (of enactment).

(3) Establishment of "user fees for ocean disposal at the 12-Mile Site," with 85-90 percent of the fees to be "levied but not collected by the federal government," but "placed in special trust accounts established by each of the sewerage agencies and dedicated for the financing of long term sludge disposal methods." ("A fee tied to a portion of the estimated short term cost differential from dumping at the 12 Mile Site versus the 106 Mile Site may be an equitable starting point".)

(4) Promulgation, within one year of reauthorization of the MPRSA of "interim sewage sludge quality standards" which "may . . . vary for ocean disposal versus on-land disposal." These standards "should speed-up implementation of industrial pretreatment programs [under the Clean Water Act] . . . by giving the sewer authorities a target to shoot at." The standards "should be tied to a four year compliance schedule designed to improve the quality of the sludges to the point of expanding treatment and disposal options."

(5) Continued direction by Congress for EPA to develop and promulgate categorical industrial pretreatment standards.

(6) Direction by Congress that EPA develop and promulgate national ambient air quality standards for heavy metals and toxic organics—"necessary to evaluate the land based option of thermal reduction."

New Jersey DEP also proposes "phasing in the restoration analysis" [i.e., development of a plan for rehabilitating the Bight Apex] until after a decision is made on sludge disposal (i.e., putting it off for 5 years or more). However, DEP expresses the belief that "with additional discussions, a consensus position could be attained" between the Hughes-Forsythe proposal and DEP's.

The National Wildlife Federation's reactions to each of these points are as follows:

(1) *Continued 5-Year Designation of the 12-Mile Site:* We prefer the Hughes-Forsythe approach of phasing-out use of the 12-Mile Site within 3 years in conjunction with an overall plan for rehabilitation of the Bight Apex. The New Jersey proposal does not really address the benefits of restoring the Bight Apex to an undegraded condition and the inability to accomplish meaningful restoration of the Apex as long as sludge dumping continues at the 12-Mile Site. The New Jersey proposal, moreover, would perpetuate an unacceptable status quo for at least 5 years (before corrective action is even initiated), while the Hughes-Forsythe approach takes firm (al-

though partial) action immediately (to be implemented within 3 years). The history of ocean dumping in the Bight is largely one of foot-dragging and delay and of confused and changing signals being given to the dumpers. A firm and unambiguous directive is much to be desired.

(2) *Preparation of a Multi-Media Assessment:* We have no objection in principle to requiring the preparation of a multi-media assessment of the sort New Jersey DEP proposes. However, for the exercise to be useful and not simply a delaying tactic or a means of perpetuating cheap but unsound current practices, two important qualifications must be incorporated into any assessment plan. First, completion of the assessment must not be a pre-requisite to the taking of at least initial remedial measures. The 3-year phase-out of the 12-Mile Site should occur simultaneous and in parallel with conduct of the assessment. Although, ideally, the assessment should be carried out on a clean slate and consider the full-range of options, this must be weighed against the countervailing need to minimize the damage caused by continuation of the status quo (and the benefits of rehabilitating the Bight Apex). Second, the multi-media assessment should be confined to an assessment of the comparative environmental and health implications of the various sludge use and disposal options. It should not attempt to weigh economic costs against environmental benefits. This seems consistent with New Jersey's proposal of an assessment "to determine the most environmentally acceptable disposal method."

(3) *Imposition of User-Fees:* We basically support this proposal, which is quite similar to the corresponding provision of the Hughes-Forsythe approach, except that we do not agree that the fee should be based on merely "a portion" of the cost differential between use of the 12-Mile and 106-Mile Sites. By the end of the 3-year period specified in the Hughes-Forsythe proposal, the fee should at least equal the full cost differential.

(4) *Promulgation of Interim Sludge Quality Standards:* We agree that sludge quality standards should be established, but do not believe that aggressive pursuit of industrial pretreatment and other opportunities to improve sludge quality should be delayed until such standards have been established.

(5) *Development of Categorical Industrial Pretreatment Standards:* We agree that this process should be completed as expeditiously as possible, but do not believe that aggressive industrial pretreatment can or should await finalization of these standards—especially where lack of pretreatment results in contamination of sewage sludge and interferes with the ability to appropriately use or dispose of the sludge in an environmentally sound fashion.

(6) *Development of Ambient Air Quality Standards for Heavy Metals and Toxic Organics:* We agree with this objective, but do not believe that aggressive industrial pretreatment, or approval of state-of-the-art thermal reduction technologies, should await finalization of such standards.

Mr. FORSYTHE. Thank you, Mr. Chairman.

Mr. HUGHES. Thank you.

Just one additional question. What in your judgment would be the impact on the water quality in the New York Bight Apex if we discontinued dumping in the 12-mile site?

Mr. KAMLET. Without any restoration plan covering the bight apex as a whole? If we just removed the sludge?

Mr. HUGHES. Just remove the sludge.

Mr. KAMLET. I think the most dramatic effect would be on making it possible to reopen shellfish beds, in a portion of the apex at least, most proximate to the 12-mile site.

The closure of the shellfish areas is related primarily to microbiological contamination for which sewage sludge is the principal source in that part of the apex. I think one would also expect to see measurable and probably significant reductions in other contaminants that are associated with sludge but obviously it requires for most of those others a bight apex-wide restoration plan to really rehabilitate the area and clean it up.

Mr. HUGHES. Mr. Lahey, do you have any comments?

Mr. LAHEY. I am not in a position to comment. I don't have technical expertise on that matter.

Mr. HUGHES. That is all I have unless there are other questions. If not, thank you very much. We appreciate your appearance, gentlemen.

That concludes the testimony for this morning's session. The subcommittee will stand in recess until 2 p.m.

[Whereupon, at 12:45 p.m., the subcommittee was recessed, to reconvene at 2 p.m., the same day.]

AFTERNOON SESSION

Mr. D'AMOURS [presiding]. The subcommittee will come to order.

We continue this afternoon with our hearing on ocean dumping of sludge in the New York Bight and of course necessarily that involves the question of the 106-mile site.

We are happy and I am personally delighted to welcome today for the second year in a row, the highly competent, congenial, affable, friendly mayor of New York City, our good friend and former colleague, Ed Koch. For the purpose of introducing Mayor Koch I would like to recognize Mr. Mario Biaggi.

Mr. BIAGGI. Thank you, Mr. Chairman.

It seems to me after your preliminary remarks, any comments of mine would be redundant, you have done it in encapsulated form. The truth of the matter is the mayor has left his mark here and went on to make it elsewhere, with more scars but he seems to thrive on adversity.

Hence he appears before us today with more vigor than before. But to reflect back on his previous appearance with relation to problems that have our mutual concern and have a significant effect on the affairs of the city of New York, happily he was most persuasive on the last occasion and the members of the committee responded and saved the city of New York a considerable sum of money.

I have not yet read the mayor's testimony but you can be assured that when he makes his presentation he makes it in a fashion that would be conciliatory so far as the objective of this committee's concern and the objective of the city of New York with relation to finances and also with respect to the environment.

All I can say to my good friend Eddie Koch who came to the Congress with me and with whom we have shared many a valiant effort, oftentimes successful and other times futile—well at least not successful—but we left our mark and I assure you, Your Honor, that you and I will be on the same side of the fence again.

I am hoping the committee and the chairman will be as understanding today as they have been in the past and I am delighted to see my good friend, Commissioner McGough here with you, who in my experience, Mr. Mayor, has done an excellent job.

Dr. Gift I am sure comes with full credentials, otherwise you wouldn't have him in your company. How they can embellish your statement and your expertise remains to be seen.

I am looking forward to it. Welcome.

Mr. D'AMOURS. I thank the gentleman from New York.

Are there any other statements to be made at this point? If not, Ed, why don't you go ahead with your testimony

STATEMENT OF HON. EDWARD I. KOCH, MAYOR OF THE CITY OF NEW YORK, ACCOMPANIED BY JOSEPH T. McGOUGH, JR., COMMISSIONER, NEW YORK CITY'S DEPARTMENT OF ENVIRONMENTAL PROTECTION; AND JAMES J. GIFT, VICE PRESIDENT, ENVIRONMENTAL PROGRAMS, ECOLOGICAL ANALYSTS, INC.

Mayor KOCH. Thank you very much, Mr. Chairman.

As I know you know it is a pleasure to come back to the Congress on any occasion and especially to come before you because we have been and always will be very good friends. I am grateful to the members of the subcommittee, Mario for his kind and generous comments, and Mr. Forsythe, we know one another, and I appreciate the enormous expertise he brings to the committee and his cooperation.

I would like to introduce my associates, Commissioner McGough who is in charge of the environmental protection department in the city of New York, and Jim Gift, our expert consultant.

I would ask your indulgence and allow me at 2:35 if you will to depart and leave you with the experts so I can make a 3 o'clock plane to get back to city hall this afternoon.

Mr. BIAGGI. May I suggest you leave at 2:30 to be certain?

Mayor KOCH. I have a lengthy statement which I would like to file and I have a short oral statement which I would like to read.

The fact is that sewage sludge has to go somewhere. In our opinion, no other option—landfill, composting, or incineration—presents fewer environmental hazards than ocean dumping. And no other site for ocean dumping is preferable to the 12-mile site we have used, along with other municipalities, since the late 1930's.

In 1982 we dumped 3.2 million wet tons of sludge, produced at our 12 water pollution control plants, in the New York Bight. This material does contain trace amounts of metals like cadmium, lead, mercury, nickel, and some PCB's.

There is no question that this disposal does contribute to some of the environmental degradation of the bight. We have studied conditions in the bight, and at other suggested sites 60 miles and 106 miles from New York City. Our studies indicate that the environmental effects of disposal in the bight have been relatively small compared to other sources of pollution.

This pollution of the bight is regrettable, but it is our position that any other sludge disposal option would have even more deleterious effects on the environment.

Landfilling is not a viable option for New York City. Even without the addition of millions of tons of sewage sludge, our landfills are close to disappearing. One will close in 3 years. The second, even with the addition of new technologies for compacting refuse, will have to close in 18 years—just in time, if we are fortunate, for our first proposed resource recovery plant to open.

Even if we did have landfill space, disposal of sewage sludge in landfills could well present us with significant problems in contamination of ground water.

Ground water contamination also would exist with techniques of composting, or spreading dried sludge as fertilizer and plowing it into the ground. And because of the metal content of the sludge, such land could never be used for anything but park land—an

option which a city with the size and density of New York would find extremely difficult, if not impossible, to manage.

Incineration of sewage sludge would release pollutants into the atmosphere, and cause, we believe, more significant public health hazards than any other option.

It seems clear to us that ocean disposal, while it has many drawbacks, is the best method now available. We also believe, as I said earlier, that the current site in the New York Bight is the preferable site.

There seems to be little point in establishing new sites for disposal. Sewage sludge contributes only an estimated 2 to 11 percent of the metals, and two-tenths of 1 percent of coliform bacteria to the bight. To move our disposal site further out to sea would have little effect on the bight and might only contribute to the creation of a new bight. Two bights would be foolish, I believe.

The negative environmental effects of disposal in the bight appear to be confined to a relatively small area. Forcing us to transport sludge to new sites farther from the city would also mean an increase from our current outlay of \$4 million a year to more than \$18 million for the 60-mile site, and nearly \$27 million for the 106-mile site.

Nevertheless, we are willing to continue looking at all three ocean sites, and we have provided our data from the three sites to the U.S. Environmental Protection Agency.

While the EPA is considering our data, and that provided by others, we strongly urge the Congress to withhold any action which would anticipate or usurp the regulatory process. We support H.R. 1761, which would allow this process to continue.

We are working now to improve the performances of our sewage treatment plants. Through our pretreatment program we will remove some of the additional metals from the sludge, and we are working on methods of reducing pollution from storm water runoff.

We are all concerned with our environment, with pollution of our land, air, and water. We have become more aware of the problems of environmental degradation in a highly urbanized society. However, we do not now have the technology to solve every environmental problem, nor do we have the funds to restore our environment to the condition it enjoyed when the first European settlers discovered this country.

Given the many difficult choices facing us, and the enormous competition for relatively few public dollars, we believe we must continue our current ocean disposal of sewage sludge, and we urge the Congress to await further scientific determinations before taking any action which might have even more deleterious effects on the environment than our current program, and spend precious dollars to accomplish nothing.

Thank you, Mr. Chairman.

[The statement of Mayor Koch follows:]

PREPARED STATEMENT OF EDWARD I. KOCH

Chairman D'Amours, Chairman Breaux, Members of the Subcommittee on Oceanography and the Subcommittee on Fisheries and Wildlife Conservation, I am happy to appear here again to bring you up to date on what New York City has been doing on the subject of ocean disposal of wastes since I last spoke to you on March 23, 1982, and to address legislative options which are currently under discussion by some Members of the Committee. With me today is Joseph T. McGough, Jr., Commissioner of the City's Department of Environmental Protection. Also with me is Dr. James Gift of Ecological Analysts, Incorporated. Dr. Gift directed the three volume study on the 12-mile, 60-mile, and 106-mile sites which we have provided to the Environmental Protection Agency to assist them in making site designation determinations. This study gathers the best scientific evidence available on the three sites. We think it strengthens and supports the City's position on ocean disposal of sewage sludge. We also think it demonstrates our good faith effort to move the ocean disposal program along and our willingness to bear our fair share of the costs of developing the necessary information for rational decision making. Following my statement, Dr. Gift will very briefly summarize the conclusions of the study.

New York-City has followed with interest and support the efforts of this Committee on behalf of H.R. 1761. We supported its predecessor in the last Congress, H.R. 6113, as it was passed in the House of Representatives. We likewise support H.R. 1761,

as it has been reported by the Merchant Marine Committee, because it allows for a rational ocean disposal permitting process to go forward without arbitrarily prejudging the desirability of any disposal option.

Your invitation to me refers to proposals such as the Staff Draft dated May 16 which has been circulated for discussion by Congressmen Hughes and Forsythe. This proposal would ban ocean disposal at the 12-mile site after three years. We are also aware that there is concern among some Members of the Committee about the possibility of using the 106-mile site. I am sure that there is similar concern among the public and in Congress as well about any other disposal option -- whether on the land, in the air, or in the ocean.

The fact is that sewage sludge has to go somewhere. We feel that the best way to deal with this perhaps disagreeable but nonetheless unavoidable fact is not to legislatively pick out one site, or another site, or one option or another option for special treatment. Rather, we recommend an examination of all disposal options and selection of the best one, based on the best scientific information available.

We urge a balanced, scientific approach to waste disposal decisions. The oceans should not be eliminated from that assessment. This does not mean we are simply arguing that waste disposal should continue in the ocean forever. On the contrary, if at some point the evidence indicates that a better option is feasible, we are prepared to adopt it. Our evidence, however, indicates that

it is simply not true that the continued use of the 12-mile site is a bad choice environmentally. Dr. Gift will address this in his testimony. The bottom line, based on the available scientific evidence, is that halting sewage sludge disposal at the 12-mile site would cause no significant, and probably no measurable improvement in the environmental condition of the Bight. In addition, there are significant air and groundwater pollution risks associated with the non-ocean alternatives.

We think that this is the kind of analysis that should form the basis for waste management decisions. It is becoming clear that there is no political solution to the problem of sewage sludge disposal which will be widely acceptable. Let the facts speak. And if the consensus of informed opinion among scientists and experts arrives at a different answer than currently appears to be the case, we will embrace it.

The City of New York is strongly in favor of developing a sound informational basis for making decisions about waste management. We support the necessary research and monitoring to determine the condition of the Bight and the effects of various disposal options. We support adequate funding for NOAA and EPA in this effort. We also support any fee provision which fairly allocates the cost of obtaining the information among the generators of the relevant wastes, which is non-punitive, and which does not pre-judge the merits of the disposal options.

The City recognizes that a decisionmaking process which is driven by information will never be static. New information will

provide new answers. No answer should, therefore, be made final by legislative or administrative fiat. Not only will information about the quality of the environment change, but information on risks will change, and technology will continue to evolve and affect the availability of disposal options. I think we need to get away from the idea that someday we can get all the necessary information and make a final decision, so that we will never have to deal with sludge disposal again. While long term planning is important, the rational approach is to retain the flexibility to make the best choice as time passes -- and likewise not force what may well be wrong choices before the evidence is in.

At this point I would like to move into a more detailed account of the City's waste management program, the progress that we have made since our last appearance, and what our current information shows. I will then address the three questions which my letter of invitation suggested I discuss as well as some of the legislative options which are currently under discussion.

New York City currently operates 12 sewage treatment plants using an activated sludge process. The sludge which is produced from this treatment is anaerobically digested, which reduces pathogen contamination and generates energy as a by-product. The final product typically contains 95 to 97 percent water and 3 to 5 percent solid material. It is then shipped to the 12-mile site in one of the City's four self-propelled vessels. In addition, seven other municipal sewage treatment plants dispose of their sludges at the site. New York City disposed of 3.2 million wet

tons of sewage sludge during 1982; this represents under 50% of the total for that year.

The City is currently constructing the Red Hook and North River sewage treatment plants. These two plants will treat sewage that is now flowing untreated into the Hudson River and the Upper Bay. The City's commitment to building these two plants under the requirements of the Federal Water Pollution Control Act is probably the single most important and cost effective measure that can be taken to improve the condition of the receiving waters. Under the current schedule, advanced preliminary treatment will begin at the North River plant by early 1986 and the Red Hook plant by August 1987. Full secondary treatment could be available by 1989 and 1991. The total capital costs of completing these two plants exceed \$1 billion.

The sludge which is produced by the City's 12 operating treatment plants contains trace amounts of heavy metals such as lead, copper, mercury, and cadmium, and some persistent organic compounds such as PCB's. Thus, sludge is one source, but a minor source, of these pollutants in the Bight. Much more important in terms of total loadings are inputs from the Hudson-Raritan estuaries due to industrial and municipal discharges at varying levels of treatment, as well as raw sewage and significant combined sewer overflows; dredged material dumping; surface run-off; and atmospheric deposition. Our data indicate that sewage sludge disposal contributes from 2 to 11 percent of the individual metals and toxic organics of concern and two-tenths of one percent of the

fecal coliform to the Bight.

There has been a great deal of interest in the pretreatment program as a possible solution to the contamination of sewage sludge. We appreciate the frustration of those who wish that our sludge could be a resource rather than a problem. The City is fully committed to implementing the legal requirements of the Federal pretreatment program. We are on schedule to have an approvable local program in place by July 1, 1983, deadline contained in the Environmental Protection Agency's regulations. However, the pretreatment program can not totally eliminate the pollutants which are concentrated in treatment plant sludges. Much of the contaminants come from non-industrial sources, such as storm water run-off which flows into the treatment plant by way of combined storm and sanitary sewer systems. And obviously the pretreatment program can not address the many pathways other than treatment plants by which pollutants find their way into the Bight area. However, we are looking forward to some reduction in the heavy metals content of our sludges in the near future.

When Congress enacted the 1977 Amendments to the Ocean Dumping Act, EPA directed its efforts to land-based alternatives. So did New York City. Like other municipalities, we proceeded to develop an interim land-based system to convert sludge to compost. Design of the system was completed in 1980 and bids for construction were solicited. The system was designed for a seven-year useful life, costing \$335 million. However, money aside, among our scientific and management community the fear grew that while

composting would stabilize and partially sterilize the sludge materials it would not remove the heavy metals and persistent organics. Thus, we would have been trading off potential environmental problems with ocean disposal for potentially more severe environmental impacts and management problems by spreading the material on land. The long-term solution -- incineration -- appeared to the scientists to be worse: the danger of generating contaminated ash, release of toxic compounds, and increasing air pollutant emissions in a densely populated area.

Faced with this dilemma, the City brought suit in the U.S. District Court, arguing that the 1981 deadline applies to sewage sludge dumping that unreasonably degrades the marine environment, and that in applying this deadline, the EPA must evaluate all the statutory criteria. Judge Sofaer ruled, in April, 1981, that EPA must revise its regulations. In particular, EPA was directed to evaluate the characteristics of the proposed dumpsite, to evaluate the availability of the alternatives, and to evaluate the environmental effects of the alternatives. The decision in the case allows New York City to continue ocean disposal until EPA completes site designation and evaluates our special permit application.

We are now well into this process. In accordance with the judgment, we petitioned EPA to proceed with site designation procedures. On December 20, 1982, EPA began rulemaking on the 106-mile site and solicited comments on the 12-mile and 60-mile sites. The City completed its three volumes of technical information in support of the designations and submitted them to EPA prior to the May deadline. At the same time we are proceeding with

preparation of our special permit application, which provides the information for a risk assessment of ocean disposal compared with the incineration alternative.

I would like to emphasize that we are not attempting to rely on the administrative procedures as a dilatory tactic to avoid the difficult task of determining disposal options. On the contrary, I feel that we have done a great deal to identify what is known and needs to be known about ocean disposal and to develop a rational framework for making decisions about long-term disposal options. We are doing everything we can to show all parties the City's good faith. We are actively soliciting and promoting a timely decision on the merits. We would strongly support any efforts by this Committee or the Congress to promote adequate resources and timely regulatory action by EPA, including the provisions contained in H.R. 1761.

If Congress repudiates the administrative process and compels a ban on ocean disposal, the question of the appropriate level of Federal assistance naturally arises. The City believes that the best evidence currently available indicates that there would be no discernable environmental benefit from stopping ocean disposal at the present time, and that quite possibly there would be a significant environmental detriment. There is certainly no evidence that we are aware of that would indicate that the additional expense of land-based alternatives would provide an environmental benefit comparable to the benefits that could be derived through other investments. In the absence of financial assistance, the necessary funds would be diverted from other environmental and social goals

to which they are currently assigned as a part of the City's budget. In our view a Federal mandate at this time to eliminate ocean disposal would show no environmental benefits to justify such a diversion of very scarce City resources. Consequently, it would be reasonable to expect the Government, through Congress, to make the City whole for its additional expenses.

Our reaction to the possibility of the Bight restoration plan is positive. Such an approach is more consistent with what we believe is the best method for making waste management decisions than simply banning the 12-mile site or any other option. If the root concern with ocean disposal at the 12-mile site is the water quality of the Bight, then it makes sense to focus on the Bight in a wholistic fashion: all pollution inputs should be evaluated and the cost effectiveness of mitigating each of them should be weighed. And, of course, the environmental effects of altering any of the inputs should also be evaluated.

A number of caveats to this endorsement are in order. First, while improvement in the environmental quality of the New York Bight is a commendable regional goal, we can never "restore" the Bight to the condition it enjoyed when Henry Hudson visited our shores. The region is a highly urbanized one with over 15 million people dependent upon a complex technology which produces complex environmental effects.

Another caveat is that restoration or improvement of the environmental condition of the Bight is only one among many legitimate and competing social and environmental goals. Ultimately the decision will have to be made about the use of scarce economic

resources for this environmental goal as opposed to other environmental programs of great importance, such as hazardous waste cleanup.

A third and related observation is that legal and institutional restraints could cause some misallocation of effort in dealing with Bight pollution problems. The City has been applying its resources to those solutions which we feel will result in the greatest environmental benefit, within the legal restraints of the various Federal statutes, and within the limits of our jurisdictional authority and responsibilities. First and foremost, we are in the process of constructing our North River and Red Hook sewage treatment plants to eliminate the discharge of raw sewage. We will continue to make improvements in our existing treatment plants. We have established an industrial pretreatment program and we have been working on plans for abating our stormwater runoff problems. We have made substantial progress over the last ten years. But restoration of the Bight is a massive undertaking that will require the strict control of hundreds of pollutant sources on a regional basis. It will require a carefully studied regional waste management strategy that will result in the greatest environmental benefit given the available local, regional, and Federal resources and legal authorities.

Ultimately, such a plan may lead to a rethinking of the fragmented coverage of Federal environmental statutes. Over the last ten years Congress has put in place the basic outlines of a Federal program to manage our society's wastes. Congress has systematically called for cleanup and protection of our air, our inland and coastal waters, our oceans, our active landfills, and

our abandoned dumps. The goals and requirements of these statutes have been admirable but not necessarily consistent. As I stated in my testimony last year, the end result of such an approach is a progressive narrowing of the options available for disposing of our society's wastes and an inability to make decisions based upon the best scientific evidence we have with respect to the risks and benefits involved in competing waste disposal and cleanup options. Now that we have most of our basic environmental statutes in place, it may be that our society is ready to move into a more mature phase of regulation which recognizes that all portions of the environment are connected and which provides a means for evaluating the comparative risks and benefits of differing disposal and cleanup strategies. Perhaps the studies called for in Section 3 of H.R. 1547 as it was reported by the Committee will provide a means to begin addressing some of these issues.

At this point I would like to comment upon three legislative proposals which are currently before the Committee in one form or another.

106-mile Proposals

We understand that drafting efforts are underway by Members concerned about dumping at the 106-mile site. I would like to request that we be given an opportunity to respond in detail to this legislative proposal and any others that are not yet available before the Committee takes final action on the issue of sewage sludge disposal. As for the 106-mile site, we have completed an extensive review of the oceanographic conditions at the site and we are submitting a technical summary of that review for the record.

Our information concludes that, although the 12-mile site may have benefits over the 106-mile site, the latter would not be significantly harmed by designation for sludge dumping. Because of this finding, and because our documentation has been submitted to EPA, I believe the regulatory process should continue so that a decision can be made on the merits.

I am aware that Representative Carper offered an amendment in full Committee which would have required EPA to submit a prospectus to the committees of jurisdiction prior to designating any site or issuing any permit for ocean dumping. The committees would have an opportunity to raise objections to the prospectus and EPA would be required to consider those objections. If EPA went ahead and designated a site or issued an objectionable permit, Congress could legislatively veto that decision.

My reaction to the proposal is both positive and negative. On the positive side, it would serve to bring information to the Committee, and I am convinced that accurate information will vindicate our approach to the issue of ocean disposal. On the other hand, I fear that a legislative veto will further politicize the decision-making process. Again, the Congress should promote an objective, scientific forum as the appropriate location for making difficult waste management choices.

State of New Jersey

This proposal has a number of attractive features which we feel are worthy of this Committee's consideration and further development. The plan calls for the 12-mile site to be designated by Congress for 5 years. During that period, EPA, New York and

New Jersey would cooperate in developing a multimedia sludge disposal assessment for the area. A fee for use of the 12-mile site would finance the assessment as well as additional monitoring, research, and implementation of the appropriate long-term disposal method. The fee would be in an amount adequate to accomplish its purposes, but it is suggested that "an equitable starting point" might be an assessment based on the cost differential between dumping at the 12-mile and the 106-mile site. The fee would be graduated over the five year period to minimize its economic impact.

In addition, the plan calls for:

- Development of sludge quality standards within one year of enactment. New Jersey would develop the standard with participation by EPA and New York. The standard would be related to a four year compliance schedule to improve sludge quality.
- Support for EPA's development and promulgation of categorical pretreatment standards.
- Support for EPA's development and promulgation of national ambient air quality standards for heavy metals and toxic organics.

Designation of the 12-mile site and continued study of sludge disposal in the New York/New Jersey area is consistent with the City's position. While the plan contemplates the possibility of requiring incineration, for example, as the long-term disposal method of choice, it does not, in our reading, mandate that outcome if the environmental assessment does not support it. A cooperative

effort to develop sludge standards which would lead to further improvements in sludge quality and further progress by EPA in developing pretreatment standards could be helpful. Development by EPA of national emission standards for hazardous air pollutants would also be helpful in evaluating the incineration option.

As I stated before, New York City would be willing to pay its fair share of fees for disposal if such fees were to add to information from which principled decisionmaking process could flow. While there is room to debate on how such a fee would be calculated, it should certainly be based on some computation of real costs. And whatever these real costs are, they at least should be consistent with the findings of the multimedia assessment. But computation of fees on the basis of the cost differential between the 12- and 106-mile sites assumes that the 106-mile site is more appropriate and that use of the 12-mile site therefore constitutes an economic windfall. We do not think that the evidence supports this assumption.

May 16 Staff Draft

This proposal, in the form of a document circulated for discussion by Congressmen Hughes and Forsythe, would mandate a firm phaseout of the 12-mile site by December 31, 1986. It would limit ocean disposal until then, both monthly and annually, to dry ton quantities disposed of in 1982. It would preclude other disposers using the site. A "special dumping fee" would be assessed against users of the 12-mile site by EPA, which would cost the City of New York \$2,300,000 in 1984, \$3,680,000 in 1985, and \$5,060,000 in 1986. Twenty-five percent of the fees collected would go for monitoring, surveillance, and development of a multimedia assessment of sludge management in the New York and New Jersey region, to be conducted by the Federal Government. Seventy-five percent would

go to special accounts for use by the municipalities to improve sludge quality and identify and implement alternatives to ocean dumping. The proposal also mandates that EPA:

- assess land and ocean disposal options using their 25% share;
- develop a plan for improving the overall water quality of the Bight Apex;
- present this plan to Congress within three years;
- establish sewage sludge quality standards within one year;
- charge additional user fees for administering and monitoring ocean disposal under Section 102 of the Ocean Dumping Act; and
- upon Congress' authorization, assess further additional fees for implementing ocean disposal alternatives or water quality improvements.

The proposal further provides that after 1986 no ocean dumping anywhere would be permitted unless pretreatment programs are fully complied with or a scheduled phase-out of ocean dumping is agreed to between the municipality and EPA.

While the proposal retains some of the features of the New Jersey plan, the logic of the proposal is marred by the a priori determination that dumping at the 12-mile site is unacceptable and must be banned. Thus, the multimedia assessment may assess all the media and all locations -- other than the 12-mile site. Likewise, the New York Bight Restoration Plan, to be submitted by EPA some time after the 12-mile ban is well on its way to being implemented, shall assess pathways of pollutants into the Bight and determine

the effectiveness of means to address those inputs -- but not the sewage sludge input, and not the effectiveness of addressing that input through imposing a ban. As with the New Jersey plan, we would urge that the steps to be taken by New York City and other municipalities in the area should be consistent with the findings of an open, balanced, and scientific assessment.

That completes my prepared testimony. I appreciate the opportunity to address the Committee once again this year on this very important subject. As I indicated at the opening of my testimony, I will now yield to Dr. Gift for a presentation of his information on the site designation studies which we have submitted to EPA and for some discussion of our ongoing work on the special permit application. The technical summaries for the site designation study will be submitted for the record.

Commissioner McGough, Dr. Gift and I will be happy to answer any questions you might wish to ask of us.

Mr. D'AMOURS. I thank you, Ed, and I am going to be very brief with my questioning recognizing the time constraints on you.

Mayor KOCH. Jim has a statement but perhaps he could forego it and we could do the questioning now. If you thought his statement was necessary he could make it at that time.

Mr. D'AMOURS. I will let you decide whether or not you want the statement made at this time. I don't want to inhibit your presentation of the full case.

Mayor KOCH. Let's have him sum it up.

Mr. GIFT. Let me pick up just one or two points of my testimony that I think probably hit the underlying arguments.

One point addresses not much what we found in our assessment on site designation, which has been detailed in the documents that we delivered to EPA, but based on those findings the question of what we can expect to gain if we ban sludge dumping at the New York Bight Apex.

First, since contaminant loadings to the bight are dominated by other sources which will continue even if sewage sludge disposal were stopped, the benefits of removing sludge if any will be minor. Current beach pollution episodes would not be reduced in number and the potential for anoxic events would not measurably decrease.

Because sewage sludge disposal does not affect beach water quality, banning sludge disposal in the bight would not improve Long Island or New Jersey beach conditions.

Further, it is highly unlikely that the New York Bight shellfish closure would be rescinded since sewage sludge contributes only two-tenths of 1 percent of the bight apex coliform bacteria load and dredged material which will continue to be a large source of coliform bacteria to the same offshore area would continue.

Finally, the sludge that is currently disposed of at the 12-mile site would have to be disposed of in some other location or medium, each of which presents its own potential for environmental or human health effects.

The one other point I would like to comment on very briefly concerns some of the additional results that we have generated as part of our special permit application preparation which will be finalized and presented to EPA by the city this summer.

We have done extensive laboratory programs, completed extensive chemical analyses on toxicity and bioaccumulation of sludge. This work has shown that toxicity is relatively low. We are finalizing a sewage sludge dispersion model and based on preliminary results it appears that most of the city's 12 sewage sludges will meet the limiting permissible concentration requirement at the 12-mile site.

Tests have shown no evidence of significant bioaccumulations in organisms due to exposure to sewage sludge in seawater.

Thus, it appears that the sewage sludge from most if not all of New York City's waste treatment plants will satisfy the environmental criteria of the regulations for ocean disposal.

I think based on both our site designation documents and the work that we will include in the special permit application which will also include a multimedia risk assessment, looking at the risk to man for ocean disposal and land-based alternatives—that a strong case will be made for continued ocean disposal at the 12-mile site.

Thank you.

[The statement of Mr. Gift follows:]

PREPARED STATEMENT OF JAMES J. GIFT

Mr. Chairman and Subcommittee Members:

I am James J. Gift, Vice President of Environmental Programs for Ecological Analysts, Inc., a multidisciplinary environmental consulting firm. My training is in environmental sciences with a focus on freshwater and marine ecology and toxicology. For the last three years, I have been responsible for directing a comprehensive technical assessment of ocean disposal of New York City's sewage sludge.

My firm and SEAMOcean, Inc., have prepared three extensive assessments of the technical information relating to the proposed redesignation of the 12- and 60-Mile Sites and the designation of the 106-Mile Site for disposal of sewage sludges. These comment documents were submitted to EPA in March 1983. We are also in the process of finalizing a comprehensive Special Permit Application which includes a cross-media assessment of New York City's land and ocean sludge management alternatives.

I appreciate this opportunity to discuss, on behalf of the City of New York, a number of technical issues that relate to the ocean disposal of municipal sewage sludge in the New York Bight.

Site Designation Issues

A multidisciplinary technical staff of over 20 scientists prepared these comprehensive comment documents which address the suitability of the 12-, 60-, and 106-Mile Sites for the ocean disposal of sewage sludge. These documents are a synthesis of over a thousand technical papers and reports. We believe the documents provide a strong technical case to support designation of the three sites under consideration.

Copies of the full technical summaries of the three comment documents are attached as appendices to this testimony and I would like to ask that they appear in full in the record. I would like to summarize some of the key findings of our site designation studies which I feel are of interest to this Committee, with particular emphasis on the 12-Mile Site which is located in the New York Bight apex (Figure 1).

. Sewage sludge disposal contributes only a minor portion of the contaminants entering the New York Bight apex from all sources. The contaminants mercury, cadmium, PCBs, and fecal coliform bacteria are of particular regulatory interest. Sewage sludge disposal is estimated to contribute only 3 percent of the mercury, 8 percent of the cadmium, 3 percent of the PCBs, and two-tenths of one percent of the fecal coliform bacteria to the Bight apex (Figure 2).

. EPA's (1978) prediction that sewage sludge disposal in the Bight would increase by 140 percent by 1981 was a significant over-estimate. Between 1973 and 1981, sewage sludge volumes increased only 46 percent. More importantly, the quantity of total solids disposed at the 12-Mile Site increased only 5 percent over the same period. The difference in these volumes is simply water.

. Although volumes of sewage sludge have increased, our estimates show the quantities of most of the toxic metals disposed have decreased, some significantly. For example, compared to NOAA estimates using 1973

data, the mercury and cadmium loadings to the Bight apex from sewage sludge have been reduced in 1981 by 65 percent and 44 percent, respectively.

. Numerous federal, state, and academic research studies have shown that sewage sludge did not cause the 1976 anoxic event nor any of the beach pollution episodes.

. Sewage sludge does not build-up on the seafloor and no sludge monster is moving towards Long Island. In fact, both NOAA and EPA have concluded that continued use of the 12-Mile Site is not a threat either to public health or water quality along the Long Island and New Jersey beaches.

. The NOAA Microconstituents Program data indicate that concentrations of metals in fish and shellfish from the Bight apex are generally not higher than concentrations in biota from other North Atlantic areas. The most recent data indicate that PCB contamination is predominantly from the Hudson River and the Hudson-Raritan Estuary, not from the ocean disposal of sewage sludge.

. The contamination of beach waters is not caused by sewage sludge disposal. Discharges located at the shoreline release 500 times more coliform bacteria than does sewage sludge which is disposed 10 miles from any beach area.

. Sludge vessels are not a navigational hazard. In fact the Captain of the Port of New York recently stated that disposal activities could double without causing traffic problems.

Based on the overall technical assessment, the 12-, 60-, and 106-Mile Sites comply with EPA's site designation criteria and should be designated for the disposal of those sludges that qualify to receive special permits. However, we feel strongly that any sludges that are transferred to the 60- or 106-Mile Sites should be phased in slowly to allow for adequate monitoring of environmental effects. We also support the U.S.

EPA's 1980 Environmental Impact Statement (EIS) conclusion that "sludge disposal should be allowed at the [106-Mile] Site only under the following conditions: Provided the existing sewage sludge site cannot safely accommodate more sludge disposal without endangering public health; severely degrading the marine environment, or degrading coastal water quality." We also support similar conclusions made by EPA in their 1978 EIS concerning use of the 60-Mile Site.

Effect of a Ban on Disposal in the Bight Apex

I would like to briefly discuss the probable results of banning sewage sludge from the New York Bight apex. First, since contaminant loadings to the Bight are dominated by other sources which would continue even if sewage sludge disposal were stopped, the benefits of removing sludge, if any, would be very minor. Recurrent beach pollution episodes would not be reduced in number and the potential for anoxic events would not measurably decrease. Because sludge disposal does not affect beach water quality, banning sludge disposal in the Bight apex would not improve Long Island or New Jersey beach conditions. Further, it is highly unlikely that the New York Bight shellfish closure would be rescinded since sewage sludge contributes only two-tenths of one percent of the Bight Apex coliform bacterial load and dredged material would continue to be a large source of coliform bacteria to the same offshore area. Finally, the sludges currently disposed at the 12-Mile Site would have to be disposed in some other location or media, each of which would present its own potential for environmental and human health effects. The recognition of these general findings led NOAA scientists to recently recommend "continued use of the existing 12-Mile dumpsite until a regional waste disposal management strategy can be developed." Our extensive review of the technical literature fully supports this statement.

Special Permit Application

I would like to briefly describe several key findings of New York City's comprehensive Special Permit Application, which should be completed for submission to EPA this summer. I also want to point out that the

approaches and results of these studies have been presented at several recent scientific meetings and to EPA's Narragansett Laboratory research staff and have been submitted to peer reviewed technical publications.

An extensive laboratory program has been completed with chemical analysis and toxicity and bioaccumulation testing of sewage sludges from each of New York City's 12 wastewater treatment plants. This test program has shown that the toxicity of sewage sludges to marine organisms is relatively low. We are currently finalizing a sewage sludge dispersion model, and, based on preliminary results, it appears that most of the City's 12 sewage sludges will meet the limiting permissible concentration requirement of the regulations. Laboratory tests have also shown no evidence of significant bioaccumulation in organisms due to exposure to sewage sludge in seawater. Thus, it appears that sewage sludge from most, if not all, of New York City's waste water treatment plants will satisfy the environmental criteria of the regulations for ocean disposal.

Until the Sofaer decision, EPA interpreted their 1977 regulations to preclude ocean dumping of any materials which did not meet the environmental criteria without regard for the impacts of alternatives to ocean dumping. However, our studies have shown that most, if not all, of New York City's sewage sludges may qualify for special permits under the stringent interpretation of EPA's regulations even without the need to demonstrate that the impacts of the alternatives to ocean disposal would be greater.

As part of establishing the need for ocean disposal, the Special Permit Application will also include a multimedia human health risk assessment, that will compare the relative risk to man from ocean disposal at the 12-Mile Site and from New York's long-term, land-based sludge management option, which is incineration. The preliminary results of this assessment show that ocean disposal presents a lower human health risk than New York's long-term land-based alternative.

Summary

Sewage sludge disposal does have some limited environmental effects in the vicinity of the 12-Mile Site. However, those effects are localized and are, at most, a minor influence on the overall environmental condition of the New York Bight apex. Based on the information developed in New York City's 12-Mile Site comment document and Special Permit Application, disposal of the City's sewage sludges at the 12-Mile Site is currently the best waste management alternative available to the City to optimize human health and environmental considerations. This is not to imply that this will always be the case. Future technological improvements may present another sludge management alternative that would be a better option for the City of New York. However, the current technical assessment concludes that disposal of sewage sludge at the 12-Mile Site should continue to be an available sewage sludge management option.

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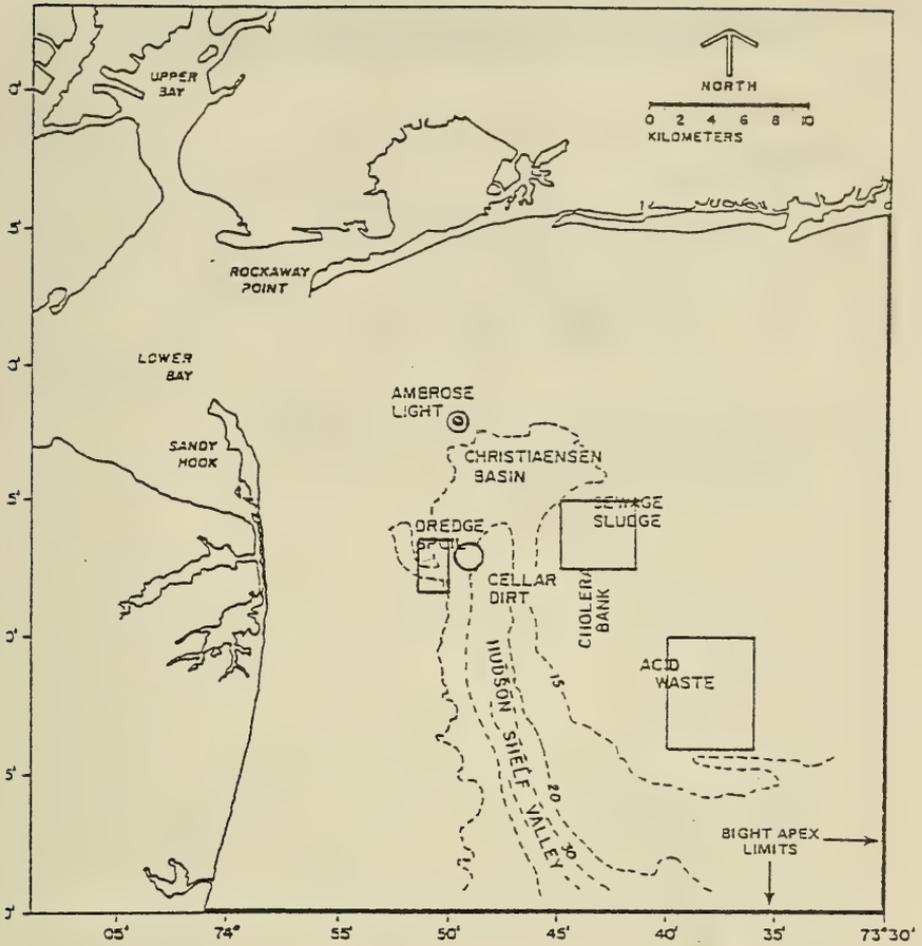
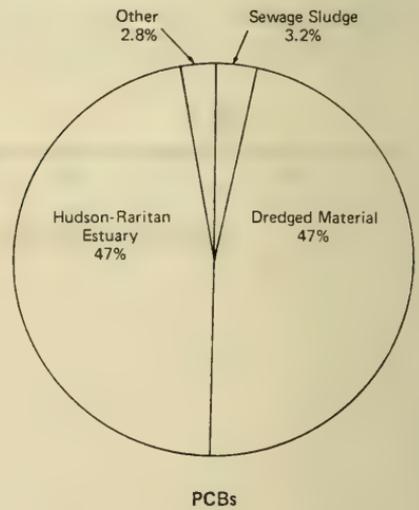
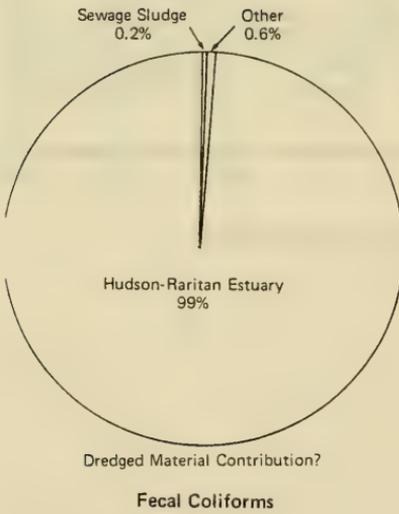
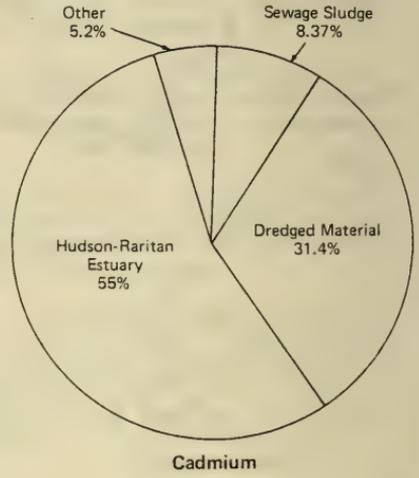
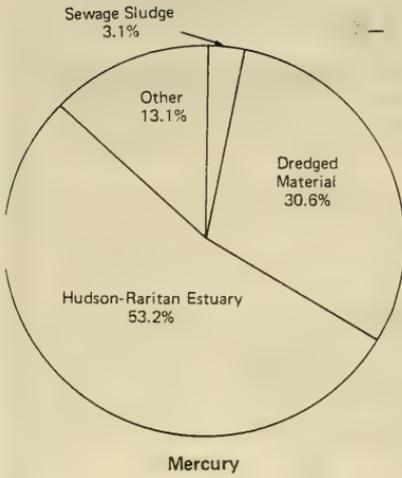


FIGURE 1. NEW YORK BIGHT APEX DISPOSAL SITES.

FIGURE 2. RELATIVE CONTRIBUTION OF SEWAGE SLUDGES TO THE CHEMICAL LOADINGS OF THE NEW YORK BIGHT APEX.



APPENDIX A

TECHNICAL SUMMARIES TO SUPPORT
THE REDESIGNATION OF THE
12-MILE SITE
FOR THE OCEAN DISPOSAL
OF MUNICIPAL SEWAGE SLUDGE

Submitted in Response to U.S.EPA's
20 December 1982 Federal Register Notice
47 FR 56665

18 February 1983

APPENDIX A

12-MILE SITE

TECHNICAL SUMMARY

This report was prepared in response to a request by the Environmental Protection Agency (EPA) for additional technical information concerning New York City's petition to redesignate the 12-Mile Site. The request was made by EPA in a letter from the Region II Administrator to New York City dated 9 December 1982 (EPA 1982), and through a "Notice of Petitions for Rulemaking and Announcement of Consideration of Commencement of Rulemaking", which appeared in the Federal Register on 20 December 1982 (47 FR 56665).

In order to redesignate the 12-Mile Site, EPA must consider a number of criteria established as part of the Ocean Dumping Regulations at 40 CFR 228.5 and 228.6. Since the site has previously been designated and used historically, the criteria in 40 CFR 228.10 for evaluating disposal impact must also be considered. Each of these criteria was examined by EPA in the Final Environmental Impact Statement on the Ocean Dumping of Sewage Sludge in the New York Bight, September 1978 (1978 FEIS), which formed the basis for final designation of the 12-Mile Site and the 60-Mile Site. This report provides a comprehensive referenced update of the technical information incorporated in the 1978 FEIS and demonstrates that the conclusions of that document not only remain valid, but are reinforced by the more recent data. The conclusions from the 1978 FEIS include the following:

"Continued use of the existing [12-Mile] site is not a present threat either to public health or to water quality along the Long Island or New Jersey beaches. Moving present sludge dumping operations to an alternate site without adequate justification would result in the unnecessary contamination of a relatively clean area of the New York Bight. Moreover, contamination of the new area would not be balanced off by recovery of the old; the quality of the existing site and its surrounding area could not be expected to improve significantly even if sludge dumping were terminated, because the bottom is severely contaminated and pollutants from other sources will continue to flow into the Bight Apex" (EPA 1978, p. 4).

In fact, the more recent technical information demonstrates that the adverse effects of contamination of the New York Bight apex are less than had been thought in 1978, that the relative contribution of sewage sludge to the contamination of the New York Bight apex is small compared to other identified contaminant sources (Section 6.6)*, and that total

* References in the Technical Summary refer to sections in the main body of the report.

contaminant loads for sewage sludge are less than was estimated by the National Oceanic and Atmospheric Administration (NOAA) from 1973 data (Section 6.7).

To assist in the ocean dumping site designation process, EPA (1982) has requested additional information from New York City concerning:

- 1) the effect of sewage sludge dumping at the proposed site on human health and welfare, including economic, aesthetic, and recreational values;
- 2) the effect of such dumping at the site on fisheries resources, plankton, fish, shellfish, wildlife, shorelines, and beaches;
- 3) the effect of such dumping at the site on marine ecosystems;
- 4) the individual and cumulative effects of dumping particular volumes and concentrations in regard to other existing or potential ocean waste disposal activities at the site and in the New York Bight;
- 5) the effect on alternate uses of the ocean, including scientific study, fishing and exploitation of living and non-living resources; and
- 6) the feasibility of utilizing locations further offshore, either on or off the Continental Shelf.

In the Federal Register notice, EPA has further defined the environmental issues to be addressed under points 1 through 6 above. EPA identified "high levels of toxicants in fish and shellfish, repetitive algal blooms, fish kills, fin rot, and beach washups" as effects that those opposed to continued use of the 12-Mile Site fear may be caused by sewage sludge. EPA further identified possible bacterial shellfish contamination, benthic impacts, public health hazards (through bacterial contamination and bioaccumulation of toxics in seafood), and the effects of cessation of dumping as the major environmental issues to be addressed in considering whether to redesignate the 12-Mile Site. Each of these issues is comprehensively addressed in other chapters of this report. However, the report goes beyond these issues by providing a comprehensive summary of the technical knowledge of the ocean environment at the 12-Mile Site and surrounding area. In this chapter the information contained in other technical chapters is summarized to respond directly to each of the issues identified by EPA.

2.1 HISTORY AND GEOGRAPHY

Located adjacent to one of the most populated and industrialized metropolitan areas in the world, the New York Bight is one of the most extensively studied marine regions of the world. Within the Bight are five major ocean dumpsites where the disposal of wastes is permitted under the Marine Protection, Research, and Sanctuaries Act of 1972. The sewage

sludge dumpsite, located 12 nautical miles southeast of the Sandy Hook-Rockaway Point Transect, has been in continuous use since 1924 (Section 2.1).

The 12-Mile Site comprises 6.6 square nautical miles with water depths of between 22 and 27 meters and is located on a shallow topographic high. The Christiaensen Basin with water depths of over 30 meters lies to the northwest of the site; the upper Hudson Shelf Valley lies to the west with depths of 30 to 40 meters, increasing to the south (Section 2.2). The dredged material dumpsite is located on the western edge of the Christiaensen Basin and has been in use since 1914. The location of the sewage sludge dumpsite is often misrepresented in the literature: either as a point at the extreme northwest corner of the site or, in some publications, even at point locations entirely outside of the actual site boundaries (Section 8.2). Sludge dumping takes place by continuous discharge from a moving vessel transiting the disposal site. Sludge is, therefore, discharged throughout the Site and not restricted to the northwest corner. Furthermore, the Coast Guard has concluded that sludge dumping activities are not a navigation hazard and that the use of the site could double with proper scheduling.

2.2 TOXICANTS IN FISH AND SHELLFISH

Analysis of NOAA's most comprehensive databases indicate that the tissue levels of metals, other than mercury, in fish and shellfish from the New York Bight are not higher than in other areas of the western Atlantic Ocean (Section 15.2). The analysis also indicates that mean metal tissue levels from the New York Bight apex do not differ from the entire New York Bight (Section 15.2, Table 15-2). Although mean mercury tissue levels in fish and shellfish of the New York Bight as a whole do appear to be somewhat higher than in other parts of the western Atlantic Ocean, mean mercury tissue levels in fish and shellfish of the New York Bight apex are not higher than in other parts of the New York Bight (Section 15.2). Furthermore, sewage sludge contributes only 3 percent of the total mercury to the New York Bight (Section 6.6). Except for some elevated PCB levels in several migratory fish species (which probably result from contamination within Hudson - Raritan estuarine system), concentrations of organics in fish and shellfish are well below levels believed to result in potential public health hazards (Section 15.3).

The New York Bight apex receives contaminant inputs from numerous sources including: the Hudson River estuary and its tributaries, municipal and industrial wastewater discharges, urban runoff, ocean dumping, atmospheric deposition, accidental spills, and landfill leachate. The dominant source of chemical constituents to the New York Bight apex is the Hudson - Raritan estuary and to a lesser extent, dredged material dumping (Section 6.6). The most recent data indicate that sewage sludge dumping contributes approximately 2 percent of the land-derived annual input of arsenic to the New York Bight apex; 3 percent of the mercury and PCBs; 4 percent of the nickel; 8 percent of the cadmium, zinc, and oil and grease; 9 percent of the lead; 10 percent of the chromium; and 11 percent of the copper (Table 6-23). Therefore, given the overwhelming contribution of contaminants from the Hudson - Raritan estuary and dredge spoil dumping, the few instances of increased contaminant levels in the New

York Bight apex fish and shellfish are more likely caused by sources other than sewage sludge.

2.3 ALGAL BLOOMS

Rapid algal population increases (blooms) have been observed on a number of occasions in the New York Bight (Section 11.2). Such blooms can lead to fish kills caused by natural toxins produced by the algae, or by the depletion of oxygen due to algal decomposition. Such blooms occur naturally in many parts of the world ocean, and since historical records indicate that blooms may have occurred often in the past in the New York Bight, those blooms now observed might also be of natural origin (Section 11.2). In some instances, algal blooms are caused by over-fertilization of aquatic ecosystems with nutrients, such as phosphorus and nitrogen, in a process called eutrophication. There is evidence that portions of the New York Bight might be seasonally eutrophic. However, the predominant sources of nitrogen, the probable causative agent, are the inputs of estuarine waters, coastal wastewater discharges, and land runoff into the New York Bight apex (Sections 6.3 and 11.4). Sewage sludge comprises only a minor fraction (approximately 6 percent) of the total nitrogen load to the New York Bight apex and therefore is not a causative agent in the initiation of nuisance algal blooms (Section 11.4).

2.4 FISH KILLS

The occasional "fish kills" that have occurred in the New York Bight are generally caused by oxygen depleted bottom waters which can form during stratified summer conditions. In general, few finfish are killed by oxygen depleted bottom waters since they are generally able to actively avoid the oxygen depleted water. However, shellfish, which are typically immobile can be killed in large numbers if anoxic conditions persist. The most significant recent fish kill took place in 1976 and has been referred to as the "1976 anoxia event."

Extensive Federal, state, and academic studies of the 1976 anoxia event have led to the conclusion that the event was the result of several anomalous natural conditions and that sewage sludge dumping in the New York Bight was not a causative factor (Section 11.5). Recent research strongly supports the conclusion reached by the 1978 FEIS that meteorological conditions of the previous winter and spring, tide and wind driven circulation patterns in the Bight, the formation of an unusually stable thermocline, and the existence of an unusually extensive and persistent algal bloom led to the 1976 anoxia event and its accompanying shellfish kill (Section 11.5). The literature also establishes that anoxic conditions occur naturally in coastal water bodies throughout the world, and that the New York Bight has historically experienced repeated, although less severe, anoxic episodes (Section 11.2).

2.5 FISH AND SHELLFISH DISEASES (INCLUDING FIN ROT)

Surveys conducted in and around the New York Bight have reported incidences of fish disease conditions including black gill, shell erosion, finrot, ulceration, lymphocystis, tumors, skeletal anomalies, parasitic infestation, and larval mutagenesis. Some of these diseases may be

related to degraded environmental quality. However, the occurrence of diseases (such as lymphocystis) in relatively unpolluted areas has led researchers to conclude that certain diseases are latent in most fish populations and may intensify periodically for natural reasons (Section 13.7).

Although much of the early 1970's literature circumstantially associated fish and shellfish disease with sewage sludge dumping, the databases used were extremely limited, lacked adequate control data, and generally were inadequate to determine the causative factors of these conditions or even to determine if the incidence of disease in "polluted" areas was significantly higher than in the general population. Recently published data indicate that the prevalence of some diseases in the New York Bight is less than was previously thought, and that the fish populations of the Bight are generally healthy. For example, recent data have indicated that the incidence of black gill disease in the New York Bight is not significantly higher than natural background levels (0-2.0 percent) and that there were no apparent differences between the incidence of the disease at "contaminated" (Bight apex stations) and control stations (Section 13.2). Furthermore, fin rot, lymphocystis, and ulcers appeared in only 3.7 percent, 0.16 percent, and 0.20 percent, respectively, of the New York Bight fish examined (Chapter 13).

2.6 BEACH WASH-UPS

Properly treated sewage sludge does not contain any significant quantity of floatable material which could potentially wash up on Long Island or New Jersey beaches. Furthermore, sewage sludge does not accumulate in a mass on the sea bottom and, therefore, there is no potential that a sludge "mass" could wash up on the beaches. The 1976 Long Island beach pollution incident attracted a great deal of attention based on media speculation that barge dumped sewage sludge was the principal source of the stranded materials. Based on numerous technical investigations, scientists have concluded that other sources (e.g., the Hudson-Raritan estuary, inland runoff, municipal wastewater discharges, combined sewer and stormwater runoff, and solid waste barging operations in New York Harbor) far outweigh any possible contribution of floatables from sludge dumping at the 12-Mile Site (Section 10.5). Furthermore, EPA water quality sampling during the beach pollution incident indicated that the problem was aesthetic rather than health related since "EPA data for surf samples collected during 14-29 June 1976 (the peak of beach contamination) showed that in all cases the total coliform levels were well within safe swimming standards" [emphasis added] and "data collected by other agencies gave similar results" (EPA 1978, p. 60).

2.7 SHELLFISH CONTAMINATION

As noted in the 1978 FEIS, shellfishing has been prohibited in the immediate area of the 12-Mile Site, as well as in other estuarine and coastal apex areas, as a result of elevated coliform bacteria levels (Section 16.2). However, the 1978 FEIS also correctly notes that "barging is an insignificant source of fecal contamination to the New York Bight" apex (p. 40). Recent data indicate the sewage sludge contribution to be approximately two-tenths of one percent of the entire coliform load to

the apex (Section 6.6). In contrast, municipal wastewater discharges and urban runoff were identified as being responsible for nearly 100 percent of the total and fecal coliform load to the area (Section 6.6).

Since sewage sludge dumping contributes an insignificant fraction of the total and fecal coliform loading to the area currently closed to shellfishing and since dumping at the adjacent dredged material dumpsite would continue to contribute coliforms, the 1978 FEIS conclusion is correct that "...nor would areas closed to shellfishing be reopened in the near future" (EPA 1978, p. 204) if sludge dumping were halted. Furthermore, the closed area represents only a very small portion of the region's available shellfish habitat.

2.8 BENTHIC IMPACTS

Press reports during the mid-1970's of a sludge "blanket" at the 12-Mile Site which had migrated to within one-half mile of Long Island bathing beaches have been proven incorrect and technically unsubstantiated (Section 9.8). The New York Bight apex has received large quantities of anthropogenic materials since the beginning of the century, yet, except for the immediate area of the dredge spoil dumpsite, no sediment build-up has been reported for the 37-year period between comprehensive bathymetric surveys. The 12-Mile Site has, in fact, undergone net erosion as evidenced by surveys conducted since 1845 (Sections 9.8 and 9.9). Furthermore, it has been shown that sewage sludge is rapidly diluted in the water column and any solids that reach the floor of the Bight become widely dispersed by natural scouring, erosion, and reworking of the shelf floor (Section 9.5).

As a result of the numerous contaminant sources, the New York Bight apex does not contain pristine benthic communities (Section 14.1). Although studies conducted in the topographic lows near the sewage sludge dumpsite have generally shown altered benthic meiofaunal and macrofaunal populations, the press reports of a "dead sea" are unquestionably wrong. Research has demonstrated that stable (though, in some areas, modified) benthic communities are established in and around the sewage sludge dumpsite, which is floored by relatively clean sands (Section 14.2). As reported in the 1978 FEIS, the adverse biological effects of dredged material dumping are thought to be far more severe than any caused by dumping of sewage sludge. Furthermore, the 1978 FEIS predicts that, even if the existing 12-Mile Site were abandoned, the benthic community would not revert to a community characteristic of a pristine area in the near future, since numerous larger contaminant inputs would continue.

Concentrations of metals and contaminant organics in bottom sediments are not uniformly distributed throughout the New York Bight, but vary according to bathymetry, sediment grain size, quantity of organic matter present, and proximity to the metropolitan area (Sections 8.2 and 8.5). Within the New York Bight apex, elevated concentrations of both metals and organic materials are generally found in topographic lows (e.g., the Christiaensen Basin and Hudson Shelf Valley), which are near the dredge spoil and sewage sludge dumpsites and which are also within the mixing zone of estuarine inputs where river borne particulates may be deposited (Section 8.5).

The altered benthic fauna in the New York Bight apex are associated primarily with topographical lows. These altered benthic populations are most likely caused by physical alteration of the sediment substrate and enhanced carbon loadings. Further, since the contribution of solids (Table 6-22) and contaminants (Section 6.6) to the apex from sewage sludge is small, it is reasonable to conclude that other identified sources contribute much more to the alteration of the benthic area.

2.9 PUBLIC HEALTH HAZARDS

Sewage sludge potentially affects human health through two possible modes of impact: consumption of contaminated fish or shellfish, and direct contact with, and ingestion of, pathogens through swimming. No seafood species in the New York Bight is known to be contaminated by any toxic compound (other than PCBs) to levels which are considered a public health hazard. PCBs contaminating some coastal fish species in the New York Bight originate from river, estuarine and coastal sources and not from ocean dumped sewage sludge (Section 15.3). Further, whatever the possible level of contamination of seafood species, sewage sludge contributes, at most, only a small fraction of the inputs of all toxic compounds to the New York Bight (Section 6.6).

Some shellfish within the Bight apex closure area are known to contain elevated concentrations of coliform bacteria, which are indicators of sewage contamination and the possible presence of pathogens (Section 16.2). It is not known what proportion of the coliforms found in these shellfish originated from treated sewage effluent discharges and untreated sewage, and what proportion originated from dumped sewage sludge. However, since sources other than sludge dumping contain orders of magnitude greater quantities of coliforms (Sections 6.6 and 16.1), it is reasonable to conclude that sewage sludge dumping is not primarily responsible for the shellfish contamination within the New York Bight apex. Since an area with a radius of 6 nautical miles around the sewage sludge dumpsite is closed to shellfishing (Section 16.2) as a precautionary measure, no public health hazard exists from shellfish contamination at or near the 12-Mile site.

The beach bathing waters of the New York Bight apex and Raritan Bay have variable coliform concentrations which sometimes approach or exceed levels that are deemed safe for swimming. However, it has been conclusively demonstrated that pipelines and other direct discharges of treated sewage effluents (and occasional untreated stormwater runoff) contribute more than a one hundred times higher coliform (and, by inference, pathogens) load than sewage sludge dumping to the New York Bight apex (Section 6.6). In addition, these land based discharges occur in nearshore areas close to the beaches, whereas sludge dumping occurs 9.9 nautical miles from the nearest beach. As sewage sludge coliforms and pathogens are transported from the 12-Mile Site, their concentrations are drastically reduced by dispersion and die-off (Section 16.6). Therefore, as noted by both EPA (1978) and NOAA (1982), the effect of sewage sludge dumping on beach water quality is insignificant, and dumping poses no potential or actual human health hazard through this mode of impact.

2.10 CESSATION OF DUMPING

The foregoing summary of information concerning the effects of dumping sewage sludge at the 12-Mile Site leads to two basic conclusions:

- The impacts of sewage sludge dumping at the 12-Mile Site are minimal. Further, those changes or anomalies, which have been observed in the New York Bight apex and which are interpreted as indications of "degradation", are all either natural occurrences or are known with a high degree of scientific certainty to be caused predominantly by contaminant inputs other than from sewage sludge. Sewage sludge is at most only a very minor contributor to some of the observed or hypothesized problems.
- If sewage sludge dumping were halted at the 12-Mile Site, there would be no significant, and probably no measurable, improvement in either the environment of the New York Bight or the degree of protection from health risks afforded the human population. This conclusion has been reached by EPA in the 1978 FEIS and by the National Oceanic and Atmospheric Administration (NOAA) in various publications, including testimony at Congressional hearings.

These conclusions would require reexamination if the quantity of sludge that was disposed at the 12-Mile Site were to be substantially increased. It is noteworthy that, in the 1978 FEIS (EPA 1978), EPA estimated that the volumes of sewage sludge dumped annually at the 12-Mile Site would rise from 4.12 million cubic meters in 1973 to an estimated 9.90 million cubic meters in 1981, an increase of about 140 percent of the 1973 volume. The actual 1981 volume dumped was 6.07 million cubic meters, an increase of less than 50 percent of the 1973 volume, or only one third of the increase projected by EPA (Chapter 5). Even this 50 percent increase in volume was apparently related to wastewater treatment improvements such as the implementation of secondary treatment.

The weight of "total sewage sludge solids" dumped annually increased only about 5 percent between 1973 and 1981 (Section 6.7). Since "total solids" as measured contain all the contaminants, then corrected for the increase in water dumped, there has been only a 5 percent increase in sewage sludge dumping between 1973 and 1981 (Section 6.7). In terms of the annual quantity of specific contaminants contained in ocean dumped sewage sludge, only "oil and grease" and copper appear to have increased between 1973 and 1981. In contrast, for a number of other contaminants, including cadmium, chromium and mercury, the total quantity dumped annually in sewage sludge decreased over this period (Section 6.8).

Virtually all secondary treatment facilities of the sewage sludge ocean dumping permittees, with the exception of the North River and Red Hook plants of New York City, are now in operation, and the population and industry of the New York region are stable and not increasing rapidly. Therefore, no major further increases in sludge quantities are anticipated until these two plants come on-line. Under a 30 December 1982 consent decree between New York City and the U.S. EPA, advanced preliminary treatment will begin at the North River plant by August 1986 and at the Red Hook plant by August 1987, and secondary treatment will be

attained by July 1991 for North River and August 1989 for Red Hook. If disposed at the 12-Mile Site, advanced preliminary treatment will result in a 3.4 percent increase in digested sewage sludge solids ocean dumped in 1981 (Chapter 5). Furthermore, if the observed decreases in contaminant concentrations in sewage sludge continue (Section 6.7), the quantities of major contaminants dumped via sewage sludge will decline.

2.11 OTHER ENVIRONMENTAL FACTORS

Fish populations of the New York Bight are dominated by migratory coastal species which have high reproductive capacities and support large commercial and recreational fisheries (Section 12.4). Annual fluctuations in year class abundance typically result from climatic variability and are affected by over-exploitation by the sport and commercial fisheries (Section 12.5). The dumping of sewage sludge at the 12-Mile Site is not believed to have adversely affected the finfish resources of the New York Bight and, no critical life stages of important species are unique to the vicinity of the dumpsite (Section 12.5).

Oceanic diffusion studies indicate that at the end of the four hour "initial mixing" period following discharge at the site, the sewage sludge is diluted one part sewage sludge to about 30,000 parts of seawater (Section 18.2). This is a result of a two phase process: a very rapid initial wake dispersion, followed by slower oceanic diffusion processes. The EPA/Corps of Engineers "release zone method" of estimating initial mixing has been shown to be conservative when compared to results of field studies conducted to evaluate the behavior of ocean dumped sewage sludge (Section 18.2 and 18.3).

Concentrations of dissolved metals and particulate organic materials in the water column of the New York Bight vary naturally both seasonally and spatially, with background concentrations for some constituents generally higher than those reported for the open ocean, but within ranges found in other coastal waters (Sections 7.1 and 7.2). There are numerous sources of these nutrient, metal, organic, and suspended material constituents to the Bight, with sewage sludge dumping being only a minor source (Section 6.6). Water quality effects following dumping are temporary, and concentrations generally return to background levels within several hours.

2.12 SURVEILLANCE AND MONITORING

Surveillance and monitoring programs are well established for dumping activities within the New York Bight apex. Conducted by EPA, NOAA, U.S. Coast Guard, and state agencies, as well as through a cooperative effort of regional sewage sludge permittees, these efforts have resulted in an extensive environmental baseline database against which environmental changes can be compared (Section 19.2). Similar surveillance and monitoring activities at the 60- or 106-Mile Sites would be far more costly and difficult to conduct, and the information obtained would be more difficult to interpret because such extensive databases are not available for these sites.

2.13 ECONOMICS

Cost estimates for ocean dumping New York City's sewage sludge (which comprises about 50 percent of the total sewage sludge ocean dumped at the 12-Mile Site) at each of the three proposed New York Bight dumpsites were computed in constant 1982 dollars. Estimated annual operating costs for dumping at the 12-, 60-, and 106-Mile Sites were \$4.09 million, \$18.05 million, and \$26.71 million, respectively (Section 17.5). These figures are based upon use of New York City's present sludge fleet (with additional capacity required for the more distant sites supplied by leased barges) and include the costs for fuel, crew salaries, and necessary additional sludge storage facilities for the more distant sites. Other ocean dumping permittees would be expected to incur similar cost escalations.

Based on the above summary and the extensive supporting material presented in this report, it is apparent that the dumping of municipal sewage sludges at the 12-Mile Site has not resulted in unreasonable degradation of the marine environment. The technical information continues to support the conclusion of the 1978 FEIS (EPA 1978, p. 1) that moving the sewage sludge dumping operations to the 60-Mile Site is "unnecessary and potentially more damaging to the environment" than continued dumping at the 12-Mile Site. There would be no significant environmental or human health benefits from closing the 12-Mile Site. In addition, considerable adverse economic impacts would occur and environmental and human health impacts could result from the required implementation of alternatives (both other ocean dumpsites and land-based) to dumping of sewage sludge at the 12-Mile Site. These issues will be evaluated in New York City's pending Special Permit Application. The 12-Mile Site should be redesignated for dumping of sewage sludges which qualify to receive a special permit to be ocean dumped at the site.

APPENDIX B

TECHNICAL SUMMARIES TO SUPPORT
THE REDESIGNATION OF THE
60-MILE SITE
FOR THE OCEAN DISPOSAL OF
MUNICIPAL SEWAGE SLUDGE

Submitted in Response to U.S. EPA's
20 December 1982 Federal Register Notice
47 FR 56665

18 February 1983

APPENDIX B

60-MILE SITE

TECHNICAL SUMMARY

This report is being submitted by New York City in response to a request by the Environmental Protection Agency (EPA) for comments on the possible redesignation of the Alternate Sewage Sludge Dump Site in the New York Bight (the 60-Mile Site) which appeared in a "Notice of petitions for rulemaking and announcement of consideration of commencement of rule-making" in the Federal Register on December 20, 1982 (47 FR 56665). In order to redesignate the 60-Mile Site for the disposal of sewage sludges, EPA must consider a number of criteria established as part of the Ocean Dumping Regulations at 40 CFR 228.5 and 228.6. Each of these criteria was examined by EPA in the Final Environmental Impact Statement on the Ocean Dumping of Sewage Sludge in the New York Bight dated September 1978 (1978 FEIS). New York City's report provides a comprehensive update and assessment of the technical information incorporated in the 1978 FEIS and demonstrates that the recent data confirm that the 60-Mile Site could be designated for the authorized disposal of sewage sludge, but that dumping should not be transferred to this site from the existing (12-Mile) site unless there was "confirmation of a possible threat" (EPA 1978, p. 4) at the existing site. The 1978 FEIS (p. 206) recommended that:

- The existing sewage sludge dump site [12-Mile Site] should continue to be used.
- The expanded monitoring program and the criteria developed to determine when and if public health or environmental factors warrant the phasing out or abandonment of the existing dumpsite should continue.
- An alternate dump site should be designated in the Northern Area for potential use if and when the existing dump site is abandoned or phased out ... This site should be a square, roughly 31 sq km (9 sq n mi) with center coordinates at 72° 42' W longitude and 40° 12' N latitude, at a depth of 55 m (180 ft). The center of this recommended site is about 61 km (33 n mi) south of Long Island, about 111 km (60 n mi) east of New Jersey, about 45 km (24 n mi) from the Hudson Shelf Valley, and about 111 km (60 n mi) from the Sandy Hook-Rockaway Point transect (EPA 1978, p. 206, emphasis added).

The technical data generated since 1978 do not significantly improve our understanding, or the predictability, of any possible impacts from dumping of sewage sludge at the 60-Mile Site, although the weight of existing evidence indicates that such dumping would not be harmful to human health or the environment of the 60-Mile Site. The inability to confidently predict possible impacts at the 60-Mile Site is caused by two factors. First, the effects of sewage sludge dumping at the site itself have not been adequately determined because no material has ever been ocean dumped at the 60-Mile Site. Second, scientific studies of the

physical, chemical, and biological conditions at the 60-Mile Site have been limited. These considerations, combined with EPA and National Oceanic and Atmospheric Administration (NOAA) assessments that the elimination of sewage sludge dumping at the 12-Mile Site will not result in any significant human health or environmental benefit, support the 1978 FEIS approach to designation of the 60-Mile Site. The 60-Mile Site could be designated for sewage sludge dumping, but sewage sludge currently dumped at the 12-Mile Site should not be transferred to the 60-Mile Site unless future data indicate a critical need to reduce sewage sludge dumping at the 12-Mile Site.

In view of the lack of knowledge concerning the potential effects of ocean dumping at the 60-Mile Site, any sewage sludge dumping at the site should be initiated with a slow phase-in period. Such a phase-in would allow adequate monitoring and assessment as prescribed in the periodic site evaluation and assessment procedures mandated under 40 CFR Parts 228.10 and 228.11. This would ensure that any unanticipated environmental impacts could be identified prior to the initiation of large scale continuous dumping operations.

The criteria that must be addressed by EPA for site selection are found at 40 CFR 228.6. These criteria, as they apply to the 60-Mile Site, are addressed here and more fully in the body of this report.

2.1 HISTORY AND GEOGRAPHY

The 60-Mile Site is located approximately 65 nautical miles from the Sandy Hook-Rockaway Point transect in approximately 55 meters of water. Concerned that the 12-Mile Site could not safely accommodate projected sewage sludge volumes, EPA designated the 60-Mile Site in May 1979 for use only if the existing site was found to be unable to safely accommodate any additional sewage sludge without endangering public health or degrading coastal water quality (Chapter 2)*. To date, no materials have ever been dumped at the site (Chapter 5). The 60-Mile Site is not located near any area having natural or cultural features of historical importance (Section 2.3).

2.2 FISHERIES

Many species of fish and some shellfish either periodically inhabit or pass through the area of the 60-Mile Site, and some, including the ocean quahog, sea scallop and surf clam, inhabit the area for most or all of their life cycle (Section 12.4). Although moderate commercial resources of ocean quahogs are thought to be present in the vicinity of the 60-Mile Site, no significant fishery for quahogs or any other species has thus far been established in the area (Chapter 12).

* References in the Technical Summary refer to sections in the main body of the report.

2.3 PHYSICAL OCEANOGRAPHY AND DISPERSION

Since the 60-Mile Site is located midway between the mouth of New York Harbor and the edge of the continental shelf, oceanographic conditions at the site are representative of typical shelf waters with reasonably well-defined seasonal temperature, salinity and density cycles. The site is not significantly affected by freshwater discharges of the Hudson River plume or incursions of oceanic slope waters. Circulation patterns at the Site are complex and variable being driven by quasi-random phenomena such as wind shear, tides, and storms. A net southwesterly flow along bathymetric contours has been reported to be normal, although northeasterly reversals for periods exceeding two months have been observed (Chapter 3).

Oceanic diffusion studies indicate that four hours after its discharge (the initial mixing period), sewage sludge is expected to be diluted one part sludge to about 30,000 parts of seawater (Section 18.2). This dilution is a result of a two phase process: a very rapid initial wake dispersion, followed by slower oceanic dispersion processes (Section 18.2). Oceanic dispersion processes are expected to be at least as effective in dispersing and diluting sewage sludge at the 60-Mile Site as at the 12-Mile Site.

2.4 OTHER USES OF THE SITE

- Few activities occur in or near the 60-Mile Site: vessel traffic is light, fisheries resources are not large, and commercial fishing in the area is limited (Chapter 4). Further, the 60-Mile Site is not identified as an area with significant potential for minerals or other forms of development (Section 4.5).

2.5 TYPES AND QUANTITIES OF WASTES

Transfer of all sewage sludge disposal operations from the 12-Mile Site to the 60-Mile Site would result in the discharge of approximately 6.7 million wet tons (1981 value) of 3-5 percent solids sewage sludge to an area of the continental shelf not previously affected by waste discharges (Chapter 5).

2.6 EFFECTS OF SEWAGE SLUDGE DUMPING

The possibility of environmental and human health effects of sewage sludge dumping at the 60-Mile Site must be assessed in order to redesignate the site. In addition, the economic effects are an unavoidable reality and should be examined. One of the major adverse effects of moving sewage sludge dumping to the 60-Mile Site would be an increased financial burden upon all municipalities and regulatory agencies involved in the dumping process.

Water Quality Effects

Waters of the outer continental shelf, which includes the 60-Mile Site, have water quality characteristics intermediate between those of the open ocean and those of the New York Bight apex. In comparison to the apex,

the 60-Mile Site is less turbid, more saline, has lower primary productivity, and lower concentrations of metals and organic pollutants. These onshore-offshore differences are normal characteristics of the coastal and shelf waters of similar areas with shallow continental shelves and substantial river discharges (Section 7.6).

The initiation of sewage sludge disposal operations at the 60-Mile Site would significantly increase the inputs of a variety of contaminants to the area, but there are insufficient data to determine whether such dumping would increase background concentrations of any contaminant following initial mixing. However, reasonable estimates indicate that any such increase would be small and should be transient due to the available dilution water and the consistent current flow at the site. The 1978 FEIS concluded that:

"Degradation of coastal water quality is not expected, even if greatly increased volumes of sludge are dumped at a new site in the Northern [60-Mile Site] or Southern Area.

The quality of Bight Apex waters will not be significantly improved by using a new site in the Northern [60-Mile Site] or Southern Area because most pollutants entering the Apex come from sources other than sludge dumping (primarily dredged material dumping, inland runoff, and wastewater discharges)" (EPA 1978, p. 205).

Any increase in the size of the 60-Mile Site compared to its present size would be beneficial in enabling minimization of any transient water quality effects resulting from ocean dumping operations.

Sediment and Benthos

Since waste disposal has not occurred at the 60-Mile Site, the primarily sandy sediments within and near the Site reflect natural geological and chemical conditions (Section 9.2). Although several baseline studies of sediment chemistry have been conducted at the northern and southern areas, data have not been collected within the specific 31 km² that was designated as the interim alternate dumpsite (Section 8.0). The available data for the northern study area do indicate that metal and organic sediment concentrations are lower than those reported for the New York Bight apex.

Because ocean dumping has never occurred at the 60-Mile Site, the data available to assess the potential for sewage sludge accretion in sediments at the site is minimal. However, based on a simplistic theoretical diffusion and dispersion model, only a small fraction of the heavier particulates is expected to reach the sea floor, although the majority of dumped particulates will remain within the water column. Any settled particulates would be subject to the combined actions of biological sediment reworking, and resuspension and redistribution by hydrologic currents. Since little or no accretion occurs at the 12-Mile Site, it is expected that no substantial accretion would occur at the deeper and more

dynamic 60-Mile Site. Because of its distance from land (32 nautical miles), the possibility of any accreted solids migrating to bathing beaches is extremely remote (Section 2.1 and Chapter 9).

Any benthic effects of sewage sludge disposal at the 60-Mile Site would be expected to be no greater in magnitude than effects at other central shelf sewage sludge dumpsites. Furthermore, transfer of sludge dumping operations to the 60-Mile Site would not be expected to measurably improve the benthic populations at the 12-Mile Site, which would remain affected by the Hudson-Raritan discharge, dredged materials and other inputs. The 1978 FEIS concluded that:

"Heavy metals, toxic organics, and microbiological agents will contaminate bottom sediments at and near a new dump site after initial use. Smothering of benthic organisms is not likely to occur, however, unless dredged material is also dumped there.

Composition of the benthic fauna at a new site may change; the benthic biomass will probably decrease in diversity, and this localized alteration of food supplies may also affect fish populations in the area" (EPA 1978, p. 205).

While these statements are supported by the technical information, the extent and significance of any sediment contamination would be expected to be small, as would any benthic faunal changes.

Oxygen Depletion

Any reductions in dissolved oxygen as a result of sewage sludge dumping at the 60-Mile Site would only be temporary and too small to adversely affect the biota, due to the depth of the water column and the inherent dispersion capacity of the water masses present. Similarly, the technical literature indicates that the transfer of sewage sludge disposal activities from the 12-Mile Site would not significantly reduce the frequency or severity of periodic anoxic conditions in the Bight apex, since dumping has been shown not to be a causative factor in these events (Chapter 11). The 1978 FEIS states:

"Concentrations of dissolved oxygen in the water column at a new site may temporarily decrease immediately following a dump, but this is not likely to significantly affect the ecosystem" (EPA 1978, p. 204).

Fisheries and Contamination of Biota

It is expected that sewage sludge dumping at the 60-Mile Site will have little impact on the recreational and commercial fishery activities of the Middle Atlantic Bight. This prediction is based on the limited size of the dumpsite relative to available species habitats, the Site's distance from land, the dilution potential of middle shelf waters, and the demonstrated ability of fish species to avoid high concentrations of contaminants. Although flounder (summer, winter and yellowtail) and butterfish may pass through the area during spring and fall migrations, the 1978 FEIS correctly notes that use of the Site should also not inter-

ferre with these migrations due to the expected dilution and dispersion and the very small spatial extent of the Site relative to the migratory pathways. The commercial harvest of black bass, flounder, lobster, and tilefish is small within the area that could be influenced by sewage sludge dumping at the 60-Mile Site.

Analysis of NOAA's most comprehensive metal and organic contaminant databases generally indicates that tissue concentrations of metals (other than mercury) and organics in biota from the New York Bight area, including the 60-Mile Site, are not significantly higher than those found in other areas of the western Atlantic Ocean (Section 15.2). Also, sewage sludge contributes only 3 percent of the land-derived mercury inputs to the New York Bight. Therefore, given the dilution and dispersion capacity of the site and the area's relatively low inherent biological productivity, it is unlikely that sewage sludge dumping at the 60-Mile Site would significantly increase the concentration of contaminants in biota in and near the Site.

Fish Diseases

It is unlikely that sewage sludge dumping at the 60-Mile Site would affect the incidence of any fish or shellfish diseases. Similarly, because of the number of contaminant inputs into the New York Bight apex and the inability to establish sewage sludge as a factor in fish disease etiology, transfer of dumping activities to the 60-Mile Site would not be expected to decrease the incidence of disease within the apex. Contrary to earlier reports, the most comprehensive surveys of fish and shellfish resources from the northeast Atlantic indicated the good health of most of the fish examined (Section 13.11). Fin rot, lymphocystis, and ulcers appeared in only 3.7 percent, 0.16 percent, and 0.20 percent, respectively, of the New York Bight fish examined (Chapter 13).

Human Health Risk

No significant human health risk is likely to be caused by sewage sludge dumping at the 60-Mile Site. As addressed in the 1978 FEIS, risk of accident to vessel crew members would increase if the vessels have to travel to the 60-Mile Site instead of the 12-Mile Site. Contamination of fish and shellfish by metals and organics to levels that are cause for concern for human health would be unlikely to occur. Further, since sewage sludge dumping at the 12-Mile Site has been demonstrated to be a minor source of Bight contaminants (<10 percent), no significant reductions in human health risk are likely to be realized by transferring sewage sludge dumping to the 60-Mile Site.

Beach pollution by floatables became a public issue following the Long Island beach pollution incident in 1976. Although it is hypothetically possible that a small quantity of oils, greases, and/or floatable artifacts discharged at the 60-Mile Site could ultimately reach bathing beaches, it is highly unlikely (Chapter 10). Conversely, since it was concluded following extensive study that sludge dumping at the 12-Mile Site was not the cause of the 1976 incident, removal of sludge dumping from the Bight apex would reduce neither the probability nor the severity of future beach pollution incidents (Chapter 10).

Since it has been demonstrated that there is no significant microbial contamination of beach waters due to sewage sludge dumping at the 12-Mile Site, and since the 60-Mile Site is much further offshore, use of the latter site would neither increase nor decrease human health risk via this mode of impact. However, there is a possibility that shellfish within the 60-Mile Site would become contaminated with microbial pathogens from sewage sludge. The 1978 FEIS concluded that:

"The FDA will probably close areas in and near a new dump site to shellfish harvesting, based on the potential for bacterial contamination. Nevertheless, use of a new dump site will increase the risks of human consumption of illegally harvested contaminated shellfish" (EPA 1978, p. 205).

The Agency also notes however (EPA 1978, p. 204), that even if the existing 12-mile Site was abandoned, areas now closed to shellfishing would not be reopened in the near future due to the predominance of other sources of microbial contamination in the apex.

Economics

Cost estimates for ocean dumping New York City's sewage sludge at each of the three proposed New York Bight dumpsites were computed using constant 1982 dollars. The estimated annual operating costs for dumping at the 12-, 60-, and 106-Mile Sites were \$4.09 million, \$18.05 million, and \$26.71 million, respectively. These estimates were based upon use of the City's present sludge fleet (with additional capacity required for the more distant sites supplied by leased barges) and include the costs for fuel, crew salaries, and the need for additional sludge storage facilities. The estimates are reasonably consistent with the 1980 FEIS predictions that the cost of using the 60-Mile Site would be 3-5 times the cost of the 12-Mile Site.

Both the New York City and 1980 FEIS cost estimates fail to include the significant costs of monitoring and surveillance. Since the costs of monitoring and surveillance at the 60-Mile Site would be expected to be large compared to the 12-Mile Site, the economic impact of transferring sewage sludge dumping to the 60-Mile Site would be larger than reflected by estimated escalations in operating costs alone. Thus, one of the major impacts of any decision to transfer dumping from the 12-Mile Site to a more remote location, such as the 60-Mile Site, would most likely be these cost increases associated with the dumping operations, monitoring, and surveillance.

2.7 SURVEILLANCE AND MONITORING

Monitoring and surveillance of dumping activities at the 60-Mile Site are feasible, although much more difficult than at the existing 12-Mile Site. Monitoring for short- and long-term environmental effects would be difficult and costly given the increased distance from shore, the types of vessels required, and the lack of adequate baseline data. Furthermore, no adequate site-specific and seasonal database exists against which any effects of dumping could be assessed.

Surveillance at the 60-Mile Site would be costly, since adequate surveillance would necessitate the use of shipboard observers, perhaps on every dumping vessel.

The 1978 FEIS concluded that:

"There is an increased probability that short dumping, including emergency dumping, will occur. The USCG [United States Coast Guard] will require increased manpower and equipment to provide adequate surveillance and enforcement of dumping regulations" (EPA 1978, p. 205).

Since 1978, USCG manpower and funding restrictions have substantially reduced the USCG ability to respond to the increased surveillance and enforcement needs anticipated by the 1978 FEIS.

Based on this update of the 1978 FEIS, it is apparent that dumping of municipal sewage sludges at the 60-Mile Site would not be expected to result in irreversible or unreasonable degradation of the marine environment. The studies to date continue to support the Agency's 1978 FEIS final conclusions, that, although use of the site for sewage sludge disposal is feasible, disposal of sludges currently dumped at the 12-Mile Site should not be permitted at the 60-Mile Site until, and unless, it is shown that the 12-Mile Site cannot safely accommodate more sludge disposal without endangering public health, severely degrading the marine environment, or degrading coastal water quality.

In the absence of detailed studies of sewage sludge dumping at the 60-Mile Site, any dumping of sewage sludge at the 60-Mile Site should be phased in gradually and concomitantly with adequate monitoring. Periodic evaluations of disposal impact, such as required by the existing regulations (40 CFR 228.10 228.11), should be performed on a continuing basis throughout the phase-in of any sewage sludge dumping.

In conclusion, it is recommended that the 60-Mile Site be formally designated for the ocean disposal of municipal sewage sludges which qualify for a special permit. However, this designation should be accompanied by restrictions equivalent to those established in the previous designation of the site:

"Disposal of sewage sludge at this site shall take place only upon a finding by EPA that the existing [12-Mile] site cannot safely accommodate any more sewage sludge without endangering public health or degrading coastal water quality" (40 CFR 228.12).

APPENDIX C

TECHNICAL SUMMARIES TO SUPPORT
THE DESIGNATION OF THE
106-MILE SITE
FOR THE OCEAN DISPOSAL OF
MUNICIPAL SEWAGE SLUDGE

Submitted in Response to U.S. EPA's
20 December 1982 Federal Register Notice
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APPENDIX C

106-MILE SITE

TECHNICAL SUMMARY

This report is being submitted by New York City in response to a request by the Environmental Protection Agency (EPA) for comments on a Proposed Rule for Designation of the 106-Mile Ocean Dump Site which appeared in the Federal Register on 20 December 1982 (47 FR 56663). The proposed rule would designate the 106-Mile Site as an approved ocean dumping site for authorized disposal of certain aqueous industrial wastes for an indefinite period of time, and for the authorized disposal of municipal sewage treatment sludges for a period of five years. This report specifically addresses the proposed five-year designation of the site for the authorized disposal of municipal sewage sludges.

In order to designate the 106-Mile Site for the disposal of sewage sludge, EPA must consider a number of criteria established as part of the Ocean Dumping Regulations at 40 CFR 228.5 and 40 CFR 228.6. Each of these criteria was examined by EPA in the Final Environmental Impact Statement for 106-Mile Ocean Waste Disposal Site Designation, February 1980 (1980 FEIS). New York City's report provides a comprehensive update and assessment of the technical information incorporated in the 1980 FEIS and demonstrates that the recent data confirm that the 106-Mile Site could be designated for authorized disposal of sewage sludge under the conditions stated in the 1980 FEIS:

"Sludge disposal should be allowed at the [106-Mile] site only under the following conditions:

- Provided the existing Sewage Sludge Site cannot safely accommodate more sludge disposal without endangering public health, severely degrading the marine environment, or degrading coastal water quality.
- Independent surveillance by the USCG or an unbiased observer (the latter at the permittee's expense) will be conducted with a program goal of 50 percent surveillance, assuming that surveillance would be increased with the implementation of ODSS [Ocean Dumping Surveillance System] by the USCG.
- Monitoring for short- and long-term impacts will be accomplished by Federal agencies and environmental contractors (the latter at the permittee's expense). This monitoring must include studies of the fate of solids and sludge micro-organisms, inside and outside of the site, and a comprehensive analysis of environmental effects.
- Vessels will discharge the sludge into the wake so that maximum turbulent dispersion occurs.

- . Vessels discharging sludge will be sufficiently separated from vessels discharging chemical wastes to prevent the two types of wastes from mixing.
- . Key constituents of the sludge will be routinely analyzed in barge samples at a frequency to be determined by EPA on a case-by-case basis, but sufficient to evaluate accurately mass loading at the site.
- . Routine bioassays will be performed on sludge samples using appropriate sensitive marine organisms" (EPA, 1980, p.xxiii emphasis added).

The technical data generated since 1980 do not significantly improve our understanding, or the predictability, of any possible impacts from continuous dumping of large quantities of sewage sludge at the 106-Mile Site, although the weight of evidence continues to indicate that such dumping would not be harmful to human health or the environment of the 106-Mile Site. The ability to confidently predict possible impacts at the 106-Mile Site is limited because of two factors. First, only very small quantities of an atypical (primary) sewage sludge have been dumped at the 106-Mile Site, this dumping has not been continuous, and scientific studies have been limited. Second, information cannot be extrapolated from studies at other dumpsites since sewage sludge has not been dumped at any other deep ocean site similar to the 106-Mile location. These considerations, combined with EPA and National Oceanic and Atmospheric Administration (NOAA) assessments that stopping sewage sludge dumping at the 12-Mile Site will not yield any significant human health or environmental benefit, support the 1980 FEIS approach to designation of the 106-Mile Site: the 106-Mile Site could be safely designated for sewage sludge dumping, but sewage sludge currently dumped at the 12-Mile Site should not be transferred to the 106-Mile Site unless future data show a critical need to reduce the quantities of sewage sludge dumped at the 12-Mile Site. Further, any dumping of sewage sludge at the 106-Mile Site should be phased in over a number of years with adequate study of the effects of continuous dumping and of any cumulative effects as the rate of dumping increases.

The proposed designation of the site for only five years shows justifiable caution in view of the paucity of knowledge concerning the effects of sewage sludge dumping at the 106-Mile Site. However, a more appropriate approach, supported by the findings of the 1980 FEIS and subsequent technical assessments, would be to designate the 106-Mile Site for sewage sludge dumping without a time limitation, but with a slow phase-in period required subsequent to initiation of any use of the site for sewage sludge. Such a phase-in would allow adequate monitoring and assessment as prescribed in the periodic site evaluation and assessment procedures under 40 CFR Sections 228.10 and 228.11, and would allow the determination as to whether this designation should be continued into future years to be based upon scientific findings from these studies.

The criteria that must be addressed by EPA for site selection are found at 40 CFR 228.6. These criteria, as they apply to the 106-Mile Site, are fully addressed in this report.

2.1 HISTORY AND GEOGRAPHY

The 106-Mile Site is a 2,500 square kilometer area of the New York Bight that is located 106 nautical miles southeast of the Ambrose Light Tower in water depths ranging from 1,440 meters in the northwest corner to 2,750 meters in the southeast corner (Section 2.1)*. Since 1961, the site has been used intermittently by more than 100 different dumpers for the ocean disposal of a variety of materials including: chemical wastes, industrial acids, radioactive materials, sewage sludge, and sewage sludge digester cleanout residues (Chapter 5). The 106-Mile Site is not located near any site having natural or cultural features of historical importance (Section 2.3).

2.2 FISHERIES

The vicinity of the site is not heavily fished because of its extreme depth, its distance from population centers, and because of the area's naturally low biological productivity (Section 12.3). The 106-Mile Site is a small area within National Marine Fisheries Service Statistical Area 623. This statistical area has consistently accounted for less than one half of one percent of the commercial catch from the Bight, with swordfish, American lobster, sea scallop, bluefin tuna, and shark accounting for most of the catch. The lobster and scallop catch almost certainly come from the shallower depths of the northwest corner of Statistical Area 623 and not from the much deeper 106-Mile Site, which has only sparse populations of these species (Section 12.3). Since the area has low biological productivity, no major unexploited stocks of any species are known to exist within the 106-Mile Site.

2.3 PHYSICAL OCEANOGRAPHY AND DISPERSION

Physical oceanographic conditions at the 106-Mile Site are extremely complex and variable due to its location on the continental slope and within the influence of three distinct water masses (shelf water, slope water, and Gulf Stream eddies). Therefore, the transport and fate of dumped materials depends both upon the location of seasonal and permanent thermoclines, which may inhibit vertical mixing, and upon the water masses present at any time (Section 3.4). Generally, shelf water runs southward along the coast while the Gulf Stream system flows northeastward. Between these two water masses, slope water circulates in a counter-clockwise gyre. Superimposed on these systems, anticyclonic warm-core eddies are spun off by the Gulf stream and typically flow southward along the continental slope (Section 3.2). It is generally concluded that, because of the great depth and active current regime, sewage sludge particulates dumped at the Site will not reach the sea bottom (Section 9.6).

Oceanic diffusion studies indicate that at the end of the four hour "initial mixing" period after its discharge, the sewage sludge is expected to be diluted one part sludge to about 30,000 parts of seawater

* References in the Technical Summary refer to sections in the main body of the report.

(Section 18.2). This dilution is the result of a two phase process: a very rapid initial wake dispersion, followed by slower oceanic dispersion processes (Section 18.2). Oceanic dispersion processes are particularly influential at the 106-Mile Site, which is characterized as one of the most highly dispersive ocean dumpsites in the world (Section 9.7).

2.4 OTHER USES OF THE SITE

Few activities other than waste disposal occur in or near the 106-Mile Site: vessel traffic is light, fisheries resources are sparse, and commercial fishing in the area is limited. Further, the 106-Mile Site is not identified as an area with significant potential for minerals development although proposed oil and gas lease tracts have been identified nearby on the continental shelf (Section 4.5).

2.5 TYPES AND QUANTITIES OF WASTES

More than 100 different dumpers have used the 106-Mile Site for waste disposal since 1961, but the Site is currently used only for the ocean disposal of industrial wastes and sewage treatment plant digester clean-out. From 1961 to 1978, approximately 5.1 million metric wet tons of chemical wastes, 102 thousand metric wet tons of sewage sludge, and 237 thousand metric wet tons of digester residue were dumped at the site (Chapter 5). Since 1978 when a high of 876 thousand wet tons of waste were dumped at the site, annual quantities dumped have decreased to a 1981 level of 267 thousand wet tons. DuPont Grasselli is currently the only active industrial dumper at the 106-Mile Site, although DuPont-Edge Moor still holds a permit. Based on the volume of waste dumped during 1981, the transfer of all sewage sludge disposal operations from the 12-Mile Site to the 106-Mile Site would increase the total volume of waste dumped at the 106-Mile Site 25 times (Chapter 5).

If all current sewage sludge operations were transferred to the 106-Mile Site and other inputs remain the same, sewage sludge would become the major contributor of most contaminants dumped at the Site, with an additional average input of about 550 tons of solids per day (Section 6.4). However, since normal background suspended solids within the upper 100 meters of the water column at the 106-Mile Site probably total more than 10,000 metric tons, these additional 550 tons of suspended solids would probably have little or no effect on water quality or the environment if adequately dispersed, as expected (Chapter 7).

2.6 EFFECTS OF SEWAGE SLUDGE DUMPING

The possibility of environmental and human health effects of sewage sludge dumping at the 106-Mile Site must be assessed in order to designate the site. In addition, the economic effects are a reality and should be examined. The primary adverse effect of moving sewage sludge dumping to the 106-Mile Site would be an increased financial burden upon all municipalities and regulatory agencies involved in the dumping process. As noted in the 1980 FEIS, "Use of the 106-Mile Site for sewage sludge disposal would be environmentally acceptable under carefully controlled conditions...however, substitution of the 106-Mile Site for

existing Shelf sites would impose severe economic burdens, surveillance and monitoring difficulties, and logistics problems" (EPA 1980, p. 5-24).

Water Quality

Because of its distance from anthropogenic coastal inputs, water quality at the 106-Mile Site is similar to that of the open ocean. The highly dispersive nature of the area combined with the large volume of available dilution water suggests that sewage sludge disposal at the site would not result in contaminant concentration increases in the water column, other than transient increases immediately following each dump (Section 7.6).

Sediments and Benthos

In comparison to the 12-Mile Site, few data exist on concentrations or distributions of metals or organics in sediments in or near the 106-Mile Site. Since sewage sludge is not expected to reach the bottom in any significant amount, a conclusion reached in the 1980 FEIS and supported by more recent data (Section 9.6), it is unlikely that the sediments of the 106-Mile Site would be contaminated as a result of sewage sludge dumping. However, the paucity of baseline sediment concentration data from the 2,500 square kilometer area will make it difficult for monitoring programs to accurately assess the extent of any such contamination.

If sewage sludge dumping takes place on a routine continuing basis at the 106-Mile Site, it is possible that some sewage sludges will be dewatered for transport and disposal at the site. Such dewatering processes could produce sewage sludge with a greater tendency to sink through the water column, and an undetermined portion of the sewage sludge dumped might reach the sediments (Section 9.6). The 1980 FEIS did not address this possibility, and little or no relevant data on the behavior of dewatered sludges in the ocean appear to exist.

Because of the demonstrated rapid dilution and dispersion processes at the 106-Mile Site, and the conclusion that sewage sludge particles dumped at the site are not expected to reach the bottom in any significant amounts, impacts on benthic populations are expected to be negligible (Section 14.2). Furthermore, since the natural surficial sediments at the site consist predominantly of sandy-silt and clay mixtures (Section 9.2), any particles that did settle out would not significantly alter the physical environment of the benthos. The predicted lack of benthic impacts is consistent with Agency observations of no benthic community effects, even after years of waste disposal at the 106-Mile Site (Sections 14.1 and 14.3).

Oxygen Depletion

Significant reductions in dissolved oxygen as a result of sewage sludge dumping would not occur at the 106-Mile Site, due to the depth of the water column and the very large dispersion capacity inherent in the water masses present. Similarly, the technical literature indicates that the transfer of sewage sludge disposal activities from the 12-Mile Site would not reduce either the frequency or severity of periodic anoxic conditions

in the Bight apex, since extensive research has indicated that sewage sludge dumping is not a causative factor in these events.

Fisheries and Contamination of Biota

It is expected that the dumping of sewage sludges at the 106-Mile Site will have little impact on the recreational and commercial fisheries of the Middle Atlantic Bight, especially since recreational fishing is virtually non-existent and commercial fishing is minimal at and near the site (Section 12.3).

Analysis of NOAA's most comprehensive metal and organic contaminant databases generally indicates that tissue concentrations of metals (other than mercury) and organics in biota from the New York Bight area, including the 106-Mile Site, are not significantly higher than those found in other areas of the western Atlantic Ocean (Section 15.3). Also, sewage sludge contributes only 3 percent of the land-derived mercury inputs to the New York Bight. Given the dilution and dispersion capacity of the site, it is unlikely that sewage sludge dumping at the 106-Mile Site would significantly increase the concentrations of contaminants in fish and shellfish in and near the site. Furthermore, since concentrations of metals in fish and shellfish tissues within the Bight apex do not differ from the New York Bight as a whole (Section 15.3), it is unlikely that the elimination of sewage sludge dumping at the 12-Mile Site would reduce Bight apex tissue levels.

Fish Diseases

It is unlikely that sewage sludge dumping at the 106-Mile Site would affect the incidence of any fish or shellfish diseases within the vicinity of the 106-Mile Site. Similarly, because of the number of contaminant inputs into the New York Bight apex and because sewage sludge has not been established as a factor in fish disease etiology, transfer of dumping activities to the 106-Mile Site would not be expected to decrease the incidence of disease within the apex. Contrary to earlier reports, the most comprehensive surveys of fish and shellfish resources from the northeast Atlantic indicated the good health of most of the fish examined (Section 13.11). Fin rot, lymphocystis, and ulcers appeared in only 3.7 percent, 0.16 percent, and 0.20 percent, respectively, of the New York Bight fish examined (Chapter 13).

Human Health Risk

No significant human health risk is likely to be caused by sewage sludge dumping at the 106-Mile Site. As noted in the 1980 FEIS, risk of accident to vessel crew members would increase if the vessels have to travel to the 106-Mile Site instead of the 12-Mile Site. Contamination of fish and shellfish to levels that are cause for concern for human health are unlikely to occur especially since few commercial species are found in or near the site. Further, since sewage sludge dumping at the 12-Mile Site has been demonstrated to be a minor source of Bight contaminants (<10 percent), no reductions in human health risk are likely to be realized by transferring sewage sludge dumping to the 106-Mile Site.

Because of its distance from coastlines, sewage sludge dumping at the 106-Mile Site would not be expected to affect Federal or state recreational areas, beaches or any other public amenity areas (Section 2.3). It is highly unlikely that any sewage sludge constituents discharged at the 106-Mile Site will reach New Jersey or Long Island bathing beaches (Chapter 10). Researchers also note that since sludge dumping contributes a negligible quantity of floatables to the Bight, the relocation of sewage sludge to the 106-Mile Site would not be expected to prevent or lessen the severity of future beach pollution incidents (Chapter 10).

Economics

Cost estimates for ocean dumping New York City's sewage sludge at each of the three proposed New York Bight dumpsites were computed using constant 1982 dollars. The estimated annual operating costs for dumping at the 12-, 60-, and 106-Mile Sites were \$4.09 million, \$18.05 million and \$26.71 million, respectively. These estimates were based upon use of the City's present sludge fleet (with additional capacity required for the more distant sites supplied by leased barges) and include the costs for fuel, crew salaries, and the need for additional sludge storage facilities. The estimates are reasonably consistent with the 1980 FEIS predictions that the cost of using the 106-Mile Site would be twice that of the 60-Mile Site and six to eight times the cost of the 12-Mile Site.

Both the New York City and 1980 FEIS cost estimates fail to include the costs of monitoring and surveillance (Chapter 19). Since the costs of monitoring and surveillance at the 106-Mile Site would be expected to be very large compared to the 12-Mile Site, the economic impact of transferring sewage sludge dumping to the 106-Mile Site would be considerably larger than reflected by estimated escalations in operating costs alone. The major impact of any decision to transfer dumping from the 12-Mile Site to a more remote location, such as the 106-Mile Site, would most likely be these cost increases associated with the dumping operations, monitoring, and surveillance. As noted above in the 1980 FEIS, "Use of the 106-Mile Site for sewage sludge disposal would be environmentally acceptable under carefully controlled conditions...however, substitution of the 106-Mile Site for existing Shelf sites would impose severe economic burdens, surveillance and monitoring difficulties, and logistics problems" (EPA 1980, p. 5-24).

2.7 SURVEILLANCE AND MONITORING

Monitoring and surveillance of dumping activities at the 106-Mile Site are feasible, although much more difficult than at the existing 12-Mile Site. Monitoring for short- and long-term environmental effects would be difficult (some believe impossible) and extremely costly given the distance from shore, the types of vessels required, the size of the dumpsite, and the depth of the water column. Furthermore, no adequate site-specific and seasonal database exists against which any effects of dumping might be assessed (Chapter 19).

Surveillance at the 106-Mile Site would be extremely costly, since adequate surveillance would necessitate the use of shipboard observers, perhaps on every dumping vessel. It should be noted that the 1980 FEIS

assumes that surveillance would be conducted ultimately through the use of the Coast Guard's Ocean Dumping Surveillance System (ODSS) which was under development at that time. Development of the ODSS has since been abandoned and, therefore, shipboard observers are the only adequate means of surveillance currently available (Chapter 19).

Based on this extensive technical update of the 1980 FEIS, it is apparent that the dumping of municipal sewage sludges at the 106-Mile Site would not be expected to result in unreasonable or irreversible degradation of the marine environment. The recent studies provide additional support to the Agency's 1980 FEIS final conclusions that, although use of the site for sewage sludge disposal is feasible and environmentally acceptable, disposal of sludges currently dumped at the 12-Mile Site should not be transferred to the 106-Mile Site until, and unless, it is shown that the 12-Mile Site cannot safely accommodate more sludge disposal without endangering public health, severely degrading the marine environment, or degrading coastal water quality. Further, in the absence of detailed studies of continuous sewage sludge dumping at the 106-Mile Site or a similar site, any dumping of sewage sludge at the 106-Mile Site should be phased in gradually and accompanied by adequate monitoring. In order to properly implement such a phase-in, the 106-Mile Site should be designated for authorized sewage dumping without the proposed five-year time limit. However, the site should be managed according to the existing regulations (40 CFR 228.10 and 40 CFR 228.11) which would ensure closure of the Site only if a periodic evaluation of disposal impact indicated a closure was necessary. Such evaluations should be performed on a continuing basis throughout the phase-in of any sewage sludge dumping.

In conclusion, the 106-Mile Site should be formally designated for the ocean disposal of municipal sewage sludges which qualify to receive a special permit. However, the designation should not be limited to five years, and any use of the site for sewage sludge should be phased in over a period of years with adequate monitoring.

Mayor KOCH. May I have the commissioner make a comment.

Mr. McGOUGH. From hearing the different witnesses this morning and this afternoon, I think one of the things that seems to be of concern is what benefit would there be to move from the 12-mile site? I think that our findings demonstrate that the benefit, although there might be some, would be slight. We believe that on the basis of the technical data we have submitted to the members and to the committee, this is demonstrated and would be further demonstrated as the regulatory process goes forward.

Thank you.

Mayor KOCH. Just so there won't be any inhibition about my time, I will make the next plane. So not to worry about that.

Mr. D'AMOURS. We appreciate that very much, Ed.

I would like to begin by asking, relative to the stated total cost of using the 106-mile site as opposed to the 12-mile site, you project a total cost increase of \$26.7 million annually.

This subcommittee has requested information from one of the larger marine transportation firms engaged in this type of operation, the A&S Transportation Co. of Somerset County, N.J. They submitted a letter to the committee estimating the cost to barging sludge to the 106-mile site to be in the range of \$3.5 to \$5 per wet ton. That lower estimate, \$3.5 per wet ton, is based on a contract running 5 to 7 years; the higher estimate being based on a 1-year contract.

Using your estimates of sludge production, as to which I have another question, the total cost then would range from \$12.9 million to \$18.4 million depending on the length of the contract as I have already indicated.

So this implies, I think, that if the city got out of the sludge hauling business and went to private industry the city would save even by your production estimates about \$8 to \$13 million a year. That doesn't take into account the salvage value of the city's fleet.

I would like to know your or your aide's response to that.

Mayor KOCH. Could I have the commissioner respond.

Mr. MCGOUGH. I am not aware of the proposal the committee received but our figures were based on our own experience in using barging companies to haul sludge from New York City. What our proposal includes is the use of our vessels, which over the past always have been demonstrated to be more cost-effective in hauling sludge than private contractors.

So our proposal included the full use of our fleet and the use of private barges only to take that which we could not remove because of the limited capability of our fleet. When you go greater distances you have longer turnaround times and therefore you have more wet tons that you cannot move yourself.

Not being familiar with the individual proposal I can only say that in the past our costs have always been demonstratively lower than that of a private carter. That is all I can tell you. It was based on those figures that our figures were used in the testimony.

Mr. D'AMOURS. I would like to point out that the information we received was not hypothetical. It was actually quoted to the Passaic Valley Sewage Commissioners as an offer. So we are not speaking hypothetically here. I think that the numbers raise some question as to the cost projections you have made.

Mr. GIFT. There is one other item included in the city's estimate and that is the cost of additional storage that would be required in terms of some of the backup for weather contingencies that you have to have because of shipping longer distances to sea. That cost would not be included in the cost estimate from the shipping firm.

Mr. D'AMOURS. OK.

That question was raised by staff with the A&S Transportation Co. and they indicated that storage cost would not be necessary because their capacity was such that they could handle the volume of sludge produced by the city.

Notwithstanding the storage that might or might not be required, the city's proposal raises questions as to cost and I would suggest that it is certainly something the city of New York should be looking into. The record will remain open for any further response you would like to make.

Mayor KOCH. Would it be permissible to get whatever letter you have from the company?

Mr. D'AMOURS. We would make that available to you.

Mayor KOCH. We will be in touch with that company to be sure we can square away the figures.

Mr. D'AMOURS. We can make that available to you today.

The other question I have, has to do with your sludge production numbers. Your total cost per year is based on 1982 costs and sludge

production of 117 million cubic feet per year—3,683,106 wet tons per year.

Yet, your actual 1982 sludge production based on EPA information was 3,206,000 wet tons, almost a half million wet tons less. That difference results in a \$2.3 million overestimation.

Are you familiar first of all with the EPA information and can this be reconciled?

Mr. MCGOUGH. I am not familiar with the specific figures you refer to. Again I would say we would attempt to reconcile the figures for record.

Your point is that there was an overestimation?

Mr. D'AMOURS. Yes. There was an overestimation of about roughly a half million wet tons as I calculate in my head, and given the figures you are using in your testimony it would be a \$2.3 million difference.

Mr. MCGOUGH. Let me make the point, wet tons is a hard thing to deal with. We have had programs in the city to try to reduce the wet tonnage, take the water out in order to cut the transportation costs. We have used thermophilic digestion and other methods to reduce it. That might account for some of this.

Mr. D'AMOURS. The conversion we make is according to the conversion factor that you supplied EPA and the committee in "Technical Information To Support the Redesignation of the 12-Mile Site for the Ocean Disposal of Municipal Sewage Sludge." We are using your conversion factor.

Mr. MCGOUGH. Percent solids is the most important thing.

Mr. D'AMOURS. Yes.

Mr. MCGOUGH. If you reduce the water it doesn't make a lot of difference, it is the solid content that matters.

Mr. D'AMOURS. We will leave the record open for that point.

My time has expired but I have one final point. The objection you have to any possible transfer of sludge dumping from the 12-mile site to the 106-mile site—

Mayor KOCH. It is environmentally degraded, you get two bights instead of one, both degrading the ocean.

Mr. D'AMOURS. I agree, Ed, you were not here earlier but your staff was here and maybe they made you aware that NOAA indicated a preference for closing the 12-mile site and turning to the 106-mile site and EPA came about as close to making that same suggestion as I have ever heard them come.

Anyway you say in your testimony to let the scientific facts speak for themselves. We will have to do that.

I will now then recognize the ranking committee minority member, Mr. Ed Forsythe from New Jersey.

Mr. FORSYTHE. Thank you, Mr. Chairman.

Welcome again, Mr. Mayor.

Mayor KOCH. Thank you.

Mr. FORSYTHE. With respect to the question on sludge volume, I believe, Mr. McGough, you said you were doing dewatering now. Obviously, by dealing in dry tons we would be talking using equivalent measures.

But do you think it would be worthwhile to pursue dewatering so that transported sludge volume would be substantially reduced?

This would reduce transportation costs to the 12-mile site as well as the 106-mile site.

Mr. MCGOUGH. That is right. The thermophilic digestion process will be included in the new sewage treatment plants at Red Hook and North River. Surely, reduction of the overall quantity reduces the cost of transport if ocean dumping is one of the modes you are using for disposal, certainly.

The major point with respect to the environment of course is reducing the solids and the contaminants.

Mr. FORSYTHE. As I understand it from the information I have, your sludge is 3 percent solids, is that relatively accurate?

Mr. MCGOUGH. Three to four percent solids is what our sludge is usually, yes.

Mr. FORSYTHE. I believe a lot of other sludges are 4 percent and above in terms of solids.

Mr. MCGOUGH. You get a different consistency from different plants based on different treatment and we have 12 sewage treatment plants and that is why we have to give more or less a range.

Mr. FORSYTHE. Did I understand you to say that you are doing dewatering in one plant now, that the two plants under construction will have it and that you will only proceed with further dewatering when other plants are taken out of service and replaced?

Mr. MCGOUGH. Yes; the process has been that—the process is being developed and, Jim, you indicated—

Mr. GIFT. The thermophilic digestion is the process that further reduces some of your organic material and you end up with a sludge of slightly higher solids content. I think what you refer to is a separate dewatering process that would raise your percent solids from 3 percent to maybe 10 or 12.

The city has looked at that as an option if they were to go to the 106-mile site. That type of process would require construction of dewatering facilities. When you look at the cost of the dewatering facilities there is no cost advantage to dewatering if you are going to 106.

Mr. FORSYTHE. The additional costs for dewatering eliminates any savings in transportation costs, I take it.

Mr. GIFT. Yes, you are taking 3 percent solids out there, yes.

Mr. FORSYTHE. Throughout your testimony you indicated the user fee should be calculated on the basis of the real cost of ocean dumping and should be consistent with the findings of a multimedia assessment.

How would you construct an interim fee system for a 3-year period until the multimedia assessment is completed?

Mr. MCGOUGH. Well, the city has always taken the position we are certainly willing to pay our fair share of a multimedia assessment of ocean dumping versus other alternatives as well as monitoring costs to the Federal Government. So that to the extent that those items are what you refer to as the true cost of ocean dumping certainly we think that fee structure along those lines would be one that we would support and even advance.

Our basic thesis is that scientific knowledge should be the basis for what we do with our sludge. Whether it is to keep it at 12, move to 106, put it on land or put it in the air. Therefore those

analyses to do that, we would be willing to pay our fair share of the cost of those analyses. And monitoring, of course.

Beyond that a fee structure as proposed by some, that either sets aside money or in fact creates in a sense a penalty for sludge dumping we don't think would be appropriate.

Mr. FORSYTHE. We are getting a lot of testimony dealing with the impact of ocean disposal of sludge throughout the bight, not just the sludge dump site.

I get the feeling everybody is working with a data base starting back from 1971, and coming up with dramatically different answers under different assumptions.

Have any of you any input on how that could be?

Mr. GIFT. I would like to address that. I think you have seen a great evolution in the technical data. In 1970 we had our initial development of environmental regulations, we were sort of buoyed with Earth Day and we went out and looked for problems. We went out and looked for problems where we were releasing materials into the environment.

One of them was ocean dumping of sludges. We went out, collected information and very rapidly developed some conclusions that went into the technical literature of substantial degradation due to ocean disposal of sewage sludge. I think a lot of that type of information has been put into perspective through very extensive subsequent studies where we had better controls, where we understand the sources of materials and I think that whole process better. This has now allowed us to come to certainly somewhat different conclusions on the whole management process and what drives it and what causes what we see out there.

But to some extent in the whole public area some of those early corps design studies still drive us as a principal perspective of what is going on out there. I think we have better insights now. We are not saying sewage sludge dumping has no effect, but we feel that measurable effects are limited to an area around the dump site and that area itself has other sources that contribute to it. Consequently movement of that one input to another location based on what we understand now will not measurably improve the overall apex area.

Mr. FORSYTHE. You broadened my question. I see my time is up but I will be back. Thank you, Mr. Chairman.

Mr. D'AMOURS. The gentleman from New Jersey, Mr. Hughes.

Mr. HUGHES. Thank you, Mr. Chairman.

Welcome, Mayor.

Mayor KOCH. Thank you.

Mr. HUGHES. Nice to see you.

Mayor KOCH. My pleasure.

Mr. HUGHES. I gather from your testimony that you find a lot of the New Jersey initiative which is worth pursuing further, the New Jersey proposal which would provide for a comprehensive intermedia-type of approach to improving water quality in the region, some type of fee imposed to finance the monitoring and assessments that would have to be done, some provision for recycling some of the fee back into a fund that would enable us to develop longer term solutions to the problem and to address the problem comprehensively on the basis of what is best scientifically to im-

prove water quality and dispose of wastes of all kinds in a rational fashion.

Mayor KOCH. We are willing to pay our fair share. We are opposed to a penalty fee arrangement because the city of New York would end up paying that fee in addition to the cost of the dumping itself.

Mr. HUGHES. Based on the proposition that New York City generates more sludge than your city should be paying more fee.

Mayor KOCH. Well, normally when you talk about a user fee it would be a way of getting the users to pay for that, that is not our situation as it relates to the dumping of this sludge.

We would have to bear that fee out of our operating budget. We believe that what we should do is to bear a fair share of the cost of such a study.

Commissioner, would you respond.

Mr. MCGOUGH. The only thing in the New Jersey proposal that is a little troublesome is the setting aside of the fee. The reason for setting aside is financial—when you run a sewage authority it might be hard when you come to the decision point in the New Jersey proposal 4 or 5 years from now, after the multimedia analysis is done, to suddenly raise the capital for the alternative.

That is not the situation in New York. We have a capital budget that runs \$1,200 million a year and in need of \$3 billion. So first of all we don't have a problem if needed, to follow out a disposal option. We have the wherewithal to quickly raise the money.

Second, to set aside in the interim money that could be used for other purposes, public purposes when we have such a great need, that is the problem we have. It is not that we don't want to pay our fair share of research and monitoring costs—that is our problem from our standpoint. We don't face the same problem that some sewage authorities would have.

Mr. HUGHES. The problem I have with that approach, obviously New York City would have a very difficult time tomorrow to determine scientifically that both the deepwater site and the 12-mile site were out of the question. New York City would have a terrible problem.

Mayor KOCH. Yes, sir.

Mr. HUGHES. The concept of a fee is to recoup some of the costs for monitoring, after all that should be borne by the dumpers.

Mr. MCGOUGH. Absolutely.

Mr. HUGHES. Development of baseline data, assessments that have to be made, monitoring the polluters, whoever they are, and to develop a fund that would be there to help finance the alternatives, whatever they might be, is important.

Mr. MCGOUGH. I think the estimate—

Mr. HUGHES. I thought I understood your testimony to be that you found merit to that approach.

Mr. MCGOUGH. There were six points in the New Jersey thing and we had trouble only with the fee. My understanding of the New Jersey proposal on how they calculate the fee that New York would pay, the city of New York might raise in this fund at the end of the period some \$50 million. If the conclusion of the study was we had to go to land disposal—capital costs alone when we go to that solution would be over \$200 million. So maybe I have just

said we should have the fee higher but you see that surely if the decision is based upon a technical determination that we would have to move out, there would be a substantial program and I don't know how far that set aside fee would take us.

Mr. HUGHES. Testimony was pretty clear from NOAA this morning that they feel we ought to close down the 12-mile site, move it to a deeper water site. As the chairman has indicated the EPA has come as close as I have heard in a long time, that they preliminarily have suggested that I think they are much in accord with NOAA's recommendation that they close the 12-mile site and move it to deeper water. The statute from 1971, as the mayor well knows, has a bias for the deepwater site, saying we can disperse a lot better and have less direct impact at the deepwater site. So we are on notice that perhaps we will have to think in terms of alternatives other than the 12-mile site.

I recognize you don't want to have to pay more than you really have to, you don't want to pay any fees if you don't have to. We also have to face the fact that the dumping taking place is very cheap compared to what other communities throughout the country are having to pay to dispose of their sludge. That is because they have made the commitments for long-term solutions.

Mayor KOCH. If I may reiterate.

Mr. HUGHES. We have to begin to put in a structure to do that.

Mayor KOCH. If I may reiterate what the commissioner has said. The city of New York came through a very difficult period of time when we had no capital budget at all and the place was falling apart. Now we are getting back on our feet and in a considerable way and this year our capital budget will exceed \$1 billion. That is a lot of money. But it is probably half or less of what we really could use to do what has to be done in the city of New York as it relates to our bridges and sewers and water tunnels and everything else that relates to its infrastructure.

What the commissioner was saying and I agree with him, is that we would not want to set aside moneys in advance in sort of a Christmas club that might be used at a later time——

Mr. HUGHES. Sludge fund.

Mayor KOCH. We never thought about a sludge fund in New York City.

Mr. HUGHES. Or slush.

Mayor KOCH. So what we would say is without question that should the time arrive—we hope it would not—but should it arrive that in a particular year we had to use parts of our capital budget for this purpose, we would use whatever moneys were necessary but we would not want it collected in advance and deprive us on an annual basis.

You lose—you are paying twice, you know, you also pay the increment in the cost of money. If you are taking money out of your capital budget and you set it aside not to be used, you don't use your capital budget to the full then and you ultimately pay more for that same improvement.

Mr. HUGHES. You probably would have supported repeal of the 10-percent withholding tax, too?

Mayor KOCH. No, no, I actually believed that the President had to be commended on his—I wish he would veto it.

Mr. HUGHES. Thank you, Mr. Chairman.

Mr. D'AMOURS. The gentleman from Maryland, Mr. Dyson.

Mr. DYSON. Thank you, Mr. Chairman.

I could tell, Mr. Mayor, it has been a—

Mr. D'AMOURS. You just missed your plane, Mr. Mayor.

Mayor KOCH. Oh, that is all right. I am having more fun here.

Mr. DYSON. I was about to say you have been a mayor obviously much longer than you have been a Congressman because I am sure as a Congressman you probably would have avoided that last question, especially since the chairman of this subcommittee was co-sponsor of that repeal here in the House.

Mayor KOCH. No, actually I was a Congressman longer than I am a mayor. I have been a mayor a little less than 6 and I was a Congressman for 9 years. While I would give the chairman my proxy on almost any matter, on occasion we can disagree.

Mr. D'AMOURS. On rare occasions.

Mr. DYSON. I think it is wonderful that you are here today. Although we totally don't agree on this issue, but this whole question of ocean dumping which those of us from the coastal States, I come from Maryland, my colleague here is from Delaware and has the beach up above me and we are all envious of the money that the beaches in New Jersey now bring into that State's commerce—but one of the concerns we have is this dumping.

My question to you is if the bight is closed as EPA has attempted to do and as has happened, attempts have been made in this committee for that, as I think you said in your opening testimony the sludge has to go somewhere. That leaves about the 106-mile site open.

Of course we like that even less than the bight site. What is that going to do for your costs? Obviously transporting it that much further will be more. That cost on top of the cost of the administration's proposal to add a user fee, and I think that is also the proposal of the gentleman from New Jersey.

It seems almost a sure thing that that will eventually happen. Where will it reach a point that it becomes prohibitive such that you look for recycling or other alternatives?

Mayor KOCH. It is very hard with existing technology to do anything other than to dump it. We will probably bear the cost of what we estimate—although the chairman has different figures and we will reconcile them I hope—but we estimate it will be \$27 million out of our operating budget.

Mr. DYSON. That would be additional?

Mayor KOCH. I think that is the total.

Mr. MCGOUGH. It is additional.

Mayor KOCH. Over and above, yes.

Mr. MCGOUGH. Other than what the chairman raised about the new proposal for cheaper barging which we will have to look at.

Mr. DYSON. Does that come out of that capital budget?

Mayor KOCH. No, our operating budget is different than our capital budget and our operating budget is tighter than our capital budget.

Mr. DYSON. That is an additional \$27 million.

Mayor KOCH. Yes, just to indicate the problem that we have we now have, come through three consecutive years of GAP balanced

budget—I never heard of GAP [general accounting principles]—we are going to be adopting our fourth consecutive GAP balanced budget in the first week of June. But let me tell you it has been very costly to us. It is very difficult for us. We used to have a little over 31,000 uniformed cops, today we have 23,000. We have cut back our services enormously. We are going to improve those services in sanitation and cops and teachers and firefighters and police. To take an additional \$27 million now out of our operating budget to do something which we honestly believe will not in a substantial way upgrade the ocean to us makes no sense.

Mr. GIFT. I would like to respond to the same question in a little different fashion. I think it is very relevant. You are very legitimately concerned with beach water quality and beach conditions, Maryland, Delaware, and New Jersey, all of you. You all have great resorts depending on it.

Based on extensive studies and what we know now at the 12-mile site where we dispose of sludge 10 miles from land, EPA and NOAA have concluded there is no effect on water quality, on the beaches by that ocean management option. Your concerns are even—you know, much further removed at 106. If we do not see effects on beach water quality at 12 miles, there is no conceivable way that you will ever see it from 106 either. That is a more fundamental question from your standpoint than the cost of the different operations.

Mr. DYSON. I do not deny that at all. My concern is that ultimately we do not want to see any ocean dumping. I am sure that you feel the same way. Certainly one proposal, and my colleague from Delaware has talked about that in earlier sessions of this committee, but there are recycling alternatives. I realize that is expensive. I guess for my own edification I am interested in what effect all of this is going to have on you if you have to choose one site over the other or it is forced upon you, and the difference is that you are going to pay, which the mayor did answer very well. Thank you.

Mr. MCGOUGH. If I might add one little bit. The city is doing much to try to make more options available to it for disposal of the sludge. Pretreatment programs, that will be in place July 1 this year. We are going beyond Federal regulations on housekeeping for dischargers over 10,000 gallons threshold that is in the Federal law. We are also looking at nonindustrial sources of the contaminants of concern in the city. We will spend money on that. The pretreatment program will cost the city of New York \$1 million a year.

Relevant to your concern is storm water overflow control. We have 450 regulators that open every appreciable rainstorm and combined discharges of both sanitary and storm water run into the surrounding waters, and that is where you get a lot of beach contamination. We are completing the North River and Red Hook plants, which will take all remaining raw discharges in the city by 1987. EPA cited this morning the flow balance method for CSO control. We have submitted a work plan, that is the next generation for control. That will have the most impact.

I would say when you balance these options here, consider what \$25 million will do in storm water control as opposed to moving the

site to 106 and what you buy for that, that is really what we are saying. Let us do it on a scientific technical basis and we will know where we are going and we will not be back here talking about the change in data base, we will have set it down and know what we are doing. If we have to come out of the ocean a technically sound basis will strengthen our hands with our populace. Right now the populace when we go for land disposal or incineration will say if it is no good for the fish, why is it good to put it in my backyard or incinerate it in my backyard? Let us get a technical basis. If we get the technical basis to get out of the ocean, it strengthens our hand as I have described.

Mr. DYSON. Thank you very much. I thank the chairman for the time.

Mr. D'AMOURS. We now recognize the gentleman from Delaware who I think shares your antipathy toward use of the 106-mile site. Mr. Carper.

Mr. CARPER. Thank you, Mr. Chairman. I would like to welcome you here to the committee again, all three of you.

I would like to ask questions that relate to alternative land disposal. But first let me say in northern Delaware, a State I represent, our sewer costs for the residents have gone up many-fold over the last decade to reflect the fact that we, as users, pay for the cost of water treatment. If the city of New York were forced to stop sewage dumping in the 12-mile site and were forced to use either a land-based alternative or to dump in the 106-mile site, would you not simply pass on to the users the extra cost of doing so?

Mayor KOCH. Not necessarily, although that is a possibility. It becomes a question of what the cost is, what is the impact on the one- and two-family homeowner, and in some cases you would conclude that it has to be in part subsidized out of the operating budget. So there is not a simple answer that I can give you.

Mr. CARPER. The question I am asking is, Is the cost of sewage treatment borne by the users in New York City, or is it subsidized through other sources of revenue?

Mr. MCGOUGH. We do not collect from our water and sewer rates, the money to cover the operation of our water pollution control. What the Mayor alludes to is the cost of the total tax and fee structure we have in the city, that separation was not made, you have to look at the total burden on the one- and two-family homeowners, and when you do that you find that while other locales can point to higher sewer rates, when they look at tax rates and real estate taxes, and sales tax rates and other rates, they find the comparisons are not consistent. So you have to look at the total bundle.

Mayor KOCH. We are the only city, if not the only one, one of the few, that has a city income tax.

Mr. CARPER. I understand the EPA has given some considerable sums of money to New York City to develop land-based alternatives. Is that correct, and could you quantify those for us?

Mr. MCGOUGH. When the deadline was in being we did spend \$30 million, 75 percent of which was Federal money, to develop the land-based alternative, which was a composting and tilling alternative with a 7-year duration. We also at that time estimated approximately \$250 million in construction costs for which we had already bid contracts for substantial portions which were canceled

and the money was returned to the Federal Government when the *Sofaer* decision came down. I do not know precisely, but \$30 million we spent in developing the short- and long-term alternatives, I believe.

Mr. CARPER. Is there any sludge produced now—I understand you have a number of plants in the city—at one or several of those plants which is acceptably clean for land application or composting.

Mr. MCGOUGH. Well, I will turn to Jim, but I believe the Oakland Beach plant, which is an entirely residential area, we have been talking to Gateway National Park that now owns our sludge beds, for land application of that because it meets land-based application. It is a very small plant, however.

Mr. GIFT. I cannot answer, I do not know whether I can add a lot. There is a moratorium on land application of sludges in the State of New York. I am not sure what the status of that is now. There is obviously a variability in the pollutant loading in the sludge of some of the plants. Some are cleaner than others. Certainly there could be a way to differentially manage them based on the constituents.

Mr. CARPER. In Delaware, they used to criticize the city of Philadelphia because they dumped their sludge off the coast of Bethany. They do not do that now. Among other things, Philadelphia is selling their compost. I wonder, is their sludge cleaner? Do you think Philadelphia sewage treatment is not the same as sewage treatment in New York City? What specifically do you think the relevant differences might be that enables the city just down the freeway from you folks to find reasonable uses for its sludge, whereas New York City has not yet done so?

Mr. MCGOUGH. Well, I am not familiar with the individual components of their sludge. What I believe, though—and I would be happy to complete the record with respect to an analysis of their sludges and ours for you—but certainly in the quantity and in the heavy metals our sludges have not been and will not in our opinion prove to be a responsive to the pretreatment program. Therefore, even after our pretreatment program is in place we will have a larger percentage of heavy metals and higher concentrations. That will be one difference. And of course the quantity.

The other thing is, too, that I think from my familiarity with the case in Philadelphia is that the strip mines have considerably widened their options.

However, I understand the State has not finalized permits in Pennsylvania to do that, and there is a lot of opposition to that application of those sludges, which fall into the same categories of quality as ours.

Again I come back to the fact, is it environmentally sound to do what Pennsylvania proposes to do? Is that the most environmentally sound option? It is the one that gets it out of the ocean, but is it the most environmentally sound option, maybe more environmentally sound than 65 miles but not 106? So again I would say the decision by Philadelphia to get out of the ocean was based on a determination because of EPA aggressiveness, but whether or not they chose that option has not been answered.

Mr. CARPER. My time expired. I just want to say thank you for joining us. I would appreciate your following through on that offer to provide some analysis between the city of Philadelphia's sludge and that of New York City. Thank you.

[See table 4 of city's responses on p. 293.]

Mr. D'AMOURS. I thank the gentleman from Delaware.

Mr. Mayor, before you go, and others may have questions, but insofar as this question revolves around the costs to the city of New York, you were on Nightline last night from the Brooklyn Bridge and you mentioned that the city's finances were in very good shape.

Mayor KOCH. Compared to what, Mr. Chairman? [Laughter.]

Mr. D'AMOURS. I thought you were speaking absolutely. I get the impression you were just comparing. But let me continue now, and you can get me later as you always do. The population of the city of New York is what, today?

Mayor KOCH. Technically 7 million, and the Census Bureau did not count 750,000 others. [Laughter.]

Mr. D'AMOURS. They were hanging from the windowsills at the time?

Based on that 7 million population, the difference in cost between 106-mile dumping and 12-mile dumping on a per capita basis is less than 1 cent per day.

That is not a lot to pay for a city that has a sound financial base, and for an area where the pollution is grave, at least in the opinion of many, many people. This question is not meant with any hostility, but are we really talking about that much money for the city of New York? My calculations are based on your figures, which as you know we have some questions about.

Mayor KOCH. I understand that. But you can use that argument about our libraries. We reduced our library time. If you took it in terms of how much per day, it probably comes out to less than a penny a day to keep them open 24 hours a day. But we in fact reduced their availability. It was very painful to us.

So what people are not aware of as relates to the city of New York is the following: In our three largest boroughs, in Brooklyn, in the Bronx, and in Manhattan in terms of population, the average number of those below the poverty line percentagewise is 25 percent. Twenty-five percent of our population in Brooklyn roughly, but in those three, it is 25 percent below the poverty line. We are not talking about an affluent city. What I was conveying last night and convey here is if you compare the city of New York now with 1975 when we were on the edge of bankruptcy we are much, much stronger. We will never be on the edge of bankruptcy again, but is \$27 million important to the city of New York and should it be spent in a prioritized way and not be spent if we think—and we hopefully convince you—that you won't be getting \$27 million in return from that expenditure. I just urge that we not be compelled to spend it there but elsewhere, where it will do more good.

Mr. D'AMOURS. Thank you very much for your answer.

Are there any other questions?

Mr. FORSYTHE. Just one, Mr. Chairman.

Mr. D'AMOURS. Mr. Forsythe.

Mr. FORSYTHE. I understand that New York City and the Army Corps of Engineers investigated the possibility of using dredged spoils for landfill cover. Couldn't composted sludge be used for the same purposes?

Mr. MCGOUGH. Yes. Indeed that was the alternative that we looked at, and were proceeding to implement when the *Sofaer* decision came down. We were going to use the composted sludge material for landfill capping. Now technically you have to put clay on top of that, but it would be tilled into the soil of unused landfills. That is what we were going to do with it.

You refer to the Corps of Engineers looking into that. They are pursuing a multimedia risk assessment analysis of what to do with the dredge spoils in the harbor.

Mr. FORSYTHE. Thank you.

Mayor KOCH. I simply want to thank the committee at this point for the great courtesy that was extended the three of us. It is always a pleasure to be before you. I hope that you will consider our case in a sympathetic way.

Thank you.

Mr. D'AMOURS. We will give you every fair and sympathetic consideration, Mr. Mayor. It is good to see you here again. Thank you for staying a little longer.

Mayor KOCH. I was delighted to. Thank you.

Mr. D'AMOURS. I would like to request that the committee be allowed to submit questions to you in writing which you would then respond to. I would ask unanimous consent that the record be left open for receipt of such information.

Mayor KOCH. We will do that.

[The information follows:]

NINETY-EIGHTH CONGRESS

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U.S. House of Representatives
Committee on
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June 3, 1983

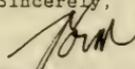
Honorable Edward I. Koch
Mayor
City of New York
Office of the Mayor
New York, NY 10007

Dear Ed:

Thank you for appearing before the Subcommittee on Oceanography and the Subcommittee on Fisheries and Wildlife Conservation and the Environment to present testimony on ocean disposal of municipal sewage sludge in the New York Bight. Your presentation and responses to our questions provided valuable information for the members of the Subcommittees. We now have a much better understanding of the issues associated with the Program. I hope you will continue to assist us as we work in this area.

Enclosed you will find additional questions which have been submitted by various Committee members. I would appreciate your prompt reply to these questions in order to make the hearing record as complete as possible.

Sincerely,


Norman E. D'Amours, Chairman
Subcommittee on Oceanography

NED/dbb

COMMENT AND QUESTIONS FROM MR. D'AMOURS

I question whether the total cost for dumping the City's sludge at the 106-mile site will total \$26.71 million as you claim in chapter 17 of "Technical Information to Support the Designation of the 106-mile Site for the Ocean Disposal of Municipal Sludge."

First of all, you overstate the amount of sludge that the City dumps. According to the cost analysis, the total cost per year is based on 1982 costs and sludge production of 117 million cubic feet (mcf) per year. Assuming that the conversion factor on page 17-1 should read "mcf multiplied by 0.03148 yields million wet tons" instead of "wet tons", 117 mcf is the equivalent of 3,683,000 wet tons. Testimony from EPA on May 25, 1983 indicates that the City actually dumped 3,206,000 wet tons (101.8 mcf) in 1982, 477,000 wet tons less than the basis for your figures.

Second, simple analysis of the City's economic projection for dumping at the 106-mile site indicates that a reduction of 0.7 hours (42 minutes) per round trip would save the City in excess of \$13 million since this reduction would allow City vessels to make an extra 156 trips per year. The 42 minutes should be easy to achieve. For example, by petitioning to move the dumpsite to 101 miles, City vessels would save 50 minutes per round trip. In this era of tight money, I find it hard to believe that the City would not pursue all available means to reduce the round trip time in order to utilize the more cost effective City vessels.

Third, I question the accuracy of your cost estimates for private barging. According to information received by the Committee (attached) your cost estimates are two to three times as high as the amount that the A&S Transportation Company of South Kearney, N.J. has quoted to a current dumper who inquired about transportation costs for dumping at the 106-mile site. The Company quoted a price of \$3.50 - \$5.00 per wet ton (\$0.11 - \$0.16 per cubic foot). Using the City's estimates for sludge production, the cost to the City for transporting all of its sludge by private barge to the 106-mile site would range from \$12.9 million to \$18.4 million. Thus if the City simply used a private contractor to haul its sludge the City could reduce its 106-mile dumping costs by \$8.3 million to \$13.8 million. Further, these figures do not take into account the salvage or resale value of the City's fleet.

Fourth, I question the need to build a storage facility to hold one week's production of sludge. According to the A & S Transportation Company, excess sludge could simply be loaded onto extra barges and be held for future transport.

Therefore, according to the information available to myself, the total cost to the City for dumping sludge at the 106-mile site would range from \$9.47 million to \$10.61 million, considerably less than the \$26.71 million quoted by the City.

I request that the City review and comment on the attached information and submit answers to the attached questions.

COSTS OF DISPOSING OF NEW YORK CITY SLUDGE AT 106-MILE SITESludge Production by NYC Sewage Treatment Plants

NYC Estimate = 117 mcf/yr
 1982 Actual Production = 101.8 mcf/yr

Summer production = 2.58 mcf/week x 101.8/117 = 2.24 mcf/week
 Winter production = 1.91 mcf/week x 101.8/117 = 1.66 mcf/week

Capacity of City Vessels

3 vessels = 4 vessels minus 25% downtime

Miles per roundtrip = 2 x (101 miles + 30 miles) = 262 miles

$\frac{262 \text{ miles/roundtrip}}{12 \text{ miles/hour}} + 2 \text{ hours loading time} =$

23.8 hours round trip time, including loading

$\frac{24 \text{ hours/day} \times 6 \text{ days/week}}{24 \text{ hours/trip}} =$

6 round trips/week/vessel or 18 trips/week, 936 trips/year

936 trips/year x 84,000 cf/trip = 78.6 mcf/year or 1.51 mcf/week

Total capacity of present city fleet = 1.51 mcf/week

Volume to be Disposed of by Private Barge

Winter production	1.66 mcf/week - 1.51 mcf/week	
shortfall x 26 weeks		3.90 mcf
Summer production	2.24 mcf/week - 1.51 mcf/week	
shortfall x 26 weeks		<u>18.98 mcf</u>
Total production		22.88 mcf

Costs for Disposing by Private Barge

22.88 mcf x \$0.11/cf = \$2.52 M

22.88 mcf x \$0.16/cf = \$3.66 M

\$ 2.52 M - \$ 3.66 M

Costs of Marine Personnel

\$ 2.28 M

Costs of Repair, Maintenance, Supplies

\$ 1.60 M

COSTS OF DISPOSING OF NEW YORK CITY SLUDGE AT 106-MILE SITE (CONT.)Costs of Fuel--City Vessels

936 trips x 262 miles/trip = 245,232 miles

245,232 miles x 10 gal/mile x \$1.25/gal = \$3.07M

Total fuel costs

\$ 3.07 M

Total cost of disposing NYC sludge at 106-mile site \$ 9.47 M - \$ 10.61M


A&S TRANSPORTATION CO.

75 Jacobus Avenue
So. Kearny, N. J. 07032
(201) 589-0277

518 Market Street
P. O. Box 743
Camden, N. J. 08101
(609) 966-0449
(215) 922-2432

May 18, 1983

Congressman Norman E. D'Amours
Chairman, Subcommittee on Oceanography
U. S. HOUSE OF REPRESENTATIVES
Committee on Merchant Marine and Fisheries
Room 1334
Longworth House Office Building
Washington, D. C. 20515

RE: Cost for Ocean Disposal of Municipal Sewage Sludge

Dear Congressman D'Amours:

We received your letter today dated May 13, 1983 wherein you posed a question concerning the barging of municipal sewage sludge to the 12 mile and 106 mile dump sites. Coincidentally, with your request, we recently gave one of our customers (a local sewage authority) a price to barge their sewage sludge to the 106 mile dump site. A portion of the letter we sent to the authority is quoted below:

"In reference to recent discussions with you and members of your staff concerning the costs to barge sewage sludge from your facility to the 106-mile dump site, we feel that the estimated price for this service would be in the range of \$3.50 to \$5.00 per wet ton. The reason for the price range is that based upon a short contract, i.e.: one year, the price would be at the higher end of the range, while a longer term contract, i.e.: five to seven years, would command a price in the area of \$3.50 per wet ton.

The above prices would be based upon our present costs and you could expect them to rise based upon the current inflation rate. We also feel that based upon your physical facilities, the moderate prices mentioned above are currently feasible and we still feel that the operations can be carried out to the 106-mile dump site without adverse affects on plant operations."

As far as barging to the 12 mile site is concerned, we are presently transporting sewage sludge for the authority mentioned above at the rate of \$1.48 per wet ton. This price is for the one year period ending December 31, 1983.

Marine Transportation Service

Congressman Norman E. D'Amours
RE: Cost For Ocean Disposal of Municipal Sewage Sludge
May 18, 1983

-2-

For your further information, A&S Transportation Co. is probably the largest independent marine transportation firm engaged in this particular type of an operation in the United States. We have been in business for over forty years and have a present fleet carrying capacity in excess of 30,000 tons.

Based upon our experience, with this present barging fleet, we could transport between 3,250,000 to 3,750,000 tons of sewage sludge per year to the 106 mile dump site. Additionally, if long term contracts were available, we would immediately be willing to double the carrying capacity of our fleet and could expect to accomplish this within a twenty-four to thirty-six month period.

We trust the above information meets with your requirements and should you have any further questions in this regard, please feel free to contact the undersigned.

Very truly yours,

A&S TRANSPORTATION CO.

Richard F. Albers

Richard F. Albers
Vice President
mjc

cc: Darrell Brown

FEDERAL EXPRESS

SUMMARY OF NEW YORK CITY'S RESPONSES TO
COMMENTS AND QUESTIONS SUBMITTED BY CONGRESSMEN
D'AMOURS, HUGHES, FORSYTHE, AND CARPER

In the following pages, we have attempted to respond to the comments and questions of Congressman D'Amours as well as the questions raised by Congressmen Hughes, Forsythe and Carper. The question of ocean disposal of sewage sludge is understandably a very complex issue due to the many factors that must be considered. It is made even more complex by the strong opinions of the advocates of both sides of the issue. We urge that the legislators and the regulatory agencies concerned base the important decisions that must be made on sound environmental, technical, and socio-economic judgements. Toward this end, we appreciate this opportunity to provide assistance by responding to your questions.

In up-dating the cost estimate for the 106 mile site, we have made several changes that reflect the responses to several questions and comments made by Congressman D'Amours. The changes are as follows:

Annual Sludge Production	101.2 mcf
Round Trip Travel Distance	320 miles
Cost of Fuel	\$0.90/gall.
Increased Crew Size	100 people
Salaries (Including Fringe and O.T.)	\$39,400/yr.

Incorporating these changes, we have lowered our estimated annual cost to go to the 106 mile site from \$26.72 million to \$23.22 million.

It should be noted that in presenting our annual operating cost for sludge disposal at the 12 mile site for 1982, we show a figure of \$6,224,285. We believe this figure does not accurately reflect our average annual operating costs because it contains a cost of \$2,396,000 for repairs, maintenance and supplies. Of this amount, \$2,123,600 was spent for shipyard repairs. This figure is approximately double the average annual expenditure for this item.

In addition, because the vessel Owls Head was laid up the entire year, the amount required for private barging was increased.

It would appear, that based on the recent work done by New York City and its consultants, Ecological Analysts, Inc. and SEAMOcean, Inc., in the preparation of a Special Permit application as well as the Site Designation comment documents, New York City's sludge will meet existing criteria for ocean disposal.

It appears, that because of the decreased usage of PCB's and the possible over estimate of PCB's once thought to be contributed

by sludge disposal in the New York Bight, the actual percentage of PCB's contributed by sewage sludge in this area may be in the same range as other contaminants in these sludges, that is between 3-12 percent.

Sludge production for the year 2,000 can now be more accurately estimated at 354 dry tons per day. As the treatment processes are upgraded and we approach these projected dates, we are able to provide more accurate estimates of sludge production.

We believe that the gradation of one City's sludge compared to another, as to which is "cleaner" or "dirtier", is not an exercise in which we wish to participate. The Environmental Protection Agency, in reviewing each municipality's special permit application, will have to decide if that municipality's sludge unreasonably degrades the ocean environment or not.

New York City's current cost to dispose sludge at the 12 mile site, based on 1982 sludge production figures and costs, is \$68.16 per dry ton. The estimated cost to transport the sludge to the 106 mile site is \$254.27 per dry ton. When one considers that the costs of all municipal services are higher here than in other cities, to seek out more expensive methods for any of these services without a sound basis would be indefensible. When these alternate methods are environmentally less acceptable, as we believe land based alternatives are compared to ocean disposal, such a switch would also be irresponsible.

Comparison of sewage sludges of New York City and Philadelphia show that Philadelphia sludges can more readily be used in land application systems than those from New York City. The essential difference is the metal content. The availability of large areas of strip mine spoils in Pennsylvania also enhances the need for this type of sludge management program. Even though these mine spoil areas exist, we believe that residents in some of these areas are becoming more reluctant to receive this gift from Philadelphia. The elimination of available application land may cause Philadelphia to reevaluate their alternatives.

As stated previously New York City is more than willing to participate in the search for answers that will ultimately lead to environmentally sound sludge management programs. Toward this end, we were happy to provide this response at this time and will gladly provide assistance in any future inquiries.

RESPONSES TO CONGRESSMAN D'AMOURS' COMMENTS:

We agree with Congressman D'Amours' comment pertaining to 1982 sludge production figures. We produced 3,206,000 wet tons in 1982, or 101,209,000 cu.ft. The 117mcf/yr. figure is a generalized number that has been used by the Department of Environmental Protection for various planning exercises. It more accurately reflects the anticipated sludge production when the City's two new plants come on line around 1990.

As a result of your comments, we have recalculated our estimate for transporting sludge to the 106 mile site. We have taken this opportunity to fine-tune this estimate based on numbers generated in response to the Congressman's list of eleven questions.

We do not agree with the alternate approach of forcing another trip per week per vessel by moving the location of the 106 mile disposal site. The site, in its present location, has been subjected to examination by many scientists. Environmental Impact Statements have been prepared for this site in its current location. As you know, Site Designation Rulemaking proceedings are currently taking place to designate this site in its current location. We do not think that movement of this site, at this time, would be possible. Furthermore, upon reexamination the actual travel distance from the Sandy Hook - Rockaway Transect to the approximate mid-point of the 106-mile site appears to be about 130 miles.

The Congressman's comments pertaining to the cost of private barging are addressed in Question No. 11.

Comment No. 4 pertains to the need to construct additional storage facilities capable of handling an additional one week's production of sludge. The City has 12 water pollution control plants throughout the City. Unlike A & S Transportation's logistics in New Jersey, where pick up is at just one plant, a private hauler would have to collect at 10 different locations in New York City. If a private hauler were unable to make the trip to the 106 mile site because of bad weather, labor problems or other reasons, additional storage space would be required at most of the existing plants, not just at one location as suggested. Possible disruption of service is, by the way, the single most important concern we have in considering the question of 100 percent private barging.

106 MILE SITE

COST ESTIMATE REVISED

1. SLUDGE PRODUCTION:

Summer = 317,447 cf/day = 2.22 mcf/wk.
 Winter = 236,458 cf/day = 1.66 mcf/wk.
 Average = 276,053 cf/day = 101.2 mcf/yr.

2. CAPACITY OF CITY VESSELS:

3 vessels = 4 vessels minus 25% downtime
 Miles per roundtrip = $2 \times (130 + 30) = 320$ miles

$\frac{320 \text{ miles/roundtrip}}{12 \text{ miles/hr.}} + 2 \text{ hours loading time} =$
 28.67 hours roundtrip + loading time.

$\frac{24 \text{ hrs./day} \times 6 \text{ days/week}}{28.67 \text{ hours/trip}} = 5 \text{ trips/week/vessel}$

or 15 trips/week, 780 trips/year

780 trips/yr. \times 84,000 cf/trip = 65.52 mcf/year
 or 1.26 mcf/wk.

3. VOLUME TO BE DISPOSED OF BY PRIVATE BARGE:

Summer: $2.22 \text{ mcf/wk.} - 1.26 \text{ mcf/wk.} = 0.96 \text{ mcf/wk.}$
 $0.96 \times 26 \text{ wks.} = 24.96 \text{ mcf}$

Winter: $1.66 \text{ mcf/wk.} - 1.26 \text{ mcf/wk.} = 0.40 \text{ mcf/wk.}$
 $0.40 \times 26 \text{ wks.} = 10.40 \text{ mcf}$

Summer Shortfall = 24.96 mcf

Winter Shortfall = 10.40 mcf

Total Shortfall = 35.36 mcf

4. COST OF DISPOSAL OF SHORTFALL BY PRIVATE BARGE:

$35.36 \text{ mcf} \times \$0.35 = 12.38 \text{ M}$

5. COST OF FUEL - CITY VESSELS:

$780 \text{ Trips} \times 320 \text{ miles/trip} \times 10 \text{ gallons/mi} \times \$0.90 = \$2.25 \text{ M}$

6. TOTAL COSTS:

Private Barging	\$12.38 M
Marine Personnel (See Question No. 6)	3.94 M
Repairs, Maintenance & Supplies	2.40 M
Fuel	2.25 M
Additional Storage	2.25 M
Total Cost at 106 Mile Site	\$23.22 M

QUESTIONS FROM CONGRESSMAN D'AMOURS

1. What was the actual 1982 summer and winter sludge production per day?

Seasonal daily average sludge production figures are not recorded numbers. They are computed numbers which merely recognize the significant seasonal differences in daily sludge production. The actual 1982 annual sludge production figures are as follows:

101,209,000 cu.ft. or

3,206,000 Wet Tons or

91,319 Dry Tons

Computation of a daily seasonal average based upon the above figures yields the following:

Summer - 317,447 cu.ft./day

Winter - 236,458 cu.ft./day

2. What was the actual 1982 downtime for the City's sludge vessels? For every year that a vessel has been in service for the City, what has been the actual downtime for each vessel?
3. What is the capacity of each vessel?
4. How many trips to the 12-mile site were made by each vessel?

The City currently owns four motorized vessels. They are the North River (NR), Newtown Creek (NC), Bowery Bay (BB) and the Owls Head (OH). The NR and the NC have a designed capacity of 106,000 cu.ft., however the actual carrying capacity is closer to 95,000 cu.ft. Similarly, the BB and the OH have design capacities of 66,000 cu.ft. while actually carrying 60,000 cu.ft.

Although the City owns the four vessels, the sludge transportation system is designed to maximize the operation of the two larger vessels in conjunction with one of the smaller vessels. The second smaller vessel is intended to be used as a reserve.

The following table shows vessel usage for 1981 and 1982:

VESSEL	1981		1982	
	TRIPS MADE	WORKING DAYS OUT OF SERVICE	TRIPS MADE	WORKING DAYS OUT OF SERVICE
North River	563	19	319	92
Newtown Creek	102	162	372	59
Bowery Bay	8	216	380	6
Owls Head	269	85	0 (*)	302
	<u>942</u>		<u>1071</u>	

(*) The Owls Head is in need of repairs. It was out of service all of 1982.

Based upon a 302 day work year, in 1981 and 1982 the City experienced downtime percentages of 40 and 38 respectively.

5. How many marine personnel were employed by the City in 1982 and what was the total manpower cost? How much of this cost was for overtime?

In 1982 an average of 55 marine personnel were employed. This number fluctuates with retirements, dismissals, new hires etc. The total personnel cost for 1982 was \$2,152,500. Of this amount \$178,500 was paid for overtime. The total figure includes \$615,000 for fringe benefits.

6. Dumping at the 60 or 106-mile sites will utilize the entire capacity of the City's fleet, yet 80 marine personnel are needed for dumping at the 106-mile site and only 72 are needed for dumping at the 60-mile site. Please explain the difference.

Recent reexamination of the anticipated trip times and the Coast Guard staffing requirements indicate that both the 60 and 106 mile sites will require the use of five, 15 person crews. In addition the 60 mile site will require 15 personnel for shore support and crew back-up. Since the trip to and from the 106 mile site is about 8 hours longer, it is estimated that 20-25 people will be required for shore support and crew backup. One reason for this increase in shore support for these two options is due to the increased time at sea. Maintenance normally performed by members of the crew while at dock side will now have to be performed by others.

106 Mile Personnel Costs:

100 people x \$39,400/person (includes fringe and O.T.) =
\$3,940,000.

7. What was the cost in 1982 for repair, maintenance and supplies associated with the sludge fleet?

The cost in 1982 for repair, maintenance and supplies was \$2,396,000. This figure is not a representative figure because in 1982, \$2,123,600 was spent for shipyard repairs. Annual shipyard repairs are usually about half this amount.

8. What was the cost in 1982 for fuel and how many gallons were consumed in 1982 for the barging of sludge to the 12-mile site?

The actual amount of fuel used was 793,205 gallons. Based upon an average cost of fuel of \$0.90 per gallon the cost of fuel for 1982 was \$713,885.

9. What was the total cost to the City in 1982 for transporting sludge to the 12-mile site?

Personnel Services (includes fringe and O.T.)	\$2,152,500
Private Barging	961,900
Fuel	713,885
OTPS (repairs, maintenance and supplies)	<u>2,396,000</u>
TOTAL 1982 COSTS	\$6,224,285

10. If the City dumped at the 106-mile site and ran its vessels seven days a week instead of six days a week. What would be the additional overtime cost to the City.

The additional overtime cost to the City for operating on Sunday while hauling sludge to the 106 mile site would be \$786,240.

This is based on the following:

15 person crew per vessel, 12 hour shift, at 1.5 times normal pay.

52 Sundays x 15 people x 12 hours x \$28/hr. x 3 vessels = \$786,240.

11. What is the source of the City's estimate of \$0.35 per cubic foot for disposing of sludge by private barge at the 106-mile site?

The \$0.35 per cubic foot price was obtained as a consensus price in telephone conversations with the two private barging companies operating in the metropolitan area, General Marine Transport and A & S Transportation Company. It should be noted that this quotation was obtained prior to the Sofaer decision, when it appeared that ocean disposal of sludge might be halted. The quote shown in A & S Transportation's letter to Congressman D'Amours, dated May 18, 1983, is an estimate, not a contract price to one New Jersey dumper. The quote, by the way, is less than the price in that dumper's current contract with A & S Transportation.

Because of the Congressman's inquiry with A & S, we held a meeting with them on July 7, 1983 to discuss what they would charge New York City to haul one half of the sludge produced here to the 106 mile site. Because the City has 12 water pollution control plants around the City compared to the one plant of the New Jersey dumper, the City's cost would be greater. They gave a rough estimate of from \$4.50 to \$6.50 per wet ton, or \$0.14 to \$0.21 per cubic foot. We believe that if a decision were made to go to the 106 mile site and negotiations were started to contract for private barging, these prices would begin to firm-up closer to the \$0.35 price originally used in our cost estimates.

QUESTIONS FROM CONGRESSMAN HUGHES:

ADDITIONAL QUESTIONS SUBMITTED FOR THE RECORD BY CONGRESSMAN HUGHES.

- (1) Is the New York Bight seriously degraded? Is it the most seriously degraded coastal area in the United States? Can you cite a region or coastal area which is more severely degraded.

Research has shown that certain limited areas within the New York Bight apex are adversely affected by pollution. Limited areas of altered benthic communities have been observed, and elevated levels of chemical contaminants have been found in the sediments of depositional areas of the New York Bight (especially the Christiaensen Basin) where particle-associated contaminants preferentially settle and have longer residence times.

It is difficult to say objectively whether or not the New York Bight apex is "seriously degraded" since "seriously" is a subjective term. However, other United States coastal areas have been formally cited as "seriously" degraded by their designation as hazardous waste sites under the Comprehensive Environmental Response, Compensation and Liability Act, or Superfund. These areas include Commencement Bay, Washington, and New Bedford Harbor, Massachusetts. New Bedford Harbor, for example, has the highest PCB sediment levels ever recorded for any coastal sediment in the U.S., and probably in the world (Massachusetts Office of Coastal Zone Management 1982). PCB levels in marine organisms from New Bedford Harbor are correspondingly high and have caused the closure of over 70 square kilometers to fishing (Massachusetts Office of Coastal Zone Management 1982).

In a comparative sense, available evidence supports the conclusion that the New York Bight is less seriously degraded than many other coastal marine areas of the United States and the world. In addition to Commencement Bay and New Bedford Harbor, several other areas (e.g., Puget Sound, Washington; Escambia Bay, Florida; Palos Verdes, California) have higher PCB concentrations in their sediments than those found in the New York Bight, despite the high inputs of PCBs to the Bight system from the Hudson River (NEMP 1981). Similarly, sediments more contaminated by heavy metals than New York Bight sediments are found in many areas throughout the U.S. and the world (Segar and Davis 1983). Contaminant inputs to the New York Bight apex largely come from inputs to the Hudson-Raritan estuary and its freshwater sources. Accordingly, the estuary itself is much more degraded by these inputs than is the New York Bight.

In general, wherever there are large urban-industrial coastal cities, the adjacent coastal sediments are contaminated. The degree of this contamination is affected not only by the rate of input, but by the hydrographic and geographic conditions near the input sources. The New York Bight is but one of numerous contaminated areas throughout the U.S. and the world, and many other areas exhibit greater benthic faunal changes and greater sediment, water column, and biotic contamination than observed in the New York Bight (Segar and Davis 1983).

The distribution of marine fauna in the Bight apex has apparently been altered to some degree in the Christiaensen Basin, where fine-grained, organic rich sediments from all sources tend to accumulate. However, in general the types of biota found in the New York Bight are not markedly different from similar environments in non-impacted adjacent areas of the continental shelf (Boesch 1979).

Many other localized areas of the marine environment have been more seriously impacted by man's activities, resulting in large alterations in the normal benthic life found in these regions. The cumulative effects of normal harbor and port activities (e.g., dredging, low-level ship discharge or leakage of petroleum hydrocarbons, construction, continuous ship traffic, etc.) substantially alter the benthic fauna. Estuarine discharges add nutrients to coastal areas, enriching productivity which can lead to reduced concentrations of oxygen in the water column and sediments. Such fundamental changes in the environment can limit the type of marine organisms which can live in these altered conditions. Impacts of this type, often of greater magnitude than those observed in the New York Bight apex, have been observed in many other coastal locations, particularly semi-enclosed areas such as Biscayne Bay, Chesapeake Bay, San Francisco Bay, Raritan Bay, and many wetland areas throughout the Southeast U.S. and the Gulf of Mexico. Other man-induced changes to the marine environment and its fauna result from alterations in freshwater flow. These include water reclamation projects in the Florida Everglades which have resulted in high salinity

incursions into low salinity marshes and mangrove swamps and large salinity fluctuations in freshwater outlets to the ocean, leading to massive shifts in species composition in these areas.

A natural tendency exists for portions of the New York Bight to become anoxic under certain conditions. However, records indicate anoxic events probably occurred in this region prior to the effects of urbanization. Oxygen depletion is a natural feature of ocean areas where there is a high productivity and restricted vertical mixing and flushing of bottom water, such as observed in the Cariaco Trench and Black Sea (Richards 1965), the Baltic Sea (Kaleis 1976), and off the west coast of Africa (Harvey 1963). The organic and nutrient inputs of man to the New York Bight, which are predominantly from the Hudson-Raritan estuary, may have increased the chance that such anoxic events will reoccur in the New York Bight under certain unusual hydrographic conditions. However, it has been shown unequivocally that the disposal of sewage sludge at the 12-Mile Site is not a significant factor affecting the likelihood of anoxia in the New York Bight. Severe anoxic events and low oxygen levels are occurring with increasing frequency in other coastal regions of the U.S. and the world where large human populations impinge on a coastal region. For example, the Chesapeake Bay is experiencing annual severe oxygen depletion in its upper reaches which has led to the loss of large populations of commercial shellfish (Heinle et al. 1980).

2. Last year when Mayor Koch appeared before this Committee, I asked if the City would furnish for the Record the number of tons of PCB's, mercury, cadmium, lead, copper and other heavy metals and toxic materials which are routinely deposited in the ocean each year out of New York City through sewage sludge dumping. These figures were never provided. Could you now provide this information to the Committee?

When the Committee originally requested this information, New York City's consultant was in the process of preparing estimates of annual contaminant loadings to the New York Bight apex from all sources. The City submitted those estimates to EPA on March 9, 1983, in response to a December 9, 1982 letter from the EPA Region II Administrator which requested technical information concerning redesignation of the 12-Mile Site, and also in response to EPA's December 20, 1982 Federal Register Notice (47 FR 56665) which requested similar information. Copies of the submission to EPA have already been provided to the Committee.

The City's comment documents to EPA provided the estimates sought by the Committee and explain the methods employed to prepare those estimates. In preparing those documents, the City's consultant performed a thorough and extensive analysis of mass constituent loadings to the New York Bight apex and compared the relative contribution of most contaminants from each source. The attached Tables 1 through 3 are the data resulting from that analysis and are taken from the City's March 9, 1983 Comments to EPA (NYC 1983). Table 1 (Table 6-16 in the City's 12-Mile Site comment document) presents estimates of the current annual loads of contaminants from New York City and from

seven other municipal sources in the New York metropolitan area, as well as the total combined loads from the current users of the 12-Mile Site. Table 2 (Table 6-22 in the City's 12-Mile Site comment document) compares those combined estimates with the total individual contaminant loads from the other measurable sources of contaminants to the apex. The estimates in Table 2 illustrate the small contaminant loadings to the apex from sewage sludge disposal at the 12-Mile Site compared to the inputs from the Hudson-Raritan estuary and from dredged material disposal. As shown in Table 3 (table 6-23 in the City's comment document) and when expressed as percentage contribution relative to the total apex loads, sewage sludge disposal by all 12-Mile Site permittees, combined, accounts for only about 2-11 percent of the total individual contaminant loads. For example, sewage sludge disposal currently accounts for approximately 0.2 percent of the fecal coliforms, 3 percent of the PCBs, 3 percent of the mercury, 8 percent of the cadmium, 9 percent of the lead, and 11 percent of the copper entering the apex annually from the land. It is also important to note that these calculations ignore the considerable quantities of these heavy metals transported into and through the apex as natural constituents of ocean water.

It should also be noted that these estimates were prepared in mid-1982; therefore, they reflect the sludge quality data available at the time and the quantities of sewage sludge disposed at the 12-Mile Site during 1981. Since these comments

were prepared, similar estimates were submitted to EPA on May 2, 1983 by five New Jersey permittees. These latter estimates were based on the quantities of sewage sludge disposed during 1982 and the resulting percent contribution estimates were nearly identical to the City's estimate submitted to EPA March 9, 1983.

- (3) What are the City's plans in the event that New York's sludge is found unsuitable for ocean dumping? Has the City made any effort since the Sofaer decision was rendered to find alternative disposal methods to ocean dumping?

It would appear that, based on the recent work done by New York City and its Consultants, Ecological Analysts Inc, and SEAMOcean, Inc., in the preparation of a Special Permit application as well as the Site Designation documents, New York City's sludge will meet the existing criteria for ocean disposal. We have always believed that ocean disposal of sewage sludge was an environmentally acceptable sludge management alternative. If, by some chance, some of New York City's sludges do not meet the regulatory criteria, we would have to initiate a review of our previously completed facility plan for a land based alternative to handle those sludges. At this time, this action is premature because a review of our Special Permit application by EPA will be required prior to such a determination.

- (4) I understand that when considering heavy metal constituents, New York's sludge may be "cleaner" than the sludge from New Jersey Municipalities; and conversely, with regard to some constituents, New York's sludge is the "dirtier." Could you comment more specifically on the difference in "sludge quality"?

We have completed a very thorough analysis of the constituents that make up New York City's sludge as part of the work done in preparing both our Special Permit application and our comments in support of Designation of all three ocean disposal sites. This information has been and will continue to be submitted to U.S. EPA for their review. We believe that the New Jersey sewage authorities are doing likewise. Any comparisons between our sludge and theirs should be done by the regulatory agencies concerned.

- (5) With regard to PCB's, the consultant's report on site designation appears to contradict figures which were previously given to the Merchant Marine and Fisheries Committee by NOAA scientists regarding the percentage of PCB contamination which ocean dumping adds to the New York Bight. Could you explain the methodology which NY used in reaching these substantially lower figures? Are New York's sludges lower in PCB levels than similar sludges from New Jersey municipalities?

The City's consultant estimates that sewage sludge dumping at the 12-Mile Site currently contributes approximately 3 percent of the total PCB input to the New York Bight apex. The two major sources of PCBs are the Hudson-Raritan Estuary discharge and dredged material dumping.

In preparing their report of March 9, 1983 on site designation, the City's consultant reviewed the information provided to the

Committee by NOAA scientists in the form of a draft technical paper authored by Swanson et al. dated January 5, 1982. In that draft version, Swanson et al. reviewed available literature on the contaminant sources to the New York Bight apex and reached the following conclusions:

. "The single largest pollutant source [to the New York Bight apex] is the Hudson River plume.....

. The ocean disposal of dredged materials, sewage sludge, and industrial waste represents a second major class of pollution inputs to the Bight.....

. [I]t is apparent [from the estimates prepared by Mueller et al. (1976)] that for most contaminants, the proportion added to the New York Bight via sewage sludge dumping is generally small; i.e., 1-10 percent of the total. One exception (to the 1-10 percent range) is PCBs."

The PCB exception was based on two technical references; Bopp et al. (1981) and O'Connor et al. (in press). On page 14 of the Swanson et al. (January 1982) draft, the following statements are found:

"Ocean dumped sewage sludge contributes roughly 30 percent of the total PCB loading to the New York Bight with dredged materials contributing approximately 70 percent (Bopp et al. 1981)..... O'Connor, et al. (in press) also have recently estimated the relative percentage contributions of the sources of PCBs to the Apex..... These figures indicate that ocean dumped sewage sludge contributes 19-26% of the PCBs; this generally agrees with Bopp's (1981) estimates. Dredged material contributes 51-61% of the PCBs."

In preparing estimates of current PCB inputs to the apex, the City's consultant reviewed and evaluated the Bopp et al. (1981) paper and the data presented by Swanson et al. (1982) which was attributed to O'Connor et al. (in press). Bopp et al. (1981) did not prepare a mass balance of PCB inputs from all sources to the New York Bight, as might be implied by Swanson et al. (1982). Most notably, they did not prepare an estimate of PCB inputs from the Hudson River discharge. Rather, they prepared an estimate of PCB loadings from the disposal of "recent fine grained sediments" dredged from the harbor annually (which is only a small fraction of the total annual dredged material load) as part of a sediment PCB budget for the entire Hudson River. Bopp et al. (1981) estimated an annual transport of 1,860 kg of PCBs to the New York Bight from dredged material dumping, assuming that 0.62 million metric tons of fine-grained sediments are dredged annually (Gross 1974) at an average concentration of 3 ppm PCBs. The City's consultant estimates that an average of 4.6 million metric tons/year of dredged material (including the recent fine-grained sediments) are currently dumped in the New York Bight apex, at an average concentration of 1 ppm PCBs. This yields an estimated dredged material input of 4,600 kg PCBs/year to the apex. The sources of the data forming the basis for these estimates are detailed in Chapter 6 of New York City's report supporting site designation dated March 9, 1983.

For comparison with their sediment budget, Bopp et al. (1981) calculated an input of PCBs to the Bight from sewage sludge dumping. Assuming an annual input of approximately 0.2 million metric tons of sludge solids per year, at an average dry weight concentration of 3.5 ppm (from a single sample collected from New York City's Wards Island plant around 1976 or 1977), Bopp et al. (1981) calculated an annual input of 700 kg of PCBs/year. The City's consultant used the best data available in mid-1982 to estimate that New York City disposes approximately 91,000 metric tons of sludge solids per year (it was later determined to be 84,140 metric tons in 1982). At dry weight concentrations ranging from 0.556 ppm to 2.82 ppm at the City's 12 treatment plants, the total PCB load from the twelve plants was estimated to be 140 kg/year. Due to a lack of PCB data from the other municipal permittees using the 12-Mile Site, it was assumed that the average concentration of PCBs in sludges from other permittees using the site was the same as the average for New York City's plants, and, therefore, it was estimated that the total PCB load from the other permittees was 167 kg/year. The cumulative PCB load from all current 12-Mile Site permittees is, accordingly, estimated to be 307 kg/year. This cumulative load is based on a total solids load of 199,000 metric tons/year (or approximately 0.2 million metric tons/year). Therefore, only the PCB concentrations used by the City's consultant differ significantly from the estimates used by Bopp et al. (1981). As would be expected with the rapid decline in the use of PCBs

in the late 1970's and the termination of General Electric Company's discharges of PCBs to the upper Hudson River in 1977, the current levels of PCBs in sewage sludge and dredged material are lower than previously estimated. The City's consultant prepared their estimates from analyses conducted during 1982 on multiple sludge samples from each of the City's 12 water pollution control plants, in contrast to the single Wards Island sample from the mid-1970's used by Bopp et al. (1981). Details of the consultant's sludge analyses will be presented in the City's Special Permit Application.

Swanson et al. (1982) cited a PCB contribution of 19-26 percent from sewage sludge and referenced it to O'Conner et al. (in press). The City's consultant is unable to comment on this data until this reference is published and can be reviewed. However, one pertinent observation can be made at this time: in a more recent draft of the Swanson et al. (1982) paper (dated February 1983), the estimates from O'Connor et al. (in press) have been deleted and the estimates from the City's consultant are included. Swanson et al. (1983) cite these data as "recent encouraging information which indicates that the decreased usage of PCBs in the late 1970s may be showing beneficial results." Swanson et al (1983) further state that "If these [recent] PCB concentrations represent a consistent decrease for all 20 [New York metropolitan area] treatment plants, the percentage contribution of PCBs in ocean-dumped New York - New Jersey sewage sludge is now comparable to that of other contaminants in these sewage sludges (i.e., within the 3-12% range)."

Finally, appropriate data are not available at this time to respond to the Committee's request to contrast the PCB levels in New York City and New Jersey Sludges.

- (6) In the event that the 12-mile site is redesignated and additional municipalities from either New York or New Jersey who are not now currently dumping apply for permits to begin dumping at the 12-mile site, would New York support or oppose the granting of such permits (assume the volume and quality of the "new" applicants was similar to the volume and quality which New York now dumps)?

Would New York support opening up the New York Bight apex site to industrial waste dumpers? (If not, why not?)

At what point will the New York Bight Apex have reached its assimilative capacity for sludge dumping, assuming that the present contaminant inputs into the bight apex from other sources continue?

Title I of the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), as amended (33 U.S.C. 1401 et seq.) authorizes the U.S. Environmental Protection Agency (EPA) to grant permits for the ocean disposal of municipal sewage sludges. Although currently under revision, the criteria used to review and evaluate such permit applications are also established by the Act and EPA. Therefore, it is EPA's responsibility to approve or deny permit applications. We would expect that EPA would base that decision upon an objective evaluation of: 1) the quality of the applicant's sludge, 2) whether the proposed disposal of that sludge would satisfy the established criteria, and 3) an assessment of the human health effects, environmental effects, and practicability of the sludge producer's land-based alternatives for disposal. New York City would not presume to prejudge such a permit decision.

Again, under Title I of the MPRSA, the EPA has the responsibility to designate ocean disposal sites and to specify the type of material (e.g., industrial and acid wastes, dredged material, municipal sewage sludges, etc.) which can be disposed at any particular site. Although the City considers it unlikely that the industrial waste generators would petition EPA to allow disposal of their wastes at the 12-Mile Site, this decision is EPA's and should be based upon the requirements of the MPRSA. It should also be noted that there is a currently designated acid waste disposal site within the New York Bight apex located approximately 2.6 nautical miles southeast of the 12-Mile Site.

In order to address the question of the assimilative capacity of any ecosystem such as the New York Bight apex, it is first necessary to decide which effect(s) and what level of that effect are to be used to define the point at which the assimilative capacity is exceeded. For example, the assimilative capacity endpoint of a City's atmosphere could be defined as the level of nitrous oxides that will increase the risk of death by 5 percent for sensitive individuals with respiratory disease, or the level at which smog limits visibility to a certain distance on a certain number of days per year, or the level of PAH's or other compounds that will cause a percent increase in susceptibility to disease in a plant or animal species, or the level at which human life is no longer possible, and so on. However, no such definition exists for the New York Bight or any other ecosystem.

Further, it is certain that the establishment of such a definition would be a complex policy process and that the definition would be revised with evolving knowledge and changing economic and social circumstances.

Because the necessary endpoints have not been defined, and because technical difficulties impede its assessment, assimilative capacity is, at present, a concept with only qualitative usefulness. Therefore, it is inappropriate to speculate what rate of waste inputs may be judged as having exceeded some presently undefined effect level. However, in the future it is important to note that contaminant concentrations, at least for metals, are known to be in an appropriate dynamic, steady-state equilibrium between inputs and removal. This is evidenced by the fact that trace metal distributions in sediments of the New York Bight apex have not changed significantly over a recent five year period (NOAA 1981) or for over a decade based on early measurements (NYC 1983a). Further, no accretion of sediments in the Bight apex, other than dredged materials, has been observed after decades of ocean dumping and discharge. Also, it should be noted that the quantities of PCBs and trace metals introduced into the Bight apex in sewage sludge appear to have decreased in recent years despite some increase in the volumes of sludge ocean disposed. If the present contaminant input rate continues, it is reasonable to assume that this state of dynamic equilibrium will also continue and the contaminant concentrations in the New York Bight apex will not increase.

- (7) In a 1979 presentation to the Merchant Marine and Fisheries Committee, data submitted by the City of New York projected that by the year 2000, the City would be producing 500-600 dry tons of sludge per day, approximately double what the City produces now. Has that figure been revised, or is the City still expected to double its sludge production in the next 20 years?

The following table shows the anticipated sludge production on a plant by plant basis for the year 2000.

	2000 Projected Sludge Production (Dry Tons)
Wards Island	16,529
Hunts Point	8,382
26th Ward	4,320
Coney Island	12,342
Owls Head	11,620
Newtown Creek	25,298
Jamaica	9,376
Tallman Island	5,267
Bowery Bay	12,019
Rockaway	829
Oakwood Beach	2,070
Port Richmond	4,405
Red Hook	2,676
North River	14,019
TOTAL	<u>129,355</u>

or 354.4 Dry Tons/Day

The revised estimate of 354.4 Dry Tons/day for the year 2,000 represents an increase in sludge quantities of only 23.5 percent over 1980 sewage sludge volumes.

- (8) Are New York's sludge barges capable of safely making the trip to the 106-mile site for disposal purposes? If not, what additional modifications are necessary to make that trip?

What are the City's estimated costs for disposal at the 12 and 106-mile sites? Has the City contacted independent barge operators to determine if these costs could be lowered by "contracting out"?

The City's motorized vessels are, for the most part, capable of making the trip to the 106 mile site. However, some modifications would have to be made to the vessels to accommodate the larger crews. Crew quarters, would have to be increased and additional life saving equipment installed.

The City's estimated costs for transporting sludge to the 12 mile and 106 mile sites were included in our comment documents for Site Designation. However, in response to questions raised by Congressman D'Amours, we have reevaluated our estimate for the 106 mile site, and provided the actual dumping costs at the 12 mile site for 1982. They are as follows:

Our revised estimate for the 106 mile site is \$23.22 million. The actual cost in 1982 to transport sludge to the 12 mile site was \$6.22 million. This is much higher than originally estimated because of unusually high shipyard repair contracts required during this particular year. Repairs and maintenance costs were \$2,396,000 for this period. This figure is about twice the average annual expenditure for this item.

An estimate for the cost of private hauling is \$0.35 per cubic foot. Our current operation at the 12 mile site is supplemented with private barging.

(9) The City had at one point developed a "contingency" plan for composting sewage sludge in the event that the ocean dumping option became unavailable. The City has repeatedly called the composting option inadequate because the City has only about a 7-year capacity of land available for composting purposes. Assuming that the City composted slightly less than half of its daily output of sludge, I would assume that the composting option would be available until at least the beginning of the next century. Has the City considered the option of composting a portion of its sewage as a long-term disposal option (for example, for cleaner sludge) and developing more suitable alternatives for the rest? Did the City consider the use of composted material as a "cover" for the Fresh Kills landfill, for which I understand the City brings in dirt daily from N.J. to use as a cover; if so, how much dirt does the City bring in each day for this purpose.

Has the City looked into the possibility of using compost resulting from its "cleaner" sludges in other parts of the State, or tried working with the State in order to find acceptable uses for this sludge outside the City (on other than agricultural land)?

When New York City's land based alternatives were developed in 1978, they were done so not as "contingency" plans, but with the full intent of implementation in order to meet the December 31, 1981 deadline. Contracts were let for the design of dewatering facilities and a composting facility at Wards Island. Both of these designs were, in fact, completed. Centrifuges were purchased and thirteen filter presses were ordered and under construction at the time Judge Sofaer rendered his decision. The City was on schedule to meet the December 31, 1981 deadline.

It should be noted that when the composting alternative was developed here, it was done so because it was the only possible solution that could meet the deadline. It was not selected as the best possible solution for New York City based on environmental, technical or economic arguments, but only because it could meet the deadline. Under the land application regulations at that time, the City could only deposit sludge-derived compost on lands that would remain under the control of the City. The seven year term was based upon the availability of such lands. These lands were primarily underdeveloped park lands (closed former landfills) and existing City landfills. The compost would be used for cover material on the landfills. Fresh Kills Landfill was intended to be the single largest recipient of compost in the system. It would have received 30 percent of all compost produced here.

These land based alternatives were developed in 1978. Since then several things have occurred which would tend to reduce even further the land available for compost application. New York City landfills have been classified as "open dumps" by the New York State Department of Environmental Conservation. The City was ordered to upgrade them to "Sanitary Landfill" classification by 1985 or close them down. The Department of Sanitation is now moving toward a resource recovery solution and probably will ultimately close down all but the Fresh Kills Landfill.

In yet another related act New York State has declared a moratorium on the application of sludge or sludge derived compost on agricultural lands in the state. The NYS Department of Agriculture and Markets is seeking to prevent application on Class 1 and Class 2 lands. One criterion that determines Class 1 and Class 2 lands is land slope. These two classes have slopes up to eight percent. Application of sludge on lands with slopes greater than eight percent is prohibited by State Regulations.

Furthermore, to develop a system of sludge disposal which is based upon the acceptance of the sludge by communities which do not produce it, is risky at best. It is our understanding that the City of Philadelphia is currently experiencing great public opposition in western Pennsylvania.

Finally, in 1978, as part of the Facility Plan for the development of land based alternative sludge disposal methods, a marketing survey was conducted to determine the potential for marketing sludge derived compost in this area. It was determined that no such market existed and further enforced the dedicated land application principle. It is very unlikely that the results of a similar survey conducted today would be any different.

The City is currently purchasing top soil for cover material at the landfills. In Fiscal 1983, the City purchased 900,000 cu.-yds. at prices ranging from \$1.64 to \$3.78 per yard.

(10) One of the issues which New York City and the New Jersey municipalities believe should be factored into a decision of whether ocean dumping should be allowed to continue at the 12-mile site is cost. A quick survey by my staff of costs incurred by other municipalities in disposing of their sludge produced the following:

Chicago -- \$70-90/dry ton (landfilling);
 Denver -- \$65/dry ton (landfill and farm injection);
 Washington D.C. -- \$120-250/dry ton, depending on method
 (composting, incineration, landspreading)

What are New York's (or N.J. municipalities') costs per dry ton in disposing at the 12- and 106-mile sites? It's my understanding that the population of New York (within the City limits) is approximately seven million people. Using rough calculations, it seems that each person in the City pays about 50 cents per year to ultimately dispose of the sewage sludge coming out of the City's treatment plants at the 12 mile site. Moving the site to the 106-Mile location would cost an additional \$1.00 to \$2.00 per year per person. Do you believe this additional cost would be an "unreasonable" burden for New York City's residents to bear? Is it fair to say that ocean dumping has been a virtual bargain for the City since dumping began at the 12-mile site in the 1930's?

New York City does not have the information to estimate sewage sludge management costs of other municipalities. However, based on a limited telephone survey of a few of the larger cities, we would like to provide the following information although the accuracy of any of the figures given can only be verified by the appropriate municipality itself. While the figures obtained by New York City are in general agreement with those listed by Committee staff, there were some discrepancies. The Washington, D.C. costs communicated to New York City ranged from \$142-240 per dry ton, depending upon the management method. Similar figures were reported by Philadelphia (\$150-250 per dry ton, exclusive of digestion and de-watering costs), St. Louis (\$100 per dry ton), and Los Angeles (\$90-100 per dry ton for composting and landfill). It should be noted that these figures

include operational and maintenance costs only and do not reflect capital expenditures. Cost estimates received by New York City for Denver's sludge management program varied significantly from those reported by the Congressional staff; Denver's estimated land application costs received by New York City were \$180 per dry ton. New York City was unable to verify the cost estimates for Chicago during the time available for generating this response.

In 1982, New York City spent \$6,224,285 to dispose of 91,319 Dry Tons of sludge or \$68.16/Dry Ton.

Based upon our estimate of cost to transport sludge to the 106 mile site of \$23.22M, the cost to dispose sludge at the 106 mile site would be \$254.27/Dry Ton.

It can be seen that sludge disposal costs in New York City are not ordinally lower than in other cities. When one also considers that the costs of all municipal services are higher here than in other cities, to seek out more expensive methods for any of these services without a sound basis would be indefensible. When alternate methods are environmentally less acceptable, as we believe land based methods are compared to ocean disposal, such a switch would be irresponsible.

QUESTION FROM CONGRESSMAN FORSYTHE:

1. What is the projected tonnage (on a dry weight basis) of municipal sewage sludge that will be produced by the City of New York for each of calendar years 1983 through 1987. Please break down the above information for each treatment plant.

<u>PLANTS</u>	<u>1980 (Actual)</u>	<u>1982 (Actual)</u>
	<u>DRY TONS</u>	<u>DRY TONS</u>
Wards Island	18,920	16,529
Hunts Point	11,202	8,382
26th Ward	4,189	4,323
Coney Island	4,454	3,206
Owls Head	6,977	6,885
Newtown Creek	26,056	18,028
Jamaica	9,546	9,376
Tallman Island	5,900	5,267
Bowery Bay	8,828	12,019
Rockaway	831	829
Oakwood Beach	3,580	2,070
Port Richmond	4,233	4,405
Red Hook	—	—
North River	—	—
T O T A L	104,716	91,319

The only anticipated increases between 1982 production levels and 1987 will be the addition of sludge produced with Advanced Preliminary treatment at the Red Hook and North River plants in 1986. The following table shows the proposed increases through 1996:

<u>YEAR</u>	<u>STATUS</u>	<u>TOTAL ANNUAL PRODUCTION DRY TONS</u>	<u>TOTAL DAILY PRODUCTION DRY TONS</u>
1982	Current	91,319	250.2
1986	Red Hook & North River Advanced Preliminary	93,836	270.8
1989	Red Hook - Secondary	99,822	273.5
1991	North River - Secondary	108,231	296.5
1996	Owls Head, Coney Island and Newtown Creek - Secondary	128,185	351.2

QUESTIONS FROM CONGRESSMAN CARPER

1. Does the City produce any sludge which might be clean enough for land application or composting?

Municipal sewage sludges are extremely variable in their composition and in the degree to which they are contaminated with metals and various other chemicals. However, New York City's sludges, in general, are not conducive to land application or composting. The New York State Department of Environmental Conservation has issued a set of guidelines for the land application and composting of sewage sludges. Although a few of New York City's treatment plant sludges might qualify subsequent to full implementation of the pretreatment program, it is clear that most, if not all, of the City's sludges cannot be landspread, primarily due to their copper concentrations. Available evidence indicates that the copper in NYC's sludges is predominantly introduced from residential and other non-industrial sources and, therefore, copper concentration will not be significantly reduced by industrial pretreatment. Although the New York State guidelines for sludge quality are applicable to pre-composted sludges, sludges that exceed the criteria may be composted and then used as ground cover on certain degraded land areas, such as city-owned landfills. However, the land area available to the City for this option is extremely limited and such disposal would remain an option for only a short period of time.

In addition, New York State has extended a moratorium on all landspreading of municipal sewage sludge on the "better" agricultural soils of the State. As long as this moratorium remains in place, even the cleanest sludges are not allowed to be landspread on approximately half of the State's agricultural lands. While the State may revise both its moratorium and its sludge quality criteria for landspreading, the sludges currently produced by the City could not be disposed by land application or composting except in very limited, highly degraded land areas.

2. Why is the City of Philadelphia able to find landbased disposal alternatives for its sewage sludge while NYC dumps all of its sludge?

There are a number of reasons why the City of Philadelphia has been able to dispose of its sludges on land, while New York City has continued to ocean dispose its sludge. As stated above, New York City's sludges generally cannot pass either U.S.D.A. or New York State criteria for the quality of sludges that can be land-applied. Philadelphia's sewage sludges generally may contain lower concentrations of heavy metals which makes them more appropriate for land application. In fact, some 35 percent of Philadelphia's sludges are reported to be suitable for land application to local farms and parks and some are even suitable for commercial trade to other states. The City of Philadelphia has been applying most of its sludges (60 percent) to abandoned strip-mined lands in western Pennsylvania which are already environmentally degraded. Since suitable strip-mined lands are

of limited availability, Philadelphia may be forced to seek other alternatives in the future.

3. Is Philadelphia sludge cleaner than all of NYC's sludges?

As previously stated, the quality of sewage sludges from a given plant varies from day-to-day. In addition, there is variability in sludge quality between treatment plants, depending on the type of service area (e.g., industrial, residential, etc.), the quality of the water supply, the types of treatment processes employed, etc. However, in general, sludges from most of the New York City plants may contain higher metal concentrations than those from the Philadelphia plants (Table 4).

4. How does the sludge from Philadelphia and NYC compare in terms of contaminants and suitability for land application or other land-based alternatives?

Table 4 compares concentrations of certain heavy metals in sludges from two areas of Philadelphia with the concentrations found in New York City sludges. There are two sets of New York City figures, both of which show the range of values among the 12 treatment plants and an average for these 12 plants. The two sets of figures were derived independently by two different City contractors and are similar.

The table also shows metal concentrations that are allowed by New York State in sewage sludges which are to be landspread on agricultural lands. The data in Table 4 generally indicate that

Philadelphia sludges would usually satisfy U.S.D.A. and N.Y. State requirements (although copper concentrations are marginal), while New York City's sludges do not, or would only extremely rarely, qualify to be disposed on land.

5. Is there a significant difference in the sewer systems of these two cities which may affect the relative cleanliness of their sludges?

A detailed comparative study of the sewer system of Philadelphia and New York City would be required to fully assess whether or not any significant differences in the two systems exist which would affect the relative "cleanliness" of the sludges. The two systems are generally similar with respect to their age, and both are combined systems in which rainfall runoff from the streets is combined with domestic and industrial sewage in a sewer system leading to the treatment plants. However, many other factors can affect sludge quality, including: the characteristics of the local water supply (particularly its acidity) and soils, the materials comprising the sewer and piping systems, the nature and quantity of industrial wastes entering the system, and the types of treatment processes used. It is interesting to note that Philadelphia estimates that approximately 10% of its inflow comes from industrial sources, while New York City estimates that only approximately 4% of the influent to its twelve plants is industrial. This fact when combined with evidence that concentrations of at least some heavy metals may be moderately higher in New York's sewage sludges than in

Philadelphia's generally would tend to support New York City's findings that sources of certain metals to its treatment plants are predominantly non-industrial (i.e., commercial, residential, run-off, and water supply).

6. Are there any other factors which might require the cities to employ different disposal options?

In addition to the previously mentioned factors of differing sludge quality, differing state regulations, and amount of land area available (factors that greatly influence direct land application), incineration is probably a less acceptable option for New York City than for Philadelphia because of the differences in ambient air quality.

TABLE 1—ANNUAL MASS CONSTITUENT LOADS TO THE 12-MILE SITE FROM SEWAGE SLUDGE DUMPING

Parameter	Annual Loads (metric tons/yr) ^(a)		
	NYC (12 POTWs)	NJ, Westchester, Nassau (7 POTWs)	Totals
Total Solids	91,000	108,000	199,000
Oil and Grease	6,570	10,209	16,779
Petroleum Hydrocarbons (b)	3,692	6,576	10,268
Mercury	0.495	1.16	1.66
Cadmium	4.17	4.66	8.83
Arsenic	1.45	1.37	2.82
Chromium	101	55.1	156
Copper	208	125	333
Nickel	26	16	42
Lead	116	80.4	196
Vanadium	3.42	0.416(c)	3.84
Zinc	224	334	558
PCBs	0.14	0.167(d)	0.307
	MPN/yr	MPN/yr	MPN/yr
Total Coliforms	1.81×10^{16}	5.4×10^{18}	5.42×10^{18}
Fecal Coliforms	3.22×10^{15}	9.3×10^{16}	9.62×10^{16}

(a) Based on 1981 quantities of wet sludge solids and 1981-1982 sludge chemistry data.

(b) Petroleum hydrocarbon loads are not additional to the oil and grease loads (i.e., oil and grease include petroleum hydrocarbons).

(c) Vanadium detected in Middlesex County only (other vanadium data are based on higher detection limits; reported as <0.50 mg/kg).

(d) Predicted load derived from the New York City load of 0.14 metric tons/yr x 1.19 (the ratio of the cumulative New Jersey, Westchester and Nassau solids load to the New York City solids load).

Source: NYC (1983), Table 6-16.

TABLE 2
 DISTRIBUTION OF ESTIMATED CONSTITUENT LOADINGS TO THE NEW YORK BIGHT APEX [Source: NYC (1983), Table 6-22]

Sources	Annual Load (metric tons/yr)											(HR/yr) Fecal Coliforms $\times 10^6$	
	Total Solids Oil and Grease $\times 10^6$	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Vanadium	Zinc	PCBs		
Hudson - Raritan Estuary(a)	1.8	128,000	73	58	741	1,240	1,020	28	620	--	3,430	4.6	4,800
Dredge Spoil Dumping(b)	4.6	31,800	57.5	33.1	644	1,370	851	16.1	335	--	2,640	4.6	--
Sewage Sludge Dumping(c)	0.199	16,800	2.82	8.83	156	333	196	1.65	42	3.84	558	0.307	9.62
Acid Wastes Dumping(d)	--	6	--	0.31	14.2	4.8	2.1	0.015	--	--	26.4	--	--
Cellar Dirt Dumping(e)	0.371	--	--	--	--	--	--	--	--	--	--	--	--
Atmospheric Deposition(f)	--	--	0.24	0.29	0.16	--	25	--	2.6	3.0	34	0.2	--
N.J. Coastal Discharge(g)	0.0489	27,700	--	4.38	11.7	43.8	24.5	6.2	--	--	120	--	321
L.I. Coastal Discharge(g)	0.0061	1,970	--	0.584	694	10.6	7.3	0.62	--	--	32.8	--	0.0402

(a) Represents total potential load from within the estuary, some of which enters the Apex via dredge spoil dumping.

(b) Based on current and projected annual average volume of 10 million cubic yards.

(c) Based on actual 1981 sludge volumes reported to EPA Region II.

(d) From EPA (1979).

(e) Based on 1973-1978 average volume. However, no dumping occurred in 1981 (EPA 1982).

(f) Loadings based on 2,000 square kilometers apex surface area.

(g) From Møller et al. (1976), converted to annual loads. Represents total potential coastal loads; not all discharge directly to the apex.

Note: Dashed lines indicate missing data.

TABLE 3--RELATIVE PERCENT CONTRIBUTION OF SEWAGE SLUDGE
CONSTITUENTS TO TOTAL APEX LOADS

Constituent	Approximate (a) Total Load (metric tons/yr)	Contribution from Sewage Sludge Dumping (percent)
Oil and Grease	206,000	8
Arsenic	134	2
Cadmium	105	8
Chromium	1,640	10
Copper	3,000	11
Lead	2,130	9
Mercury	53	3
Nickel	1,000	4
Zinc	6,840	8
PCBs	9.7	3
	<u>MPN/yr</u>	
Fecal Coliforms	4.84×10^{19}	0.2

(a) Derived from the summation of columns on Table 2.

Source: NYC (1983), Table 6-23.

TABLE 4

COMPARISON OF METAL CONCENTRATIONS OF NEW YORK CITY AND PHILADELPHIA SEWAGE SLUDGES
(mg/kg)

	NYC RANGES (a) (MEDIAN)	NYC RANGES (b) (MEDIAN)	PHILADELPHIA		USDA/NY STATE LIMITS (d)
			SOUTHWEST (c)	NORTHEAST	
Cd	7-147 (10)	10-145 (11)	14	10	25
Cr	53-2746 (378)	81-3308 (518)	274	202	1000
Cu	1200-3635 (1856)	750-2824 (1584)	335	960	1000
Ni	29-1696 (142)	46-1206 (170)	71	123	200
Pb	326-3621 (548)	316-6098 (763)	410	324	1000
Zn	936-4332 (1821)	963-4813 (1458)	1760	1720	2500

(a) Source of data - NYC Site Designation Documents (1983).

(b) Source of data - NYC Industrial Pretreatment Program (1983).

(c) Primarily domestic sources.

(d) Source of data - EPA/FDA/USDA (1981). N.Y. State also uses these guidelines.

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Mr. D'AMOURS. Our next witnesses are the Honorable Michael Castle, who is the Lieutenant Governor of the State of Delaware, and Mr. Paul Arbesman, who is deputy commissioner of New Jersey's Department of Environmental Protection.

Gentlemen, I would appreciate it if you would approach the table at this time. We will have you testify one after the other and questions will be asked of the two of you together as a panel.

STATEMENTS OF HON. MICHAEL N. CASTLE, LIEUTENANT GOVERNOR, STATE OF DELAWARE, ACCOMPANIED BY TOM EICHLER, DIRECTOR, DIVISION OF ENVIRONMENTAL CONTROL; PAUL ARBESMAN, DEPUTY COMMISSIONER, NEW JERSEY'S DEPARTMENT OF ENVIRONMENTAL PROTECTION, ACCOMPANIED BY BARRY SCHMIDT, CHAIRMAN, COMMITTEE ON OCEAN WASTE MANAGEMENT

Mr. D'AMOURS. Before we begin I would like to recognize out of order the gentleman from Delaware, Mr. Carper, for the purpose of introducing the Lieutenant Governor of the State of Delaware.

Mr. Carper.

Mr. CARPER. Thank you very much, Mr. Chairman.

I am delighted this afternoon to have before this subcommittee our Lieutenant Governor, Michael N. Castle, who previously served as a State senator and State representative in the State of Delaware. He was minority leader and today serves as Lieutenant Governor. A personal friend, someone with whom I have a great deal of respect and admiration. He shares my concerns about the prospective damage that could be done to our State by designation of the 106-mile site.

I just want to welcome you and Tom Eichler, director of the division of environmental control. Welcome.

Mr. D'AMOURS. Thank you, Mr. Carper.

Gentlemen, if you would like to proceed. Lieutenant Governor Castle, please.

STATEMENT OF MICHAEL N. CASTLE

Mr. CASTLE. Thank you, Mr. Chairman, and thank you, Congressman Carper. You have met Tom Eichler, to my left, director of the environmental control.

My experience is quite a bit less than Mayor Koch's. My concerns are the same but my conclusions are different than his conclusions. For the past 11 years, Members of Congress have been talking about ocean dumping. For the past 11 years, Delawareans have been saying to the Congress, to agents of the Environmental Protection Agency, Federal oceanographers, and to anyone who might listen, we do not want sludge from distant municipalities, or for that matter from any source whatsoever, disposed of or dispersed in the ocean off our coastline.

Fifteen days ago, in Rehoboth Beach, Del., a place that is well known to you folks in this area, the EPA held a public hearing on the issue that rests before us today. At the hearing, the entire Delaware congressional delegation, Senator Roth, Senator Biden, and Representative Carper, expressed unequivocal opposition to designation of the so-called 106-mile site, as did Delaware's Gover-

nor, Pierre S. du Pont, and Delaware's attorney general, Charles Oberly.

Governor du Pont's views could be considered expert testimony; while serving as Delaware's lone Member of the U.S. Congress in 1972, he was a member of the committee which wrote the Marine Protection, Research, and Sanctuaries Act.

The aforementioned elected political leaders were reflecting the concerns of all of us in Delaware. The quality of Delaware's coastal waters, beaches, and wetlands is vital to our economic and personal well being.

The dumping of sewage sludge in the Atlantic Ocean involves three sites. The EPA proposes designation of the 106-mile site off Delaware's coast for sludge dumping over a 5-year period. In addition, New York City and six northern New Jersey sewage authorities have petitioned the EPA to redesignate a 12-mile site and a 60-mile site, both off the New Jersey and New York coasts for sewage sludge dumping. The 12-mile site has been used for that purpose for many years.

The 1980 environmental impact statement on the 106-mile site said that the feasibility of municipal sewage sludge disposal at the 106-mile site is a special case and that "the only reasonable long-term solution for disposal of harmful sewage sludge is by means of land-based processes." In view of that statement, I urge the EPA to insist that New York City and northern New Jersey sewage authorities make every possible effort to find land-based means of sludge disposal.

It is technologically and financially feasible to process and dispose of wastes on land. What is required is a consistent national policy and a national goal to avoid adding to the pollution of the oceans and estuaries.

Delaware has already made such a commitment. Although Delaware could have requested permission to dump waste materials in the ocean, it did not. Delaware has established a land-based treatment system to assure that the ocean environment is not affected by residual waste disposal.

We have spent nearly \$65 million to construct the Delaware reclamation project. This facility has the capability of processing 1,000 tons of solid waste per day and 350 tons of sludge per day from the metropolitan area of Wilmington, Del.

This land-based reclamation system is easily monitored not only by plant officials, but also by the regulatory agencies of the State and Federal Governments. Should there be some future indication that this land-based system of disposal needs improvement or correction, there will be ample time and opportunity to do so. Not so in an ocean environment.

New York City and New Jersey could design similar systems that would dispose of solid waste and sludge in a cost-effective manner. In Delaware, the average family will pay approximately 25 cents per day for sewage sludge and solid waste disposal. For that price, our residues are disposed of using environmentally safe methods and without the threat of harm to the land or ocean environment of neighboring States.

Delawareans are not alone in taking responsible steps to avoid ocean dumping. Philadelphia has found alternatives, too. If we can

do it, certainly New York and northern New Jersey communities can do the same. It will become impossible to safeguard the environment, if the Federal Government allows recalcitrant cities to follow environmentally unsound practices that threaten ocean life and adversely affect the coastal resources of neighboring States.

Finally, I must express grave concern over the ability of the Environmental Protection Agency to strictly police ocean dumping regulations at the 106-mile site. First, its distance from shore makes short dumping a very real possibility, particularly in foul weather. The environmental impact statement admits that the 106-mile site is beyond the normal range of Coast Guard patrol vessels and helicopters. The EIS refers to the environmental acceptability of using the 106-mile site under "carefully controlled conditions—and accompanied by a comprehensive monitoring program." Are the funds, equipment, and manpower available to the Environmental Protection Agency and the Coast Guard to monitor an entire ocean disposal operation from the port to the 106-mile site?

The Marine Protection, Research, and Sanctuaries Act was intended to discourage ocean waste disposal in the long run. Eleven years ago at the time of its enactment, ocean dumping was viewed as a regrettable, temporary means of disposal to be sanctioned only if every other reasonable method was unattainable or potentially more harmful. Wherever possible, wastes were to be recycled to reduce disposal needs. Ocean dumping was never intended to replace other methods solely because it might represent the least expensive alternative to dispose of toxic materials.

Eleven years later, after numerous hearings in Delaware, southern New Jersey, and Maryland at which residents and elected officials expressed vehement opposition to ocean dumping off our coastlines, in testimony, which was recorded, transcribed, and kept on file with the Federal Government, I and others must come before Federal officials again to reiterate our same concerns.

I speak for hundreds of thousands of people when I say I find this very frustrating, and I call on you to end the talk about ocean dumping at the 106-mile site. If you agree with our well-documented position, we urge you to help us convince the EPA of the harm that will occur if ocean dumping regulations are weakened or if the practice of ocean dumping is allowed to expand.

Regardless of your position on this matter, the State of Delaware will pursue every legal means of blocking the selection of the 106-mile site. We are tired of talking.

Thank you.

Mr. D'AMOURS. So are we. Thank you, Lieutenant Governor.

[The statement of Mr. Castle follows:]

PREPARED STATEMENT OF MICHAEL N. CASTLE

One of the institutional features of U.S. Congress is an abnormal fascination with talk.

For the past eleven years, members of Congress have been talking about ocean dumping. For the past eleven years, Delawareans have been saying to the Congress, to agents of the Environmental Protection Agency, federal oceanographers, and to anyone who might listen we do not want sludge from distant municipalities, or for that matter from any source whatsoever, disposed of or dispersed in the ocean off our coastline.

Fifteen days ago, in Rehoboth Beach, Delaware, the E.P.A. held a public hearing on the issue that rests before us today. At the hearing, the entire Delaware Congressional delegation, Senator Roth, Senator Biden, and Representative Carper expressed unequivocal opposition to designation of the so-called 106 mile site, as did Delaware's Governor, Pierre S. du Pont, and Delaware's Attorney General, Charles Oberly.

Governor du Pont's views could be considered expert testimony; while serving as Delaware's lone member of U.S. Congress in 1972, he was a member of the committee which wrote the Marine Protection, Research, and Sanctuaries Act.

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The aforementioned elected political leaders were reflecting the concerns of all of us in Delaware. The quality of Delaware's coastal waters, beaches and wetlands is vital to our economic and personal well-being.

While the values of our coastal resources can not be expressed adequately in terms of economic statistics, a recitation of such data suggests both the practical and esthetic lure of Delaware's shorelines.

Over 30,000 boats currently are registered in Delaware, more than double the number ten years ago. The charter and head boat industry contributes about \$3.5 million to the State's economy each year. In 1982, sport fishing contributed approximately \$9 million to our economy. Our three coastal State parks annually attract nearly 2 million visitors, and nearly two-thirds of coastal park revenues are supplied by out-of-state visitors. Statewide in 1981, out-of-state visitors contributed about \$461 million to Delaware's economy, most of which was spent in our coastal area. Citizens of Rehoboth Beach and other coastal resort communities will attest to the absolutely essential role of the environment to their local economies and tax revenues.

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The dumping of sewage sludge in the Atlantic Ocean involves three sites. The EPA proposes designation of the 106 Mile Site off Delaware's coast for sludge dumping over a five year period. In addition, New York City and six northern New Jersey sewage authorities have petitioned the EPA to redesignate a 12 Mile Site and a 60 Mile Site, both off the New Jersey and New York coasts for sewage sludge dumping. The 12 Mile Site has been used for that purpose for many years.

The 1980 Environmental Impact Statement on the 106 mile site said that the feasibility of municipal sewage sludge disposal at the 106 Mile Site is a special case and that, "...the only reasonable long term solution for disposal of harmful sewage sludge is by means of land-based processes." In view of that statement, I urge the EPA to insist that New York City and northern New Jersey sewage authorities make every possible effort to find land-based means of sludge disposal.

It is technologically and financially feasible to process and dispose of wastes on land. What is required is a consistent national policy and a national goal to avoid adding to the pollution of the oceans and estuaries.

Delaware has already made such a commitment. Although Delaware could have requested permission to dump waste materials in the ocean, it did not. Delaware has established a land based treatment system to assure that the ocean environment is not affected by residual waste disposal.

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We have spent nearly \$65 million (ironically, about \$40 million came from the Environmental Protection Agency Grants Program) to construct the Delaware Reclamation Project. This facility has the capability of processing 1000 tons of solid waste per day and 350 tons of sludge per day from the metropolitan area of Wilmington, Delaware.

The cost of the construction and operation of this plant will be borne by the nearly half million people living nearby. Waste materials are processed so that recoverable items are returned to the economic cycle. The plant produces humus and refuse derived fuel -- humus used in our agriculture and turf grass industry and fuel to produce electric power and to satisfy the energy needs of the reclamation plant itself. Excess power will be sold to the local electric utility company. Only residues which have no economic value are sent to the adjacent landfill. Even the landfill will help pay for itself, when later this year methane gas captured there will be sold to a private supplier.

This land based reclamation system is easily monitored not only by plant officials, but also by the regulatory agencies of the State and Federal Governments. Should there be some future indication that this land based system of disposal needs improvement or correction, there will be ample time and opportunity to do so. Not so in an ocean environment. Once material is dumped in the ocean, it is not recoverable and we must accept whatever consequences may befall us.

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New York City has enormous quantities of solid waste and sewage sludge. Handling it is admittedly a problem, but not an insurmountable one. The city's demand for heating and cooling systems is also enormous. A significant portion of the heating and cooling load could be transferred to boiler systems using solid wastes and sewage sludge as feedstocks. This technology is practical, feasible, and would reduce dependence on fuel oil.

There are examples of this technology at work in the State of New York. The Eastman Kodak facility in Rochester is an example of co-combustion of solid wastes and sewage sludge, and good planning and execution of this technology. The solid wastes produced by the sprawling Kodak facility are used as fuel to produce steam for the plant's production needs. The flue gases from combustion of solid wastes are used to dry the sewage sludge generated by Kodak's wastewater treatment plant. The dried sludge is mixed with the solid wastes and fed to the boiler system.

New York City could design similar systems that would dispose of solid waste and sludge in a cost effective manner. In Delaware, the average family will pay approximately 25 cents per day for sewage sludge and solid waste disposal. For that price, our residues are disposed of using environmentally safe methods and without the threat of harm to the land or ocean environment of neighboring states.

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Delawareans are not alone in taking responsible steps to avoid ocean dumping. Philadelphia has found alternatives, too. If we can do it, certainly New York and northern New Jersey communities can do the same. It will become impossible to safeguard the environment, if the Federal Government allows recalcitrant cities to follow environmentally unsound practices that threaten ocean life and adversely affect the coastal resources of neighboring states.

Finally, I must express grave concern over the ability of the Environmental Protection Agency to strictly police ocean dumping regulations at the 106 mile site. First, its distance from shore makes "short dumping" a very real possibility, particularly in foul weather. The Environment Impact Statement admits that the 106 mile site is beyond the normal range of Coast Guard patrol vessels and helicopters. The E.I.S. refers to the environmental acceptability of using the 106 mile site under "carefully controlled conditions... and accompanied by a comprehensive monitoring program." Are the funds, equipment, and manpower available to the Environmental Protection Agency and the Coast Guard to monitor an entire ocean disposal operation from the port to the 106 mile site?

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The Marine Protection, Research, and Sanctuaries Act was intended to discourage ocean waste disposal in the long run. Eleven years ago at the time of its enactment, ocean dumping was viewed as a regrettable, temporary means of disposal to be sanctioned only if every other reasonable method was unattainable or potentially more harmful. Wherever possible, wastes were to be recycled to reduce disposal needs. Ocean dumping was never intended to replace other methods solely because it might represent the least expensive alternative to dispose of toxic materials.

Eleven years later, after numerous hearings in Delaware, southern New Jersey and Maryland at which residents and elected officials expressed vehement opposition to ocean dumping off our coastlines, testimony which was recorded, transcribed, and kept on file with the Federal Government, I and others must come before Federal officials again to reiterate our same concerns.

I speak for hundreds of thousands of people when I say I find this very frustrating, and I call on you to end the talk about ocean dumping at the 106 mile site. If you agree with our well documented position, we urge you to help us convince the E.P.A. of the harm that will occur if ocean dumping regulations are weakened or if the practice of ocean dumping is allowed to expand.

Regardless of your position on this matter, the State of Delaware will pursue every legal means of blocking the selection of the 106 mile site. We're tired of talking.

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Mr. D'AMOURS. Mr. Arbesman.

STATEMENT OF PAUL ARBESMAN

Mr. ARBESMAN. Mr. Chairman, members of the committee, thank you very much. I am Paul Arbesman, deputy commissioner for the New Jersey Department of Environmental Protection. I am pleased to be here today in behalf of the State of New Jersey to discuss the set of recommendations that we have developed addressing the ongoing controversy associated with disposal of sewage sludge at the 12-mile site within the New York Bight Apex.

The congressionally mandated 1981 ocean dumping phaseout has not been implemented. Litigation occurred and the results have compounded the issues and confused the decisionmaking process. Congress, EPA, the States, the current ocean dumpers, and environmental groups all share the frustration that the current predicament has brought. The solution requires the cooperation and necessary action of all affected parties.

The New Jersey Department of Environmental Protection offers a set of recommendations which we believe may form the basis for decisionmaking on disposal of sewage sludge into the New York Bight Apex. The aims of the DEP's proposed strategy are to:

Resolve temporarily the issues currently in litigation. We believe the litigation has created a decisionmaking void as dumping continues at the 12-mile site.

Provide a mechanism to make long-term decisions on the use of the ocean, the land, and the air as disposal media for sewage sludge generated by the current ocean dumpers.

Move immediately to improve the quality of sewage sludge.

Expand the long-term disposal options by improving the quality of the sludge.

Provide a funding source to assist in the implementation of long-term sludge disposal options by the affected sewerage authorities and municipalities.

The approach outlined is meant to support Congress in taking action during the reauthorization process of the Marine Protection, Research, and Sanctuaries Act. We specifically recommend the following programs:

(a) The designation by Congress of the 12-mile sewage sludge disposal site as the ocean disposal site for current ocean dumpers of sludge for a period of up to 5 years from the date of reauthorization of the Marine Protection, Research, and Sanctuaries Act [MPRSA].

(b) A requirement by Congress that continued use of the 12-mile site be subject to preparation of a comprehensive multimedia assessment by EPA in cooperation with the States of New Jersey and New York. The multimedia assessment under the NEPA format should analyze the various land-based alternatives and ocean disposal at the 12-, 60-, and 106-mile sites to determine the most environmentally acceptable disposal method and the technological, economic, and legal requirements necessary to produce acceptability. Congress should mandate that the assessment be completed no later than 3 years from the date of reauthorization of the MPRSA. Final decisionmaking on the most acceptable disposal method or

methods should then take place by EPA, Congress, and the affected States and implementation begin within the recommended 5-year interim ocean dumping authorization.

(c) The enactment by Congress of user fees for ocean disposal at the 12-mile site. The fees should be tied to the 5-year interim ocean disposal authorization and designed to provide a framework for final resolution of the disputed issues. A fee structure should be established to accomplish the following purposes:

One. Provide for a multimedia assessment under the NEPA format,

Two. Continue monitoring and surveillance by EPA, the Coast Guard and NOAA,

Three. Conduct research on the impact of ocean disposal of sewage sludge,

Four. Conduct research on land-based sludge management and disposal technologies applicable to the New York/northern New Jersey metropolitan area, and

Five. Help finance facilities necessary for implementation of the adopted long-term sludge disposal method.

At the fee levels we recommend, a fixed percentage of the fees, between 10 and 15 percent, should be collected by EPA and be adequate for the purposes above. The remainder of the fees should be levied but not collected by the Federal Government. Rather, we believe the fees should be placed in special trust accounts established by each of the sewerage agencies and dedicated for the financing of long-term sludge disposal methods. The funds could be drawn upon by the sewerage agency to finance the selected long-term sludge disposal option.

The user fees should be graduated over the 5-year period to lessen the economic impact on the industrial users and communities within the service area. The fee structure should be sufficient in size to accomplish the Federal purposes and make a meaningful contribution to a facilities financing program. A fee tied to a portion of the estimated short-term cost differential from dumping at the 12-mile site versus the 106-mile site may be an equitable starting point.

(d) Within one year of reauthorization of the MPRSA, the promulgation of interim sewage sludge quality standards. The standards could be developed through a regional rulemaking process in which EPA would invite technical participation by New Jersey and New York. The interim sludge quality standards should speed up implementation of industrial pretreatment programs consistent with section 307 of the Clean Water Act by giving the sewer authorities a target to shoot at. The standards may also vary for ocean disposal versus on-land disposal. The interim standards should be tied to a 4-year compliance schedule designed to improve the quality of the sludges to the point of expanding treatment and disposal options.

(e) Continued direction by Congress for EPA to develop and promulgate national categorical pretreatment standards for industries to implement.

(f) Direction by Congress that EPA develop and promulgate national ambient air quality standards for heavy metals and toxic or-

ganics. These standards are necessary to evaluate the land-based option of thermal reduction.

Our strategy is predicated on two premises. First we need a comprehensive basis for decisionmaking which can only be brought forth in a multimedia assessment that evaluates both the land-based alternatives and the several ocean disposal sites. This has not been done in the past. Second, by improving the quality of the sludges, the disposal options should be expanded and the decision-making process made easier.

This six-point program is a product of the DEP's Committee on Ocean Waste Management. I would like at this point to introduce Larry Schmidt, who is chairman of that committee. The committee has representation from seven diverse elements of the department with members bringing technical expertise in disciplines ranging from the marine sciences to air pollution and industrial pretreatment. The initial set of recommendations was developed over 3 months ago. Rather than releasing it as the State's portion, we have sought to meet informally with the affected parties in an effort to seek a consensus. The six current ocean dumpers in our State, the city of New York, lawmakers, and selected environmental and business groups each have had an opportunity to listen and react to our proposals. We are convinced, now more than ever, that the State's set of recommendations represent a solid middle ground, one in which rational decisionmaking can take place over a sensible timeframe.

In addition to our formal comments, the subcommittees have asked three specific questions of the State of New Jersey. I would ask the chairman if he would like us to respond now or wait for the question and answer period.

Mr. D'AMOURS. I would prefer that you submit that information for the record which will be kept open for that purpose without objection.

Mr. ARBESMAN. Thank you, Mr. Chairman.
[The statement of Mr. Arbesman follows:]

PREPARED STATEMENT OF PAUL ARBESMAN, DEPUTY COMMISSIONER

Chairman D'Amours, Chairman Breaux, and members of the Subcommittees, I am Paul Arbesman, Deputy Commissioner of the New Jersey Department of Environmental Protection. I am pleased to be here today on behalf of the State of New Jersey to discuss a set of recommendations developed by the State Department of Environmental Protection addressing the ongoing controversy associated with the disposal of sewage sludge at the 12 mile site within the New York Bight Apex.

Dealing with the disposal of sewage sludge from the New York-Northern New Jersey metropolitan area is a real challenge in ocean waste management. There are currently nine municipalities and sewerage authorities in New York and New Jersey that dispose of sewage sludge in the ocean. Those nine current ocean dumpers create over 300,000 dry tons of sludge each year.

The Congressionally mandated 1981 ocean dumping phase-out has not been implemented. Litigation occurred and the results have compounded the issues and confused the decision-making process. Congress, EPA, the States, the current ocean dumpers, and environmental groups all share the frustration that the current predicament has brought. The solution requires the cooperation and necessary action of all affected parties.

The New Jersey Department of Environmental Protection offers a set of recommendations which we believe may form the basis for decision making on disposal of sewage sludge into the New York Bight Apex. The aims of the DEP's proposed strategy are to:

- Resolve temporarily the issues currently in litigation. We believe the litigation has created a decision-making void as dumping continues at the 12 Mile Site.
- Provide a mechanism to make long term decisions on the use of the ocean, the land, and the air as disposal media for sewage sludge generated by the current ocean dumpers.
- Move immediately to improve the quality of sewage sludge.
- Expand the long-term disposal options by improving the quality of the sludge.
- Provide a funding source to assist in the implementation of long-term sludge disposal options by the affected sewerage authorities and municipalities.

The approach outlined is meant to support Congress in taking action during the reauthorization process of the Marine Protection, Research and Sanctuaries Act. We specifically recommend the following program:

- a) The designation by Congress of the 12 Mile Sewage Sludge Disposal Site as the ocean disposal site for current ocean dumpers of sludge for a period of up to five years from the date of reauthorization of the Marine Protection, Research, and Sanctuaries Act (MPRSA).

- b) A requirement by Congress that continued use of the 12 Mile Site be subject to preparation of a comprehensive multi-media assessment by EPA in cooperation with the States of New Jersey and New York. The multi-media assessment under the NEPA format should analyze the various land based alternatives and ocean disposal at the 12, 60, and 106 mile sites to determine the most environmentally acceptable disposal method and the technological, economic, and legal requirements necessary to produce acceptability. Congress should mandate that the assessment be completed no later than three years from the date of reauthorization of the MPRSA. Final decision-making on the most acceptable disposal method or methods should than take place by EPA, Congress and the affected states and implementation begin within the recommended five year interim ocean dumping authorization.
- c) The enactment by Congress of user fees for ocean disposal at the 12 Mile Site. The fees should be tied to the five year interim ocean disposal authorization and designed to provide a framework for final resolution of the disputed issues. A fee structure should be established to accomplish the following purposes:
- 1) Prepare a multi-media assessment under the NEPA format,
 - 2) Continue monitoring and surveillance by EPA, the Coast Guard and NOAA,
 - 3) Conduct research on the impact of ocean disposal of sewage sludge,
 - 4) Conduct research on land based sludge management and disposal technologies applicable to the New York/Northern New Jersey metropolitan area, and
 - 5) Help finance facilities necessary for implementation of the adopted long term sludge disposal method.

At the fee levels we recommend, a fixed percentage of the fees, between 10-15%, should be collected by EPA and be adequate for the purposes above. The remainder of the fees should be levied but not collected by the federal government. Rather, the fees should be placed in special trust accounts established by each of the sewerage agencies and dedicated for the financing of long term sludge disposal methods. The funds could be drawn upon by the sewerage agency to finance the selected long term sludge disposal option.

The user fees should be graduated over the five year period to lessen the economic impact on the industrial users and communities within the service area. The fee structure should be sufficient in size to accomplish the federal purposes (1-5 above) and make a meaningful contribution to a facilities financing program. A fee tied to a portion of the estimated short term cost differential from dumping at the 12 Mile Site versus the 106 Mile Site may be an equitable starting point.

- d) Within one year of reauthorization of the MPRSA, the promulgation of interim sewage sludge quality standards. The standards could be developed through a regional rule-making process in which EPA would invite technical participation by New Jersey and New York. The interim sludge quality standards should speed-up implementation of industrial pretreatment programs consistent with Section 307 of the Clean Water Act. By giving the sewer authorities a target to shoot at, the standards may also vary for ocean disposal versus on-land disposal. The interim standards should be tied to a four year compliance schedule designed to improve the quality of the sludges to the point of expanding treatment and disposal options.
- e) Continued direction by Congress for EPA to develop and promulgate national categorical pretreatment standards for industries to implement.
- f) Direction by Congress that EPA develop and promulgate national ambient air quality standards for heavy metals and toxic organics. These standards are necessary to evaluate the land based option of thermal reduction.

Our strategy is predicated on two premises. First, we need a comprehensive basis for decision-making which can only be brought forth in a multi-media assessment that evaluates both the land based alternatives and the several ocean disposal sites. Second, by improving the quality of the sludges, the disposal options should be expanded and the decision-making process made easier.

This six point program is a product of the DEP's Committee on Ocean Waste Management. The Committee has representation from seven diverse elements of the Department with members bringing technical expertise in disciplines ranging from the marine sciences to air pollution and industrial pretreatment. The initial set of recommendations was developed over three months ago. Rather than releasing it as the State's portion, we have sought to meet informally with the affected parties in an effort to seek a consensus. The six current ocean dumpers in our State, the City of New York, lawmakers, and selected environmental and business groups each have had an opportunity to listen and react to our proposals. We are convinced, now more than ever, that the State's set of recommendations represent a solid middle ground, one in which rational decision-making can take place over a sensible timeframe.

In addition to our formal comments, the Subcommittees have asked three specific questions of the State of New Jersey. Our responses are as follow:

- 1) Is it realistic to adopt the stated goal of environmental restoration of the New York Bight? Representatives Hughes and Forsythe have proposed a New York Bight Restoration Plan to be developed by the EPA within a three year period following reauthorization of the MPRSA. We agree that such a plan would be worthwhile provided that the planning process determines achievable goals and sets forth specific proposals for implementation. Intuitively, it is difficult to postulate restoration as an achievable goal given the degree of urbanization in the New York Metropolitan areas. The contaminant loadings of

the Bight Apex from the Hudson-Raritan effluent plume is probably the largest single input source and therefore any restoration plans would have to give major considerations to on-land water pollution control from both point dischargers and non-point sources. As we have suggested different time-frames, five years versus three, timing is also a problem. Whatever time-frame is selected, it seems the first stage of restoration is a decision on sludge disposal. Therefore we suggest phasing in the restoration analysis after such a decision is made. This should also assure that efforts will not be diverted from the task at hand.

- 2) If it is determined that ocean disposal is an appropriate option for disposal, is it best to continue dumping at the 12 mile site or move to a deep water site such as the 106 mile site? The thrust of the State's recommendations centers around the need for a comprehensive multi-media assessment following a NEPA format. The options of ocean disposal at a shallow water site versus a deep ocean site should be determined as part of the multi-media assessment.
- 3) A request to address the proposals of Representatives Hughes and Forsythe and Representatives Carper and Dyson to curb dumping activities at specific sites. The Department has recently received copies of the May 16 Staff Draft act and subsequent (May 19) revision suggesting optional approaches. The initial version of the staff proposal is based on a firm 3 year phaseout for disposal at the 12 mile site. However, the staff has been very willing to address the concerns which we raised with the initial proposal. The May 19 option paper, although not fully compatible with our recommendations, represents significant progress. We believe that with additional discussions, a consensus position could be attained. The Department of Environmental Protection will continue to work toward an acceptable solution to the current dilemma involving sludge disposal in the Bight. If such a program can be developed, we sincerely hope that it will enjoy the support of both Subcommittees.

I wish to thank the two Chairman and the members of the Subcommittees for extending an invitation to the State to testify and participate in the reauthorization process.

Mr. D'AMOURS. Thank you, gentlemen.

I would like to state for the Lieutenant Governor that a good many of the members of this committee fully agree that had it not been for Judge Sofaer and what we consider his erroneous decision that we perhaps would be on land by now. We almost were as you well know, until that decision reversed the trend.

But given that we are now considering, the tradeoffs between the 12- and the 106-mile sites, your testimony indicates that Delaware will be severely affected by switching to the 106-mile site. What evidence do you have, or can you offer us that dumping at the 106-mile site will have that impact on Delaware?

Mr. CASTLE. You ask the difference between the 12-mile site and the 106-mile site you put us between the devil and the deep blue sea in making a decision.

Mr. D'AMOURS. That is where this committee is.

Mr. CASTLE. I understand that. But 106 miles is a long ways away. We are worried about the monitoring of that. We feel that when Philadelphia was dumping up until 2 years ago we were having some problems with our environment because of some of what we consider to be short dumping as testified to by our fishing people.

We also feel that the 12-mile site is known as far as environmental impacts, whatever it is. Whether it is limited or not it is a known and controlled factor. We are not sure what will happen if we switch to 106 miles. You can argue it is a lesser impact but that is not certain, especially when one moves off the Delaware shore. We have a basic concern as to why the various cities in areas of other States can't take care of their own problems in this situation.

We do, as you probably well know, depend on our resort area for our tourism in the State of Delaware. Any indication of any problem whatever can create havoc with our tourism industry, even a false report can cause problems.

In addition, we have some uncertainty as to what the 106-mile site would attract. We understand that new York does not want to go that far, and other people may not. But it gets it further offshore and it may open places all the way from Connecticut to North Carolina that might be involved in it. It concerns us that others may try to fit into that site.

For these reasons we feel that the continuation of the 12-mile site would be more reasonable at this time. Obviously we would like to have the alternative of land disposal looked at. It is our feeling unless the Congress comes down on it that that will never be done.

Mr. D'AMOURS. I very much agree with your answer and I know most of the members here today probably agree with it also. We thought we had addressed land disposal versus ocean dumping, but Judge Sofaer thought we had not done that.

But the question is specifically whether or not you have any evidence, anything that indicates that dumping at the 106-mile site will in a real and tangible and more direct way than you so far indicated affect the State of Delaware? I take it from your testimony that there is no such evidence?

Mr. CASTLE. I have no tangible evidence but I would like to see if Director Eichler has anything to say concerning that.

Mr. EICHLER. I don't think we have evidence beyond what we have in other people's reports. We know from the EIS that EPA said to open it up for 5 years to evaluate impacts. We are not convinced anyone really knows what it will mean. We would be reluctant to have that experiment conducted off our shores.

Mr. D'AMOURS. I appreciate your answer.

Mr. Arbesman, the Passaic Valley Sewerage Commission is going to testify just after you finish with questions and answers here, that they had developed land alternatives pursuant to EPA direction but that the New Jersey Department of Environmental Protection wouldn't permit implementation of that plan due to what they found to be environmental considerations.

Where were the State policies inconsistent with the national policy?

Mr. ARBESMAN. I don't think they were. I don't think there was a national policy across the media. That is why we talk about a multimedia assessment now. It is an excellent question. I will give you examples.

We have five sewer authorities proposing to build incinerators, who received grants similar to New York City's, as Mayor Koch testified. We were presented with five permit applications for onland incinerators to burn sludge. We looked at the heavy metals and they would have been the largest source of air pollution ever permitted in New Jersey, surpassing our powerplants, over anything else we have.

The lead emissions alone from the proposals would have almost equaled 200 tons per year of lead into the environment. That was after appropriate air pollution control devices. This is the sludge that is being put out in the ocean today. With pretreatment, the numbers will probably get better and that is why we would like to see the pretreatment program instituted but we still are going to have problems with heavy metals and various organics that will necessitate the permit review for any thermal reduction or incineration process.

That is why we also would like EPA to set the national air standards so we have a target to shoot at for the onland alternatives which is another piece of our strategy.

Mr. D'AMOURS. I should have raised this with EPA and unfortunately I didn't. Do I understand that EPA had approved Passaic Valley procedures and that they did meet EPA policy standards?

Mr. ARBESMAN. EPA approved the concept of Passaic Valley going forward with the design of the incinerator. We didn't have the specific numbers that would be emitted from the incinerator until the designs were complete. What I am giving you are the end-of-the-line design numbers as presented to us in the permit process.

Mr. D'AMOURS. Weren't they presented to EPA in the EIS?

Mr. ARBESMAN. No.

Mr. D'AMOURS. They were not, OK.

Mr. ARBESMAN. One of the failings of the EIS in my opinion was that it looked at impacts on the ocean mostly and did little in terms of the regard for impacts from land-based alternatives. That was left up to the individual sewer authorities to struggle with.

Mr. D'AMOURS. Thank you.

Mr. Forsythe.

Mr. FORSYTHE. Thank you, Mr. Chairman. I thank the witnesses, too, for their testimony.

Mr. Governor, from the maps we've looked at, the 12-mile site seems even closer to Delaware than the 106-mile site. Does that change your view at all?

Mr. CASTLE. We have looked at the same map, Congressman, and I appreciate that. One of the things we are relying on is the fact that this 12-mile site is tried and true, if you will. It is probably not a good expression for what it is.

Mr. FORSYTHE. That is right, it is certainly tried, though probably not that true.

Mr. CASTLE. Right. And we fear the change more than anything else, as Mr. Eichler pointed out, we are concerned about the unknown. We don't want to be an experiment for something we don't know about now. I don't want to get—we really are opposed to any ocean dumping whatever. I don't mean to suggest we endorse the 12-mile site. It is a matter of choice.

Mr. FORSYTHE. Of course we hear from your able Representative that anything to stop designation of the 106-mile site is good.

Mr. CASTLE. Right.

Mr. FORSYTHE. One of the witnesses this morning, Mr. Kamlet, suggested designating another deepwater site which would be north of the 106-mile site. As a matter of fact, it would be north of Hudson Canyon, somewhat closer to New York and well separated from the 106-mile site.

Would that do anything to ease your pain?

Mr. CASTLE. That is the so-called 60-mile site?

Mr. FORSYTHE. No, no.

Mr. CASTLE. No? That would ease our anguish somewhat, though. Anything that is north and more removed would be easier for us to live with.

Mr. FORSYTHE. It still would be off the shelf.

Mr. CASTLE. That is correct.

Mr. FORSYTHE. Which the 60-mile site is not.

Mr. CASTLE. We prefer anything that is dumped not get too near Delaware. We are concerned about the sites. The 106 sounds good, but we don't know if we always believe it.

Mr. FORSYTHE. We do appreciate your testimony. Obviously there is a ways to go. As a matter of fact, the site designation process for the 106-mile site has not been completed and EPA is going into great detail in its new reviews investigating that. This morning I got assurances from EPA that there would be hearings on the 60-mile and 12-mile sites in New Jersey because of site proximity.

Thank you.

For Mr. Arbesman, welcome from New Jersey.

Mr. ARBESMAN. Thank you.

Mr. FORSYTHE. I wish the chairman would have let you answer those questions instead of saying we will take them for the record, but we will accept this.

Mr. D'AMOURS. Would the gentleman yield? I would be happy to have those questions answered if there is that desire.

Mr. FORSYTHE. I don't want to delay the time more.

Mr. D'AMOURS. The Chair would be willing to take that time if any member of the committee thinks that that would be productive and useful.

Mr. FORSYTHE. I hope the committee will have the opportunity to read the entire record.

I think one of the most important things I heard you say on this proposal was that the Passaic Valley Sewerage Commissioners considered incineration. However, when the final numbers on heavy metal content came out, the incineration option was totally unacceptable to the New Jersey DEP. Although there is considerable research going on—it seems we don't have an alternative to land-based facilities. This is true in areas like New Jersey where we have a very sensitive water aquifer, particularly in the southern part of the State, and true in other areas surrounding the New York Bight, such as eastern Long Island.

With regards to incineration, anything that is going into the air, such as heavy metals, will come back down, of course. Incineration poses a problem in that regard.

What is happening in New Jersey in terms of really implementing pretreatment? Alternatively, must action be taken at the Federal level?

Mr. ARBESMAN. It is a combination, Congressman. There has to be national standards which are required under the law, those are Federal requirements. All of those have not been established yet. Then those standards have to be enforced and they are enforced by the State on the industries and the authorities that would be affected by those standards.

The pretreatment program will certainly help the problem by holding back some of the materials that come into the sewer authorities. I would also note that when we do pretreatment, we have to figure out what to do with the toxic material we take out before it goes into the sludge. That is no easy situation to deal with either.

But your point is well taken. There isn't an easy answer to the onland alternative. The pretreatment program will give us more options that may be more acceptable for onland alternatives, but my opinion is they will still be difficult options to select from.

Mr. FORSYTHE. And, therefore, you do believe that the phasing strategy that is in the New Jersey proposal is essential before any flat get-out-of-the-ocean prescription is laid down as the way to solve our problems?

Mr. ARBESMAN. We spent a lot of time looking at impacts on the ocean. We should spend similar time in looking at onland effects and choose the best option for all concerned.

Mr. FORSYTHE. This is the problem I have had, the more we get into ocean dumping, the more we find there are problems no matter what you do. We don't know enough yet to resolve this.

Mr. ARBESMAN. The location of that incinerator of the Passaic Valley is in downtown Newark. We have a problem meeting the ambient lead standard in downtown Newark. It is not an area where we can allow additional emissions of any substantial quantity.

Mr. FORSYTHE. Thank you very much.

Mr. D'AMOURS. The gentleman from New Jersey, Mr. Hughes.

Mr. HUGHES. Thank you, Mr. Chairman. I, too, want to welcome the panel, Governor Castle, and my colleagues from New Jersey, Mr. Arbesman and Mr. Schmidt.

Let me say to my colleagues from New Jersey, I am delighted that Commissioner Hughey has attempted to come to grips with what has been a major problem for a number of years and I think New Jersey by and large has been a reluctant actor. Commissioner Hughey has demonstrated a lot of courage and determination to try to look at this problem comprehensively. I congratulate you. I think that you have made some major strides already.

Let me just, if I might, Governor Castle, indicate that I really am sorry that it looks like it is going to come down to a New Jersey versus Delaware-Maryland-Virginia situation at the 106-mile site. I regret that because the site is as close to New Jersey as it is to Delaware. I think we have been dumping at the 106-mile site for probably over 20 years. I think 1961. It has been a chemical dump site.

As you know, we have managed mainly because of the pressure put on by this committee to get the chemical dumpers down to a handful. There were over 100 when I came here 9 years ago. I think we are down to under 20 now. Among the major polluters, some from your region, as you well know, I just—all the studies I have seen would indicate that Delaware, like New Jersey and Maryland, is more at risk with the 12-mile site than we are with the 106-mile site. We have had experience and the suggestion I think you make is well, we know what we have. We may not like it, but we don't know what we may have in the deepwater site.

I don't think that is accurate.

We know that, first of all, we have had no impact from the deepwater site from chemical dumping.

Mr. CASTLE. That is correct, as far as I know, sir.

Mr. HUGHES. So the deep water and the currents that have disseminated that material have borne out the original studies that at least given the scope of the dumping up until now it has not presented a direct impact upon those coastal areas.

However, the migratory species of seafood that are contaminated, taking the PCB's and taking it up in their fatty tissues poses as much risk to Delaware as it does to New Jersey. You have a very substantial recreational fishery trade, you have very substantial commercial fisheries as does New Jersey and Maryland, and frankly, I question the statement really whether or not the deepwater site will present more risk.

I grant you that we are talking about a new type of dumping in the deepwater site and a lot of us don't like the idea of any dumping and nobody has fought harder on this question in trying to phase out harmful dumping than this Member, but for the life of me, I can't see it as a New Jersey versus Delaware-Maryland-Virginia issue.

Mr. CASTLE. Let me say I appreciate your obvious knowledge in questioning Mayor Koch and in terms of your questions here and I defer to that. I don't want you to think we are opposing each other because we have to stay together to get a lot of things done. But our situation is different by the fact we don't have ocean dumping

whatever from the State of Delaware now. Therefore, our concern is to stop all ocean dumping if we can. We feel——

Mr. HUGHES. Don't you have ocean outfalls in Delaware?

Mr. CASTLE. We have one outfall, I think.

Mr. EICHLER. We have one ocean outfall off the ocean, but that is after a tertiary treatment.

Mr. HUGHES. Tertiary treatment?

Mr. EICHLER. That is right.

Mr. CASTLE. Our concern is if we move from 12 to 106 or whatever and we continue to do this, New York will continue to put off the ultimate decision and perhaps even New Jersey, to do something alternatively that would be a complete prevention of the problem of dumping in the ocean. If it got to the point where you said it has to be 12 or 106 on a permanent basis, then perhaps the answer would change somewhat, but if you allow a change and continue to encourage the ocean dumping by allowing change from one site to another, it seems to not set up any kind of end to the ocean dumping which we so vehemently oppose.

It is for that basic reason that we have the opposition. I am not pretending to be an environmental expert in this case, but in talking to Mr. Eichler and other people in Delaware and reviewing what Congressman Carper has done, we think at least the jury is out on the difference between the 12-mile and 106-mile site.

You obviously may feel differently. That puts us all between a rock and a hard place, with all political decisions some are 100 percent to nothing, and some are 60-40 and this is a close call. As far as I am concerned, my mind could be turned with additional evidence concerning that. I well understand everything you say here today.

Mr. HUGHES. First of all, I appreciate the cooperation that Tom Carper has afforded us. He has demonstrated to me to be a good member of this committee in working out the compromises that he did. I don't have to tell you that even when we work together as coastal areas concerned about harmful ocean dumping, we have had mixed results at best. So a divided house is going to insure that we have perpetual dumping, harmful ocean dumping.

It is important to develop a consensus. That is why I alluded to what New Jersey is doing. I would invite you, Governor, to look at the comprehensive procedure taken by Delaware. I think the multimedia approach, a look at all the types of dumping, to try to develop a fee schedule that would recycle some money into a fund to be used to finance land-based alternatives, if that be the most feasible approach, to help us defray the cost of monitoring, we are cutting back in monitoring, of course; it was zero funded as some research activities at the time dumping will increase.

But we need a comprehensive approach as a way to arrive at some consensus. We all want to get there, I think.

Mr. CASTLE. I am very impressed by New Jersey's testimony. This is an answer better given by Congressman Carper than me in this circumstance, but I would certainly think that a review of that in cooperation with New Jersey could indeed perhaps bring us a consensus in this area.

Mr. HUGHES. Thank you.

Mr. D'AMOURS. I thank the gentleman from New Jersey. I would now recognize the Representative from Delaware who has been outstanding in his work on behalf of Delaware's interest on this question, and of which I am sure both you and Governor du Pont speak of frequently and glowingly in Delaware. The gentleman from Delaware, Mr. Carper.

Mr. CARPER. I just want to thank you for your kind words and also thank my colleague from New Jersey. I fully intend to keep working in a cooperative spirit with you and other committee members to develop a comprehensive solution to this problem.

I would like to go back to the question that you raised regarding the use of the 106-mile site for industrial dumping. A report that was recently presented to us by GAO, dated May 18, 1983, talks about the magnitude of that dumping and it indicates that in 1982, apparently one firm in New Jersey, a New Jersey firm going under the name of Dupont used this site. As I understand, it was the only industrial dumping.

I have one question for Mr. Arbesman—is it a fair assessment of New Jersey's position to say that ocean dumping is not the long-term solution? Is that a fair characterization?

Mr. ARBESMAN. No, I don't think it is. There is a bias against ocean dumping. That was the intent of the Marine Protection, Research, and Sanctuaries Act. We are at the crossroads where we must make an intelligent judgment. It doesn't rule out ocean dumping, but we have to evaluate impacts of the on-land alternatives. We don't think that has to be done up to this point in time.

Mr. CARPER. I missed part of your testimony because I had to be out of the room, but did I understand you to say there are no New Jersey municipalities currently ocean dumping, or did you say they are taking active steps to end that form of disposal?

Mr. ARBESMAN. There are a number of utilities that came out of the ocean, smaller utilities with sludges that lend themselves to on-land alternatives, sludge farming and so on. The big utilities that serve industrial areas are the problems we have which are the major disposers of sludge in the ocean at this time.

Mr. CARPER. Ironically, one of the permittees who was an industrial dumper at the 106-mile site was the firm which was selling a product used in wastewater treatment and because of the great demand for that product for wastewater treatment over the last couple years, they have not had to dump their industrial wastes. Just a Brownie point I wanted to share with you.

One last question, it sort of gets to the issue of county ordinances, state laws, and perhaps city ordinances. Some jurisdictions, like Philadelphia, appear to have come to grips with land-based alternatives and are working on a statewide basis toward finding suitable land-based alternatives.

When we look at a State like New York, for example, we don't find that kind of cooperation. We find barriers to land-based alternatives erected at almost every level whether it is local or the state level.

What kind of barriers or what cooperative spirit exists in your State between different levels of government to better enhance land-based alternatives?

Mr. ARBESMAN. I think what I have laid out is an attempt at a new cooperative spirit to reach resolution of the issue. I think it is fair to say New Jersey doesn't have the land space of Pennsylvania or New York to consider options they may have. Most of the options studied for on-land disposal in our State have been processing-type options like incineration and thermal reduction. Those necessarily have some severe components that have to be evaluated. We don't think they have been adequately addressed at this time.

Therefore, we are trying to do in a coordinated fashion and we would like to look across all media to look at the pathways for these pollutants. Is it worse to have it in the air rather than in the water? Is it better at one place in the ocean or is it better on land? We have a severe problem in New Jersey getting rid of garbage at the present time. We have a number of Superfund sites that need attention. It is not going to be an easy time to do anything in terms of land-based alternatives. That is why from the credibility standpoint, we believe this thorough reassessment of all the data you have seen, that from Federal agencies. The city of New York is spending millions to do their own study to stay at the 12-mile site. We need a pulling together of all that information into one concise approach that says yea or nay to the various options open to us and try to force what should have been forced a long time ago and that is dealing with toxic issues in pretreatment and setting of national ambient standards.

Mr. CARPER. Thank you.

Have you looked at Eco Rock, not to be confused with punk rock or anything? I understand the city of Philadelphia has developed a pilot plant that currently takes sludge and develops from it a rock-like substance which can be used among other things for road construction. Have you folks considered that particular alternative?

Mr. ARBESMAN. We think that ought to be covered in the review done. We have looked at the Garden State one time, we are the Garden State, and we wanted to use the domestic sludges in a buzz word of that sort. So there are avenues open in the low technology area that could pull off a piece of the problem if the sludges were cleaned up adequately.

Mr. CARPER. Thank you, and particularly to my friends from Delaware, thank you for your appearance and testimony today.

Mr. D'AMOURS. I thank you, also, gentlemen. It was good having your testimony. It will be very useful to the subcommittees.

Thank you very much.

Mr. CASTLE. I would like to thank you personally. Conducting a legislature can be strident and I appreciate the courtesy and wisdom with which you have handled everything.

Mr. ARBESMAN. I would like to echo that sentiment. It has been a very interesting hearing for us to attend just to listen to witnesses. I would like to publicly thank Congressman Hughes and Congressman Forsythe for their actions on helping us with the strategy we have outlined and also Congressman Hughes for particularly being a long-term supporter of trying to keep the ocean in a proper state and cleaning it up from where it was.

Thank you.

Mr. D'AMOURS. We thank you very much, gentlemen.

STATEMENT OF CHARLES C. CARELLA, CHIEF COUNSEL, PASSAIC VALLEY OCEAN DUMPING PROJECT

Mr. D'AMOURS. Our next witness is Mr. Charles Carella, the chief counsel of the Passaic Valley ocean dumping project of Newark.

Thank you for coming, Mr. Carella. I note that your testimony, which has been submitted on behalf of Passaic Valley, was prepared by Carmine Perrapato, and not by yourself.

Mr. CARELLA. Yes.

Mr. D'AMOURS. I don't know if you were here earlier when I asked all witnesses to summarize, if possible, the testimony. Since this is not your testimony, that may be difficult. I will repeat the admonition that if it is possible to summarize, please do so. Most members of the committee have read the testimony so if you can summarize, we would appreciate it.

Mr. CARELLA. Thank you, Mr. Chairman.

First, let me indicate that I am an attorney at law from the State of New Jersey. I am special counsel to the Passaic Valley sewerage commissioners. Seated to my right is Mr. Kummer, a partner in my law firm, Carella, Burn, Bain & Gilfillin from Newark.

We have been involved representing the Passaic Valley in a number of matters concerning ocean dumping. By way of background, I give you this: We were counsel in the litigation which ensued some time back which resulted in a consent order with EPA. We are presently attorneys of record with respect to the litigation national wildlife against a number of agencies in New Jersey.

We represent the Passaic Valley in that litigation as well. I appear today in behalf of Carmine T. Perrapato, who was unable to attend but who extends his apologies to you and who has asked me to deliver his message to you out of respect to you and the committee and of course out of the importance with which the Passaic Valley sewerage commissioners consider this important problem. I will be brief, but as I indicated, I am delivering a message from Mr. Perrapato.

I am pleased to be here today to respond to your request to present the views of the Passaic Valley sewerage commissioners and that of the other New Jersey authorities that are currently disposing of sludge in the ocean. The New Jersey authorities are: PVSC, Bergen County Utilities Authority, Joint Meeting of Essex and Union Counties, Linden/Roselle Sewerage Authority, Middlesex County Utilities Authority, and Rahway Valley Sewerage Authority.

The above-named authorities are projected to dispose of 2,783,000 wet tons of sludge out of a total of 7,545,000 dumped at the 12-mile ocean dump site. Of this total, PVSC's contribution will be 823,000 wet tons per year.

PVSC treats the wastewater generated by 1.2 million people and 330 major industries located in heavily industrialized northern New Jersey. Our service area encompasses 30 communities in parts of Bergen, Hudson, Essex, and Passaic Counties, including the cities of Newark and Paterson.

The PVSC, together with the other above-referenced New Jersey sewerage authorities, treats the wastewater of a total of 122 New Jersey municipalities with a total population of approximately 3.2 million people or about 50 percent of New Jersey's population.

The PVSC and the other New Jersey sewerage authorities are committed to the treatment of wastewater in an environmentally acceptable and responsible manner. In that regard, PVSC and the other New Jersey authorities, under the 75 percent grants program of the USEPA, have spent over \$650 million in construction of secondary treatment facilities to comply with the mandate contained in the Clean Water Act. The PVSC and the other New Jersey authorities have seen their total annual operating expenses, which are borne solely by the taxpayers in our respective districts, increase from \$24 million to over \$100 million.

Moreover, the commitment of the PVSC and the other New Jersey authorities concerning disposal of sludge is equally clear. At the direction of USEPA, the PVSC, and the other New Jersey authorities, since at least as early as 1976, have conducted extensive studies aimed at developing alternatives to the ocean dumping of sludge.

Subsequent to the completion of those studies, the PVSC and the other New Jersey authorities developed various land-based alternatives to ocean disposal such as incineration, composting, and codisposal. In some cases, the alternatives to ocean disposal have been partially constructed. The study, development, and construction of land-based alternatives to ocean dumping was carried out on each occasion under the direction, supervision, and funding of the USEPA.

Notwithstanding the cooperation and efforts of the PVSC and the other New Jersey authorities, the implementation of land-based alternatives to ocean dumping came to an abrupt and screeching halt. Quite simply, after the land-based alternatives were developed at the direction of EPA, the NJDEP could not permit the implementation of the alternatives due to environmental considerations associated with the land-based alternatives.

Thus, we believe that the PVSC and the other New Jersey authorities have been placed in a catch-22 position as a result of the lack of mutually consistent policies by the USEPA and NJDEP concerning the disposal of sludge. As a result, while the authorities are willing to comply with the directives of regulatory agencies, we are unable to do so because of the lack of guidance and mutually consistent policies of the regulatory agencies.

You requested that I address the following subject matter: "What actions have been pursued since our former chief engineer testified before these subcommittees in March 1982 to identify and develop long-term disposal options?"

As we have previously stated, PVSC and the other authorities have studied various land-based alternatives to ocean dumping of sludge. These studies indicated that, for a densely populated and industrial area such as ours, the only feasible alternative would be some form of incineration of dewatered sludge. However, because of the industrial nature of our district, NJDEP claims that our sludge contains unacceptable amounts of heavy metals such as mercury, cadmium, chromium and lead.

During incineration, according to NJDEP, some of these metals would be vaporized and released to the air. Although PVSC would use state-of-the-art air pollution control devices, NJDEP maintains that low levels of metals would still be released. Because the NJDEP feels that the long-term effects of these emissions are not well understood, PVSC and the other authorities have not been given permits to build the incinerators.

USEPA is engaged in the promulgation of industrial wastewater pretreatment standards. We understand that USEPA believes that when pretreatment of industrial wastes have been implemented, the heavy metals content of sludge may be low enough to permit incineration. At this time, however, there is no assurance that, even if the PVSC and the other authorities comply with whatever pretreatment standards USEPA may promulgate, NJDEP will permit the incineration of pretreated sludge.

In any event, the PVSC and the other New Jersey authorities have prepared their own pretreatment programs, in anticipation of the promulgation of USEPA pretreatment standards. Again, this has been done in a spirit of cooperation. PVSC's program is presently up for public hearings by the NJDEP and the PVSC expects approval of same within the next 2 months. As soon as USEPA proposes categorical pretreatment standards, we will immediately go through our files and notify the industries in our district concerning same so that they can be prepared to comment at the public sessions and also get ready to implement the rules when they are promulgated.

In addition to our progress in the removal of heavy metals by conventional treatment methods, we are also seeking innovative methods to solve this problem. An example of this is our involvement with the metal plating industry. These were the first rules promulgated by EPA back in 1979, but as a result of court decisions, et cetera, the deadline has been extended to 1984.

In conjunction with NJDEP, the metal platers, and a professor at Princeton University, the PVSC is exploring the use of a process to economically recover the heavy metals used by the plating industry, before the metals enter the wastewater stream.

This program looks very encouraging at this time. If the concept is successful with the plating industry, it could be applied to other industrial users who will be required to pretreat for heavy metals, such as leather tanners, inorganic chemical manufacturers, textile dyers, et cetera. If a significant quantity of heavy metals are recycled and reused, it would not only greatly reduce the amount of metals introduced into our sludge, but also improve the competitive position of the aging industries located in our district.

Moreover, the PVSC is continuing to search for and develop environmentally acceptable and responsible long-term solutions to sludge disposal. We at the PVSC believe that solutions must take into account and balance the relative environmental impact of land-based versus ocean disposal methods. Indeed, we believe that the only responsible approach to the sludge disposal problems is to balance the risks of each alternative versus its anticipated environmental benefit.

We would like to commend Commissioner Hughey of the NJDEP who, to put it simply, has "taken the bull by the horns" and pro-

posed the first sensible plan I have seen. Briefly, the draft of the proposed plan would be to continue ocean disposal of sludge at the present 12-mile site for another 5 years, while an indepth study is conducted to examine the relative impacts of each land and ocean-based disposal option.

This is a logical plan which will allow the authorities and presumably the regulatory agencies, the time necessary to intelligently evaluate all disposal options. With the participation of NJDEP and USEPA, it is anticipated that the study will produce options for sludge disposal which will be acceptable to and consistent with the policies of each agency. Hopefully, the results of this study will provide solutions based upon facts—not rhetoric or political expediency. It will be nice to be told, for a change, what we can do instead of what we cannot do.

The second question you asked me to address is: "If we were compelled to stop ocean dumping, what responsibilities do you feel the Federal Government should have to provide financial or other types of assistance to the authorities?"

In response to this question, I would note at the outset that presently there are no acceptable alternatives to ocean disposal of sludge. Notwithstanding that the PVSC and the other New Jersey authorities have studied and developed land-based alternatives to ocean dumping, the inability of the regulatory agencies to arrive at mutually consistent and acceptable policies has precluded the implementation of land-based alternatives to ocean dumping.

Moreover, recent scientific studies have concluded that the ability of the ocean to assimilate waste may be far greater than previously anticipated. Indeed, these studies suggest that presently the ocean is the preferred medium for the disposal of sludge. In that regard, for example, we respectfully address your attention to the following studies: The 1978 "Environmental Impact Statement on the Ocean Dumping of Sewage Sludge in the New York Bight," prepared by the USEPA, the 2-year study entitled "The Role of the Ocean in a Waste Management Strategy," prepared by the National Advisory Committee on Oceans and Atmosphere, the report entitled "A Preliminary Assessment of the Environmental Considerations for the Disposal of Sewage Sludge in the New York Bight: Present Ocean Dumping Conditions and Proposed Land-Based Alternatives," prepared by Ecological Analysts, Inc., for the city of New York, as well as the "Comments Supporting the Redesignation of the 12-Mile Site and the 106-Mile Site," prepared by the PVSC and the other New Jersey authorities with the assistance of Ecological Analysts, Inc., and Seamotion, Inc., and submitted to the USEPA for consideration during current rule-making proceedings concerning ocean dumping of sludge.

We believe that NJDEP's proposed plan to study all available options for sludge disposal is the proper way to go. As indicated previously, we believe that both the NJDEP and USEPA should participate in this study to the end that mutually agreeable solutions will be identified. In view of the previous financial commitment already made by the PVSC and the other New Jersey authorities to the development and construction of land-based alternatives, at the direction of USEPA, it is only fair that the Federal Government participate in the cost of the proposed NJDEP study along with those au-

thorities whose primary or untreated effluent is ultimately discharged into the ocean.

Only then will the PVSC and other New Jersey authorities be able to avoid development and construction of facilities which are later found to be unacceptable by the regulatory agencies. In a word, it is time for a Federal commitment on the issue of sludge disposal.

Your third question was: "Is it realistic to adopt the stated goal of environmental restoration of the New York Bight?"

In response to this question, it is important to note that the PVSC and the other New Jersey authorities are really not qualified to respond to the issue of restoration of the New York Bight. We are wastewater engineers—not marine biologists. We would not presume to address an issue that should be addressed to more appropriate experts.

However, we feel that it is important to note that as pointed out, for example, in the NOAA studies and in our comments supporting the redesignation of the 12-mile site, et cetera, sludge contributes less than 6 percent of most metals, less than 4 percent of most nutrients, and an insignificant amount of microorganisms to the waters of the New York Bight.

Indeed, most contaminants come from the dumping of dredged materials and wastewater discharges from Metropolitan New York and New Jersey that ultimately flow into the bight. Our conclusion, supported by the various recent studies cited previously, indicates that sludge dumping at the present 12-mile site has a relatively minor impact on the bight, as compared to other sources of contaminants discharged into it.

Cessation of dumping in the New York Bight would not significantly restore the ecosystem of the bight. However, any alternative to continued ocean disposal at the present 12-mile site in the bight would increase the costs of disposal without a commensurate improvement in the ecology of the bight.

Let me close by assuring this committee that PVSC and the other agencies have a continuing commitment to fulfilling our responsibility for environmental protection. Our track record is clear. We want to come up with an acceptable solution, but we need your help and the help of USEPA and NJDEP in deciding what that acceptable solution should be.

Mr. D'AMOURS. We wish to thank you, Mr. Carella, and assure you that we are not unsympathetic to the difficulty of the position in which you find yourself and we applaud your efforts to find ways to obviate the need for any ocean dumping.

I have no questions at this time.

I will yield my time for questioning to Mr. Carper, if he has any questions.

Mr. CARPER. Mr. Chairman, I do not.

Mr. D'AMOURS. Mr. Forsythe.

Mr. FORSYTHE. Yes, I have questions, Mr. Chairman.

Mr. Carella, I appreciate your testimony. You indicate that New Jersey DEP believes your sludge contains unacceptable levels of heavy metals. Has the New Jersey DEP defined "acceptable" levels? If so, can you achieve such levels with your pretreatment program?

Mr. CARELLA. I am unaware of the facts that would answer that. However, if I may suggest and respectfully request, I can provide an answer to that in writing to the committee if you so permit.

[The information follows:]

QUESTIONS OF MR. FORSYTHE AND ANSWERS BY PASSAIC VALLEY SEWERAGE COMMISSIONERS

Question 1. On page 2 and 3 of your testimony, you indicate that land-based alternatives (incineration, composting and co-disposal) were unacceptable to the New Jersey Department of Environmental Protection due to the environmental considerations. Later in your testimony, you explain precisely why incineration was unacceptable. Could you elaborate on why composting and co-disposal were considered infeasible? Would these objections be removed if you pretreated industrial wastes entering Northern New Jersey sewage treatment systems?

Answer. During the preparation of PVSC's "Facilities plan for land-based sludge alternatives," dozens of various alternatives to ocean dumping of sludge were explored, some of which were composting and co-disposal of sludge.

Composting provides for stabilization and volume reduction of sludge. In the case of PVSC, however, we employ a wet air oxidation system that produces a product similar to compost. We therefore looked into the possibility of using our sludge in the same manner as compost.

Various methods of disposal of our compost-like sludge in land application uses were looked into. Compost or sludge can either be used for agricultural or non-agricultural use. If PVSC were to dispose of our treated sludge by application to agricultural land, we would require approximately 120,700 acres without pre-treatment, or 57,000 acres with pre-treatment. This area, even with pre-treatment, amounts to over 50% of the land area of the county in with pre-treatment, amounts to over 50% of the land area of the county in which the plant is located. Non-agricultural land application would use a total of 27,000 acres without pre-treatment and 11,000 acres with pre-treatment.

The amount of land needed for any type of land application is greater than that available anywhere in the State of New Jersey. We have gone so far as to seek permission of the States of New York and Pennsylvania for possible land application in those states. That permission was denied. We therefore had to abandon the land application alternative due to the lack of any possible application site.

At the time our facilities plan was prepared (December, 1978), a number of co-disposal options were investigated. The Port Authority of New York and New Jersey, the Hackensack Meadowlands Development Commission, Public Service Electric & Gas Co., and the Essex County Improvement Authority were contacted in an effort to explore the co-disposal of PVSC's sludge with the solid waste produced in PVSC's area. Although the disposal of solid waste is a critical problem for this area, firm plans were not and still are not in place for the design and construction of solid waste facilities. The time constraints imposed upon PVSC at the time of the preparation of our facilities plan did not give us the luxury of waiting for these other agencies to move forward on their solid waste disposal facilities. Therefore, this option was ruled out at the time of the preparation of our facilities plan.

We recently contacted the agencies that were responsible for the disposal of solid waste in the PVSC area and have discovered that their plans are still in the formulation stage. We cannot rely upon these agencies to dispose of our sludge when they still do not know how they will dispose of their primary responsibility of solid waste disposal. However, we face the same problem of emissions standards with co-disposal as we do with on-site sludge incineration. If the emission question were to be answered, both alternatives could be considered viable.

Question 2. On page 3 of your testimony, you indicate that the New Jersey Department of Environmental Protection found your sludge to contain "unacceptable" levels of heavy metals such as mercury, cadmium, chromium, and lead. Has the New Jersey Department of Environmental Protection defined "acceptable" levels of these metals? If so, could you achieve these levels under a pretreatment program?

Answer. In order to construct a sludge incinerator, PVSC prepared applications to construct sludge incinerators and applied to the NJDEP and USEPA for a review of these applications on June 26, 1981. The NJDEP and USEPA have studied the issue of heavy metal concentrations of sludge and their affects on air quality after incineration. The DEP continues to study this extremely complex subject and as of this date, has not yet decided whether the levels present in PVSC sludge are of such a level that they can permit the construction of a sludge incinerator. The submittal

that PVSC made to the DEP assumed that a pre-treatment program would be in effect and that the latest in air pollution abatement equipment would be installed on the incinerator. However, our emissions from the incinerator must be looked at in the context of all possible sources of heavy metals emitted in the PVSC air basin. It is for this reason that the results of the DEP studies have not been made as of this date. In summary, we have not yet been informed of what "acceptable" levels of heavy metals are in our sludge.

Question 3. In testimony presented before these committees last year, Mr. Rocco Ricci (Chief Engineer, Passaic Valley Sewerage Commission) indicated that the Passaic Valley Sewerage Commission was monitoring industrial discharges. What is the current status of this effort? Has it helped you to identify and reduce undesirable contaminant levels in your sludge?

Answer. The monitoring system for user charge is in place and operating as it was designed. The pretreatment program was submitted to NJDEP for approval in November, 1982 and we anticipate approval shortly. We have adopted a pretreatment regulation for mercury and required the major discharger of mercury to install a pretreatment facility. This action has resulted in a 90% reduction in the quantity of mercury entering the treatment plant. This reduction has been confirmed by recent sludge analyses. We are also working with NJDEP, the electroplaters and a professor associated with Princeton University to implement an alternate system for pretreating electroplating wastes. This system will enable the planters to pretreat their waste to meet the regulations. However, the system that is proposed would generate a material that could be recovered. This process will eliminate the generation of toxic metal sludges. We have identified most of the dischargers of the other toxic heavy metals and are implementing the pretreatment requirements as the federal regulations are promulgated. We anticipate conducting a toxic organic survey in 1984 to identify and quantify these pollutants which enter the treatment plant. Action to control the toxic organics will be based on the results of this survey.

Question 4. Could you provide an estimate of the percentage increase (in dry weight) of sludge expected to be disposed of by the six New Jersey sewerage authorities over the next 5 to 10 years?

Answer.

Year	Quantity 1,000 dry tons/per year	Percent change from 1982
1982.....	167
1983.....	186	+10.2
1984.....	159	-5.0

Quality is expected to remain the same from 1984 onward.

From non-site specific permit applications submitted to EPA Region II.

Mr. FORSYTHE. I think we will ask you to answer some questions that I will submit. I recognize the situation you are in, that you are neither the author of this testimony, nor really intimately connected with the operations covered in it.

Mr. CARELLA. That is correct, sir.

Mr. FORSYTHE. Thank you, Mr. Chairman.

Mr. D'AMOURS. Thank you, gentlemen. We thank you for your testimony.

Before we adjourn, I would like to ask that the record—by unanimous consent—be kept open for a reasonable time for submission of written questions and replies to those questions from members of these subcommittees, and without objection, that is so ordered.

[The information follows:]

QUESTIONS OF MR. D'AMOURS AND ANSWERS BY EPA

Question. If all municipal sewage sludge currently being dumped at the 12-mile site was dumped at the 106-mile site, would states of New Jersey, Delaware, Mary-

land and Virginia be more impacted by new dumping at the 106-mile site or continued dumping at the 12-mile site?

Answer. In general, there are two potential impacts of concern to coastal states as a result of ocean dumping of sewage at the 12 or 106-Mile Sites. The first would be potential impacts to a state's resort industry. These would include aesthetic effects—e.g., is the dumping contributing to the degradation of beach quality or causing potential adverse human health impacts (viruses, pathogens)? The second potential impact would be to marine resources, particularly fisheries and shellfisheries. Such impacts include closure of shellfish beds, changes in species diversity, and stress related impacts and bioaccumulation in species of recreational or commercial importance (e.g., finrot in flounder, elevated body burdens of PCB's in bluefish and in striped bass).

The potential for adverse impacts on a coastal state's resort industry from dumping at the 106-Mile Site, given its great depth and distance from shore which allow for significant dilution and dispersion of wastes, is extremely remote. The general transport mechanisms for water movement at the 106-Mile Site are parallel to or away from coastal areas. The potential for impacts to the shore from continued or increased dumping of sludge at the 12-Mile Site is of more concern. Although monitoring by EPA and others of beach water quality has not shown any degradation directly attributable to sludge dumping, as long as there are shoreward transport mechanisms the concern for potential future impacts remains.

The potential for fisheries and shellfisheries impacts from dumping at the 12-Mile Site is greater than that at the 106-Mile Site primarily due to the nature of the fisheries and shellfisheries—productive shellfish beds are not known to exist in the vicinity of the 106-Mile Site, but do occur throughout the Continental Shelf. Also, much more extensive recreational and commercial fisheries exist near shore than off-the-shelf. Likewise, the potential for human exposure to pathogens from ingestion of contaminated shellfish is greater for nearshore areas due to the type of shellfish which occur nearshore and are often ingested raw; quahogs and scallops, which are harvested farther out on the shelf (between the 12 and 106-Mile Sites), are cooked before ingestion, thus limiting public health risks.

Physical oceanographic conditions cause the 12-Mile Site, unlike the 106-Mile Site which is an extremely dispersive site, to be a containment site. As a result of this, a community of stress-tolerant benthos has developed in the vicinity of the 12-Mile Site providing an abundant food source for demersal fish and thus increasing the potential for bioaccumulation in species utilized for human consumption. The highly dispersive nature and the lack of a bottom fishery of commercial importance significantly decrease the potential for bioaccumulation at the 106-Mile Site.

Question. What is the status of all applications for the ocean dumping of sewage sludge?

Answer. The following have submitted to EPA incomplete applications for special ocean dumping permits: New York City Department of Environmental Protection, NY; Nassau County Department of Public Works, NY; Westchester County Department of Environmental Facility, NY; Bergen County Utilities Authority, NJ; Linden Roselle Sewage Authority, NJ; Rahway Valley Sewerage Commissioners, NJ; Middlesex County Utilities Authority, NJ; Passaic Valley Sewerage Commissioners, NJ; Joint Meeting of Essex and Union Counties, NJ; and Washington, D.C.

In addition, incomplete applications were received in 1982 and subsequently withdrawn from: Joint Meeting of Rutherford, East Rutherford, and Carlstadt, NJ; City of Asbury Park, NJ; and Joint Meeting of Madison-Chatham.

In accordance with court issued final judgements regarding New York City (November 1981), six New Jersey sewerage authorities (May 1982), and Nassau County (December 1982), and a proposed judgement with Westchester County (48 FR 15020), applications for special ocean dumping permits have been received. Additionally, data required under 40 CFR Part 221, which is non-ocean dumpsite specific, have been submitted to EPA by all but NYC and Westchester County. These data are being reviewed for completeness.

Until completion of EPA's final action on petitions to redesignate the 12-Mile Site for disposal of sewerage sludge under the court orders, these applicants are not required to submit ocean site specific information, or information concerning the relative environmental risks of land-based versus ocean disposal.

The District of Columbia submitted to Region II, in November 1981, an incomplete application for a Special permit to ocean dump sewage sludges at the 106-Mile Site. Region III informed the District in April 1982 of specific deficiencies in this application. No response has been received (as of June 1983) by EPA.

QUESTIONS OF MR. CARPER AND ANSWERS BY EPA

Question. What sort of monitoring program does the Environmental Protection Agency have in mind for the 106-mile site (details, please)?

What will be NOAA's and EPA's responsibilities under this program?

What costs are to be anticipated in conjunction with the program described above? (if an expanded MARMAP Program is envisioned, what will be the additional costs incurred to adequately monitor the 106-mile site over existing expenditures?)

Answer. As indicated in EPA's testimony, a monitoring program is currently being developed jointly by EPA and NOAA. Once developed, EPA plans to provide interested Congressional offices and State agencies with an opportunity to review and comment. This program will use as its base two programs currently operated by NOAA, its Marine Resource Monitoring, Assessment and Prediction (MARMAP) Program and its Northeast Monitoring Program (NEMP). MARMAP measures temporal and spatial changes in key components of the shelf ecosystem including primary productivity, nutrients, zooplankton, ichthyoplankton, fish, benthos, and circulation. NEMP monitors and assesses various components of the marine ecosystem to provide a current appraisal of the health of these waters. In addition, short-term and compliance monitoring requirements will be developed to assess specific wastes covered in the site designation. Short- and long-term monitoring will include sampling protocols in the water column, bottom sediments, and marine organisms. Both of these monitoring programs, including the sampling protocols, will be developed conceptually and will be modified, as necessary, to apply to particular permitted wastes. The final monitoring program will be developed prior to the Agency's final site designation rulemaking.

MARMAP and NEMP are existing programs which are expected to continue to be funded through the NOAA budget process. Short-term, long-term, and compliance monitoring are proposed to be conducted by federal agencies and funded either through a user fee system, which was proposed by the Administrator and submitted into the record by Frederic A. Eidsness, Jr., EPA's former Assistant Administrator for Water, at the 15 March 1983 House Merchant Marine and Fisheries Committee meeting, or through the usual NOAA and/or EPA budget Process.

Question. From the EPA's perspective, why are New York City and New Jersey municipalities which are still dumping not using land-based alternatives for sewage sludge disposal?

Is there any sludge in NYC or the NJ municipalities in question which might be clean enough for land applications or composting now?

Why is the City of Philadelphia able to find land-based disposal alternatives for its sewage sludge while NYC dumps all of its sludge?

Is Philadelphia sludge cleaner (than all of NYC's sludge)?

How does the sludge from these cities compare in terms of contaminant loading and suitability for land application or other land-based disposal alternatives?

Is there a significant difference in the sewer systems of these two cities which may affect the relative cleanliness of their sludges?

Are there any other factors which might require the cities to employ different disposal options?

Answer. New York City, Nassau County, Westchester County, and the six New Jersey sewerage authorities which are still ocean dumping sewage sludge have not implemented land-based disposal options primarily because they were unable to acquire requisite State approvals to construct and/or operate such disposal options.

The State of New Jersey has opposed the land-application of sludges from five of the six plants in northeastern New Jersey due to contaminant loadings. Most authorities have considered thermal destruction. The State of New York has established a moratorium on land application to certain soil types (including most soil types in the metropolitan area).

Implementing land-based options for sewage sludge disposal involves institutional/regulatory problems, as mentioned above, and consideration of the capacity of the particular disposal option, as well as the level of contamination of "cleanliness" of the sludge in question. For instance, the Bergen County Utilities Authority (BCUA) investigated the feasibility of utilizing composting. The land upon which BCUA intended to construct its composting facility is instead being proposed by the State of New Jersey for a State park. Also, in the event that state approvals were obtained, the question of the availability of sufficient capacity to dispose of sludge arises. For instance, New York City investigated site availability and capacity for composting its sludges and found that available areas for using the composted sludge were limited in capacity and could only be utilized for seven years.

The city of Philadelphia, like New York City, has an old combined storm/sanitary sewerage system. Philadelphia disposes of its sludge in a number of ways, including the experimental uses of composted sludge to reclaim strip-mined areas in western Pennsylvania. The lease to utilize these strip-mined areas is expiring, and the State, has not yet reauthorized use of these areas. Philadelphia, like New York City, will now need to reevaluate alternative disposal methods.

Question. Can industrial pretreatment make NYC's and NJ municipalities' sludge clean enough for at least some useful land application or composting purposes?

Answer. Industrial pretreatment can result in the reduction of concentrations of constituents of concern thus improving the quality of sewage. However, the institution/regulatory and land use/availability problems mentioned previously remain to be resolved regardless of whether an industrial pretreatment program is implemented.

Question. Could you provide for the record evidence that the EPA and the Coast Guard are making an effort to ensure adequate surveillance of ocean dumping activities, especially in the event the 106-mile site is designated?

Answer. Under the Marine Protection, Research, and Sanctuaries Act, the U.S. Coast Guard has the responsibility for conducting police-type surveillance of ocean dumping activities. The current U.S. Coast Guard instruction regarding surveillance and enforcement of dumping activities at ocean disposal sites establishes a goal of observing 75% for industrial waste disposal operation and 25% for municipal wastes. General surveillance activities include stationing a shiprider onboard the vessel to observe the disposal operation, conducting random spot checks before the barge leaves port, checking vessel logs for departure and arrival times, randomly inspecting shore facilities, and using helicopter/plane and picketship surveillance. Nearshore sites permit use of patrol vessels and helicopters; however, until other techniques are developed, surveillance at the 106-Mile Site is limited to the use of observers (ship-riders). As indicated by Mr. Steven Schatzow, Director of EPA's Office of Water Regulations and Standards, before the Subcommittee on Oceanography and the Subcommittee on Fisheries and Wildlife Conservation and the Environment of the House Merchant Marine and Fisheries Committee on 25 May 1983, some innovative surveillance techniques—permittee supported shipriders, "black boxes", navigational overlays—are being considered by EPA to augment those methods of surveillance currently employed by the U.S. Coast Guard.

QUESTIONS OF MR. HUGHES AND ANSWERS BY EPA

(1) To what extent will the cross medium analysis program currently being undertaken by EPA's sludge management task force be directly applicable to regional problems in the New Jersey/New York area?

The fundamental charge to the Task Team is the development by the end of 1983, of draft comprehensive guidance for sewage sludge disposal; that is, disposal on or in land, incineration, and discharge into the ocean. The guidance will embody explicit policy objectives formulated as part of this effort and will complement existing Agency regulations and technical guidance pertinent to sludge management. The guidance document, which is expected to be advisory rather than regulatory in nature, will include: (1) general and technical background information; (2) recommended practices and criteria for assuring environmental protection; (3) guidance for maximizing beneficial uses and cost effectiveness; and (4) a general analytic framework for assisting local officials in assessing their disposal and reuse options in light of local environmental, economic, and socio-political conditions. Thus, once available, the guidance may be utilized by Federal, State, and local regulatory agencies and sewage sludge generators in assessing technically feasible, environmentally acceptable, and economically affordable disposal and reuse options.

(2) Does the ocean dumping of sewage sludge in the New York Bight Apex play a role in lowering the bottom-dissolved oxygen concentrations in and adjacent to the New York Bight Apex, stressing fish and shellfishing populations, altering benthic productivity, and possibly resulting in the death of some bottom organisms?

The oxygen demand from ocean dumped sewage sludge can contribute to the lowering of dissolved oxygen concentrations in bottom waters in and adjacent to the dump site, particularly during late summer months. A similar statement for the entire Apex would not necessarily be accurate. Reduced dissolved oxygen concentrations, (i.e., below 3 ppm), can stress non-mobile fish and shellfish populations, can alter benthic productivity, and can result in the death of some benthic organisms. The role that sewage sludge dumping has played in reduced oxygen content and reduced species diversity at or near the 12-Mile Sewage Sludge Dump Site in the

Bight Apex is presently being evaluated by the Agency in its consideration of petitions to redesignate the 12-Mile Site for continued use.

(3) The City of New York contends that there is virtually no significant accumulation of sewage sludge on the ocean bottom at the existing dump site; in other words, that a mound of material has not built up at the sludge site as it has at the existing dredge site. One must assume, then, that the site itself has not shown huge accumulations because the solids have been dispersed by physical processes over a much greater area of impact. Could you comment on the dispersion of solid material from the 12-Mile Site. In which direction or directions is the material most likely to be transported? How large an area of the ocean bottom has been affected by sewage sludge disposal at the 12-Mile Site?

The National Oceanic and Atmospheric Administration (NOAA) has reported that, within the accuracy of bathymetry measurements, there has been no significant accumulation (mounding) of sewage sludge at the 12-Mile Site. This is not unexpected. Basically sewage sludge, when ocean dumped, breaks into four fractions: a surface film which is dispersed primarily by wind action; a water fraction (roughly 95 percent of sludge is water) which is widely dispersed and diluted in the water column; a suspended particulate fraction which is likewise widely dispersed before settling out to the bottom; and a denser solid fraction which settles relatively quickly to the bottom. NOAA and EPA studies indicate that the particulate and solid fractions generally settle in a topographic low known as the Christiaensen basin. Some also is transported down (about 50 miles) the Hudson Canyon. Estimates of the area of the bottom impacted by sludge dumping vary from 20 to 30 square miles. This is in comparison to the 6.6 square mile area of the 12-Mile Site.

(4) Could you comment on the bioaccumulation of cadmium by fish and shellfish in the Bight Apex, especially as compared with organisms in less contaminated water. It is my understanding that NOAA studies indicate that the eastern Christiaensen Basin acts as a sediment trap for cadmium and contains the highest levels in the Bight Apex. Are similar trends occurring with regard to PCB's?

Recent NOAA and EPA studies indicate that sediments of the Christiaensen basin, a topographic low which acts as a settling area for suspended particulates and solids introduced into the Apex, have elevated concentrations of pathogens, heavy metals including cadmium, and organic compounds including PCB's. The role that sewage sludge dumping has played in contributing to the accumulation of these contaminants in sediments and any impacts on fishery resources is presently being evaluated by the Agency in its consideration of petitions to redesignate the 12-Mile Site for continued use.

(5) In testimony before the Committee on April 25, former Assistant Administrator for Water, Frederic A. Eidsness, Jr., indicated that the Port Authority of New York and New Jersey had received \$942,000 in grants to plan activities such as recycling and cogeneration. He further stated that five refuse-to-energy projects in the metropolitan region are in preliminary design, and one in Westchester County is 40 percent complete. Will any of these projects be designed so as to be able to also burn sludge? Was the use of sewage sludge considered in the design or planning on any of these plants?

The five projects referred to by Mr. Eidsness in his testimony are: New York City Department of Sanitation, Brooklyn Navy Yard; Port Authority—Essex County—City of Newark, New Jersey; Bergen County, New Jersey; Passaic County, New Jersey; and Wheelabrator—RESCO, Middlesex County, New Jersey.

According to current plans, none of these projects will be designed to incinerate sewage sludges. The inclusion of sewage sludge co-disposal was considered early in the planning process by all of these project sponsors, with the exception of New York City; but co-combustion was rejected because of public perception problems.

(6) What are the chances of an anoxic event similar to the one which occurred in 1976 occurring again? Does high organic loading in the New York Bight Apex as a result of sludge dumping play a role in stimulating the high phytoplankton productivity which, in turn, could be a causative factor in the oxygen depletion episode?

NOAA has postulated the 1976 event was a result of a series of simultaneously occurring phenomena, i.e., an extended period of calm meteorological conditions, early peak river discharge, early warming of surface waters, and a massive bloom of a dinoflagellate *Ceratium tripos* concentrated at and below the pycnocline. If these conditions were to occur again, the possibility of another anoxic event does exist. NOAA and EPA continue to monitor dissolved oxygen levels throughout the Bight Apex and have observed that depressed dissolved oxygen levels usually occur in late summer. When dumped into the already enriched environment of the Bight Apex, sewage sludge can play a role in the occurrence of phytoplankton blooms. However, based upon mass loadings, the major input of nitrogen and phosphorus, the two pri-

mary nutrients requisite for supporting phytoplankton blooms to the Apex, is the Hudson/Raritan estuarine discharge. The input attributable to sewage sludge is relatively minor.

(7) Could you comment on reports that there has been a buildup of materials associated with sewage sludge in the sediments in and around the 12 mile sludge dumpsite. How extensive is this buildup, and how far does it extend?

NOAA studies have indicated that while there has been no significant accumulation (mounding) of sewage sludge at the 12-Mile Site, there is some evidence of benthic impacts in an area of approximately 20 to 30 square miles adjacent to the 12-Mile Site. This area extends within five miles of the Long Island coastline and approximately 50 miles down the Hudson Canyon.

(8) Do you believe that sufficient scientific data exists with regard to the environmental impacts associated with sludge dumping in the New York Bight Apex to justify closing the site? Are proposals for further research in this area to determine the extent to which degradation has occurred necessary before a decision could be made with regard to whether the 12- or 106-Mile Site is a preferable disposal location?

EPA has received petitions from New York City and the six New Jersey sewerage authorities to redesignate the 12-Mile Site for continued disposal of sewage sludge. The "burden of proof" is upon the petitioners to provide the data needed to demonstrate compliance with EPA site designation criteria found at 40 CFR Part 228 and established pursuant to Sections 102 (a) and (c) of the Marine Protection, Research, and Sanctuaries Act. EPA is under court orders to take action on these petitions and subsequently on special permit applications from these sludge generators. An EPA/NOAA Task Team has been formed to evaluate the possible designation of the 12-, 60-, and 106-Mile Sites for disposal of sewage sludge. The preliminary recommendations of the interagency Task Team concerning the 12-Mile Dump Site designation is scheduled to be formulated for internal Agency review by the end of August 1983.

Mr. D'AMOURS. The subcommittee stands adjourned.

[Whereupon, at 4:12 p.m., the subcommittee was adjourned, to reconvene, subject to the call of the Chair.]

[The following was received for the record:]



NATIONAL WILDLIFE FEDERATION

1412 Sixteenth Street, N.W., Washington, D.C. 20036 202-797-6800

June 17, 1983

The Honorable Norm D'Amours
Member of Congress
House of Representatives
2242 Rayburn House Office Building
Washington, D. C. 20515

Re: Possible Alternative Deepwater Ocean Dumpsites for Sewage Sludge

Dear Mr. D'Amours:

On May 25th, at the Ocean Dumping hearings you chaired, the National Wildlife Federation, along with witnesses for NOAA and EPA, voiced support for phasing out the ocean dumping of sewage sludge at the present 12-Mile Site, and (under various conditions) for designating a new sewage sludge dumpsite in deep water at the edge of the continental shelf. The EPA witness seemed to favor a shift of the sludge dumping to the existing 106-Mile Dumpsite, which is used for chemical waste dumping. He expressed the view that by using different corners of the 106-Mile site for sludge and chemical wastes an adequate separation could be achieved to avoid interaction of the two wastes and to permit separate monitoring of individual dumping fate and effects. On behalf of NWF, I expressed a preference for an entirely separate sludge site and for a legislative amendment which would preclude multiple types of wastes from being ocean-dumped within the same dumping site.

Following the hearing I did some checking into historical deepwater dumpsites off the New York and New Jersey coasts. Three such sites are referred to in the literature (Attachment I), although the first two of these may in fact be the same site. Of these two or three sites, the one located 97 nautical miles off Montauk Point, New York, which is portrayed on the accompanying map (Attachment II), seems the most promising. It would furnish much more separation (if sludge were dumped there) from industrial waste dumping at the 106-Site than would be possible within the 106-Site; it is of comparable depth and distance from shore in relation to the 106-Site; yet it is more directly off the coasts of New York and New Jersey which generate ocean-dumped sludge (preserving the relationship to those states of the present 12-Mile Site), while being further removed from Maryland and Delaware which do not ocean-dump sludge and object to sludge-dumping practices by New York and New Jersey.

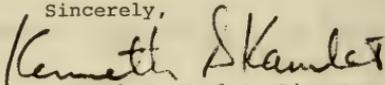
The Honorable Norm D'Amours

Page 2

I would strongly encourage you to seek written views from NOAA and EPA in the near future on the relative merits of selecting an alternative deepwater site for sewage sludge versus commingling (even at opposite corners) within the 106-Mile Site ocean-dumped sludge and industrial wastes. For your convenience, I enclose a set of possible questions (Attachment III) which you may wish to consider posing to NOAA and EPA in this regard.

Thank you for your consideration of this request and for your diligent and continuing efforts to safeguard the marine environment so vital to us all.

Sincerely,



Kenneth S. Kamlet, Director
Pollution and Toxic Substances
Division

Attachments

cc: Hon. Bill Hughes (341 Cannon)
Hon. Ed Forsythe (2210 Rayburn)
Hon. Tom Carper (1020 Longworth)
Hon. Roy Dyson (224 Cannon)
Hon. Claudine Schneider
Hon. Barbara Boxer

Attachment IHistorical Deepwater Ocean Dumpsites off the New York and New Jersey
Coasts

1. High explosives and chemical dumping ground--at a point not less than 110 nautical miles, bearing 130° true from Ambrose Light. (IEC, 1973, p. 2-14).
2. High explosives and toxic wastes--at a point 115 nautical miles, bearing 127° True from Sandy Hook Light, at 39°17'30"N lat. and 72°W long. (IEC, 1973, p. 2-43).
3. Explosives and toxic chemical ammunition--at 39°38'N. Lat., 71°00'W. Long.; 97 nautical miles off Montauk Pt., N.Y. (depth: 1250 fathoms) (Smith and Brown, 1971, p. 72).

Sources

Interstate Electronics Corporation (Subsidiary of A-T-O Inc.)
1973. Ocean Waste Disposal in Selected Geographic Areas.
IEC Report 4460C1541 (prepared for the U.S. Environmental Protection Agency, Ocean Disposal Program Office).

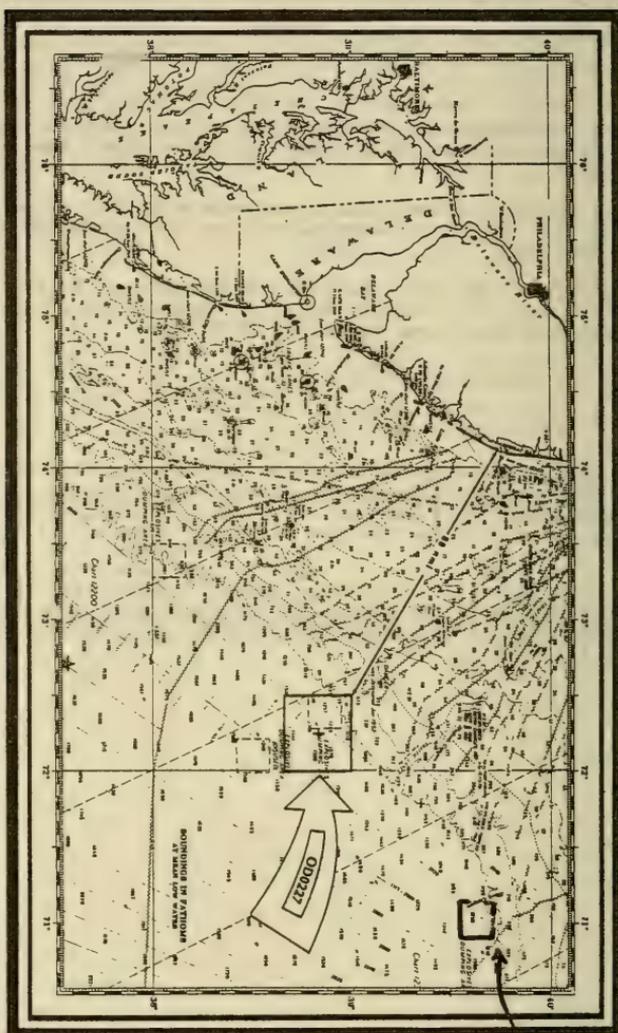
Smith, D.D. and R.P. Brown (Dillingham Corp.). 1971. Ocean Disposal of Barge-Delivered Liquid and Solid Wastes from U. S. Coastal Cities. (prepared for U.S. EPA Solid Waste Management Office), publication no. SW-19c. 119 pp.

ATTACHMENT II

OD0227
Atlantic City, NJ

Boundary Coordinates: 38°48'00"N, 10 33'00"00"W,
73°00'00"W, to 27°33'00"W,
Center Coordinates: 38°50'00"N, 73°15'00"W.

Navigation Chart No.: NDS 13180
Area: 470 Square Nautical Miles
Scale: International Albers
Material Type: Inshore A & C, Orange Water
 Indicating Vents



September 1980

Source: Interstate Electronics Corporation. 1980. Atlas of Ocean Waste Disposal Sites. IEC4010C364 (prepared for U.S. EPA Ocean Disposal Program).

ATTACHMENT IIIQuestions for NOAA and EPA

1. Assuming it is desirable to require any sewage sludge which is ocean-dumped to be dumped in deepwater, at a site further offshore than the current 12-Mile Site, would you agree--as EPA noted in a December 20, 1982 Federal Register notice--that such a shift in dumping location should occur under conditions that permit "further studies of the site and careful monitoring of the impacts of disposal at the site"?
2. Would you also agree that one of the important conditions on which the ability to meet study and monitoring objectives may depend is the distance separating sewage sludge and industrial waste dumping activities, the opportunities for initial mixing with seawater before commingling of the affected water masses occurs, and generally the potential for interaction of the different wastes?
3. The National Wildlife Federation, at the May 25th hearing, stated that, to get an acceptable degree of dilution of a conservative sewage sludge contaminant like PCBs so that interaction could be minimized would require an initial dilution on the order of a million-fold. This is based, presumably, on the assumed presence of PCBs in sludge at the part-per-million level, and on an assumed acceptable water quality requirement of ambient marine water column PCB levels in the part-per-trillion range. Do you agree with NWF's estimate of the degree of initial dilution required to ensure sufficient separation of nearby dumping activities? If not, please provide your own best estimate, and indicate the basis for this estimate.
4. The suggestion was made at the May 25th hearing that the 106-Mile Deepwater industrial waste dumpsite is sufficiently large that a large separation between industrial wastes and sewage sludge could be achieved within the boundaries of this site (e.g., by requiring the two types of wastes to be dumped at opposite corners of the site). Please provide your best estimates for the maximum and minimum (i.e., worst-case) initial dilutions (i.e., within 1 hour) that could be anticipated in the course of a year (or longer) for wastes dumped at various locations within the 106-Mile Site. How confident can we really be that sludge containing 1 ppm of PCBs, if dumped in one quadrant of the 106-Site will undergo a millionfold (or other required degree of) dilution within an hour, or before impinging on other quadrants of the dumpsite?
5. At least 2 or 3 other deepwater ocean dumpsites located to the north of the 106-Mile Site have been historically used for explosives and/or chemical wastes (see attachments). As you know, the 106-Mile Site is itself a former explosives dumping site. For each of the indicated alternative sites, please indicate if there is any basis for believing, by virtue of prevailing current patterns or the distribution of fishery or other biotic resources, that that site would be a less suitable repository for ocean-dumped sewage

sludge than the 106-Site? Also, for each such site, would locating sludge dumping there likely increase or decrease the possibility of interaction with industrial wastes dumped at the 106-Site, in comparison with having both types of wastes dumped within the 106-Mile Site?

6. (Question for EPA) EPA's EIS on the North Atlantic Incineration Site states that "information on the proposed site and the 106-Mile Ocean Waste Disposal Site...is applicable to other mid-Atlantic geographic areas" and that environmental consequences discussed for the proposed incineration site "are valid for any location selected in the mid-Atlantic Bight region bounded by the Continental Shelf on the west and north, and the Gulf Stream on the east and south." Considering the present availability of baseline data in the general area, and assuming that Congress were to mandate an end to sludge dumping at the 12-Mile Site by the end of 1986 at the same time prohibiting the dumping of sludge at existing industrial waste sites (such as the 106-Mile Site), could EPA realistically complete the formal designation of a new deepwater dumpsite. (for sewage sludge) off the New York or New Jersey coast by 1987? What additional expense would be incurred by EPA to undertake and complete such a designation?

ENVIRONMENTAL OVERSIGHT OF GEORGES BANK EXPLORATION

MONDAY, JUNE 27, 1983

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON OCEANOGRAPHY,
COMMITTEE ON MERCHANT MARINE AND FISHERIES,
Boston, Mass.

The subcommittee met, pursuant to call, at 10 a.m., in room 2003A, Government Center, JFK Federal Building, Boston, Mass., Hon. Norman E. D'Amours (chairman of the subcommittee) presiding.

Present: Representative D'Amours.

Staff present: Howard Gaines, Anthony Mazzaschi, Cyndy McGovern, Thomas H. Tackaberry, Deborah Storey, and Margaret O'Bryon.

Mr. D'AMOURS. The hearing of the subcommittee will come to order. We are going to try to stay on schedule as best we can. We have a long series of witnesses.

Another member of the subcommittee is expected, but I will begin at this time.

Today's hearing will review the environmental impacts of oil and gas drilling in Georges Bank, with particular emphasis on the report of the Georges Bank Biological Task Force.

Let me make it clear from the outset that I have grave reservations about the wisdom of oil and gas leasing in the Georges Bank. The Georges Bank is twice as productive a fishing area as the North Sea, four times as productive as the Grand Banks, and five times as productive as the Northeast Arctic. The Georges Bank sustains a New England fishing industry worth \$1 billion a year and supports over 40,000 jobs in the region. It clearly represents a major renewable, self-sustaining resource for the entire Nation.

The Department of the Interior's best guess is that there are 55.7 million barrels of oil and 280 billion cubic feet of gas in the sale No. 52 lease area. This is equivalent to 4 days of total U.S. oil and gas needs.

For these reasons, the Georges Bank lease sales have come under particularly close scrutiny. Challenges to the sales are currently underway both in the courts and in pending legislation.

It was as a result of one of the early legal challenges to Georges Bank oil and gas activities that an agreement was reached to create the Biological Task Force and to abide by the findings of the Biological Task Force.

This morning we will be hearing about the first year's results of task force activity.

The Biological Task Force has been presented a unique opportunity to study at close hand and from the beginning the impacts of oil and gas activities. It is unfortunate that where there are potential threats to the marine environment; such exhaustive monitoring and study is not the rule, rather than the exception.

And so, with the future of Georges Bank oil and gas activities very much in question, we are here today at a pivotal juncture, not only for the effort to recover mineral resources, but also for this unique monitoring effort.

I look forward to the testimony. I welcome the witnesses we have here this morning.

We have divided our witnesses into three panels. The first panel consists of Mr. William Beller, chairman of the Biological Task Force and a representative of the Environmental Protection Agency. Also Mr. Elmer P. Danenberger, who is the North Atlantic District Supervisor, Minerals Management Service, Department of the Interior.

We had expected to hear from Mr. John B. Rigg, an Associate Director of the Minerals Management Service. I guess we were notified rather recently, Mr. Danenberger, that you were going to fill the bill.

If you can, I would like to know why we had that last-minute switch.

STATEMENTS OF WILLIAM S. BELLER, CHAIRMAN, BIOLOGICAL TASK FORCE FOR GEORGES BANK, AND CHIEF, OCEAN PROGRAMS BRANCH, U.S. ENVIRONMENTAL PROTECTION AGENCY, AND ELMER P. DANENBERGER, ON BEHALF OF HON. JAMES G. WATT, SECRETARY OF THE INTERIOR

Mr. DANENBERGER. I really don't have any information other than he had another commitment for today.

Mr. D'AMOURS. Not a prior commitment, obviously.

Mr. DANENBERGER. I am not sure what the conflict was.

Mr. D'AMOURS. At any rate, I welcome you, Mr. Danenberger, and I welcome you, Mr. Beller.

I am going to suggest to the extent that you can you summarize your testimony. I can assure you that I have read every bit of your testimony, every word of it, and other committee members will also be familiar with your testimony. If you can, in the interests of time, please summarize, and your full testimony will be made a part of the record.

So you can begin in whatever order you may decide amongst yourselves. I guess, Mr. Beller, you are scheduled to go first.

STATEMENT OF WILLIAM S. BELLER

Mr. BELLER. Thank you, Mr. Chairman.

I want to tell you that, speaking for the Biological Task Force, I am very pleased to be here to present some of the work that they have done. I feel it has been quite constructive, probably a milestone in cooperation amongst the three agencies.

I have divided my statement into the organization and responsibilities of the task force, its interactions with other groups, its design and usefulness, prospective changes in the program, and the costs to date.

To summarize what has taken place, I would note that eight wells, exploratory wells, have been drilled in Georges Bank. They have all been dry wells. We have made baseline studies; we have monitored the drilling; and we have determined to the extent we can, on the information available, the effects of the drilling fluids and the cuttings.

Mr. D'AMOURS. Let me interrupt you just a moment. This is a public hearing. I want to know if everybody can hear.

Excuse me. Go ahead.

Mr. BELLER. I appreciate my statement being put into the record, so I will try to summarize as briefly as I can.

Insofar as the organization and responsibilities of the task force are concerned, the task force was set up by charter in October 1979. The charter was signed by the Department of the Interior, the Department of Commerce, and the Environmental Protection Agency.

The work of the task force was to advise the Department of the Interior, through the supervisor of the Geological Survey, on prudent environmental control of the drilling.

We have held all our meetings of the biological task force in the open, and we have sought to involve every group with responsibilities or interests in Georges Bank. I believe we have succeeded.

The design of the monitoring program was started in February 1980. Its final draft was completed in April 1981.

I believe the program can be best understood and probably appreciated if I can refer to the diagram on the easel to your left.

This is a diagram showing essentially Georges Bank and the topographical contour lines. Georges Bank is this area. It is a plateau from about 3 meters to 200 meters, about the size of Connecticut and Massachusetts combined. There is a clockwise gyre there. And that has dictated how we put our various stations for samplings.

We have a total of 46 stations on and around Georges Bank. These stations were divided into two sets: Stations to get immediate readings on what is happening, cite specific stations; and stations to determine regional readings, that is the long-term effects, effects that might stretch out beyond Georges Bank.

In order effectively to arrange these stations, we have to have a control. So what we said was this: We will take stations—and here are three regional stations—at Transect I, which is east of lease sale 42, which would be the control. Presumably none of the discharge, except if it turns around, will reach Transect I.

Transect II goes right through lease sale 42 and would tell us what is happening during drilling on the sites.

Transect III is downstream.

This in effect would give us a very close feel of what is occurring in the vicinity of sale 42.

As you notice, from the clockwise spiral, there could be areas of deposition, that is, that the discharges would be carried downstream to some-sink. It is hypothesized that the sink would be the mud patch, which I believe is station 13. We put a station there.

Then as the spiral turned around on itself, we put stations in the bay here, and in an area right above the concentration of stations.

We also felt that we wanted to concentrate on early drilling. So we put 29 stations around station 5, which was the Mobil station, in order to find out what was happening there. And we also had three regional stations around the Shell station at lock 410.

In essence, that gives you an idea of how we planned our program.

We have reached two fundamental conclusions based upon the first year's work, based upon eight wells drilled, which were dry wells. And let me relate what they are.

One, relatively small increases in the amount of barium—and by relatively small, I mean relative to crustal rock and other areas in Georges Bank—and no increases in chromium and other metals were found in the bulk sediments in two intensely studied areas near where drilling occurred.

And two, no significant changes that could be related to drilling activities were detected in the structures of the benthic communities at the regional and site specific stations.

Let me turn now to the fourth point, prospective changes in the program.

Sale 52, which right now, as we know, is temporarily enjoined, goes into portions of Georges Bank, the southern portion, and then off into the deeper water of the slope and possibly the rise. We have very little information, biological information, oceanographic information, about what occurs in these deep waters.

We have set up a monitoring subcommittee which will be meeting tomorrow to recommend a monitoring program for these deeper waters, for sale 52, and for other sales that may follow.

On the last point, costs to date, the cost for Environmental Protection Agency and for the Department of Commerce I believe has been restricted to the infrastructure support for the meetings and for transportation.

On the other hand, the Department of Interior has already spent about \$4.3 million for its 3-year effort.

That would conclude a summary of my remarks, Mr. Chairman. I would be pleased to answer any specific questions.

[Statement of Mr. Beller follows:]

PREPARED STATEMENT OF WILLIAM S. BELLER

Good morning, Mr. Chairman and Members of the Subcommittee. I am William S. Beller, Chairman of the Biological Task Force (BTF) for Georges Bank. I am also Chief, Ocean Programs Branch, U.S. Environmental Protection Agency. I am pleased to be here today to tell you briefly of the role and work of the Task Force on environmental issues related to Georges Bank oil and gas exploration activities.

To do this, I have divided my statement into (1) organization and responsibilities of the Task Force; (2) its interactions with other parties and groups; (3) the design and usefulness of the Task Force's monitoring program; (4) prospective changes in the program; and (5) costs to date.

A quick summary may be in order, which will help put the statement into perspective. To date, oil/gas operators have drilled eight exploratory wells into Georges Bank. All have been dry holes. Scientists made initial baseline studies in the area, monitored the drilling, and are determining the fates and effects of the drilling fluids and cuttings. We are entering the third year of this work. To date, the scientists have reported no significant effects of the drilling discharges on benthic biota.

Organization of the Task Force

The center of Georges Bank lies about 120 miles east-southeast of the Massachusetts coast. The area comprises a vast plateau, ranging in depth from 3 to 200 meters. The plateau is only slightly smaller than the combined areas of Massachusetts and Connecticut. Through a unique combination of ecological and oceanographic factors, Georges Bank supports one of the largest marine fisheries in the world.

Three agencies in October, 1979, signed the Charter setting up the Biological Task Force for Georges Bank. These were the Department of the Interior, the Environmental Protection Agency, and the National Oceanic and Atmospheric Administration. They formed the BTF shortly before Lease Sale #42 occurred, December 19, 1979. This was the first leasing of oil/gas tracts on the Bank.

The Task Force was set up to assist the Department of the Interior on environmental matters connected with Sale #42. Specifically, the Charter instructs the Task Force "to advise the Geological Survey's Oil and Gas Supervisor on those aspects of oil and gas operations resulting from Lease Sale #42 that affect biological resources on Georges Bank and their habitats, including the enforcement of stipulations relating to the protection of biological resources and habitats and the design of environmental studies and surveys, as well as periodic sampling of environmental conditions, to provide warning of adverse impacts."

The Charter stresses the importance of the affected coastal States participating in the activities of the Task Force but not as voting members. I want to note that from the beginning the State representatives have participated actively, effectively, and have made substantial contributions.

Although the present Charter restricts the BTF's responsibilities to Lease Sale #42, the Department of the Interior says it wants the Task Force to make environmental recommendations for pending Lease Sale #52, and is giving strong consideration to including as well pending Lease Sale #82. Lease Sale #52 includes part of Georges Bank, while Lease Sale #82 includes the entire North Atlantic Planning Area, about 60 million acres.

Interactions with other Groups

From the time of its first meeting in Hyannis in early 1980, the Task Force declared all its meetings should be open, publicized beforehand, and aimed at solving technical problems. All the meetings are well attended, 60 people to several hundred participating, depending on the agenda. These people represent just about every shade of interest in Georges Bank. The Task Force sought to set the tone of its meetings by stressing in its discussions the goal of protecting the living resources of Georges Bank while allowing the prudent extraction of oil

and gas. On this goal, everybody could agree. Therefore, discussions involving the entire audience were centered on the discovery and interpretation of data and evidence. Most votes of the Task Force were unanimous.

A subcommittee, chaired by Dr. Suzanne Bolton, then a scientist with EPA, started designing the monitoring plan for Sale #42 in 1980. The plan that was adopted unanimously in April, 1981, was essentially put together at a series of two-day open meetings attended by academic scientists, government officials, industry scientists, and representatives of environmental groups. All interested States at one time or another were represented--Rhode Island, New Hampshire, Maine, Massachusetts. What struck me most forcefully at the meeting where the plan was adopted was that it was heartily endorsed by all factions. Just about everybody had components they would have liked to have seen in the monitoring program, but these people recognized the constraints as well as the goals. They recognized that the plan brought about by consensus was good. The Department of the Interior subsequently funded it.

Design and Usefulness of the Monitoring Program

The major environmental concern of the Task Force centers on determining the effects on bottom-dwelling animals of discharges from oil/gas drilling operations. The bottom-dwellers help support the commercial fisheries of Georges Bank. The discharges include drilling fluids and the drill cuttings.

It is estimated that between 100 and 2000 tons of drilling fluids are used to drill a single well. The metal content of these fluids usually includes large amounts of barium, much lesser amounts of chromium, and far lesser amounts of other metals. Such metals can affect marine organisms.

Thus, the Task Force wants to know how far and in what quantities the drilling fluids and cuttings travel, whether they accumulate in unique areas, and what their effects are on the benthic populations. To get the answers, the Task Force formulated and recommended that the Department of the Interior institute the several-year monitoring program for Lease Sale #42.

The geographic design of the program gives an insight into why studies of a certain nature were performed, and how they are contributing to our understanding of the effects of drilling. Figure 1 shows the existing leases for Sale #42. They all lie in waters of depths 200 meters or shallower. The Figure also shows that Lease Sale #52 drops off into deeper waters. Lease Sale #82 for the North Atlantic Planning Area is bounded by the encompassing bold lines.

The program calls for determining near a new well the short-term effects of the drilling, and on a regional basis, the long-term. On the regional basis, the 18 stations shown in Figure 2 are the sites for

monitoring the fates of the drilling fluids and cuttings, and also the effects of these discharges on the benthic animals. Because the currents move generally toward the southwest along the southern flank of Georges Bank, the program established three sets of stations: one set is "upstream" of the Lease Sale area, the second at the area, and the third "downstream." These are Transects I, II and III, respectively.

In effect, Transect I can act as a control against which the fates and effects of the discharges encountered at the other two transects can be compared. The program also includes areas where the discharges might possibly accumulate or cause undue harm. In the first category is the "Mud Patch," Station 13; and in the second, the heads of Lydonia and Oceanographer Canyons.

While the foregoing arrangement was designed to derive regional or long-term information, the "target" arrangement of stations shown in Figure 3 was designed to acquire short-term data in the vicinity of a drilling platform. Here, 29 monitoring stations are arranged in five circular arrays, the outermost lying six kilometers from the "bull's eye." Mobil Oil Company's platform at Block 312 at Station 5 is the bull's eye. Drilling started there on December 8, 1981, and continued until June, 1982.

The reports of the contractors for their first full year of field studies, which began in July, 1981, are now in hand. In their search for long-term effects of the exploratory drilling in Georges Bank, contractors for three of four projects are continuing their work into this second year.

The major part of this program calls upon contractors to assess the effects of the drilling discharges on animals and communities living in the bottom sediments (benthic infauna); the contractors must also look at effects in potential depositional areas for drilling fluids and cuttings such as in submarine canyons. Carrying out this "Georges Bank Benthic Infauna Monitoring Program," are the Battelle New England Marine Research Laboratory, Duxbury, Massachusetts, and the Woods Hole Oceanographic Institution, in Woods Hole, Massachusetts.

The other parts of the monitoring program recommended by the BTF and directed by the Department of the Interior include:

- "Analysis of Trace Metals in Bottom Sediments," Dept. of the Interior Geological Survey, Woods Hole;

- "Analysis of Hydrocarbons in Bottom Sediments and Analysis of Hydrocarbons and Trace Metals in Benthic Fauna," Science Applications, Inc., La Jolla, CA; and,

- "Analysis of Historic Benthic Infaunal Samples from BLM's New England Environmental Benchmark Program," Taxon, Inc., Salem, MA.

It is important to note that these are not the only efforts in Georges Bank, nor is this the first time data have been collected in the area. Studies have been done, and others are coming out through industry and Federal agencies, that are contributing to our understanding of the effects of drilling on Georges Bank. This work includes baseline studies by what is now the Minerals Management Service of the Department of the Interior, work in water currents and hydrography by industry, work in biology and fisheries by the National Oceanographic and Atmospheric Administration, and work in drilling fluids toxicity by the Environmental Protection Agency, the Department of Energy, and the American Petroleum Institute.

The Task Force has the following major findings based on the first year's study:

- Relatively small increases in the amount of barium, and no increases in chromium and other metals were found in the bulk sediments at two intensely studied areas near where drilling occurred. (Barium is used as a tracer for determining the accumulation of the drilling muds.)

- No significant changes that could be related to drilling activities were detected in the structures of the benthic communities at the regional and site-specific stations.

These are not unexpected findings. Georges Bank is fashioned to allow rapid dilution of discharges into its waters. The mixing of the pressure gradients of tides, currents and storm waves over a shallow plateau leads to highly energetic mingling of the waters. The vertical mixing renders nutrients in the water column available to all organisms; thereby they produce the fisheries of Georges Bank.

Because the monitoring has thus far shown the benthic communities unaffected by initial exploratory drilling, the Task Force has made no recommendations relative to Lease Sale #42 other than to continue the monitoring in order to detect longer term effects, should such occur.

The Department of the Interior is using the Georges Bank monitoring program to help in the development of the agency's study-program policy. In drawing up monitoring programs for other areas, particularly high-energy ones, the work done on Georges Bank is particularly useful. The results of such monitoring programs are valued in writing environmental impact statements, which would be useful in protecting areas of biological concern.

In specific terms, the Department has used the results of the monitoring studies in preparing its "OCS Oil and Gas Lease Sale #52 Environmental Assessment," published January, 1983; and similarly, for its "Draft Environmental Impact Statement for the February, 1984, North Atlantic Lease Offering." The monitoring results will also be used to help prepare the final environmental impact statement for the February, 1984 North Atlantic Lease Offering.

The Environmental Protection Agency (EPA) has made good use of the work of the Task Force. In the spring of 1981, when the BTF was developing its monitoring program, Region I of EPA was formulating National Pollutant Discharge Elimination System (NPDES) permit conditions for oil/gas operators wanting to drill in Georges Bank. Region I concluded that there was insufficient information to determine there would be no unreasonable degradation of the environment as a result of discharges made during exploratory drilling. Additional information was needed, which was similar to that needed by the BTF for its recommendations to the Department of Interior.

EPA could issue NPDES permits for drilling only if monitoring were conducted to satisfy the agency's information needs. The EPA Region I chose to use the BTF program as the means to acquire the needed data. This avenue was used because of the Department of the Interior's commitment to fund the BTF program, and the scientific consensus that the

program was designed to develop information to answer the critical impact questions for Georges Bank. Essentially though, EPA required what DOI required, and there was no point in EPA's calling for new work.

The results of the BTF monitoring studies suggest that the NPDES permitted discharges to date have not caused "unreasonable degradation" or "irreparable harm" to the benthic environment of Georges Bank. Looking ahead, EPA has a good grasp on the NPDES conditions for new tracts, for example in Lease Sale #52, that might be sold near Lease Sale #42. Similarly, the Agency will be able to identify oceanographic conditions in other North Atlantic lease sale areas, which might require special discharge or monitoring conditions. Moreover, EPA could use a BTF recommended monitoring plan for submarine canyons and deeper waters, which plan might suffice for any special monitoring EPA might require of new permittees. Such a plan would also address concerns raised by scientists, operators, and States.

Prospective Changes in Program

As I indicated earlier, the Task Force is expanding its responsibilities to Lease Sale #52, and is looking forward to including the entire North Atlantic Planning Area. With the possibility of Lease Sale #52 taking place soon, the BTF at its May 12, 1983, meeting, set up a new monitoring subcommittee to recommend a program for the deeper waters, which subtend the continental slope and rise. The subcommittee

includes members of the Federal agencies on the BTF as well as a representative from the State of Massachusetts.

The monitoring problem becomes much more complicated in the deeper waters than in the shallower. In continental slope and rise areas, drilling muds and cuttings would be discharged, diluted and dispersed in much greater volumes of water and over much greater depths than on the continental shelf.

Operational problems intrude. Industry experience in deepwater exploratory drilling is limited; little deepwater monitoring has been attempted; relatively little is known about the physical and biological characteristics of continental slope and rise areas. The availability of suitable sampling and observational platforms, for example, submersibles, may be a significant problem.

In view of the above factors, the BTF program will expand geographically, technically, and in its difficulty. Other elements the BTF foresees involve the development and production phases of the oil/gas operations. Nonetheless, with the continued full cooperation of the charter agencies, the BTF will be able to do its job.

Cost to Date

The agencies having representatives on the BTF pay essentially their travel, per diem and salaries.

To carry out the BTF monitoring program for Sale #42, the Department of the Interior has already spent or has obligated itself to spend a total of about \$4.3 million for a three-year effort. These funds include payments for sampling at the Georges Bank stations four times a year for the entire period, which ends May, 1984. Total cost of the first year program: \$1.7 million. Funds already obligated for the second and third years: \$2.64 million.

Until the report of the new monitoring subcommittee is prepared, I can not estimate the cost of its recommendations.

These remarks conclude my statement. I would be pleased to respond to questions.

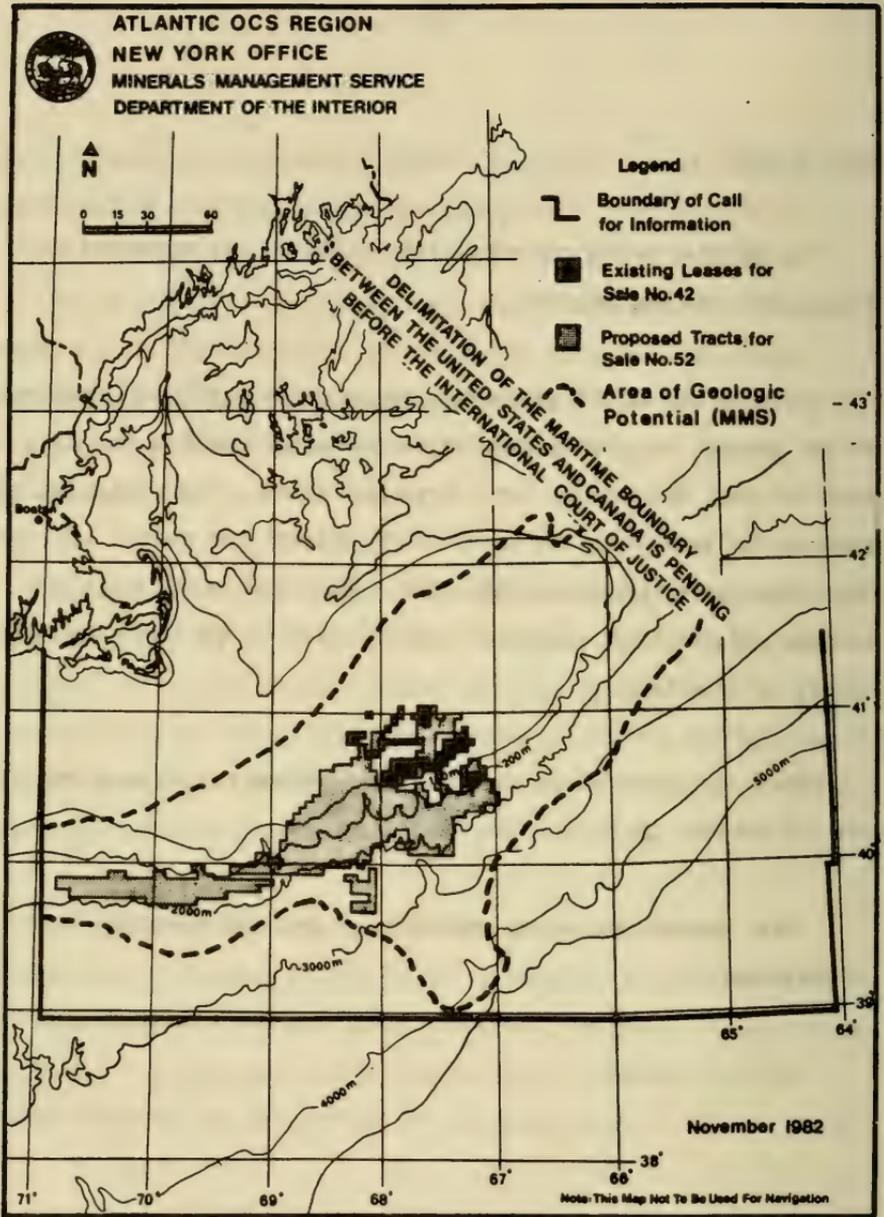


FIGURE 1. PROPOSED NO. ATLANTIC LEASE OFFERING (FEBRUARY 1984) .

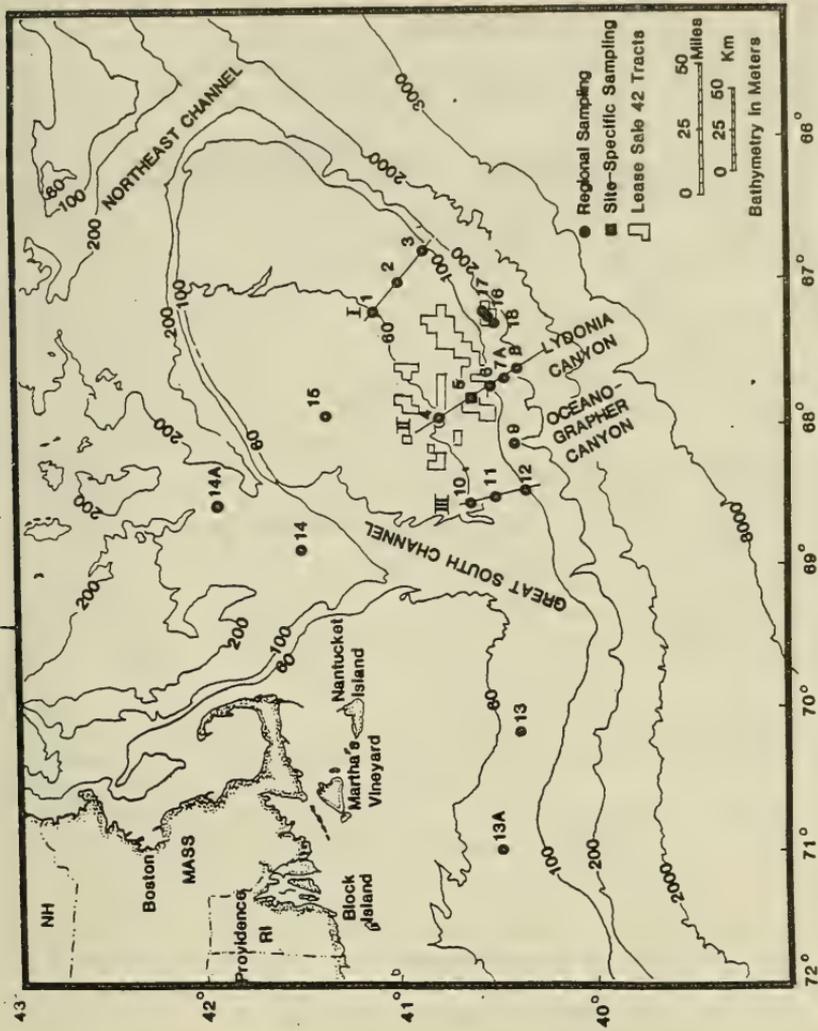


FIGURE 2. LONG-TERM REGIONAL STATIONS

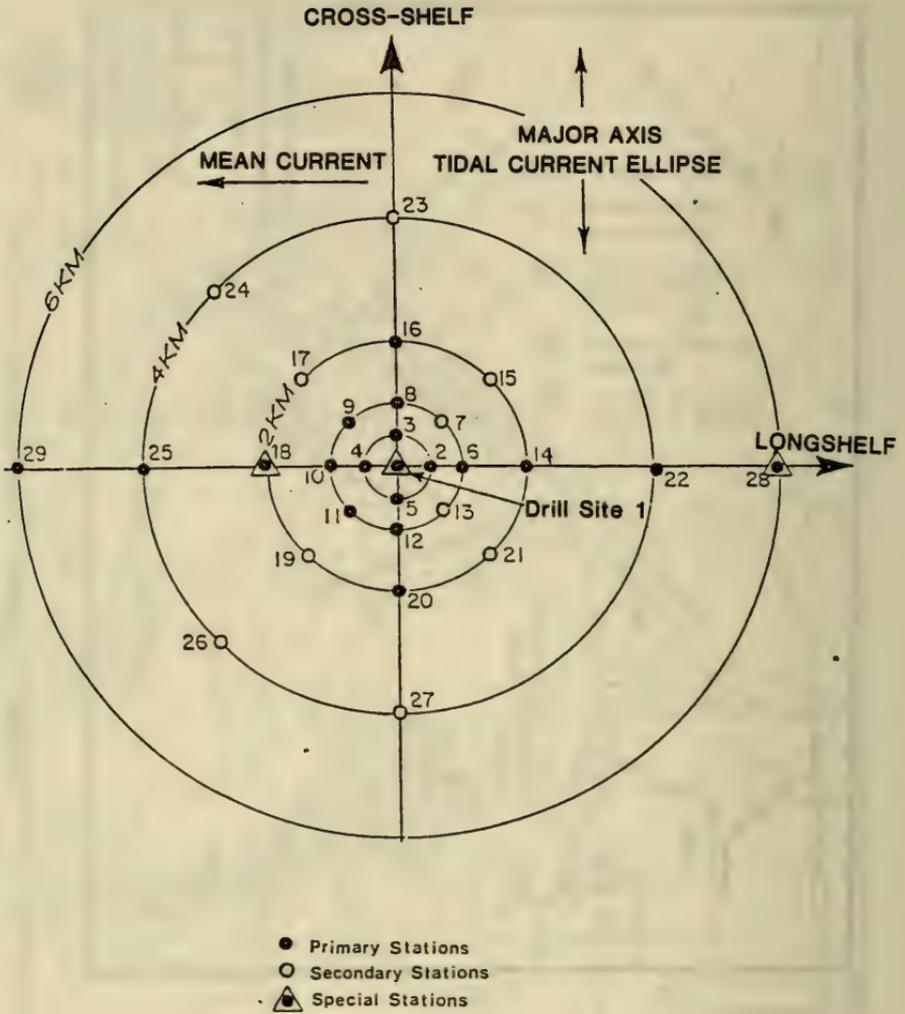


FIGURE 3. SITE-SPECIFIC STATIONS

Mr. D'AMOURS. Thank you very much, Mr. Beller. I am going to hold off on the questioning until Mr. Danenberger has also testified. But I am most appreciative of the fact that you did summarize very adequately your testimony. I am sure Mr. Danenberger will follow suit.

Mr. Danenberger, would you proceed, please.

Mr. DANENBERGER. OK. I just want to note one correction in the testimony that is presented. They did manage to get the name changed on the statement, but they did not correct the position. I am not the associate director for Minerals Management Service. I have a much better job.

I will try to summarize as briefly as possible so that we can move on with questions.

I think Bill did a good job of summarizing the program. I will just hit some other highlights and try and respond to some of the other requests for information.

As far as other studies that have been done prior to OCS sale 42, which is the first lease sale for the North Atlantic, the Department had contracted for a 2-year North Atlantic environmental baseline study in 1976 and 1977 at a cost of \$4.5 million, and a 5-year physical oceanography program, between 1977 and 1982, at a cost of \$14 million, acquired extensive geophysical and meteorological information, and conducted a comprehensive coordination and program review produce with States, Federal agencies, and private institutions.

One of the aspects of the agreement that ended the litigation on the sale was the biological task force, which ultimately led to the program which Bill has described for you.

The program was accepted by the Department of the Interior, which has been responsible for most of the funding.

I have attached some details and summary reports to the statement that you may look at at your leisure.

At this point we are nearing the completion of the second year of the monitoring program, and preliminary results from the second year have not altered the assessment produced by the first year effort. To date the Department has committed \$4.3 million to the program and a continuation effort into the third year is planned at an estimated cost of \$1.5 million.

The monitoring program has been useful in policymaking in several ways. The Department has a wide range of enforcement and regulatory actions it may take if information is obtained that indicate detrimental effects to the environment.

For example, we may invoke the provisions of the biological stipulation which would require lessees to conduct special environmental surveys. To date the results of the monitoring efforts have not indicated the need for additional surveys, and the interruption of drilling activity has given us some time to pause and look at the data.

The Georges Bank monitoring program data is also being used by EPA, as Mr. Beller indicated.

As far as additional deep water studies, in 1979 the Department began a multiyear effort to assess the biological and physical processes operating in the North Atlantic canyons and on the slope. That effort is being performed by Lamont Doherty Observatory at

Columbia University and the U.S. Geological Survey. A report is due within the next couple of months.

In 1980 the Department began planning for fiscal year 1982 regional study plan for the Atlantic. As with the regional technical working groups in other areas, the North Atlantic regional technical work group was an active participant in recommending the special studies.

Deep water studies were considered and the general consensus was that environmental information summarized should be prepared before any field program was initiated.

The Department contracted for this summary in 1982, and the draft final report was just received from Marine Geoscience Applications, Inc. It will be used in designing a field program that is scheduled to begin in this fiscal year.

The Scientific Advisory Committee has also examined this issue of deep water studies, and issued a report in 1982 advising the Department to conduct broad surveys first and then focus on areas of specific interest.

That advice was followed in planning the 1983 studies program. There are some plans now being made for a deep water field effort. They will be made public shortly. Field studies will be conducted for at least two years in deep waters of the North Atlantic. The Department remains convinced, however, as has been noted in the recent NEPA documents, that there are sufficient controls on drilling operations and that deep water environments will suffer no more risk of damage than those in the shallower areas.

The subcommittee also expressed interest on the resource estimates for Georges Bank. The first resource estimates for the proposed sale 52 area were developed in 1980 for use in the EIS process. The resource estimates were developed by using conditional assumptions that commercial hydrocarbon accumulation existed in the area. At that time the conditional resource estimates ranged from 17 million to 6.35 millions of oil, and from 196 billion cubic feet to 13.5 trillion cubic feet of gas. The conditional mean estimates, assuming commercial discoveries, were 1.73 billion barrels of oil and 5.2 trillion cubic feet of gas.

What this means is that if the commercial discovery were made, these were the quantities of hydrocarbons that would be expected.

It was estimated there was a .6 probability that no commercial accumulation was present.

These original resource estimates were based on preliminary mapping of a regional seismic data grid on rather wide spacing, approximately 7.5 by 12 miles.

The only geologic data available at that time was from the two stratigraphic test wells drilled in 1976 and 1977. These resource estimates reflected a lot of the general optimism that was prevalent at the time of the first OCS sales, where over \$817 million was paid to the Department in bonuses for the 63 tracts that were leased.

In sale 42, bids by the operators were primarily based on deep structures, even though the data available from the stratigraphic test wells indicated a lack of potential reservoirs. Enthusiasm on the part of the industry reflected in this bidding increased the Department's optimism and was part of the reason for the higher initial estimates for OCS sale 52.

In April of 1982, updated resource estimates were developed for the sale 52 secretarial issue document and in designing a bidding system to use in the sale. They conditionally mean resource estimates were 56 million barrels of oil and 280 billion cubic feet of gas. This dramatic decrease in resource estimates was a result of additional geophysical and geological information and some further analysis of the well results—the results of the first three wells that were drilled on Georges Bank.

The new seismic data was on a tighter grid and did provide much better quality of coverage.

The initial three wells drilled on Georges Bank indicated a lack of potential hydrocarbon reservoir formations in the deeper stratigraphic section, and condemned several structures, including two patch reefs and a geophysical bright spot. These new data resulted in elimination of many potential deep stratigraphic prospects, and increased the risks associated with others. These are the primary reasons for the sharp reduction.

It should be pointed out, that, although resource estimates and methodologies may be precise, the estimates themselves are rarely accurate, never precise, and they include very subjective judgments. I will definitely vouch for that.

While the resource estimates previously discussed were conditional, and commercial accumulation within the proposed area, they do include subjective judgments as to the probability of each prospect lacking hydrocarbons. If a discovery was made in one of the prospects, there would be a reassessment of all the risk analyses and an adjustment in the resource figures.

That concludes my summary.

[Statement of Mr. Danenberger follows:]

Statement of Elmer P. Danenberger

Associate Director, Minerals Management Service

on behalf of

James G. Watt

Secretary of the Interior

before the Subcommittee on Oceanography,

Committee on Merchant Marine and Fisheries

U.S. House of Representatives

before an oversight hearing in Boston, Mass.

June 27, 1983

Good morning, Mr. Chairman and Members of the Subcommittee. I am

Bud Danenberger, North Atlantic District Supervisor, Minerals Management

Service of the Department of the Interior. I have been asked to appear

here on behalf of Secretary Watt, who regrets that he could not appear

before you himself.

The Department has been keenly interested in leasing and exploring the

North Atlantic area for potential oil and gas resources for some time.

Planning for the first North Atlantic lease sale, Sale #42, began in 1975. The Department has always recognized the importance of Georges Bank fisheries to the New England and National economies, and has sought all available means of mitigating the possible adverse effects of offshore drilling on the fisheries and fishing industry. The Department contracted for a 2-year North Atlantic environmental baseline study in 1976 and 1977 at a cost of \$4.5 million, and a 5-year physical oceanography program (1977-1982) at a cost of \$14 million, acquired extensive geophysical and meteorological information, and conducted a comprehensive coordination and program review produce with States, Federal agencies, and private institutions, the sum of which made up the decision process that led to the sale. While there was litigation that delayed the sale for nearly 3 years, a settlement agreement was eventually obtained that, among other things, charged DOI with the responsibility to consider for approval and funding the recommendations of the Georges Bank Biological Task Force (BTF).

The BTF was created in October, 1979, over a year before the settlement agreement was approved by the District Court. During that year, the BTF

developed and recommended a monitoring plan that rivaled earlier BLM baseline studies in its scope. After becoming more fully aware of the magnitude and range of the BLM studies, the BTF, with the help of the DOI Scientific Advisory Committee (SAC), developed new objectives for the program and a sharper, more directed studies plan resulted which was approved as the Georges Bank Monitoring program (GBMP) in April 1981.

It was this Administration that accepted the recommended plan and immediately began funding and implementation so that environmental information could be obtained prior to exploration drilling. In essence, the GBMP attempts to track the fate of discharged drilling materials, and to determine if they have any effects on bottom communities, where these materials would be expected to accumulate. To do this, scientists collect organisms and sediments seasonally and analyze them for accumulations of the trace metal components of drilling muds, and for hydrocarbons. Samples are collected at regional stations in order to detect long-term accumulations, and in a dense pattern around a formerly active drill site. There are three separate groups of scientists

conducting the analyses: 1) hydrocarbon chemists; 2) trace metal chemists and geologists; and 3) marine biologists and ecologists. Results from these analyses are synthesized and interpreted by the scientists themselves and by a Scientific Review Board established by DOI that includes scientists under contract as well as independent specialists. In this way, information from the program is subjected to broad internal peer review before it is reported to the BTF and others. Attached to the testimony are details of the monitoring program, the contracts that DOI issued for conducting the program, and other studies that DOI has performed to increase our knowledge of the area.

Also included a report of the first year's monitoring results, which indicates that exploratory drilling has caused no significant biological effects on bottom communities. We are nearing the completion of the second year of the monitoring program, and preliminary results from the second year have not altered the assessment produced by the first year effort. To date, the Department has committed \$4.3 million to the monitoring program, and a continuation effort into the third year is planned at an estimated cost of \$1.5 million.

The GBMP has been useful in policy-making in several ways. The Department has a wide range of actions it may take if information is obtained that indicates detrimental effects to the environment. We may, for example, invoke the provisions of the biological stipulation which would require lessees to conduct environmental surveys to determine the existing conditions and the extent and composition of biological habitats in the area of proposed operations. To date, the results of our monitoring efforts have indicated little or no adverse effects on the environment so we have not had to invoke any survey requirements or require modifications of operations. However, these measures remain available to us to protect against or mitigate any detrimental effects we might identify.

The design and implementation of the GBMP by DOI allowed the Environmental Protection Agency to issue NPDES discharge permits contingent on information derived from the program. While EPA noted in hearings in Boston that there was insufficient information available to

make a determination that drilling would result in no irreparable harm to the environment, it felt that the GBMP would provide the information that would satisfy agency needs. Future NPDES permitting would also be made easier. Thus, the GBMP is facilitating EPA's ability to meet its responsibilities under the Clean Water Act.

The Department made use of preliminary results of the GBMP in preparing the Environmental Assessment for Lease Sale #52, released in January of this year. The final report for the first year program was used in its draft Environmental Impact Statement for the February, 1984, North Atlantic Lease Offering, which was released just this month. Additional information, as it becomes available, will be used in preparing the final EIS for that lease offering.

The GBMP experience has shown how a scientific program can become the focal point around which public and private entities can coordinate their needs and objectives, both in designing the program and in using results from the studies. This will prove valuable to the Department if similar requirements should arise in other geographic areas, or in deeper waters in the North Atlantic.

Deep water studies are being addressed on several fronts. In 1979, DOI began a multi-year program to assess the biological and physical processes operating in North Atlantic canyons and on the slope. That effort, being performed by Lamont Doherty Geological Observatory of Columbia University and the U.S. Geological Survey, is in its final stages and a report is due within 2 months. In 1980, we began the planning for the FY 1982 Regional Study Plan for the Atlantic. As with Regional Technical Working Groups in other areas, the North Atlantic Regional Technical Working Group (NARTWG) was an active participant in recommending studies for the FY 1982 plan. Deep water studies were considered, and general consensus was reached that, before any field program was initiated in deep water, an environmental information summary should be prepared. The Department contracted for this summary in 1982, and the draft final report was just received from Marine Geoscience Applications, Inc. It will be used in designing a field program that is scheduled to begin in FY 1983.

Our Scientific Advisory Committee has also examined the issue of deep water studies. It issued a report in 1982 advising the Department to

conduct broad surveys first, and then focus on areas of specific interest. MMS has followed that advice in planning our FY 1983 studies, also developed in conjunction with the NARTWG, by first conducting the information summary, then providing for regional characterization, and finally providing for monitoring of operations when locations are chosen and exploration plans approved. Specifics of the deep water field studies will be made public shortly. Field studies will be conducted for at least 2 years on deep waters of the North Atlantic. The Department remains convinced, however, as has been noted in recent NEPA documents, that there are sufficient controls on drilling operations and that deep water environments would suffer no greater risk of damage than those in shallower areas.

We hope the good working arrangement we have with the BTF and NARTWG will continue. We are committed to active coordination with these and other groups in order to ensure we are applying the latest and most accurate environmental information to decision-making, and to plan additional monitoring studies to ensure the compatible development of both living and non-living resources.

The subcommittee expressed an interest in how resource estimates for Georges Bank oil and gas were compiled and incorporated in the policy making process. Resource estimates are normally incorporated in the presale policy making process at two points, the draft environmental impact statement (EIS) and the Secretarial Issue Document (SID). This allows the presale analysis to proceed incorporating the most current information available. Provisions are available to incorporate at any time significant changes to these estimates further allowing decisionmakers access to the most current information.

The first resource estimates for the proposed Sale No. 52 area were developed in October 1980 for use in preparing the EIS analysis addressing the costs and benefits associated with the proposed sale and alternatives to the proposal. These resource estimates were developed on the conditional assumption that a commercial hydrocarbon accumulation existed in the proposed area. The conditional resource estimates ranged from 17 million to 6.35 billion barrels of oil and from 196 billion

cubic feet to 13.5 trillion cubic feet of gas. The conditional mean estimates were 1.73 billion barrels of oil and 5.25 trillion cubic feet of gas. This means that if a commercial discovery was made in the area proposed for leasing we would, on average, expect to find 1.73 billion barrels of oil and 5.25 trillion cubic feet of gas. It was estimated that there was a .6 probability that no commercial accumulation was present. These resource estimates were based on preliminary mapping of a regional seismic data grid (approximately 7.5 x 12 miles). The only geologic data available in the vicinity of the proposed sale were from two COST wells drilled in 1976 and 1977. These resource estimates reflect the general optimism prevailing at the time, as evidenced by Sale No. 42 where the Department leased 63 tracts for \$817 million in bonus bids.

In Sale 42, industry offered high dollar bids on deep structures even though data available from the COST wells indicated a lack of potential reservoirs (based on the porosity and permeability of rock structures). This enthusiasm on the part of industry, as reflected in Sale No. 42

bidding increased the Department's optimism regarding these deep structures and other deep potential stratigraphic traps.

In April 1982 updated resources estimates were developed for the Sale 52 SID and in designing appropriate alternative bidding systems to use in the sale. These conditional mean resource estimates were 56 million barrels of oil and 280 billion cubic feet of gas. The dramatic decrease in resource estimates was a result of additional geophysical and geological information and a different scope of potential hydrocarbon prospects being considered in this appraisal. In the period between January and March 1982 the Department acquired new seismic data on approximately a 1 x 3 mile grid that were of a significantly better quality than the data used to develop resource estimates for the EIS. Analysis of the newly acquired geophysical and geological data indicated that many previously mapped prospects were smaller or did not exist and that others were much more questionable and, therefore, more risky. The April 1982 resource estimates incorporate the data obtained from three dry holes drilled in the Sale No. 42 area. These wells indicate

a lack of potential hydrocarbon reservoir formations in the deeper stratigraphic section and condemned two patch reefs as well as a geophysical bright spot (a possible indication of a gas accumulation).

These new data resulted in the elimination of many potential deep stratigraphic prospects and an increase in the risk associated with others. In addition to the new geophysical and geological data, the resource estimates developed for the SID did not include some possible stratigraphic traps that could not be adequately delineated for purposes of a resource economic evaluation. The SID resource appraisal included only those prospects that were being considered for resource economic evaluations prior to the sale.

It should be pointed out that although resource assessment methodologies may be precise, resource estimates are only rarely accurate, never precise, and they include subjective judgements (probabilities of success or failure) based on the reliability of the data and information available to the evaluator at the time of the appraisal. While the resource estimates previously discussed are conditional on a commercial accumulation within the proposed sale area, they do include subjective

judgments as to the probability of each prospect lacking hydrocarbons.

If a discovery was made in one of the prospects being considered, it could exceed the average amount previously estimated to exist in the area under consideration. In any event, a discovery would result in a reassessment of the risk associated with other prospects and a new assessment.

This concludes the statement. I would be pleased to answer any questions that members of the Subcommittee might have on this issue.

GEORGES BANK MONITORING PROGRAM

Studies Funded and Managed
by the Minerals Management Service

Prepared by: Branch of Environmental Studies
Minerals Management Service
Washington, D.C. 20240

June 1983

Georges Bank Monitoring Program

Introduction

On April 14, 1981, the Georges Bank Biological Task Force recommended a monitoring program to assess the effects of OCS oil and gas operations resulting from Lease Sale #42 on the benthic communities of the Georges Bank area. Shortly thereafter, the Bureau of Land Management (BLM) assumed the responsibility for funding and managing several studies proposed by the Biological Task Force. In May, 1982, the Outer This document provides Continental Shelf component of BLM, including the studies program, was transferred within the Department of Interior (DOI) into the newly created Minerals Management Service (MMS). This document provides a discussion of the monitoring program and descriptions of the studies funded originally by BLM, now MMS.

Two types of sampling stations have been established for the monitoring program: long-term, regional stations and site-specific stations. The long-term, regional stations were established to monitor broad-scale, long-term changes in benthic epifaunal and infaunal populations, and sediment texture and chemistry resulting from OCS oil and gas operations. The locations of these stations are shown in Figure 1. The site-specific stations are arrayed around an operating rig. These stations were established to monitor local changes in the benthic community and sediment texture and chemistry in the immediate vicinity of drilling operations. The locations of these stations are shown in Figure 2.

The Lease Sale #42 tracts are located along the southern flank of Georges Bank in water depths ranging between 50 and 200 meters. The average currents in this region of the bank are generally westward. Areas to the east of the lease sale tracts (upcurrent) should be affected less by materials discharged from drilling operations than areas to the west (downcurrent). Sampling stations located upcurrent of the lease sale tracts along Transect I (stations 1, 2, and 3) were chosen because it relatively was felt they would be free of drilling discharge materials and be acceptable long-term, regional "control" sites downcurrent stations along similarly, Transect III (stations 10, 11, and 12) were chosen as sites where effects from discharges are more likely to occur.

Upcurrent control stations are situated in a manner which facilitates comparisons with respective downcurrent stations along or near the same isobath. The rationale for such a comparison is that surficial sediments, currents, hydrography, and benthic communities change significantly in a cross-shelf direction from the crest of the Georges Bank to the edge of the continental shelf, but change less dramatically along a

given isobath. Also, recirculation in the Georges Bank gyre occurs in water depths less than 60 meters. Therefore, recirculated discharge material which could possibly contaminate the upcurrent control sites should be dilute, and any effects should be relatively small in comparison to downcurrent stations.

By monitoring combinations of upcurrent and downcurrent stations along more than one isobath it should be possible to compare the effects of drilling activities on different benthic communities.

Additional long-term regional stations are located in the immediate Georges Bank lease sale area along Transect II (stations 4, 5, and 6); at a single station within the 60-meter isobath on Georges Bank where maximum resuspension of sediments is likely to occur (station 15); and at sites of active deposition where fine-grained materials associated with drilling operations may accumulate. The latter stations are located at the heads of Lydonia and Oceanographer Canyons (stations 7 and 9), at the shelf/slope break (station 8), in Great South Channel (station 14), and at the "mud patch" (station 13).

Sampling at all long-term regional stations includes:

(1) "infaunal grab samples" for characterization of infaunal community structure and composition, sediment grain size distribution, and organic carbon, hydrogen, and nitrogen concentrations in sediments; (2) "geology and geochemistry grab samples" for characterizing sediment grain size distribution and concentrations of hydrocarbons and trace metals in sediments; (3) photographs of the bottom for characterizing large-scale topography and epifaunal community structure and composition; and (4) measurements of dissolved oxygen, salinity, and water temperature. Dredge or trawl collections of epifauna will be taken at the "mud patch," the head of Lydonia Canyon, and at station 2 (control) for the identification of epifaunal voucher specimens and the analysis of hydrocarbons and trace metals in epifaunal tissues.

Site-specific stations are arrayed around an exploratory drilling rig. The array of stations is presently located at a rig site in the vicinity of long-term, regional station 5 on Block 312 (Figure 2). These stations were established to determine local changes in sediment texture and chemistry and in the benthic communities in the immediate vicinity of drilling activity. Lease block 312 was selected for this experiment because available water current and sediment transport observations suggest that drilling discharges may be most easily observed in the 75 to 95 meter depth range along the southern flank of Georges Bank.

Sampling within the site-specific array is being conducted within approximately six kilometers of the rig. An over-sampling approach is being used, with stations finely spaced in a quasi-radial pattern around the rig. More intensive sampling is conducted within two kilometers of the rig

in each direction, because symmetric distribution of deposited material is expected initially due to the strong rotary tidal currents in the area. Sampling is also more intensive along the axis parallel to the direction of mean current flow, particularly in the area downcurrent from the rig site.

The array of site-specific stations is divided into "primary," "secondary," and "special" stations. Benthic infauna samples, geology and geochemistry samples, and bottom photographs are collected at all "primary," site-specific stations. Hydrocarbon subsamples are collected and archived. Sampling is conducted at "secondary" stations in a manner similar to the "primary" stations but the samples are analyzed only if data from the "primary" stations suggest that additional analyses would be beneficial. "Special" stations are located at the rig site, two kilometers downcurrent from the rig site, and six kilometers upcurrent from the rig site. Sampling is conducted as described for "primary" stations. The following additional work is conducted at the "special" stations: (1) "dredge/trawl collections" of epifauna for identification of voucher specimens and analysis of hydrocarbon and trace metal concentrations in tissues; (2) subsampling and analysis of sediment hydrocarbons from "geology and geochemistry grab samples"; and (3) any additional studies of special interest. In addition, measurements of dissolved oxygen, salinity, and water temperature are made at the drill site.

All monitoring stations, both long-term, regional and site-specific, are sampled seasonally, until concentrations of drilling fluid components observed during the post-drilling surveys are similar to pre-drilling concentrations. Furthermore, if the benthic community has changed as a result of drilling activities (based on comparisons of pre-drilling and post-drilling samples and/or comparisons of control stations and experimental stations) sampling and analysis will continue until such changes are no longer distinguishable from changes identified as natural variation. Quarterly sampling has been selected to evaluate the magnitude of seasonal changes in the abundance of benthic organisms and concentrations of hydrocarbons and trace metals in the sediment. Analysis of historical benthic samples, which has been funded by BLM/MMS and recently completed, will provide pertinent background seasonal data for several long-term, regional stations. Additional background information, including benthic sampling data, exists from the BLM-funded USGS/WHOI program and the National Marine Fisheries Service Ocean Pulse and MURT programs.

Study Title: Georges Bank Monitoring Program -
Analysis of Benthic Infauna
Communities

Sponsoring Office: New York OCS Office

Principal Investigator: Dr. Jerry Neff
Battelle New England Marine Research
Laboratory
397 Washington Street
Duxbury, MA 02332

BLM Contract Number: AA851-CT2-7

Period of Performance: January 1982 - January 1983
FY 1983:

Study Cost: FY 1982: \$700,000; Cumulative: \$800,265

Objectives:

1. Describe the benthic communities and populations at selected stations on Georges Bank during various stages of OCS oil and gas exploration and development.
2. Relate changes in the benthic communities to changes in pollutant concentrations associated with oil and gas activities.

Background:

The Biological Task Force for Sale #42 on Georges Bank was established to recommend to the U. S. Minerals Management Service's Supervisor for Oil and Gas Operations in the North Atlantic "the design of environmental studies and surveys as well as periodic sampling of environmental conditions to provide warning of adverse effects" of OCS operations. MMS is currently funding the research program recommended by the Biological Task Force on April 14, 1981.

The major emphasis of the Biological Task Force's monitoring program is to link the discharges from oil and gas operations to effects on the benthic communities on or near Georges Bank. This program design requires an understanding of the (1) physical processes on Georges Bank which transport materials and nutrients, (2) areas of pollutant accumulation, and (3) effects of pollutants on various benthic communities of the Georges Bank ecosystem. This contract is specifically for the analysis of benthic communities on Georges Bank and any changes in these communities that may occur in response to the discharge of pollutants from OCS oil and gas operations. It also provides for logistical support for collection of samples for the trace metal and hydrocarbon contracts, and integrates the results of analysis performed under those contracts.

Study Description:

Six replicate 0.04 square meter benthic samples are collected at all long-term, regional stations during each sampling cruise and double-sieved at 500 and 300 microns. Subsamples for grain size and carbon-hydrogen-nitrogen analyses are removed from these samples prior to their sieving and preservation. An additional six replicate samples are collected at these stations using a 0.1 square meter grab. These samples are preserved and archived. Infauna samples are sorted and specimens identified to the lowest possible taxonomic level and counted. Wet weight biomass is determined for each taxonomic group, for each replicate sample, and for each station. Analyses of this information includes (1) measures of species diversity, (2) measures of temporal and spatial abundance, (3) descriptions of the life stages of individuals of each species, and (4) measures of faunal affinity and appropriate multivariate techniques to define species and station patterns. Relationships between changes in community and population structures and changes in sediment texture and chemistry resulting from drilling activities are then interpreted.

Six replicate 0.04 square meter benthic samples are collected at all site-specific stations. These samples are double-sieved at 500 and 300 microns and preserved for subsequent analysis.

Epifauna samples are collected during all cruises by dredge and/or trawl at the "mud patch," the head of Lydonia Canyon, and station 2 (control). Sufficient organisms are collected to perform the chemical analyses of trace metals and hydrocarbons. Special consideration is given to commercially-important species that represent a variety of feeding mechanisms.

Still photographs of the bottom are taken at all stations where infaunal grab samples are collected. These photographs display the large-scale surface topography and the structure and composition of epifaunal assemblages at these sites.

Measurements of salinity, temperature, and dissolved oxygen are made at all long-term, regional stations on each sampling cruise.

Information Use:

A final report containing the results of the first year of this study was submitted to MMS in April 1982. The information from this study was presented to be used by the Biological Task Force to evaluate the effects of OCS exploratory operations on the benthic communities of the Georges Bank area. The information will be used in future pre- and post-sale decisions related to environmental sensitivity of benthic communities to OCS discharges, platform siting, discharge requirements, and the adequacy of mitigating measures.

Study Title: Georges Bank Monitoring Program -
Analysis of Trace Metals in Bottom
Sediments

Sponsoring Office: New York OCS Office

Principal Investigator: Dr. Mike Bothner
U. S. Geological Survey
Branch of Atlantic and Gulf Geology
Woods Hole, MA 02543

BLM Contract Number: AA851-IA2-18

Period of Performance: April 1982 - December 1982
Reauthorized for FY 1983

Study Cost: FY 1982: \$324,849 Cumulative: \$324,849
FY 1983: Commulative

Objectives:

1. Describe the distribution of trace metals discharged during OCS oil and gas operations on Georges Bank.
2. Quantitatively describe the dispersion, concentration, and distribution of trace metals in bottom sediments on or near Georges Bank.
3. Evaluate trace metal concentrations in relation to season and physical oceanographic conditions.
4. Identify areas of trace metal accumulation on or near Georges Bank.

Background:

The Biological Task Force for Sale #42 on Georges Bank was established to recommend to the U. S. Minerals Management Service's Supervisor for Oil and Gas Operations in the North Atlantic "the design of environmental studies and surveys as well as periodic sampling of environmental conditions to provide warning of adverse effects" of OCS operations. MMS is currently funding the research program recommended by the Biological Task Force on April 14, 1981.

The major emphasis of the Biological Task Force's monitoring program is to link the discharges from oil and gas operations to effects on the benthic communities on or near Georges Bank. This program design requires an understanding of the (1) physical processes on Georges Bank which transport materials and nutrients, (2) areas of pollutant accumulation, and (3) effects of pollutants on various benthic communities of the Georges Bank ecosystem. This contract is specifically for the analysis of bottom sediments for the presence of trace metals discharged from OCS oil and gas operations.

Study Description:

Sediment samples for trace metal analysis are collected seasonally by removing the upper 1-2 cm of sediment from each of three replicate 0.1 square meter grab samples collected at 43 stations on or near Georges Bank. The rig site Block 312' represents both long-term regional station 5 and site-specific station 5-1. Approximately 382 sediment samples are selected for analysis from the 15 long-term, regional stations and the 29 site-specific stations. Priority will be placed on samples from all of the regional stations and the 19 primary stations in the site-specific array.

Sediment samples are analyzed for aluminum, mercury, iron, chromium, zinc, lead, copper, nickel, vanadium, and barium. Samples are prepared for analysis by the complete acid digestion method. Elements are analyzed by flameless or flame atomic absorption and/or plasma emission spectrophotometry. At all 15 regional and 19 primary site-specific stations, analyses are performed on blended, unfractionated samples. At selected stations, analyses are performed on individual replicates and on discrete grain-size fractions.

Sediment grain-size analyses are performed using the appropriate sieving and rapid sediment-analyzing techniques. Results are presented as percent sand, silt, and clay. Sand-size material is described as weight percent of full phi fractions.

Information Use:

The final report containing the results of the first year of this study will be submitted to MMS in December 1982. The information from this study was presented to the Biological Task Force to evaluate the effects of OCS exploratory operations on the benthic communities of the Georges Bank area. The information will be used in future pre- and post-sale decisions related to environmental sensitivity of benthic communities to OCS discharges, platform siting, discharge requirements, and the adequacy of mitigating measures.

Environmental Studies Program
 GEORGES BANK STUDIES OTHER THAN MONITORING STUDIES
 June 16, 1983

1.
 Georges Bank Conference on Marine Environmental Assessment
 Contractor: New England National Resources Center
 Status: Completed Award Date: 04/75 Contract No. CT5-29
 Cumulative Amount \$ 19,770
 Administering Office: Atlantic

2.
 Evaluation of Proposals for Physical Oceanography Program in the New England OCS
 Contractor: Dean Bumpus
 Status: Completed Award Date: 07/76 Contract No. CT6-32
 Cumulative Amount \$ 584
 Administering Office: Washington

3.
 New England Outer Continental Shelf Physical Oceanography - First Year
 Contractor: EG & G Environmental Consultants
 Status: Completed Award Date: 09/76 Contract No. CT6-50
 Cumulative Amount \$ 1,416,804
 Administering Office: Atlantic

4.
 New England Outer Continental Shelf Environmental Benchmark Study
 Contractor: ERCO
 Status: Completed Award Date: 08/76 Contract No. CT6-51
 Cumulative Amount \$ 4,302,416
 Administering Office: Atlantic

5.
 New England Physical Oceanography - First Year
 Contractor: Raytheon
 Status: Completed Award Date: 09/76 Contract No. CT6-53
 Cumulative Amount \$ 3,812,767
 Administering Office: Atlantic

6.
 Meteorological Buoy Monitoring Network
 Contractor: National Oceanographic and Atmospheric Administration
 Status: Completed Award Date: 01/76 Contract No. IA6-03
 Cumulative Amount \$ 152,600
 Administering Office: Atlantic

7.
 North Atlantic Geological Studies - First Year
 Contractor: U.S. Geological Survey
 Status: Completed Award Date: 09/76 Contract No. MU6-29
 Cumulative Amount \$ 1,896,475
 Administering Office: Atlantic

8.

Second Year North Atlantic Physical Oceanography
 Contractor: EG & G Environmental Consultants
 Status: Completed Award Date: 09/78 Contract No. CTB-46
 Cumulative Amount \$ 2,122,850
 Administering Office: Atlantic

9.

New England Physical Oceanography-Second Year
 Contractor: Raytheon
 Status: Completed Award Date: 09/78 Contract No. CTB-47
 Cumulative Amount \$ 696,990
 Administering Office: Atlantic

10.

The North and Mid-Atlantic Canyons Assessment Study
 Contractor: Columbia University - Lamont-Doherty Institution
 Status: Completed Award Date: 09/78 Contract No. CTB-49
 Cumulative Amount \$ 612,180
 Administering Office: Atlantic

11.

Georges Bank Climatological & Oceanographic Atlas
 Contractor: National Oceanographic and Atmospheric Administration
 Status: Completed Award Date: 03/78 Contract No. IAB-14
 Cumulative Amount \$ 394,847
 Administering Office: Atlantic

12.

North Atlantic Geological Studies - Second Year
 Contractor: U.S. Geological Survey
 Status: Completed Award Date: 07/78 Contract No. MUB-24
 Cumulative Amount \$ 999,782
 Administering Office: Atlantic

13.

Geological Studies - North and Mid-Atlantic
 Contractor: U.S. Geological Survey
 Status: Completed Award Date: 02/79 Contract No. MU9-04
 Cumulative Amount \$ 1,284,140
 Administering Office: Atlantic

14.

Canyon and Slope Processes Study
 Contractor: Columbia University - Lamont-Doherty Institution
 Status: Active Award Date: 09/80 Contract No. CT0-59
 Cumulative Amount \$ 4,651,777
 Administering Office: Atlantic

15.

North and Mid-Atlantic Geohazards Study
 Contractor: U.S. Geological Survey
 Status: Completed Award Date: 06/80 Contract No. MU0-18
 Cumulative Amount \$ 3,264,729
 Administering Office: Atlantic

16.
Interpretation of Physical Conditions and Their Application to Pollutant
Transfer and Biological Resource Modeling
Contractor: EG & G Environmental Consultants
Status: Completed Award Date: 04/81 Contract No. CT1-39
Cumulative Amount \$ 824,414
Administering Office: Atlantic

17.
Geohazards: North and Mid-Atlantic
Contractor: U.S. Geological Survey
Status: Completed Award Date: 06/81 Contract No. IA1-17
Cumulative Amount \$ 1,252,249
Administering Office: Atlantic

18.
Publication of Paper on Quantification of Potential Oil Spill Impacts on
Georges Bank Commercial Fisheries
Contractor: Applied Science Associated, Inc.
Status: Active Award Date: 09/82 Contract No. CT2-72
Cumulative Amount \$ 15,640
Administering Office: Washington

Total Cumulative Amount: \$ 27,721,014

Environmental Studies Program
 NORTH ATLANTIC STUDIES WHICH EXCLUDE GEORGES BANK
 June 16, 1983

1.
 Socioeconomic and Environmental Factors Relating to the Area Adjacent to and Including the OCS from Sandy Hook, New Jersey to the Bay of Fundy
 Contractor: TRIGOM, Research Institute of Gulf of Maine
 Status: Completed Award Date: 06/73 Contract No. CT3-08
 Cumulative Amount \$ 201,824
 Administering Office: Washington

2.
 Effects of the Tamano Spill on the Marine Environment
 Contractor: Bigelow Laboratory & Bowdoin College
 Status: Completed Award Date: 07/74 Contract No. CT5-12
 Cumulative Amount \$ 28,000
 Administering Office: Atlantic

3.
 Summary of Environmental Information on the Continental Slope-Canadian Border to Cape Hatteras
 Contractor: TRIGOM, Research Institute of Gulf of Maine
 Status: Completed Award Date: 06/75 Contract No. CT5-47
 Cumulative Amount \$ 48,311
 Administering Office: Atlantic

4.
 County Level Data - Employment, Wages, Goods & Services - Harris Model
 Contractor: University of Maryland
 Status: Completed Award Date: 03/75 Contract No. CT6-23
 Cumulative Amount \$ 67,500
 Administering Office: Atlantic

5.
 Socioeconomic Model Run
 Contractor: International Research and Technology Corporation
 Status: Completed Award Date: 04/76 Contract No. CT6-25
 Cumulative Amount \$ 26,120
 Administering Office: Atlantic

6.
 Review Proposals for Microbiological Studies - North Atlantic
 Contractor: Claude E. Crawford
 Status: Completed Award Date: 07/76 Contract No. CT6-36
 Cumulative Amount \$ 300
 Administering Office: Washington

7.
 Review Proposals for Microbiological Studies - South Atlantic
 Contractor: Claude E. Crawford
 Status: Completed Award Date: 08/76 Contract No. CT6-37
 Cumulative Amount \$ 450
 Administering Office: Washington

8.

Evaluation of Proposals for Physical Oceanography Program in the New England OCS
 Contractor: Dean Bumpus
 Status: Completed Award Date: 08/76 Contract No. CT6-39
 Cumulative Amount \$ 757
 Administering Office: Washington

9.

Summary of Environmental Information from the Bay of Fundy to Cape Hatteras, N.C.
 Contractor: Center for Natural Areas
 Status: Completed Award Date: 09/76 Contract No. CT6-45
 Cumulative Amount \$ 194,180
 Administering Office: Atlantic

10.

Review Proposals for Microbiological Studies - South Atlantic
 Contractor: Claude E. Crawford
 Status: Completed Award Date: 09/76 Contract No. CT6-55
 Cumulative Amount \$ 300
 Administering Office: Washington

11.

Development of Models to Determine Network of Resources in Georges Bank - Sale # 42
 Contractor: Arthur D. Little
 Status: Completed Award Date: 06/77 Contract No. CT7-33
 Cumulative Amount \$ 9,432
 Administering Office: Washington

12.

Environmental Impacts of the ARGO MERCHANT Oil Spill
 Contractor: National Oceanographic and Atmospheric Administration
 Status: Completed Award Date: 1977 Contract No. IA7-09
 Cumulative Amount \$ 170,000
 Administering Office: Washington

13.

Summary and Analysis of Cultural Resources on the OCS from the Bay of Fundy to Cape Hatteras
 Contractor: Harvard University
 Status: Completed Award Date: 05/78 Contract No. CT8-18
 Cumulative Amount \$ 235,555
 Administering Office: Atlantic

14.

Characterization of Marine Mammals and Turtles in the Mid- and North Atlantic OCS
 Contractor: University of Rhode Island
 Status: Completed Award Date: 09/78 Contract No. CT8-48
 Cumulative Amount \$ 3,704,867
 Administering Office: Atlantic

15.

Meteorological Monitoring Buoy Network for the Atlantic OCS
 Contractor: National Oceanographic and Atmospheric Administration
 Status: Completed Award Date: 10/78 Contract No. IAB-37
 Cumulative Amount \$ 413,367
 Administering Office: Atlantic

16.

Crude Oil Effects to Developmental Stages of the American Lobster
 Contractor: Woods Hole Oceanographic Institution
 Status: Completed Award Date: 03/79 Contract No. CT9-05
 Cumulative Amount \$ 119,848
 Administering Office: Atlantic

17.

Study of the Resources Loss from Oil Spills to Commercial Fishing (North
 and Mid-Atlantic OCS)
 Contractor: University of Rhode Island
 Status: Completed Award Date: 09/80 Contract No. CT0-75
 Cumulative Amount \$ 954,068
 Administering Office: Atlantic

18.

OCS Oil and Gas Operations: Possible Effects on Cetaceans
 Contractor: Naval Ocean Systems Center
 Status: Completed Award Date: 01/80 Contract No. IA0-05
 Cumulative Amount \$ 393,600
 Administering Office: Atlantic

19.

Third Informal Workshop: Oceanography of the Gulf of Maine and Adjacent
 Sea
 Contractor: EG & G Environmental Consultants
 Status: Completed Award Date: 03/81 Contract No. CT1-26
 Cumulative Amount \$ 5,058
 Administering Office: Atlantic

20.

Harris Model - Analysis of Potential Economic, Demographic and Fiscal
 Effects of OCS Lease Sales
 Contractor: University of Maryland
 Status: Completed Award Date: 06/81 Contract No. CT1-35
 Cumulative Amount \$ 116,786
 Administering Office: Washington

21.

Alternative Modes of Transporting OCS Produced Oil and Natural Gas
 Contractor: Policy Planning and Evaluation, Incorporated
 Status: Active Award Date: 08/82 Contract No. CT2-41
 Cumulative Amount \$ 150,000
 Administering Office: Atlantic

22.

An Environmental Summary of the U.S. Atlantic Continental Rise
 Contractor: Marine Geoscience Applications, Incorporated
 Status: Active Award Date: 08/82 Contract No. CT2-47
 Cumulative Amount \$ 250,000
 Administering Office: Atlantic

Total Cumulative Amount: \$ 7,090,323

Environmental Studies Program
 GEORGES BANK STUDIES
 June 16, 1983

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 Status: Completed Award Date: 04/75 Contract No. CT5-29
 Cumulative Amount \$ 19,770
 Administering Office: Atlantic

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 Contractor: Dean Bumpus
 Status: Completed Award Date: 07/76 Contract No. CT6-32
 Cumulative Amount \$ 584
 Administering Office: Washington

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 Contractor: EG & G Environmental Consultants
 Status: Completed Award Date: 09/76 Contract No. CT6-50
 Cumulative Amount \$ 1,416,804
 Administering Office: Atlantic

4.
 New England Outer Continental Shelf Environmental Benchmark Study
 Contractor: ERCO
 Status: Completed Award Date: 08/76 Contract No. CT6-51
 Cumulative Amount \$ 4,302,416
 Administering Office: Atlantic

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 New England Physical Oceanography - First Year
 Contractor: Raytheon
 Status: Completed Award Date: 09/76 Contract No. CT6-53
 Cumulative Amount \$ 3,812,767
 Administering Office: Atlantic

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 Meteorological Buoy Monitoring Network
 Contractor: National Oceanographic and Atmospheric Administration
 Status: Completed Award Date: 01/76 Contract No. IA6-03
 Cumulative Amount \$ 152,600
 Administering Office: Atlantic

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 Contractor: U.S. Geological Survey
 Status: Completed Award Date: 09/76 Contract No. MU6-29
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 Administering Office: Atlantic

8.
 Second Year North Atlantic Physical Oceanography
 Contractor: EG & G Environmental Consultants
 Status: Completed Award Date: 09/78 Contract No. CTB-46
 Cumulative Amount \$ 2,122,850
 Administering Office: Atlantic

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 New England Physical Oceanography-Second Year
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 The North and Mid-Atlantic Canyons Assessment Study
 Contractor: Columbia University - Lamont-Doherty Institution
 Status: Completed Award Date: 09/78 Contract No. CTB-49
 Cumulative Amount \$ 612,180
 Administering Office: Atlantic

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 Status: Completed Award Date: 03/78 Contract No. IAS-14
 Cumulative Amount \$ 394,847
 Administering Office: Atlantic

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 Status: Completed Award Date: 07/78 Contract No. MUB-24
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 Administering Office: Atlantic

13.
 Geological Studies - North and Mid-Atlantic
 Contractor: U.S. Geological Survey
 Status: Completed Award Date: 02/79 Contract No. MU9-04
 Cumulative Amount \$ 1,284,140
 Administering Office: Atlantic

14.
 Canyon and Slope Processes Study
 Contractor: Columbia University - Lamont-Doherty Institution
 Status: Active Award Date: 09/80 Contract No. CT0-59
 Cumulative Amount \$ 4,651,777
 Administering Office: Atlantic

15.
 North and Mid-Atlantic Geohazards Study
 Contractor: U.S. Geological Survey
 Status: Completed Award Date: 06/80 Contract No. MU0-18
 Cumulative Amount \$ 3,264,729
 Administering Office: Atlantic

16.

Interpretation of Physical Conditions and Their Application to Pollutant Transfer and Biological Resource Modeling
 Contractor: EG & G Environmental Consultants
 Status: Completed Award Date: 04/81 Contract No. CT1-39
 Cumulative Amount \$ 824,414
 Administering Office: Atlantic

17.

Analysis of Historical Benthic Infaunal Samples from Georges Bank
 Contractor: Taxon, Incorporated
 Status: Active Award Date: 09/81 Contract No. CT1-69
 Cumulative Amount \$ 100,706
 Administering Office: Atlantic

18.

Geohazards: North and Mid-Atlantic
 Contractor: U.S. Geological Survey
 Status: Completed Award Date: 06/81 Contract No. IA1-17
 Cumulative Amount \$ 1,252,249
 Administering Office: Atlantic

19.

Georges Bank Monitoring Program: Benthic Infauna
 Contractor: Battelle, Incorporated
 Status: Active Award Date: 01/82 Contract No. CT2-07
 Cumulative Amount \$ 2,158,359
 Administering Office: Atlantic

20.

Charter of R/V ENDEAVOR
 Contractor: University of Rhode Island
 Status: Completed Award Date: 02/82 Contract No. CT2-17
 Cumulative Amount \$ 104,263
 Administering Office: Atlantic

21.

Analysis of Hydrocarbons in Bottom Sediments and Analysis of Hydrocarbons and Trace Metals in Benthic Fauna from Georges Bank
 Contractor: JRB Associates, Incorporated
 Status: Completed Award Date: 05/82 Contract No. CT2-33
 Cumulative Amount \$ 100,000
 Administering Office: Atlantic

22.

Publication of Paper on Quantification of Potential Oil Spill Impacts on Georges Bank Commercial Fisheries
 Contractor: Applied Science Associated, Inc.
 Status: Active Award Date: 09/82 Contract No. CT2-72
 Cumulative Amount \$ 15,640
 Administering Office: Washington

23.

The Georges Bank Monitoring Program: Analysis of Trace Metals in Bottom Sediments
 Contractor: U.S. Geological Survey
 Status: Active Award Date: 03/82 Contract No. IA2-18
 Cumulative Amount \$ 324,847
 Administering Office: Atlantic

24.

Analyses of Hydrocarbons in Bottom Sediments and in Benthic Fauna as Part
of the Georges Bank OCS Monitoring Program
Contractor: JRB Associates, Incorporated
Status: Active Award Date: 02/83 Contract No.
Cumulative Amount \$ 126,869
Administering Office: Atlantic

25.

Georges Bank Monitoring Program: Analysis of Trace Metals in Bottom
Sediments During the Second Year Monitoring Period
Contractor: U.S. Geological Survey
Status: Active Award Date: 05/83 Contract No.
Cumulative Amount \$ 317,587
Administering Office: Atlantic

Total Cumulative Amount: \$ 30,953,645

How the resource estimates for Georges Bank oil and gas were compiled and incorporated in the policymaking process.

Resource estimates are normally incorporated in the decisionmaking process at two points, the draft environmental impact statement (EIS) and the Secretarial Issue Document (SID). This allows the presale analysis to proceed incorporating the most current information available. Provisions are available to incorporate at any time significant changes to these estimates further allowing decisionmakers access to the most current information.

The first resource estimates for the proposed Sale No. 52 area were developed in October 1980 for use in preparing the EIS analysis addressing the costs and benefits associated with the proposed sale and alternatives to the proposal. These resource estimates were conditional upon a commercial accumulation existing in the proposed area. The conditional resource estimates ranged from 17 million to 6.35 billion barrels of oil and from 196 billion cubic feet to 13.5 trillion cubic feet of gas. The conditional mean estimates were 1.73 billion barrels of oil and 5.25 trillion cubic feet of gas. This means that if a commercial discovery was made in the area proposed for leasing we would, on average, expect to find 1.73 billion barrels of oil and 5.25 trillion cubic feet of gas. It was estimated that there was a .6 probability that no commercial accumulation was present. These resource estimates were based on preliminary mapping of a regional seismic data grid (approximately 7.5 x 12 miles). The only geologic data available in the vicinity of the proposed sale was from two COST wells drilled in 1976 and 1977. These resource estimates reflect the general optimism prevailing at the time, as evidenced by Sale No. 42 where the Department leased 63 tracts for \$817 million.

In this sale, industry offered high dollar bids on deep structures where data available from the COST wells indicated a lack of potential reservoirs

(porosity and permeability). The Sale No. 42 bidding increased the Department's optimism regarding these deep structures and other deep potential stratigraphic traps.

In April 1982 updated resource estimates were developed for the SID and in designing appropriate alternative bidding systems to use in the sale. These conditional mean resource estimates were 56 million barrels of oil and 280 billion cubic feet of gas. The dramatic decrease in resource estimates was a result of additional geophysical and geological information and a different scope of potential hydrocarbon prospects being considered in this appraisal. In the period between January and March 1982 the Department acquired new seismic data on approximately a 1 x 3 mile grid that were of a significantly better quality than the data used to develop resource estimates for the EIS. Analysis of the newly acquired geophysical and geological data indicated that many previously mapped prospects were smaller or did not exist and that others were much more questionable and, therefore, more risky. The April 1982 resource estimates incorporate the data obtained from three dry holes drilled in the Sale No. 42 area. These wells indicate a lack of potential hydrocarbon reservoir formations in the deeper stratigraphic section and condemned two patch reefs as well as a geophysical bright spot (a possible indication of a gas accumulation). These new data resulted in the elimination of many potential deep stratigraphic prospects and an increase in the risk associated with others. In addition to the new geophysical and geological data, the resource estimates developed for the SID did not include some possible stratigraphic traps that could not be adequately delineated for purposes of a resource economic evaluation. The SID resource appraisal included only those prospects that were being considered for resource economic evaluations prior to the sale.

It should be pointed out that although resource assessment methodologies may be precise, resource estimates include subjective judgments (probabilities of success or failure) based on the reliability of the data and information available to the evaluator at the time of the appraisal. While the resource estimates previously discussed are conditional on a commercial accumulation existing within the proposed sale area, they do include subjective judgments as to the probability of each prospect being dry. If a discovery was made in one of the prospects being considered, it could exceed the average amount previously estimated to exist in the area under consideration. In any event, a discovery would result in a reassessment of the risks associated with other prospects and a new resource assessment.

Sale No. 52 Conditional Resource Estimates

		<u>5 Percentile*</u>	<u>Mean**</u>	<u>95 Percentile***</u>
Draft EIS (Oct. 1980)	Oil (billion bbls)	.017	1.73	6.35
	Gas (trillion cf)	.196	5.25	13.49
SID (April 1982)	Oil (billion bbls)		.056	
	Gas (trillion cf)		.280	

These resource estimates are conditional on the existence of a commercial hydrocarbon accumulation within the area under consideration. The estimates consider the probability that individual prospects may be dry or do not contain sufficient quantities of hydrocarbons to warrant development.

- * If commercial hydrocarbons are present there is a 5 percent (or 1 in 20) chance of finding less than this amount.
- ** If commercial hydrocarbons are present, on average, this amount is expected to be found.
- *** If commercial hydrocarbons are present there is a 95 percent (or 19 in 20) chance of finding less than this amount.

Study Title: Georges Bank Monitoring Program -
Analysis of Hydrocarbons in Bottom
Sediments and Benthic Fauna and
Trace Metals in Benthic Fauna

Sponsoring Office: New York OCS Office

Principal Investigator: Dr. James R. Payne
Science Applications Inc
476 Prospect Street
La Jolla, CA 92038

BLM Contract Number: AA851-CT2-33

Period of Performance: May 1982 - December 1982
Reauthorized for an additional two year
period.

Study Cost: FY 1982: \$125,408 Cumulative: \$125,408
FY 1983: Cumulative:

Objectives:

1. Determine the quantities, composition, and seasonal distribution of hydrocarbons in bottom sediments and benthic fauna at selected sample sites on and near Georges Bank.
2. Determine whether petroleum hydrocarbon contamination of bottom sediments and fauna is occurring at these sites and whether the source of contamination is associated with exploratory drilling activities.
3. Relate concentrations of trace metals and hydrocarbons observed in benthic fauna to drilling discharges.

Background:

The Biological Task Force for Sale #42 on Georges Bank was established to recommend to the U. S. Minerals Management Service's Supervisor for Oil and Gas Operations in the North Atlantic "the design of environmental studies and surveys as well as periodic sampling of environmental conditions to provide warning of adverse effects" of OCS operations. MMS is currently funding the research program recommended by the Biological Task Force on April 14, 1981.

The major emphasis of the Biological Task Force's monitoring program is to link the discharges from oil and gas operations to effects on the benthic communities on or near Georges Bank. This program design requires an understanding of the (1) physical processes on Georges Bank which transport materials and nutrients, (2) areas of pollutant accumulation, and (3) effects of pollutants on various benthic communities of the Georges Bank ecosystem. This contract is specifically for the analysis of bottom sediments for petroleum hydrocarbons and the analysis of benthic epifauna for both petroleum hydrocarbons and trace metals.

Study Description:

Sediment samples for hydrocarbon analyses are collected seasonally by removing the upper 1-2 cm of sediment from each of three replicate 0.1 square meter grab samples collected at 43 stations on or near Georges Bank. Epifauna samples for hydrocarbon and trace metal tissue analyses are collected by dredge and/or trawl at six stations: at the "mud patch," the head of Lydonia Canyon, an upcurrent control station, and at three sites near the exploratory operation. Special consideration is given to commercially-important species that are sufficiently abundant for analyses and, if possible, to species representing different feeding mechanisms.

The analyses of hydrocarbons in sediments are performed on each of three replicate grab samples from each of the four seasonal cruises at six of the 43 stations listed above. All other sediment samples are archived. Initial scanning for hydrocarbons is performed by ultraviolet fluorescence on the upper 1-2 cm of sediment. Samples with detectable unsaturated hydrocarbons are characterized for their origin (petrogenic or biogenic) by using glass-capillary gas chromatography on the aliphatic and aromatic fractions of the sample. Additional intensive analyses using gas chromatography/mass spectrometry are performed on a few samples to identify and characterize component compounds.

Analyses of trace metals and hydrocarbons in benthic organisms are performed on a maximum of three species, representing at least three feeding types, which will be collected seasonally at the six stations described above. The analyses of hydrocarbons in biota follow the same analytical hierarchy as the sediment samples. Tissue samples for trace metal analysis are prepared by complete acid digestion. Samples are analyzed for eleven trace metals: aluminum, mercury, chromium, zinc, lead, iron, cadmium, copper, nickel, vanadium, and barium. Barium and vanadium concentrations are measured by Instrumental Neutron Activation Analysis. The remaining nine trace metals are analyzed by flame or flameless atomic absorption.

Information Use:

The final report containing the results of the first year of this study was submitted to MMS in November 1982. The information from this study was presented to the Biological Task Force to evaluate the effects of OCS exploratory operations on the benthic communities of the Georges Bank area. The information will be used in future pre- and post-sale decisions related to environmental sensitivity of benthic communities to OCS discharges, platform siting, discharge requirements, and the adequacy of mitigating measures.

Environmental Studies Program
 GEORGES BANK MONITORING STUDIES
 June 16, 1983

1.
 Analysis of Historical Benthic Infaunal Samples from Georges Bank
 Contractor: Taxon, Incorporated
 Status: Active Award Date: 09/81 Contract No. CT1-69
 Cumulative Amount \$ 100,706
 Administering Office: Atlantic

 2.
 Georges Bank Monitoring Program: Benthic Infauna
 Contractor: Battelle, Incorporated
 Status: Active Award Date: 01/82 Contract No. CT2-07
 Cumulative Amount \$ 2,158,359
 Administering Office: Atlantic

 3.
 Charter of R/V ENDEAVOR
 Contractor: University of Rhode Island
 Status: Completed Award Date: 02/82 Contract No. CT2-17
 Cumulative Amount \$ 104,263
 Administering Office: Atlantic

 4.
 Analysis of Hydrocarbons in Bottom Sediments and Analysis of Hydrocarbons
 and Trace Metals in Benthic Fauna from Georges Bank
 Contractor: JRB Associates, Incorporated
 Status: Completed Award Date: 05/82 Contract No. CT2-33
 Cumulative Amount \$ 100,000
 Administering Office: Atlantic

 5.
 The Georges Bank Monitoring Program: Analysis of Trace Metals in Bottom
 Sediments
 Contractor: U.S. Geological Survey
 Status: Active Award Date: 03/82 Contract No. IA2-18
 Cumulative Amount \$ 324,847
 Administering Office: Atlantic

 6.
 Analyses of Hydrocarbons in Bottom Sediments and in Benthic Fauna as Part
 of the Georges Bank OCS Monitoring Program
 Contractor: JRB Associates, Incorporated
 Status: Active Award Date: 02/83 Contract No.
 Cumulative Amount \$ 126,869
 Administering Office: Atlantic

 7.
 Georges Bank Monitoring Program: Analysis of Trace Metals in Bottom
 Sediments During the Second Year Monitoring Period
 Contractor: U.S. Geological Survey
 Status: Active Award Date: 05/83 Contract No.
 Cumulative Amount \$ 317,587
 Administering Office: Atlantic
- Total Cumulative Amount: \$ 3,232,631

Environmental Studies Program
 NORTH ATLANTIC DEEP WATER STUDIES
 June 16, 1983

1.
 Evaluation of Proposals for Physical Oceanography Program in the New England OCS
 Contractor: Dean Bumpus
 Status: Completed Award Date: 07/76 Contract No. CT6-32
 Cumulative Amount \$ 584
 Administering Office: Washington
2.
 Summary of Environmental Information from the Bay of Fundy to Cape Hatteras, N.C.
 Contractor: Center for Natural Areas
 Status: Completed Award Date: 09/76 Contract No. CT6-45
 Cumulative Amount \$ 194,180
 Administering Office: Atlantic
3.
 New England Outer Continental Shelf Physical Oceanography - First Year
 Contractor: EG & G Environmental Consultants
 Status: Completed Award Date: 09/76 Contract No. CT6-50
 Cumulative Amount \$ 1,416,804
 Administering Office: Atlantic
4.
 New England Outer Continental Shelf Environmental Benchmark Study
 Contractor: ERCO
 Status: Completed Award Date: 08/76 Contract No. CT6-51
 Cumulative Amount \$ 4,302,416
 Administering Office: Atlantic
5.
 New England Physical Oceanography - First Year
 Contractor: Raytheon
 Status: Completed Award Date: 09/76 Contract No. CT6-53
 Cumulative Amount \$ 3,812,767
 Administering Office: Atlantic
6.
 Meteorological Buoy Monitoring Network
 Contractor: National Oceanographic and Atmospheric Administration
 Status: Completed Award Date: 01/76 Contract No. IA6-03
 Cumulative Amount \$ 152,600
 Administering Office: Atlantic
7.
 Summary and Analysis of Cultural Resources on the OCS from the Bay of Fundy to Cape Hatteras
 Contractor: Harvard University
 Status: Completed Award Date: 05/78 Contract No. CT8-18
 Cumulative Amount \$ 235,555
 Administering Office: Atlantic

8.

Second Year North Atlantic Physical Oceanography
 Contractor: EG & G Environmental Consultants
 Status: Completed Award Date: 09/78 Contract No. CTB-46
 Cumulative Amount \$ 2,122,850
 Administering Office: Atlantic

9.

New England Physical Oceanography-Second Year
 Contractor: Raytheon
 Status: Completed Award Date: 09/78 Contract No. CTB-47
 Cumulative Amount \$ 696,990
 Administering Office: Atlantic

10.

Georges Bank Climatological & Oceanographic Atlas
 Contractor: National Oceanographic and Atmospheric Administration
 Status: Completed Award Date: 03/78 Contract No. IAB-14
 Cumulative Amount \$ 394,847
 Administering Office: Atlantic

11.

Meteorological Monitoring Buoy Network for the Atlantic OCS
 Contractor: National Oceanographic and Atmospheric Administration
 Status: Completed Award Date: 10/78 Contract No. IAB-37
 Cumulative Amount \$ 413,367
 Administering Office: Atlantic

12.

Interpretation of Physical Conditions and Their Application to Pollutant
 Transfer and Biological Resource Modeling
 Contractor: EG & G Environmental Consultants
 Status: Completed Award Date: 04/81 Contract No. CT1-39
 Cumulative Amount \$ 824,414
 Administering Office: Atlantic

13.

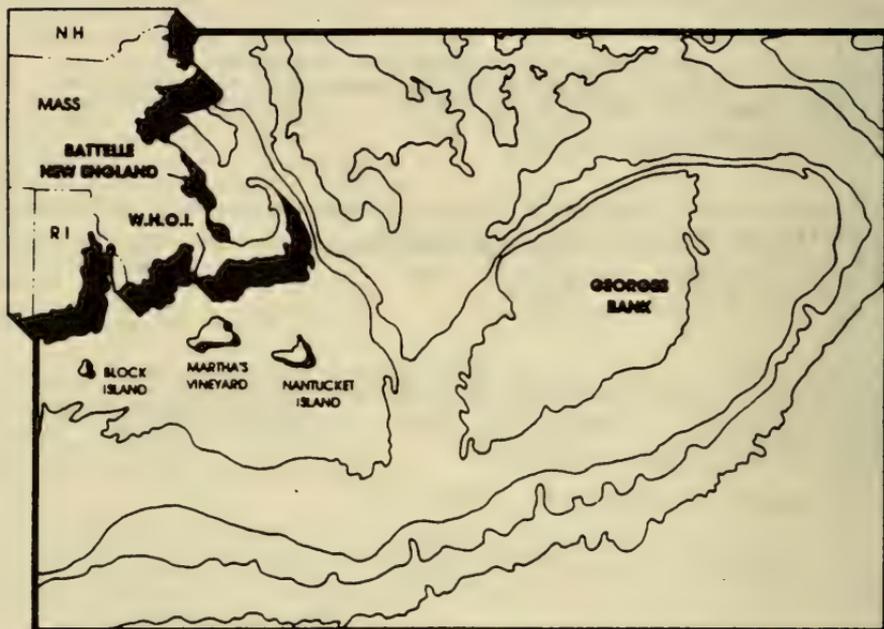
An Environmental Summary of the U.S. Atlantic Continental Rise
 Contractor: Marine Geoscience Applications, Incorporated
 Status: Active Award Date: 08/82 Contract No. CT2-47
 Cumulative Amount \$ 250,000
 Administering Office: Atlantic

Total Cumulative Amount: \$ 14,817,374

Georges Bank Benthic Infauna Monitoring Program

EXECUTIVE SUMMARY REPORT

YEAR I



PREPARED BY

**Battelle New England
Marine Research Laboratory
Duxbury, Massachusetts**

**and
Woods Hole
Oceanographic Institution
Woods Hole, Massachusetts**

GEORGES BANK BENTHIC INFAUNA MONITORING PROGRAM

Battelle New England Marine Research Laboratory
397 Washington St., Duxbury, Massachusetts 02332

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Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543

April 29, 1983

EXECUTIVE SUMMARY REPORT
FOR FIRST YEAR OF SAMPLING
(July, 1981 - May, 1982)

Availability Unlimited

Prepared for

UNITED STATES DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE
Washington, D.C. 20240

1. Report No.	2.	3. Recipient's Accession No.
4. Title and Subtitle The Georges Bank Benthic Infauna Monitoring Program		5. Report Date April 29, 1983
7. Author(s) James A. Blake, J. Frederick Grassle, Nancy Maciolek-Blake, Jerry M. Neff, Howard L. Sanders		6.
9. Performing Organization Name and Address Battelle New England Marine Research Laboratory 397 Washington Street, Duxbury, MA 02332 Woods Hole Oceanographic Institution Woods Hole, MA 02543		8. Performing Organization Report No.
12. Sponsoring Organization Name and Address U.S. Department of the Interior Minerals Management Service, Procurement Division Procurement Operations Branch B, Mail Stop 635 12203 Sunrise Valley Drive Reston, VA 22091		10. Project/Task/Work Unit No.
		11. Contract or Grant No. 14-12-0001-29192
		13. Type of Report EXECUTIVE SUMMARY
15. Supplementary Notes		14.
16. Abstract Concerns about the potential effects of oil and gas exploration activities on the highly productive Georges Bank off the coast of Massachusetts led to the initiation of an intensive monitoring program in July, 1981. The program includes intensive sampling of the benthic communities, collected near, upcurrent and downcurrent of the drilling rigs, analysis of bottom photographs for epifauna and microtopography, dredge and trawl collections, CHN and sediment grain size analysis. Collections of six replicate infaunal samples at each of 46 stations are made on a seasonal basis. Samples are collected with a 0.04m ² modified Van Veen grab sampler and are double live-sieved through 500 μm and 300 μm screens. Twenty-nine stations are positioned in a tight radial array around 1 rig at 80 m. A second group of 3 stations are near a rig site at 145 m. The remaining stations cover a broad expanse of the Bank and nearby areas of potential deposition of drilling materials. Use of the 300 μm screen has resulted in the retention of newly settled and juvenile forms, as well as small-bodied species which are normally under-sampled by larger screens. The capability of identifying the earliest juvenile stages of several species has enabled us to provide accurate counts of each species and to predict times of settlement. Results from the first 4 biological collections indicate little heterogeneity within stations, with good replication between samples. A strong relationship between faunal composition and both sediment type and depth is indicated by cluster analysis. No biological impacts which could be attributed to drilling activities have been detected to date at any station, including the site-specific array in Block 312, the 3 stations near the drill rig in Block 410, or any regional station monitored in this program.		
17. Originator's Key Words Georges Bank, benthic infauna, exploratory drilling, drilling fluids		18. Availability Statement Availability unlimited
19. U. S. Security Classif. of the Report	20. U. S. Security Classif. of This Page	21. No. of Pages
		22. Price

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1. CONCLUSIONS

- The Regional Stations analyzed for benthic infauna group consistently over all four sampling periods by depth and sediment type. Replicate samples at each station show an exceptionally high degree of homogeneity. Cluster analysis demonstrates that all of the replicates of any one regional station are more similar to each other than to replicates from any other station. When replicates at each station are summed, the samples from each of the four sampling periods fuse before any separation occurs between stations. This homogeneity should enable us to detect biological changes should they occur at these stations.

- Site-specific stations in the array around Station 5-1 have a homogeneous community structure, both spatially and temporally over most of the area. The species composition does change with the increase in the proportion of fine sand at stations located 4 and 6 km to the west of Station 5-1.

- At all stations sampled, the community structure (i.e., species composition) does not change very much with season. Although average densities of several species were observed to fluctuate seasonally, these changes probably reflect natural cycles in these populations and do not appear to be related to drilling activities.

- The only result of the chemical analyses that provides a basis for an hypothesis of an impact due to drilling activities is the gradient of barium concentrations (as a marker of accumulation of drilling muds) near the Block 410 Stations 16, 17 and 18, and Site-Specific Station 5-1.

- Drilling began in Block 410 in July, 1981 and continued until March, 1982. With the methods of analysis used thus far, no biological impacts which could be attributed to drilling activities were detected. Differences between stations were always greater than temporal differences at any one of the three stations.

- Drilling began in Block 312 on December 8, 1981 and continued until June, 1982. At the site-specific array of stations in this block, the separation of February (M3) and May (M4) samples into discrete clusters may be a result of the decline in total densities at many of the stations in February (M3), followed by a recovery in May (M4).

The density declines in February (M3) may be related to changes in sediment composition or to normal seasonal population cycles. An analysis of the change in densities over time of 24 infaunal species revealed that at Stations 5-1, 5-2 and 5-8, where the greatest increment in barium concentration between July (M1) and May (M4) occurred, the densities of many species declined in November (M2) before drilling began and increased in February (M3).

- In general, no significant changes in benthic community structure which can be related to drilling activities have been detected with the methods of analysis used thus far.

2. RECOMMENDATIONS

- Sampling should continue at all long-term Regional Stations in order to establish normal seasonal patterns of population fluctuations. This will allow us to better interpret population fluctuations seen at drilling areas. The most important stations include the deeper water and canyon Stations 3, 6, 7A, 8, 9 and 12 adjacent to the proposed Lease Sale 52 area, and stations in major depositional areas (Stations 13 and 13A).

- Sampling should be continued at three stations in Block 410 (Stations 16, 17, 18). This will provide information on long-term effects at a deeper drilling site, which may be useful for predicting impacts of drilling in the Lease Sale 52 area.

- Biological and chemical sampling should continue at those stations in the Site-Specific array at which elevated concentrations of barium (a marker of drilling mud accumulation) were detected in the fine fraction of sediment on Cruise M4. First priority should be given to stations of this type two or more kilometers from the drill site. Analysis of sediment barium concentrations at an additional radial array of four to sixteen stations located about 8 and/or 10 km from the rig site would be useful for better defining the pattern and extent of movement of drilling muds away from the rig site.

- Barium should be analyzed in the fine fraction of sediments from the Secondary Site-Specific Stations for Cruises M1 through M4 to better establish the distribution of drilling muds in sediments around the rig site. If elevated concentrations

of barium are detected in sediments from the Secondary Site-Specific Stations or the new far-field stations, a subset of these, including Stations 5-23, 5-24, 5-26 and 5-27 should be analyzed for benthic infauna and sediment grain size.

- Additional effort should be made to obtain more samples of Arctica islandica or other suitable macroinfaunal animals at Site-Specific Stations having elevated sediment barium concentrations, for metals and petroleum hydrocarbon analysis. This will help answer the critical question of whether materials from drilling discharges accumulating on the bottom are bioavailable.

- Because of the problems with the wet-weight biomass technique, as discussed in the final report, the method for determining biomass should be re-evaluated. For at least one set of samples, another technique, such as decalcified wet weights or ash-free dry weights, should be used in order to establish a better estimate of secondary productivity.

3. BACKGROUND

The Georges Bank, a large plateau lying under 3 to 200 meters of water 80 to 325 km east-southeast of the Massachusetts coast, is one of the most productive commercial fishery areas in the world. Many species of finfish and shellfish, including codfish, haddock, flounder, ocean scallops, and lobster, with a market value in excess of 165 million dollars are harvested from Georges Bank each year.

As known domestic reserves for oil and gas have dwindled and dependence on foreign sources of these fossil fuels has increased, there has been a growing interest in exploring new oil and gas reserves in the coastal and Outer Continental Shelf waters of the United States, including the Georges Bank. The first offering of lease tracts for exploratory drilling on Georges Bank (Lease Sale #42) took place in December, 1979. In this offering, a total of 63 blocks, each 3 x 3 miles (23.3 km²), on Georges Bank were leased by major oil companies or consortia. Two additional lease offerings are scheduled for the North Atlantic Outer Continental Shelf, including portions of Georges Bank (Figure 1). All lease blocks in Lease Area 42 and those blocks in the proposed Lease Area 52 that actually are on Georges Bank are located along the south-central and southwest portion of the Bank. The area of geologic potential for the proposed North Atlantic Lease Offering (February, 1984) includes much of the remainder of Georges Bank, as well as areas in deeper water (exceeding 2,000 m).

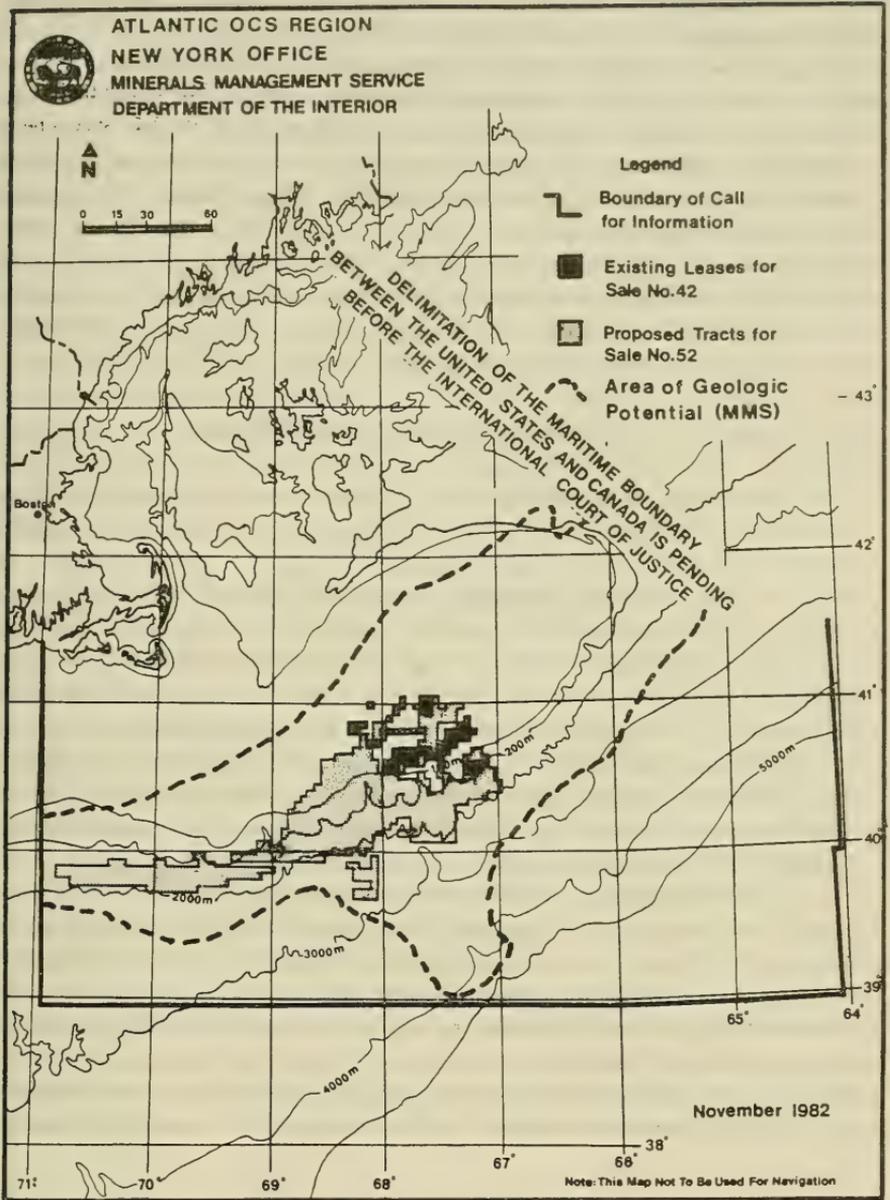


FIGURE 1. PROPOSED NO. ATLANTIC LEASE OFFERING (FEBRUARY 1984) .

Substantial concern has been expressed by environmentalists and the commercial fishing industry that oil and gas exploration and possible later fossil fuel development and production on Georges Bank would seriously damage this complex and highly productive ecosystem and the commercial fisheries dependent on it. Because of these concerns, a Biological Task Force for Outer Continental Shelf Lease Sale 42 was established by the Federal Government to recommend to the U. S. Department of the Interior, Supervisor of Oil and Gas Operations in the North Atlantic, the design of environmental studies and surveys that would provide an early warning of adverse effects of oil exploration on the Georges Bank environment (Biological Task Force, 1981). The Bureau of Land Management (now Minerals Management Service) of the U. S. Department of the Interior has implemented the monitoring program recommended by the Biological Task Force, with some slight modifications.

4. PURPOSE AND SCOPE OF THE PROGRAM

The major environmental concerns resulting from exploration and development activities for oil and gas on Georges Bank are that intentional discharges of materials (mainly drilling fluids and cuttings) from oil platforms during normal exploratory and development activities may damage the Georges Bank environment, particularly animals living on or in the bottom sediments, upon which commercial fisheries species depend for food. If commercial quantities of oil or gas are found, a major concern during the development and production phases of the Georges Bank field is that accidental spills of crude oil and operational discharges of petroleum hydrocarbon-laden produced water will harm the marine biota, and particularly the floating or pelagic eggs and larvae of commercial fishery species. Other concerns relate to increased ship traffic over the Bank, disruption of the bottom by pipelines, anchors and rig structures, and disturbances of migrating and feeding whales by noise and surface pollution.

The Georges Bank Monitoring Program is designed to address the concerns related to the initial exploratory phase of Georges Bank development. Specifically, the objectives of the Program are to determine the fate of discharges (primarily drilling fluids and cuttings) from exploratory drilling platforms in Lease Area 42 and to assess the effects of these discharges on benthic species and communities of Georges Bank and potential depositional areas for drilling fluids and cuttings in submarine canyons and the Outer Continental Shelf south of eastern New England. The accumulation and distribution of drilling fluid-associated metals, in particular barium and chromium, in bottom

sediments in the vicinity of exploratory activities are being used to trace the patterns and quantities of drilling fluid deposition around and downcurrent from drilling rigs. This research is being performed by the U.S. Geological Survey, Woods Hole, Massachusetts (Bothner et al., 1982). Concentrations of several metals are being analyzed in selected species of bottom-living fish and shellfish and possible petroleum hydrocarbon contamination of bottom sediments and marine animals of Georges Bank is being investigated by Science Applications, Inc. (Payne et al., 1982) in a further effort to determine if drilling activities are resulting in contamination of the Georges Bank environment. The major portion of the Monitoring Program is being performed by Battelle New England Marine Research Laboratory and Woods Hole Oceanographic Institution and addresses the question of whether populations of animals living in the bottom sediments (benthic infauna) change in selected regions of the southern Georges Bank and southwestward (downcurrent) along the southern New England Outer Continental Shelf, including Lydonia and Oceanographer Canyons, during various stages of oil and gas exploratory activity in Lease Area 42, and whether these changes can be related to observed changes in the concentrations in the benthic environment of pollutant materials discharged from exploratory platforms.

5. PROGRAM DESIGN AND IMPLEMENTATION

The Benthic Infauna Monitoring Program was designed to determine both the near-field short-term and the regional long-term environmental impacts of oil exploration activities in Lease Area 42. A total of 46 stations were established on and adjacent to Georges Bank. These were of two types. A group of long-term regional stations was established to assess long-term and widespread impacts of drilling activities (Figure 2). Benthic infaunal distributions on the southern flank of the Bank are determined largely by water depth and sediment characteristics. Therefore, three transects of three stations each were established perpendicular to the local depth profiles, approximately in a north-south direction. The transects were located west of, east of, and directly through the Lease Area 42 blocks. The three stations on each transect were located at depths of approximately 60, 80, and 100 meters. Because the net movement of water currents over the southern flank of Georges Bank at all depths and seasons is toward the southwest, the eastern Transect I, lying upstream of the lease area, was considered a reference transect, unlikely to be influenced by drilling activities, with which to compare the other transects. The western Transect III lies downstream of the drilling activity where drilling discharges

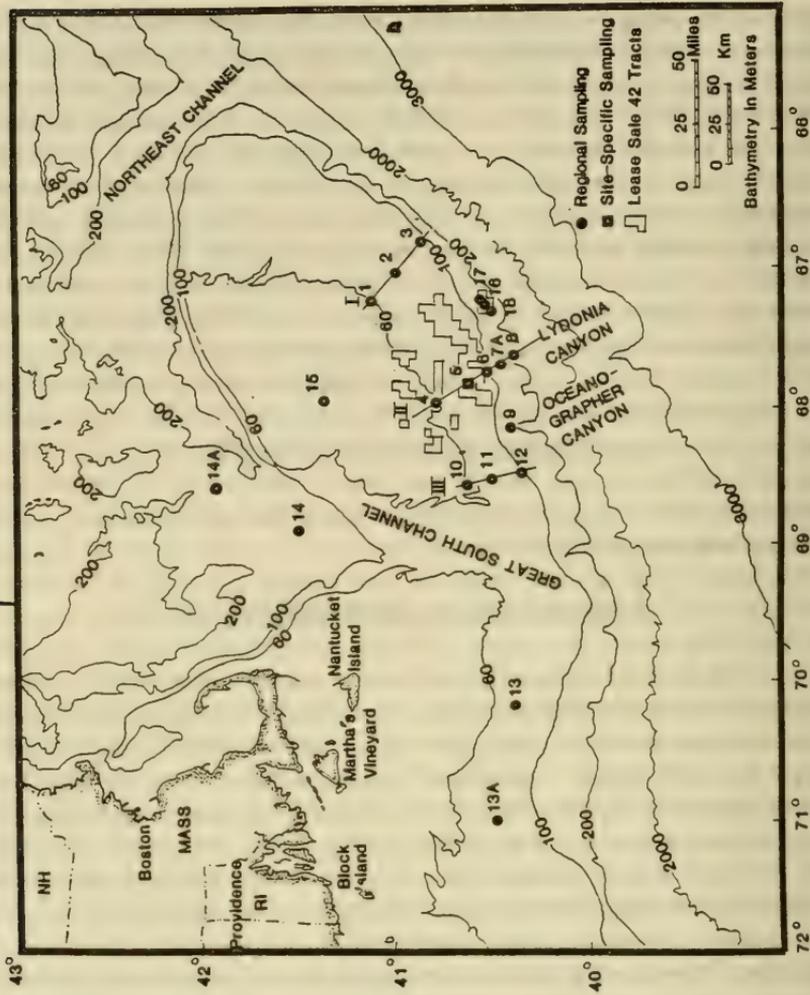


FIGURE 2. LONG-TERM REGIONAL STATIONS

could accumulate and long-term effects might occur. Additional regional stations were located at sites where drilling fluids and cuttings might accumulate over time. These include the heads of Lydonia and Oceanographer Canyons, the Mud Patch south of Cape Cod and Rhode Island, and just above the edge of the Continental Shelf south of the lease area. Another station was located in a high energy erosional area at the top of the Bank in about 35 meters of water.

In order to detect near-field impacts of drilling discharges on the benthic environment, two groups of sampling stations were established in close proximity to two exploratory drilling operations. A group of three stations was located within 200 meters, and approximately 2,000 meters upcurrent and downcurrent of the drilling site in Block 410 located in about 140 meters of water (Stations 16, 17 and 18 in Figure 2). A larger array of 29 stations was located in a radial pattern around the exploratory rig site in Block 312 in 80 meters of water (Figure 3). This rig site corresponds to Regional Station 5 in Figure 2. Stations were located within 200 meters and at distances of 0.5, 1, 2, 4 and 6 kilometers from the rig site. An over-sampling strategy was used here. Nineteen of the stations were designated as primary stations, and all samples from these stations were analyzed. The other ten stations were secondary stations, and samples from them will be analyzed, if needed, to aid in interpretation of impacts observed at the primary stations.

All stations were sampled four times per year on a seasonal basis. During the first year of the Program samples were collected in July and November, 1981 and February and May, 1982. At each station, six replicate biology samples and three replicate chemistry samples of undisturbed bottom sediments were collected with 0.04 m² and 0.1 m² Van Veen grab samplers, respectively. Subsamples of these were taken for analysis of carbon-hydrogen-nitrogen (CHN) and sediment grain size. Biology samples were sieved through 0.5 and 0.3 mm screens and preserved in buffered formalin. Chemistry samples were frozen.

Bottom photographs were taken at each station to document the presence of animals living on the sediment surface (epifauna) and bottom living (demersal) fish, and in an effort to detect evidence of accumulation of drilling mud and/or cuttings. Measurements of water column hydrography (salinity, temperature, dissolved oxygen) were taken at all regional stations. Dredge and trawl samples were collected at up to three regional and three site-specific stations to obtain fish and mollusc (ocean quahog *Arctica islandica*) samples for chemical analysis and to obtain representative specimens of epifauna and demersal fish for a voucher collection to be used in identifying species observed in bottom photographs.

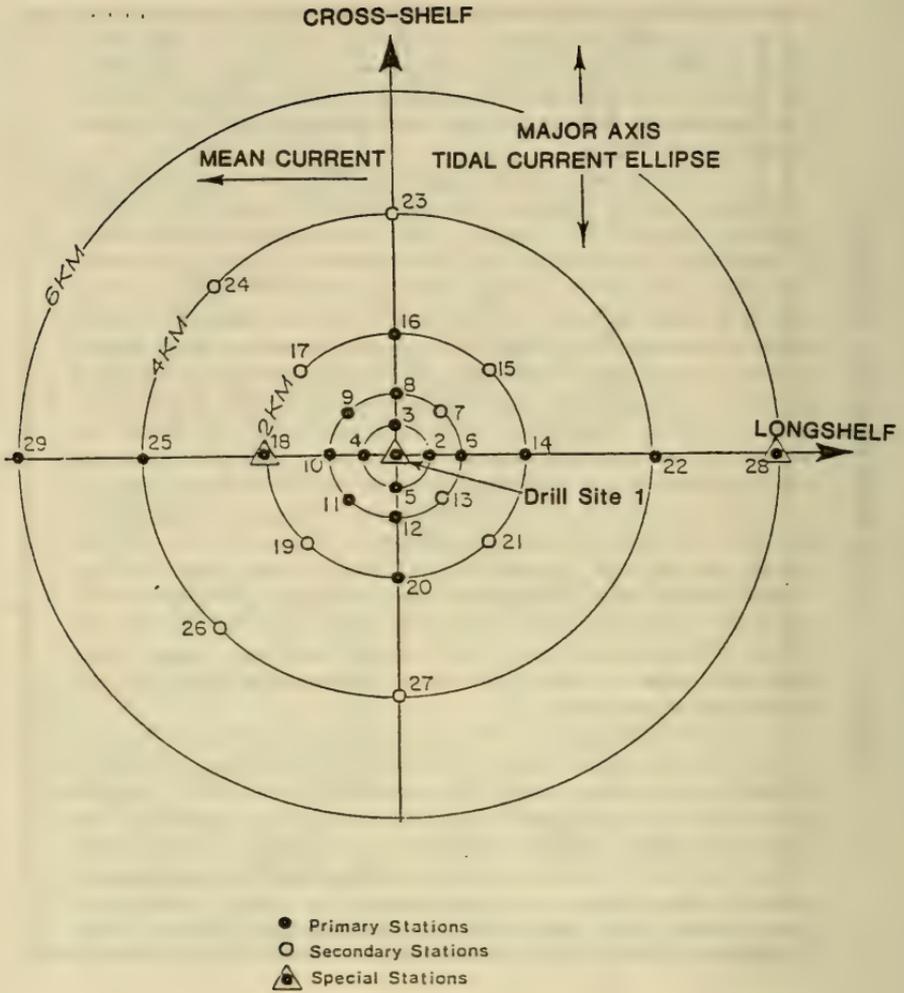


FIGURE 3. SITE-SPECIFIC STATIONS

In the laboratory, each benthic biology sample was transferred to 70 percent alcohol, stained with Rose Bengal and examined under a dissecting microscope. All organisms were sorted to basic taxonomic groups such as polychaete families, amphipods, isopods, other crustacea, molluscs, echinoderms, etc. Identifications then were made to the lowest possible taxon, usually species. Verification of the identity of voucher specimens and problematic species was performed by outside taxonomic experts. Wet-weight biomass was determined separately for each species.

All data from each sampling cruise were coded at Battelle and entered into the VAX 11/780 computer at Woods Hole Oceanographic Institution. Statistical treatment of the data set included an agglomerative clustering technique to determine similarity between samples. The similarity measure was NESS, the Normalized Expected Species Shared, where the comparison of expected species shared is between random samples of 50 or 200 individuals from the initial collection of individuals in each grab. NESS is more sensitive to the less common species than the other commonly used methods. The clustering strategy was flexible sorting with β set at the commonly used value of -0.25. We also have used the Bray-Curtis or percent similarity coefficient as a similarity measure with group average sorting. In addition, the Shannon-Wiener diversity (H') was calculated and Hurlbert's modification of the rarefaction method was used to predict the number of species in a random sample without replacement.

6. RESULTS FOR THE FIRST YEAR OF THE BENTHIC INFAUNA MONITORING PROGRAM

6.1 Sediments

Sediments at all regional stations except Station 13 consisted of greater than 95 percent sand. Sediments at Station 13 consisted of nearly equal parts very fine sand and silt/clay. At Stations 16, 17, and 18 near the rig site in Block 410, sediments were dominated by coarse to medium sands. However, Station 18 had a higher proportion of fine sand than Stations 16 and 17. There was no change in the percent of very fine sand or silt/clay between the first (predrilling) and fourth (postdrilling) cruises. The sediments at the 19 primary site-specific stations were very similar. However, sediments at Station 5-29, the station farthest west of the rig site, had a higher proportion of very fine sand and silt/clay than did the other stations. The percentage of fine sand at many site-specific stations was highest in February.

6.2 Taxonomy

The 0.3 mm screen was more efficient than the conventional 0.5 mm screen in sampling several species of benthic invertebrates. Very small species such as the polychaete Paradoneis new sp. A were retained almost exclusively on the 0.3 mm screen, while efficiency of sampling of long, thin, smooth species like the amphipod Erichthonius rubricornis was much greater with the 0.3 mm than the 0.5 mm screen. Recently settled early life stages of many species of polychaetes and crustaceans also were sampled more efficiently on the 0.3 mm screen.

A total of 783 taxa of benthic invertebrates have been identified in the samples analyzed to date. Seventy-four of these were epifaunal invertebrates or demersal fish. The remainder were infaunal invertebrates. Polychaetes, represented by 306 species, were the most abundant group, and accounted for 39.1 percent of all taxa identified. The polychaetes included at least 8 undescribed genera and 30 undescribed species. Arthropods, represented by 159 species, accounted for 20.3 percent of all taxa identified. Half of these were amphipods. There were at least two undescribed species. Molluscs accounted for 16.6 percent of the fauna with 132 species, at least one of which was a new species. The remaining 23.7 percent of the fauna included cnidarians, echinoderms, oligochaetes, ectoprocts, etc.

6.3 Abundance and Diversity

The number of individuals per 0.04 m^2 was high at most stations and varied seasonally. Densities were highest at Stations 5, 12, and 13, averaging approximately 1,020, 870 and 1,200 individuals per 0.04 m^2 , respectively. Lowest densities were at Stations 11 and 17, averaging between 100 and 200 individuals per 0.04 m^2 .

Shannon-Wiener diversity was lowest at the shallow Stations 4 and 10 and highest at the deeper Stations 3, 16, and 17. The number of species per 1,000 individuals was highest at regional stations at or below the 100 meter depth (mean 83-121 species per 1,000 individuals) and lowest at the shallow stations.

6.4 Population Patterns: Regional Stations

The most remarkable feature of the cluster analysis of the regional stations was that all of the replicate samples of one station clustered with each other before

joining with those of another station. This occurred for each of the four sampling seasons. The excellent comparability of replicate samples from the same station allows us to detect small changes in benthic community characteristics.

If the data from the six replicates for each station for each sampling period are summed, it is possible to perform a cluster analysis on all the data at once. With one exception the samples for the four seasons at each station cluster together before any separation occurred between stations. The exception was the closely-spaced Stations 16 and 17 which had particularly similar community characteristics in February (M3).

The species composition of the benthic infauna on the southern flank of Georges Bank changed very little over the year and differences between sampling dates were always less than differences between stations. If drilling activities had had a short-term regional impact on the Bank, we might have expected to have seen some changes in community characteristics at some regional stations between the first (predrilling) and subsequent seasonal sampling periods. This was not the case.

The stations tended to cluster together according to water depth, and to a lesser extent according to sediment type (Figure 4). Station 15 at the top of the Bank and Station 13 in the Mud Patch were the only two stations that were distinct from all the others. The remaining stations sorted into five groups: the eastern deep (140-150 m) Stations 8, 16, 17, and 18; a western deep (100-250 m) grouping of Stations 6, 7, 9, and 12; a low similarity fusion of the 80 m Station 11 with the 100 m Station 3; a 70-80 m grouping of Stations 2 and 5; and a 60 m group of stations 1, 4, and 10.

In Block 410, Station 18 to the west of the rig site clearly was different from Stations 16 and 17. For example, the amphipod Ampelisca agassizi was dominant at Station 18 and rare at Stations 16 and 17. This can be attributed to the finer sediments at the former station compared to the latter stations.

Exploratory drilling began in Block 410 in July 1981, shortly after Cruise M1, and continued until the end of March, 1982. During this time, approximately 1,000 metric tons of drill cuttings and 600-800 metric tons of drilling fluid solids were discharged. Bothner et al. (1982) reported that concentrations of barium (presumably from drilling fluids) in unfractionated surficial sediments at Station 16, 200 m from the rig site, increased by a factor of 3.5 between July, 1981 and May, 1982. Smaller increments in sediment barium concentration were observed at Stations 17 and 18. Some evidence of drill cuttings was observed in the gravel fraction of sediments at Station 16. The clay size fraction of sediments from this station showed increases in concentrations of barium, chromium, aluminum, copper, and mercury between pre- and postdrilling samples.

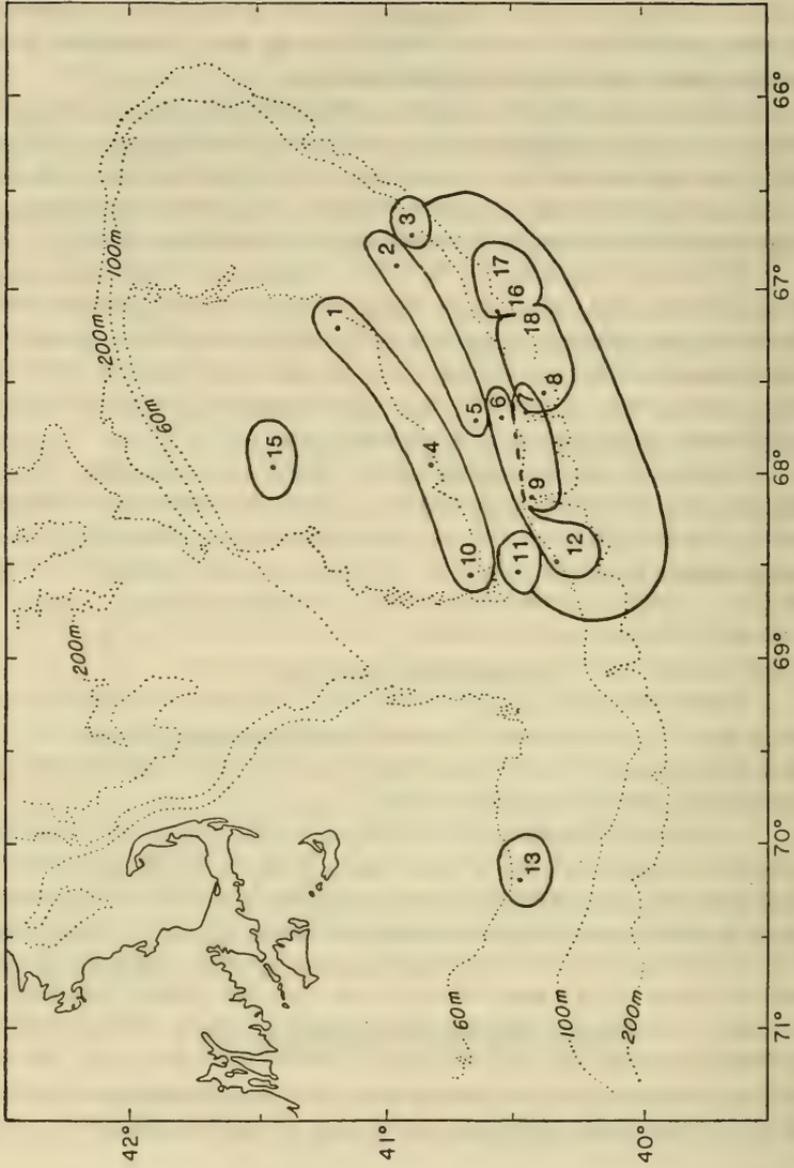


FIGURE 4. MAJOR CLUSTERS OF SUMMED REGIONAL STATIONS AS DELIMITED BY NESS AT 200 INDIVIDUALS AND FLEXIBLE SORTING.

There was no evidence of a biological impact that could be attributed to the accumulation of drilling fluids and cuttings in sediments around the rig site in Block 410. Some species of polychaetes and amphipods showed increases in abundance in November and February followed by a decline in May. Others showed declines in November followed by a large increase in February. Gravid females and recently hatched young of Ampelisca agassizi were abundant in February at Station 18.

Seasonal densities of several species at Station 13, the Mud Patch, showed an increase from July to November or February, followed by a sharp decline in May. These population fluctuations probably represent a sequence of normal seasonal settlement and mortality patterns.

6.5 Population Patterns: Site-Specific Stations

All site-specific stations and sampling dates could be clustered at once using NESS at 200 individuals. The clearest separation occurred between Station 5-29 and the rest of the site-specific stations. This was due in part to the fact that at Station 5-29, where sediments were finer-grained, the amphipod Ampelisca agassizi was more abundant and the amphipods Erichthonius rubricornis and Unciola inermis were less abundant than at the other site-specific stations, regardless of season. With the exception of Station 5-28, the station farthest east or upstream of the drill site, all site-specific stations showed some seasonal changes in community characteristics.

Bothner et al. (1982) reported increases in barium concentrations in bulk sediment samples from several site-specific stations between the first and fourth cruises. Drilling actually started in Block 312 on December 8, 1981, shortly after Cruise M2 and continued to June 1982, shortly after Cruise M4. As much as 900 metric tons of drilling fluids and 1,000 tons of drill cutting may have been discharged during this time. The major increase in sediment barium concentration occurred between the February and May cruises. Drill cuttings were observed in the gravel fraction of sediments at Station 5-1.

In an effort to determine if these accumulations had a biological impact, abundances of several species were compared over the four seasons at those near-field stations showing the largest increment in sediment barium concentration (Stations 5-8, 5-2 and 5-1), those downcurrent stations showing moderate increments in barium (Stations 5-10 and 5-25), and upcurrent stations where there was no evidence of drilling fluid or cuttings accumulation (Stations 5-28 and Regional Station 2). At stations near the rig site, there was a decrease in the number of individuals per sample from July to November,

with good recovery in February, continuing through May. The downcurrent stations did not experience a decline until February and there was substantial recovery by May. The upcurrent reference stations did not show declines in density in either November or February, but exhibited gradual increases in density through the four seasons.

Several species showed this or a slightly different pattern of seasonal change in abundance. The most dramatic population decline was experienced by the corophiid amphipod Erichthonius rubricornis, an epifaunal suspension feeder. Most of the population changes observed near the rig site can be correlated with changes in sediment grain size characteristics. This probably was due primarily to the scouring action of winter storms, particularly between November, 1981 and February, 1982. It also is possible that accumulation of drill cuttings near the rig between November and February could have contributed to the population changes observed. Evidence of drilling fluid accumulation did not occur until May, by which time most species had shown substantial recovery. Thus, no short-term adverse changes in the benthic infaunal community have been identified to date which can be related to accumulation of materials from drilling discharges in sediments near exploratory rigs.

6.6 Bottom Still Photographs

Bottom still photographs taken at regional and site-specific stations provided visual evidence of seasonal changes in the surface texture and color of the bottom, and patchiness of epifaunal invertebrates and demersal fish. No evidence of drill cuttings or drilling fluid accumulation on the bottom was found in any photograph. This is not surprising, because the chemical evidence provided by Bothner et al., (1982) indicates that only very small amounts of these materials accumulated per unit area of bottom near the rig sites.

Several regional stations, particularly those at the same depth interval, showed similarities in surface topography, amount of detritus or biological cover, and sediment type. Biological cover was most dense in July and May. There was evidence of bottom scour, including pronounced ripple marks, in November and particularly February at many stations. Bottom scour was most evident at the shallower stations.

7. KEY PARTICIPANTS IN THE PROGRAM

The Georges Bank Benthic Infauna Monitoring Program has been a collaborative effort of nearly 100 scientists and technicians. The program leaders are:

Jerry M. Neff, Program Manager, Nancy Maciolek-Blake and James A. Blake from Battelle New England Marine Research Laboratory, and J. Frederick Grassle and Howard L. Sanders from Woods Hole Oceanographic Institution. George R. Hampson (W.H.O.I.) is First Scientist on sampling cruises and Rose Petrecca (W.H.O.I.) is Cruise Coordinator.

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Mr. D'AMOURS. Thank you very much, Mr. Danenberger. I also appreciate your very apt summary of your testimony.

I have a few questions I would like to ask.

I will start with Mr. Beller—since he spoke first.

You specify in your testimony that just about everybody involved with the task force had components they would like to have seen in the monitoring program that were not present because of “constraints”—your word—as well as goals. What constraints do you think prevented certain components from being included in the monitoring program?

Mr. BELLER. The constraints are those that govern many of our programs. When the monitoring subcommittee first met, in Woods Hole, in February of 1980, they—the subcommittee—tried to put together all the desires of the scientists and other participants, sort of a wish list, which, if we had unlimited funds, we could carry out.

As we went further down the road, we found the constraints were two: one, financial, and two, applicability.

Two things struck me as being things that were left out. One was the desire to do research in the water column, of the organisms in the water column. It was felt that we could probably get better results if we looked at the benthic infauna which essentially don't move, we could count them easier, it would be cheaper to count

them, and consequently, although it would be nice to find out what is happening in the water column, we would have more meaningful results if we concentrated on the benthic infauna.

If we were to do a complete research job, we would have looked into the water column, although I frankly don't think that was necessary.

Mr. D'AMOURS. All right. What you are telling me is that the primary constraint is financial?

Mr. BELLER. I would say that was one of the major constraints, yes, sir.

Mr. D'AMOURS. All right.

In your testimony you also imply rather strongly that monitoring in the lease 52 area is going to be very expensive, precisely because of the sample-gathering problems in deep water.

Do you anticipate having sufficient funds to do the necessary monitoring and sample-gathering in the lease sale 52 area, and if you do, what timetable are you looking at for achieving some designation and/or design in the sale 52 study area?

Mr. BELLER. To answer the first part, all I can say is we would hope we would have sufficient funds, because, of course, it is the Department of the Interior that has been funding the program to date, and the Department of the Interior, with the first recommended program, funded it totally adequately and, in fact, added five stations to those we recommended. It has been an extremely good relationship.

True, to do equivalent research in deeper water, as you say, Mr. Chairman, would be more expensive than to do the same research in the shallower waters of Georges Bank. However, it could be that we could do less research, require less stations in deeper waters, and consequently the amount of money needed could be the same.

How much money we would need, what experiments we would need to do, we are looking toward our subcommittee to advise the Biological Task Force on. That goes into your second question as to when we could conceivably get results from the work of the subcommittee. As I mentioned earlier, they will be meeting tomorrow for their first meeting to try to map out a monitoring program.

I would expect that at the latest, by the end of the current year, we would have a monitoring program ready for adoption and financing by the Department of the Interior. That is a guess, but that would be my suggestion..

Mr. D'AMOURS. All right. Thank you.

Just one short followup to that.

If you do economize by setting out information stations, doesn't that impact on the quality of your work?

Mr. BELLER. Not necessarily, because it may be fewer stations appropriately placed could give us the same quality.

Mr. D'AMOURS. That is iffy at this point, obviously.

Mr. BELLER. Yes, the whole problem is.

Mr. D'AMOURS. Then you become very relevant, Mr. Danenberger, to the whole process. Can you give the subcommittee and the full committee some assurances that in fact the Department of the Interior will fully fund all reasonable study and monitoring attempts in the deepwater area and continue full funding in the lease sale 42 area?

Mr. DANENBERGER. Well, it is difficult to say exactly what the final decision on the total funding package will be. You understand there is a commitment to deepwater studies by the Department, including a field program. And I think that might be tied into both Mid-Atlantic and North Atlantic drilling. Of course, it is very difficult to plan for North Atlantic monitoring since there aren't any effective deepwater leases at this point. It is uncertain where such leases actually would be, if there is a sale in the next year, and concerning the continuation—there is still a commitment for continuing the sale 42 program.

However, the suspension of drilling in that area makes it more difficult to justify ongoing funding for several years into the future.

Mr. D'AMOURS. Well, you have no current plans to terminate the monitoring in the sale 42 area, do you?

Mr. DANENBERGER. It is my understanding that it is approved for this year. Now, if it continues to show very little or no effect, then I don't know what the decision will be by the Department for future years.

Mr. D'AMOURS. The question specifically was, are there any plans within DOI to after this year phase out the sale 42 monitoring program?

Mr. DANENBERGER. I don't know what the plans are beyond this year. If there is no further drilling, I would think there would be consideration of putting the resources in other areas. That is my own feeling. There has been a lot of money spent for only an eight-well drilling program. If there is not going to be any further drilling on Georges Bank, it may be wiser to put some of those funds into deep water studies.

Mr. D'AMOURS. Some of the sale 52 area is involved in Georges Bank.

Mr. DANENBERGER. Yes it is. But the most likely area that would be leased probably wouldn't be on the banks. It would probably be on the slopes.

Mr. D'AMOURS. How do we know the sediments and the pollutants from the slope drillings will not transfer themselves on to the bank?

Mr. DANENBERGER. This is part of the work that is ongoing now with the oceanographic studies being done by Lamont Doherty, and by USGS, which are trying to determine if there are some sinks. But I think it is my understanding that it would be more likely that the deposition would be on the slope.

Mr. D'AMOURS. Would it be wise in your judgment to discontinue the sale 42 area monitoring until we know with some assurance scientifically that there will be no transfer to the plateau?

Mr. DANENBERGER. I think it would be wise to maintain those stations that we feel would be necessary on a regional basis to help in the deep water program that is being developed by the Biological Task Force now. It may be wise to keep at least several stations on the bank to see if there is any kind of transfer.

Mr. D'AMOURS. Mr. Beller wants to comment on that.

Mr. BELLER. Yes, I would like to comment on this, backing up what Bud has said.

We did recommend that monitoring be continued until the benthic infauna organisms showed no effects of the drilling. At this

particular time they are showing no effects—based upon, as you observed, a limited number of wells. If we continue having no more wells drilled on 42, and if the stations included in the monitoring program for 42 cannot contribute to sale 52, then at the end of the third year it might well be that discontinuance of the monitoring would well be in order in order to use that money more appropriately for deeper waters.

Mr. D'AMOURS. But in point of fact, there are no such plans at this time, are there?

Mr. BELLER. There are no plans at this time to discontinue the monitoring, to my knowledge.

Mr. D'AMOURS. Do you concur with that rather direct statement, Mr. Danenberger?

Mr. DANENBERGER. It is my understanding that there are no such plans.

Now, there may be some readjustment of the program, depending on where the future activity is going to be. I think very few people would have anticipated significant impacts from only eight wells drilled on the bank. So we have to look now where more of the future activity will be, and try and design the studies best so that we can detect impacts if there are going to be any as a result of future drilling.

Mr. D'AMOURS. Let me get back, then, to my original question on whether DOI is going to continue funding the probably more expensive monitoring and studying at the deep water sites.

You said in response just now that DOI was "committed," to such studies. Now, can I assume that the commitment to the studies means that they are going to fund the studies?

Mr. DANENBERGER. I know they are going to fund some sort of deepwater program.

Now, one advantage in the deep water is that there would be very few wells and they would be very widely spaced. There is a limited number of rigs, and it costs a lot of money to operate in the deep water. So it might be, and this is what we are dependent upon the BTF for, advisable to look at a couple of those wells very closely. We may not need nearly as many stations. The BTF may be able to point to certain areas that are the most likely zones impacted.

Mr. D'AMOURS. But certainly if Interior is committed to the studies, you would have no problems telling me Interior would be happy to commit to fund such studies, would you?

I am not saying fund any and all studies, any and all ideas. But you are willing to fund the studies you are committed to, are you not?

Mr. DANENBERGER. That is my understanding.

Mr. D'AMOURS. Do you have any doubts personally about that?

Mr. DANENBERGER. Well, my personal doubts are not important, I don't think.

Mr. D'AMOURS. They are important to me.

Mr. DANENBERGER. I feel that there is a commitment to deep-water studies program.

Mr. D'AMOURS. All right.

Well, on that same topic, Mr. Danenberg, I think this summer the Shell Oil Co. is going to do some drilling.

Mr. DANENBERGER. Right.

Mr. D'AMOURS. Off Maryland. The deepest exploration drilling ever done. Is interior or the task force—and I will expand this to you, Mr. Beller—doing any kind of studying and monitoring now at the site of that drilling which might help the task force later on in the Georges Bank area?

Mr. DANENBERGER. Well, we are doing very detailed operational monitoring, because this, as you said, will be a record water depth well by over a 1,000 feet. In the Atlantic we have had a lot of time to concentrate on this proposed operation. So we have been spending a lot of time on the operational aspects.

As far as the environmental aspects of the operation, Shell is going to be doing some current profiling. One of the concerns within the industry and within the Department of the Interior are the Gulf Stream rings. They are warm core rings that could cause currents of approximately two knots in the drilling area, which is not very likely where Shell is, but could be in other areas. It will be useful to profile some of these warm core rings and see how the current patterns vary, since they can have a significant influence on the operation.

I think there is also some planning underway to do some actual site monitoring on one of the Shell wells. It is a several-well program which the first well starting in July. In addition, I think there are some plans being made to do some bottom sampling in the area but I have no firm information on that.

Mr. D'AMOURS. You say there are some plans being concocted to monitor specific site activity on drilling that is going to begin in July. Wouldn't it be very helpful to get in there early, get some baseline data, rather than leaving that environmental work up to the Shell Oil Co.?

Mr. DANENBERGER. Well, this work would be done by the Department. The only work Shell will be doing—

Mr. D'AMOURS. Which work?

Mr. DANENBERGER. If there are in fact environmental studies.

Mr. D'AMOURS. The work that is planned?

Mr. DANENBERGER. Right.

Mr. D'AMOURS. But the only work we know is going to be performed at the site is going to be performed by Shell Oil Co.?

Mr. DANENBERGER. Right. At this point.

Mr. D'AMOURS. Why wouldn't Interior get in there?

Mr. DANENBERGER. There are plans to get in.

Mr. D'AMOURS. Plans to get in is one thing. I don't want to harangue you, but it is a little frustrating. Why won't the Department of the Interior, whose job it is to check these things, get in there, rather than say "Shell, you can check this for us and let us know what you found out before you begin to drill."

Mr. DANENBERGER. There is no real strong reason to believe there are going to be effects in deep water based on the studies that have been done in the shallow area. I think that the feeling, the predominant feeling, is that there would be greater dilution, less effect in the deep water. But I think, because of the tremendous interest in deep water activities in the future, that there are plans being made for some sort of a program down there. I don't have the details at this point.

Mr. D'AMOURS. I am not sure I just heard properly. Are you saying you don't anticipate there will be any problems in the deep water sites—you think lease sale 42 data is sufficient upon which to conclude, well, we don't expect any problems in deep water, so why get into it?

Mr. DANENBERGER. I think there are possibilities of problems if there are some depositional zones where discharges might accumulate, or if there are some unusual features there. But I think if you took just one deep water site as a study area, that in all probability the effects would be less than a similar shallow water environment.

Mr. D'AMOURS. Right. But that sounds a little cavalier to me. In all probability—let's go ahead, after all Shell is keeping an eye out for the environment. It just upsets me because it sounds, frankly, a little bit cavalier. And again I don't mean to harangue. I mean to be fair.

Mr. Beller, do you have any thoughts on this? Are you as secure as Interior seems to be that what we have discovered already in the very limited sampling, in the exploration area, sale 42, is sufficient upon which to take a laid-back attitude on deep water sites in sale 52?

Mr. BELLER. I am not sure, in view of Interior's support of the Biological Task Force with respect to Georges Bank, Interior has done anything but try to support deep water work.

I would point out that, based upon the work of lease sale 42, we have, I quite agree, a limited number of samples which can be projected from having eight dry wells drilled, and that is all; there is no projection possible at this time.

When you get into deep water, you have different problems. When you get down below the permanent thermocline at 400 meters, you have different types of organisms involved.

I would point out that the organisms in the deep waters, unlike those in the shallower waters, are not used to the stresses of being close to the mainland. Consequently, they could be more easily hurt by discharges that would be possibly innocuous in the shallower waters. And these are the things we want to find out.

Mr. D'AMOURS. I understand that Interior has been apparently supporting the task force. But I think it is still relevant to consider what Interior is apt to do henceforth. Interior apparently is going to permit exploratory drilling off of Maryland, and allow, or trust Shell to do the environmental work. It just seems to me that if Interior is committed to the process, and if the problems are different as you suggest that they are, in deeper waters, that the Department of the Interior, which is charged with looking after the public interest in these areas, should be doing environmental work rather than leaving that to the Shell Oil Co.

Don't you agree with that, Mr. Beller?

Mr. BELLER. You put me in a difficult position in trying to evaluate the Department of the Interior.

Mr. D'AMOURS. Well, it is not my purpose to put you in a difficult position. But I think it is important that we arrive here at some idea as to what direction we ought to be taking. This will allow the subcommittee to go back and inform the full committee and the U.S. Congress as to whether legislative remedies might be called for here or whether we ought to restructure the Biological

Task Force in one way or another. So it is important that we obtain this information.

I am sure that Mr. Danenberger, who has been with Interior for some time, and Secretary Watt, would not be terribly offended if you expressed views that did not fully agree with them as to their deep water intentions at this point.

Mr. BELLER. Well, I can comment on the basis of information I have at hand. I suspect I could judge Interior's intentions with respect to the Georges Bank and North Atlantic area by noting that Interior has asked the task force, which was restricted to sale 42, to expand its interests and work to encompass sale 52, which certainly shows Interior's environmental intentions.

Mr. D'AMOURS. Let's leave Interior's motives and Interior's good intentions aside for the moment.

Do you think it would be a good idea to get out off the coast of Maryland, have the Interior Department or someone else and conduct studies for the purpose of developing baseline figures to help determine environmental impacts of the work that is going to be done in the deep water area?

Mr. BELLER. I would say that any research that could help us understand deep waters, whether it is in Maryland or Georges Bank, would certainly help in our evaluation of the impact of oil and gas drilling. To that extent, I would agree with you, Mr. Chairman.

Mr. D'AMOURS. All right.

So you agree that it would be useful to get into the Baltimore Canyon, this 110-mile site, specific site, and to begin gathering information?

Mr. BELLER. It indeed would be helpful.

Mr. D'AMOURS. Does that change your mind, Mr. Danenberger?

Mr. DANENBERGER. I agree 100 percent. I think it would be very helpful. But you have to have a plan for a study program. That is what the Biological Task Force is working on for deep water up here. There is a Biological Task Force in the Mid-Atlantic. They did not recommend such a study.

I agree 100 percent it would be useful. I think there is a possibility that one is being planned. I don't think it is critical that it be on the first well—it is a several-well deep water program. It is more critical that the study be well-planned.

Mr. D'AMOURS. All right. I am a little bit concerned. You are talking about planning, and the work is going to begin in a matter of weeks.

Mr. DANENBERGER. Initial work.

Mr. D'AMOURS. Have the plans been reviewed by Interior? Has Mr. Watt looked at these plans? If so, has he given approval or conditional approval?

Mr. DANENBERGER. The exploration plans have been reviewed by Interior.

Mr. D'AMOURS. No. I am talking about the environmental work.

Mr. DANENBERGER. You mean is Interior considering whether or not the studies are—

Mr. D'AMOURS. No, no. I am talking about the work that you say is being planned for the Baltimore Canyon.

Mr. DANENBERGER. This is a deep water program in general. I think the way my understanding is, is that the environmental stud-

ies people are at this time developing a deep water program. Whether or not monitoring of one of the Shell wells is an element of this program, I am not certain.

Mr. D'AMOURS. I thought you told me earlier there was some planning going on.

Mr. DANENBERGER. There is planning for deep water monitoring.

Mr. D'AMOURS. But not at the Shell site?

Mr. DANENBERGER. I think that is being considered, but I am not certain as to whether or not—

Mr. D'AMOURS. Mr. Beller seems to think that would be a good idea.

Mr. DANENBERGER. I agree.

Mr. D'AMOURS. You think it would be a good idea? Has anyone proposed that good idea to Interior?

Mr. DANENBERGER. It has been discussed and is being considered.

Mr. D'AMOURS. Do you know if the Secretary has seen it?

Mr. DANENBERGER. I don't know.

Mr. D'AMOURS. You don't know if any action has been taken as to whether or not that plan should be implemented?

Mr. DANENBERGER. No, I don't. I do know there is going to be a deep water program discussed in the near future. There is a possibility that that would be an element of it.

Mr. D'AMOURS. All right.

Mr. Beller, you noted there was an increase in the levels of barium, but obviously, or apparently from your statement, not anything that we should be at this point concerned about. At what levels should we become concerned?

Do you have any knowledge of that?

Mr. BELLER. Yes. I would say we should be concerned when the levels—and if the levels of barium do have effects on the community structure of the organisms on the seabed. Now tests, laboratory tests have shown that even elevated amounts of barium, and only a limited number of tests, seemingly do not have too much of an effect. There has been some abrasions, physical effects of the gut I believe in some shrimp. But we don't have really a large amount of data that would indicate that barium is a serious concern.

Mr. D'AMOURS. Do you mean in the Georges Bank area, you have detected these effects?

Mr. BELLER. These effects I am speaking of were laboratory tests, not in the Georges Bank area.

Mr. D'AMOURS. You said there was something about shrimp.

Mr. BELLER. Yes, but that was a laboratory test.

Mr. D'AMOURS. Not noted in the bank area?

Mr. BELLER. That is correct.

Mr. D'AMOURS. And even at increased levels of barium, you say?

Mr. BELLER. Yes.

Mr. D'AMOURS. Is not barium highly toxic?

Mr. BELLER. No. It is not very toxic at all. It is what we use when we take internal examinations, I understand. I would not advise you making a diet of it; rather untasty.

Mr. D'AMOURS. I was under the impression it is toxic. It is not terribly toxic?

Mr. BELLER. I think what you may be referring to is chromium, which can be quite toxic, which we do use in drilling fluids.

Mr. D'AMOURS. All right. When I say toxic, I mean to the marine environment, not necessarily to human beings.

Mr. BELLER. Yes.

Mr. D'AMOURS. It is not toxic to the marine environment nor to human beings?

Mr. BELLER. Moderate amounts have not been shown to be toxic to either species.

Mr. D'AMOURS. OK.

I want to bring this to some kind of a conclusion. But there is still an area I want to explore with you gentlemen. We will get back to Mr. Danenberger.

On the bottom of page 8 of your testimony, you referred to the various studies that have been performed and planned for deep water, and then you state that:

The Department remains convinced, however, as has been noted in recent NEPA documents, that there are sufficient controls on drilling operations and that deep water environments would suffer no greater risk of damage than those of shallower areas.

I have been concerned for some time that the sale 52 leasing was done even before the biological task force reports were published and released. And now you are getting into the deep water tracts and sites even before any real studies have been done as to the possible impacts of deep water drilling, especially the impacts of drilling in areas that are deeper than have ever been attempted before.

Some people think this represents a bit of a cavalier attitude toward the marine protection functions of the Department of the Interior. What would you say to that?

Mr. DANENBERGER. Well, I think it is unlikely that one or two deep water wells would have any detectable effect on the environment. Now, there has to be some sort of monitoring program, and there has to be some sort of drilling operation ongoing to effect a meaningful monitoring program, if you intend to monitor the drilling.

I think the important aspects of all this is to tie the results of the monitoring program into the regulatory program such that if the monitoring does show that modifications in the drilling could reduce any effects that were detected, then we could make some modifications in the drilling program. I think the Department remains committed to monitoring, but we feel that this can be ongoing as the exploratory drilling proceeds, and that we will have even a far better understanding of the potential effects when and if we move into the development and production stage which would be the stage that would more likely create any impacts if there are going to be any.

So I think the exploratory stage is a good time to do some monitoring to see if, and when there is, and if there is more drilling activity, what modifications in the programs will be necessary.

Mr. D'AMOURS. You don't think it is important to have all of this information before we begin to explore—given that it is very difficult to distinguish between the exploration stage once it results in a successful discovery? It moves to the production phase almost immediately, does it not?

Mr. DANENBERGER. No. It is quite a lengthy procedure between the first discovery and the initiation of production, especially in a deep water area. It is at least a 5-year period.

Mr. D'AMOURS. Once you strike the pool of oil, don't all of the risks attendant with production occur at that point?

Mr. DANENBERGER. No. Because there wouldn't actually be any production until some sort of production program was submitted and the platforms or sub-sea completions, all the fabrication work and the pipelaying has to be done.

Mr. D'AMOURS. Have you ever known of a successful strike to have not been produced in the history of drilling?

Mr. DANENBERGER. Yes. A lot of times it takes years to determine whether or not a strike is commercially exploitable. In the Baltimore Canyon there is a discovery right now that is still being further reviewed.

At this point it appears it is not commercial. It is possible that in the future more information will indicate that it is, or additional discoveries in the area will allow them to bring this one in.

Mr. D'AMOURS. I don't know why it wouldn't be commercial. It may be because there are not sufficient amounts to bring up. But the question here is environmental, I would think, rather than commercial. And I wonder, have you ever known of a substantial find of a pool of oil not to have been developed?

Mr. DANENBERGER. Well, there is always that chance. There is one right now off of Newfoundland that is a tremendous discovery, that has been delayed for several years because of political and environmental concerns. The Hondo field of California was initially discovered in 1970, and I believe it was after approximately 1980 before production started. And most of those delays were because of environmental studies. So I think—

Mr. D'AMOURS. The first case you cited was a Canadian case?

Mr. DANENBERGER. Right.

Mr. D'AMOURS. I guess I meant to limit my question to the United States.

Mr. DANENBERGER. There are examples. The Hondo field is one, where extensive environmental work was done, including an environmental impact statement.

Mr. D'AMOURS. But there was production ultimately?

Mr. DANENBERGER. There was production ultimately, but modified procedures.

Mr. D'AMOURS. So we know of no U.S. case where a substantial, worthwhile find, was not produced?

Mr. DANENBERGER. I cannot think of one that ultimately was not considered for production, but with major modifications.

I know there is a commitment to an environmental impact statement before the initiation of production in the North Atlantic. So these types of concerns would be considered at that point.

Mr. D'AMOURS. Do you think that, given the rather dramatic decrease in the projected levels of oil to be recovered from Georges Bank, that it make sense to go ahead with continued exploration unless and until we have further information as to the possible dangers and impacts presented by deep water drilling?

Mr. DANENBERGER. I just wanted to make one further point on your last question.

There is also a field that I just read of in the Mississippi Canyon, in the Gulf of Mexico, an Exxon discovery. It is in a slope and potential slump-prone area. MMS has required several years of geophysical study to make sure that a platform can be installed there.

Mr. D'AMOURS. When will they begin producing there?

Mr. DANENBERGER. It is still unclear if they ever will because it is a very difficult area to install production platforms.

As far as the resource estimate business, the only thing I can say concrete about resource estimates is that their degree of accuracy is very low. It is not just the problem with the work that is done by the Department, but industry has shown also in frontier areas that they are incapable of really assessing what is there until some exploratory drilling has been done.

If you look at all the frontier areas, starting in Alaska, and specifically, the Gulf of Alaska, and the lower Cook Inlet, both of which were thought to be excellent prospects, both have been very disappointing so far. In the Atlantic, all sectors have proved surprisingly disappointing. In the eastern Gulf of Mexico, there were single tracts that drew over \$200 million in bids and proved to be dry.

It all just goes to prove that we can get these types of estimates before a sale, but they are really not useful for planning purposes, if you want to really try and project what the ultimate effects will be and what employment opportunities will develop.

Before the drilling has been done, there are many examples of mistakes in trying to determine what is there. The only real way is to do some exploratory drilling and find out.

Mr. D'AMOURS. Well, that is very interesting, because one of the purposes of the OCSLA, the Outer Continental Shelf Lands Act—I think it is in section 18 if I recall—one of the purposes is to weigh the relative good to be obtained from exploration as opposed to the possible harm that might be created by such explorations.

Now, if what you are saying is correct, we have no way to make that determination and in every case we are going to go ahead and drill to see what is there, without any basis upon which to make a judgment as to whether there is a relative benefit.

Mr. DANENBERGER. It is very difficult on the resource side to calculate the plus-minus side of the resource versus fisheries source—it is very difficult on the oil and gas resource side because it is so difficult to project what the resources's potential really is for an area until the wells have been drilled.

Now, you do know which areas may be more environmentally sensitive. So it is easier to make the projection I would say on that side.

Mr. D'AMOURS. When do you make the projection it is not worth the risk? Upon what data do you make that projection?

Mr. DANENBERGER. It has to be—I guess to date the Department has primarily used the primary source numbers. But it is not a very good tool in making forecasts. Unfortunately—

Mr. D'AMOURS. Is there another tool?

Mr. DANENBERGER. Fortunately, the impacts of doing exploratory drilling in most environments have been found to be very minimal. So during this stage there is a very low likelihood that there will be any detrimental effects.

Mr. D'AMOURS. But the whole bias, the whole prejudice seems again to be cavalier—let's go ahead and drill, we don't really know what is out there, we cannot assess the relative risk. We are talking about the most productive fishing grounds in the world, on a per-area basis.

We are also talking about the likelihood, possibility at least, of a very minimal discovery in that area, and some significant risk of an accident, of a blowout, of permanent destruction to this resource. You are saying go ahead anyway, we have no idea what is out there, we don't really know if it is worth it, but let's drill and find out.

Given the fact that the OCSLA section 18 requires a balancing of risk, do you think that perhaps we should rewrite the OCSLA to give you some other judgment or provide some other standard to make a judgment of risk?

Mr. DANENBERGER. If you can tell us how much oil and gas is out there, it might be a good idea to rewrite it.

Mr. D'AMOURS. You told us. Your first estimate is it was well worth the risk because there were billions of barrels of oil and billions of metric cubic feet of natural gas. Then you reduced that estimate at the last second. That is one of the reasons you are under court injunction blocking sale 52. The reduced estimate didn't make any difference in the decision as to whether we should go forward.

I am saying if the only standard you have can be so cavalierly discarded, then perhaps we will have to give you some other standard, and perhaps it will have to be a more heavy-handed approach by the Congress, which I would like to avoid.

I would like to get from the Interior Department the level of potential discovery at which you are unwilling to tamper cavalierly with an extremely fragile ecosystem.

Mr. DANENBERGER. I think the risks during exploration are so low that there would be an opportunity to evaluate the pros and cons of development and production which would be a somewhat higher risk without in fact putting the fishery in jeopardy. I think this has been proven out on Georges Bank, and proven out in other areas where oil and gas exploration have been conducted.

Mr. D'AMOURS. If we separated the leasing process—separate exploration leasing, and an entirely different process for production, would you go along with that, would that simplify your quandary?

Mr. DANENBERGER. I think that is largely in effect with present language in the OCS Lands Act amendments, requiring an environmental impact statement between the exploration and the development stage. So I think—

Mr. D'AMOURS. But entirely separate leasing process?

Mr. DANENBERGER. Then it would be hard to get somebody I guess to take the risk initially to do the work. It would help in that way. But there are other concerns: would you be able to lease any?

Mr. D'AMOURS. Why don't we try.

Would you be willing to give it a shot?

Mr. DANENBERGER. You might end up with the Federal Government doing the drilling.

Mr. D'AMOURS. We have a situation here where the oil companies are doing the environmental testing. Maybe we should have

the Federal Government doing the drilling, if we are going to swap roles.

Mr. DANENBERGER. They do the testing in some situations under very strict guidelines and close scrutiny, I can assure you of that.

Mr. D'AMOURS. But the bottom line is, you cannot give me any standard upon which the Department of the Interior would make a determination that it is not worth risking an extremely fragile ecosystem.

Mr. DANENBERGER. Well, I am thinking in terms of the Atlantic, and there are some areas in the Atlantic that are easier for exploration than others. My only point is that during the exploration phase the risks are felt to be low enough that under most circumstances exploratory drilling can go ahead.

Mr. D'AMOURS. Isn't that somewhat prejudging the monitoring that is going on in lease sale 42. If you are so certain of that, why not take all of that monitoring equipment off of 42?

Mr. DANENBERGER. I think the program for sale 42 was set up for years and years of operation, and there is still a lot of uncertainty. There are a lot of wells drilled over the years, a lot of oil and gas activities in an area, and there is still a lot of concern as to what the chronic effects might be.

Georges Bank didn't prove to be a good testing ground for long-term study, because of the poor results in the initial drilling.

Mr. D'AMOURS. One further question of you, Mr. Danenberger. That is, on page 12 of your testimony you state that new data has revealed an "increased risk" associated with specific deep water sites. Would you elaborate on that?

Mr. DANENBERGER. That is from a resource standpoint. I believe that is the point you are referring to. That there is greater risk from the standpoint of an operator that is going out to drill. There is a lesser likelihood that he would make a commercial discovery. So that relates to the risk that is assumed by the lessee.

Mr. D'AMOURS. You are talking about financial risk?

Mr. DANENBERGER. Right. Lower probability of making a commercial discovery.

Mr. D'AMOURS. How long, Mr. Danenberger, have you been with the Department of Interior?

Mr. DANENBERGER. Since 1971.

Mr. D'AMOURS. You have seen a lot of changes, haven't you?

Mr. DANENBERGER. Indeed.

Mr. D'AMOURS. Well, OK.

Before we terminate, Mr. Beller, on this entire area of balancing risks which Congress intended the Federal bureaucracies, to do before it granted leases and the like, and the difficulty of applying any standard to make leasing decisions as I have discussed with Mr. Danenberger, do you have any comments on that?

Can you advise Congress as to what they might do? Perhaps, even though you are reticent to do so, advise DOI as to what they might be doing to be a little more careful about balancing environmental risk and being a little less thoughtful of economic risk?

Mr. BELLER. Let me take that question first of all from a technical point of view, and that is insofar as the biological task force is concerned, we come into the picture after it has already been decided to drill. We have no—nothing to say about that.

Mr. D'AMOURS. I understand that. And that is why I asked the question in a conditional way. I was just wondering if you had any thoughts on it, if you want to comment on that. If you don't we will not consider you anything less than very prudent.

Mr. BELLER. I will take advantage of your latter comment.

Mr. D'AMOURS. I want to thank both witnesses for your very kind attention. It is a difficult area, I understand. But I hope, Mr. Danenberger, you go back and tell Secretary Watt, who in Mr. Rigg's testimony assured me he was very sorry he could not be here personally—not nearly as sorry as I am—but we do think the Department of Interior ought to go on funding these studies, especially the deep water sites. If we are going to apply the OCS Lands Act at all making judgments that have to be made as to the risks and benefits to fragile ecosystems, the Congress would very much appreciate it if he was a little more sensitive to the environmental concerns and maybe a little less sensitive to the economic concerns.

And with that lecture to Mr. Jim Watt, who is not here, I thank you very much.

Mr. D'AMOURS. Our next panel is Ms. Patricia Hughes, Outer Continental Shelf coordinator, Office of Coastal Zone Management, Executive Office of Environmental Affairs, Commonwealth of Massachusetts; Mr. Charles S. Colgan, senior economist, State of Maine Planning Office; Mr. Douglas Foy, executive director, Conservation Law Foundation, and Mr. Jimmy Costakes, director, New Bedford Seafood Council, representing the Seafood Producers Association.

Gentlemen and Madam, welcome, we appreciate your attendance. That last panel took a little longer than I expected. Perhaps a panel always seems to go a little bit more slowly when we have the administration sitting before us.

I would repeat my admonition. If you could summarize, I would appreciate it. Your testimony is brief enough that I suppose we could get by in 10 minutes for any witness anyway. But to the extent you can, please summarize.

You may proceed. I guess the order in which I introduced you ought to be the order in which you testify. Why don't you go with that?

STATEMENTS OF PATRICIA HUGHES, OUTER CONTINENTAL SHELF COORDINATOR, OFFICE OF COASTAL ZONE MANAGEMENT, EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS, COMMONWEALTH OF MASSACHUSETTS; CHARLES S. COLGAN, SENIOR ECONOMIST, STATE OF MAINE PLANNING OFFICE; DOUGLAS FOY, EXECUTIVE DIRECTOR, CONSERVATION LAW FOUNDATION, AND JAMES COSTAKES, DIRECTOR, NEW BEDFORD SEAFOOD COUNCIL, REPRESENTING SEAFOOD PRODUCERS ASSOCIATION

STATEMENT OF PATRICIA HUGHES

Ms. HUGHES. Thank you, Mr. Chairman.

I am Patricia Hughes, Outer Continental Shelf coordinator for the Massachusetts Coastal Zone Management Office. My office is responsible for review of OCS activities for the Commonwealth. I am here today representing James S. Hoyte, Secretary of Environmental Affairs. I appreciate this opportunity to express the views

of the Commonwealth of Massachusetts on the Georges Bank Biological Task Force and its activities.

The Georges Bank BTF was established through an agreement between the Department of the Interior and the National Oceanic and Atmospheric Administration, NOAA, in order to resolve a dispute over the designation of Georges Bank as a marine sanctuary. Despite its beginnings, a review of the charter shows that the BTF is not meant to be a political body, but rather an interagency committee which provides advice of a technical and scientific nature to the regional supervisor of the Minerals Management Service, MMS.

The task force performed its role in exemplary fashion in the development and implementation of the Georges Bank monitoring program for the sale 42 area. It is not often that Federal agencies from different departments work together, as they have on the monitoring program, and involve scientists from outside Government in the design of a major program for a specific area. The Department of the Interior committed itself to funding the program, which is about to begin its third year.

In the development of the program, scientists discussed recent or ongoing research programs, some of which are designed to gain a better understanding of the high productivity of the Georges Bank ecosystem and the mechanisms that contribute to its productivity, and some of which are designed to monitor the environmental health of the ecosystem. The objectives of the monitoring program were based on these discussions and the specific concerns over the potential impact of drilling activities on Georges Bank.

The monitoring program is an important effort, since it is particularly critical to determine in a frontier region whether there are significant impacts from drilling activity. However, post-lease monitoring studies are not adequate by themselves as a means of collecting scientific data in most OCS areas. Prelease scientific studies are necessary, not only for developing complete and useful environmental impact statements, but for assessing the capability of existing drilling technologies, for developing stringent lease stipulations tailored to the environmental conditions of an area, and for determining whether there are portions of a proposed sale area that may deserve special attention.

Although there has been no drilling activity on the bank for almost 1 year, lease sale 82 is scheduled for February 1984. Sale 52, originally scheduled for 1982, is held up in court. The task force must now prepare for additional leasing, encompassing a larger area of the North Atlantic.

This next lease sale will include the continental slope and rise areas adjacent to Georges Bank, where the physical, chemical and biological processes are not well understood. As a part of its ongoing environmental studies program, the Department of the Interior is supporting research efforts that will add to our knowledge of these deep water areas. Prelease studies such as these are necessary in order to make reasonable decisions on areas to be leased, and whether specific restrictions should be placed on drilling activities in certain areas.

The BTF has the ability, because of its composition, to integrate information from the monitoring program with other North Atlan-

tic research programs and begin developing a comprehensive view of the important environmental questions surrounding the conduct of oil and gas activities in the North Atlantic.

The BTF can make recommendations for consideration prior to a lease sale, in addition to recommending postsale monitoring studies. Specifically, the charter gives the BTF the authority to:

First, identify, with justification, zones of special biological significance, identified zone, including but not limited to benthic populations or habitats and temporal finfish populations and spawning areas;

Second, recommend to the supervisor, within 90 days following the lease sale, criteria for the evaluation of adverse biological effects on the North Atlantic ecosystem, including where feasible the establishment of standards which, if not met, will initiate the application of previously agreed-upon mitigating measures, including termination or modification as necessary of the activities;

Third, recommend to the supervisor mitigating measures designed to protect biological resources which may be, or are being, adversely affected by oil and gas operations.

Fourth, advise the supervisor of any adverse impacts on the marine environment from oil and gas operations.

Execution of these responsibilities requires continued coordination and communication among the Federal agencies represented on the task force. All of the task force agencies conduct or support research programs in the North Atlantic. Two agencies, MMS and EPA, have regulatory responsibilities for oil and gas activities, and a third, NOAA, has regulatory authority for the conservation and management of the living marine resources in the North Atlantic.

The delineation of areas of special biological significance can be done only with the participation of the NMFS. The development of mitigating measures designed to protect biological resources must involve MMS personnel from the operations division, as well as involving members of the scientific community. While the BTF advises the MMS regional supervisor, EPA's involvement can result in an NPDES permit that incorporates a particular mitigating measure developed by the task force.

Finally, the responsibility of recommending criteria for evaluating adverse biological effects on the North Atlantic ecosystem cannot be successfully carried out without the involvement of the task force representatives, the scientific community, and the State representatives.

To facilitate communication among the task force representatives and the States, the scientific community, and the environmental community, and to sustain and improve the effectiveness of the biological task force, Massachusetts recommends that the representative from each of the participating agencies, one, come from the district or regional office; two, be involved in either the development or the review of permits regulating oil and gas activities; three, have a scientific or technical background; and finally, four, have the time to commit to the task force.

Massachusetts also recommends that the BTF review available environmental information on the area proposed for sale in February 1984 and make appropriate recommendations on zones of spe-

cial biological significance, mitigating measures, and scientific studies.

It is important that the Georges Bank BTF become involved in prelease decisionmaking.

Mr. D'AMOURS. Thank you, Ms. Hughes.

We will now hear from the State of Maine, Mr. Colgan.

STATEMENT OF CHARLES S. COLGAN

Mr. COLGAN. Thank you, Mr. Chairman.

I am Charles Colgan, senior economist with the Maine State planning office. I am also director of Maine's OCS policy program.

I want to express my own and the Governor's appreciation to you for this opportunity. I think it is a good time to review the task force's work to date and the work it has to do in the future.

For my contribution, I would like to briefly review what I think are some of the successes and problems which we in Maine, as regular but nonvoting members of the task force, have perceived in our participation.

Let me start with the successes, which I think have been numerous and substantial.

I think you have to look at the purposes of the task force; not the goals or the statement of purpose in the charter, but the background reasons for which the task force was formed.

In the beginning, the task force had two major purposes: One was to quiet the controversy surrounding the withdrawal of Georges Bank from consideration as a marine sanctuary, which occurred as part of the sale 42 presale decisionmaking. Let me come back at the end to the question of whether the task force has succeeded in that.

The other purpose of the task force was to serve as a coordinating agency between those Federal agencies directly involved in OSC leasing and management. This coordinating or consultative role is particularly important in OCS management because of the way the Federal Government is structured for OCS decisions.

There is one agency, the Department of Interior, with oil and gas authority and regular secretarial attention to that issue; and there is another agency, the National Marine Fisheries Service, which is an agency that is not in the mainstream of its own umbrella organization, the Department of Commerce. So I think it is very important that these kinds of technical level coordinating and consultative roles be set up and be regularly maintained.

The North Atlantic Biological Task Force was one of a number of task forces around the country. It differs in its formal structure and charter, which was a result of the controversy surrounding its creation.

This coordinating and consultative role I think has been very successful. For evidence of that success you can point to the EPA permitting that took place for the sale 42 tracts. The EPA permits were issued as conditional permits, conditional upon the studies suggested by the task force. This was because the state of knowledge about the fate and effects of drilling muds at the time was insufficient for EPA to make a determination whether drilling discharges would or would not have an effect on the environment.

In the absence of the kinds of studies that the task force recommended, EPA would have been hard-pressed to make a decision that would not have been challenged. But with the studies and with the consultative role that the task force was able to serve, EPA's permitting process went ahead with some degree of credibility.

A major reason for that credibility is that the task force did its work in a relatively open and forthright fashion. It conducted its meetings in public; it offered opportunities for members of the public and the States to comment and be involved throughout the process not only in the formal task force meetings but in the development of the monitoring program in the subcommittee. This role of providing a public forum to discuss the issues surrounding the permitting and the beginning of exploratory drilling off Georges Bank was a very critical one.

It was also important that the task force created a scientifically sound monitoring program. They had the benefit of being able to review and criticize a number of earlier drill mud studies and then attempt to develop a study which corrected the problem with earlier studies. As a result, I think they have designed and overseen perhaps the best studies to date on the fate and effects of drill muds, which is certainly one of the central issues in the regulation of oil and gas drilling.

The results of that monitoring program are now beginning to come in. While there is still a great deal of work to be done. But the early results give cause for optimism that oil and gas operations on those ecosystem types on Georges Bank that were studied, and from the point of view of the routine discharges that were examined, present relatively few conflicts.

These successes of the task force I think are noteworthy and are a cause for optimism in the future. But I don't think they can be taken as evidence that oil and gas activity is now capable of proceeding on a full-speed-ahead basis on Georges Bank, or anywhere else for that matter. There are still some major problems the task force is going to have to look at.

A first order of business is going to be to figure out what the results mean—when the final reports from the first-year studies come in.

The task force has a responsibility to recommend to MMS concerning biological impacts and an implicit responsibility to assist EPA in its regulatory decisions. It must begin considering relatively soon what the results of the monitoring program mean and whether, for instance, EPA's permit restrictions on drilling discharges should be continued, modified, or eliminated.

The task force is also going to have to begin considering the deep water issues. We heard a little bit about that this morning. Clearly some of the things the task force has done so far are going to have to be radically altered in the deep water. Where we looked at benthic impacts in the Georges Bank, we are going to have to be asking questions such as: What are the impacts of drill muds falling through nearly a mile of water instead of 4 or 500 feet of water?

This is a whole new set of issues that will have to be addressed.

There are two other things that the task force will have to begin fairly soon. One is the fact that if lease sale 82, or the February 1984 lease offering as it is now called, takes place in anywhere near its presently proposed form, we are looking at drilling on the central and northern edges of the bank, areas previously unleased.

I leave to different forums my comments on the wisdom of that leasing. If that happens, the task force will have a new area of Georges Bank to consider in addition to the deep water. And the task force will also be considering general permitting under the process that EPA is considering.

I am quite hopeful that the task force's success will be carried into the future and be built upon.

I have only two major negative observations from my experience. One is the one Pat just mentioned, about the representation on the task force.

I think there has been some confusion in agencies at times as to which level, headquarters or regional, should be the appropriate representation. I am well known for being loath to interfere with Federal decisionmaking, but I do think that the closer to the actual management decisions a person is, the better he will serve both his agency and the task force.

The other negative observation is the status of the States on the task force. We are nonvoting members. We are nonvoting members principally because of the strictures of the Federal Advisory Committee Act which, were we made members of the task force, would bring the task force under, a whole set of bureaucratic requirements about Federal Register notice, publishes minutes, and so on.

I have some sympathy for keeping the task force's minutes and proceedings as nonbureaucratic as possible. I would suggest that if amendments to the Advisory Committee Act were within the realm of possibility, a modification to allow the States to participate might be appropriate.

I mentioned at the outset I would leave the question of whether the task force had quieted the controversy surrounding Georges Bank drilling to the end. I think it is fair to say that neither the task force nor any other agency has quieted that controversy. It is still going on today.

I do think, however, the task force has made a major contribution to help make the search for and perhaps eventually the production of oil and gas on Georges Bank, if there is any, a responsible endeavor.

Thank you.

Mr. D'AMOURS. Thank you.

[Statement of Mr. Colgan follows:]

PREPARED STATEMENT OF CHARLES S. COLGAN

My name is Charles S. Colgan, and I am Senior Economist with the Maine State Planning Office. I am also Director of Maine's OCS Policy and Program efforts, a position I have held for six years.

It is no secret that OCS oil and gas exploration on Georges Bank has been a highly controversial issue, and the Georges Bank Biological Task Force (BTF) has often been at the center of those controversial issues.

This hearing is a timely opportunity to review the experience we have had with OCS oil and gas activity in the North Atlantic, and the part which the Biological Task Force has played in managing that activity. The first phase of oil and gas exploration on Georges Bank has been completed, along with the first full year of the monitoring program recommended by the BTF. We face leasing in new areas of the North Atlantic in the near future, and the possibility of development and production operations resulting from exploratory activities to come.

I would like to express my appreciation to Chairman D'Amours for providing the opportunity to conduct that review.

For my part, I would like to review the successes and the problems which we in Maine have perceived as regular, although non-voting, participants in the Task Force's efforts. Let me begin with the successes, which have been numerous and substantial.

To appreciate those successes, it is necessary to measure the performance of the Task Force against the goals which the Task Force was created to meet. The goals to which I refer are not the Task Force's functions described in the Charter, but rather the underlying purposes of the BTF, some of which were present from the circumstances surrounding the creation of the task force, and others of which grew as the Task Force began its work.

In the beginning that Task Force had two major purposes. The

first was to defuse the storm of controversy which surrounded the decision in 1979 not to pursue the possibility of a Marine Sanctuary on Georges Bank.

To allay concerns that the biological implications of OCS operations resulting from Sale 42 would receive insufficient attention at the Department of the Interior, the Biological Task Force was formally established by interagency agreement, with rights of appeal spelled out should any agency be aggrieved by a Task Force decision.

This formality was unique to the North Atlantic BTF. Biological Task Forces had been created in other leasing regions, but on an informal basis to provide a consultative mechanism for the various agencies involved in overseeing oil and gas activity.

This consultative role was the second major purpose of the Task Force. The need to coordinate the activities of Interior, NOAA, and EPA in OCS management decisions, particularly with regard to conflicts with fisheries, has been apparent for some time. The federal government is not well organized to handle these conflicts, since the oil and gas responsibilities are in one department, where they receive regular secretarial attention, and the fisheries responsibilities are in another department, where they are located in a relatively small bureau which is somewhat outside the mainstream functions of the department in which they are located.

There is thus a critical need for regular contacts between Interior and NMFS to deal with fish/oil conflicts. Since EPA also has a role owing to its substantial permitting responsibilities, the Task Force is composed of the appropriate federal agencies to consider the operational aspects of oil and gas regulation.

There have been difficulties caused by these agencies' occasional inability to decide between having representatives from the headquarters or regional levels as their representatives, but by and large the Task Force has provided a good means of coordinating federal agency activity.

This was especially apparent during the permitting process for the wells drilled on Sale 42 blocks. The Monitoring Program which the Task Force recommended was essential to the granting of the NPDES permits by EPA, since it allowed for the granting of permits conditional on further study.

With the substantial controversy surrounding the fate and effects of drill muds which was going on at the time, EPA would have been hard pressed to issue an NPDES permit based on a

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finding of no harm to the environment, or to deny a permit based on demonstrated harm. Without the monitoring program, litigation against the EPA permit decision would have been inevitable.

A major reason the monitoring program was able to contribute to a smooth permitting process is that the Task Force came to be very successful at performing a function which was only considered secondary when the Task Force was created. The Task Force became a focal point for much of the public involvement in addressing the issues surrounding the beginning of exploratory drilling. In the process of developing the monitoring program on a relatively open and cooperative basis, people came to believe that the monitoring program would ask the right questions and that studies would be conducted using best available techniques.

The credibility of the monitoring program in the scientific and environmental communities must be counted as another of the major successes of the Task Force. This credibility was not easily won; the first version of the monitoring program recommended by the Task Force was rejected by the Department of the Interior on the advice of numerous parties, including the New England States. It took almost a full year to develop a monitoring program which was satisfactory to all concerned, but in the end the program that emerged was widely perceived to be well designed, and I think has come to be seen as well executed.

By focusing on the questions surrounding the effects of drill muds on benthic organisms, the accumulation of drill muds around a rig and down current from the drilling area, and on the fate and effects of hydrocarbons, the monitoring program attempts to address central issues in the regulation of oil and gas drilling.

The study design is scientifically sound in that it builds on preceding research on the fate and effects of drill mud discharges and specifically corrects for some of the problems found in earlier studies. It is also sound in the use of existing knowledge concerning the physical oceanography of Georges Bank to establish the experimental design.

The results of the monitoring program are now beginning to come in. Although all the data has been collected from one full year of seasonal cruises and from the stations at the rig-specific sites, much work in analysis and interpretation of the data remains, so conclusions are still preliminary. It does appear that there was little permanent accumulation of drill muds or hydrocarbons in the immediate vicinity of the rig, and that trace metal concentrations have not been significantly elevated.

If born out by the final analyses, these results would give

cause for optimism that oil and gas operations can safely coexist with the fisheries of Georges Bank, at least from the point of view of routine discharges.

In sum, I believe the Task Force has been made a major contribution in the areas of interagency coordination, support of regulatory decisions, providing a forum for public involvement, and in establishing a credible and well run scientific monitoring program whose results will contribute significantly to our understanding of the effects of oil and gas operations on the marine environment.

These successes must not, however, be taken as evidence that OCS oil and gas activity can now proceed on a full speed ahead basis. The success has not been achieved without difficulty, and the entire approach taken by Task Force to date must be reexamined in light of forthcoming issues.

A first order of business for the Task Force as the results of the monitoring program are reported is to evaluate those results and make recommendations to the Department of the Interior and, if appropriate, to the other federal agencies involved concerning the implications of those results for future management decisions.

It should be emphasized that the Task Force has a specific charge in its charter to make recommendations on the management aspects of oil and gas which may affect biological resources. The Task Force has not made such recommendations in the absence of the information which the monitoring program was designed to provide. But these matters can no longer be avoided. For example, priority consideration will have to be given to the implications of the results of the monitoring program for continuation of the special discharge limitations which EPA imposed on drilling in the first round of permitting.

The Task Force must also consider the need to modify the existing experimental design in light of the results obtained. Discussions have already begun on this point, and I expect substantial additional consideration will be necessary.

As we look to future lease sales in the area, new issues arise. Foremost among these are the issues surrounding deepwater drilling. We do not have any where near the depth of information on the area of the North Atlantic Continental Slope that we have on the Continental Shelf, and so we will not have the same ability to design a monitoring program tailored to the specific environment of the region that we did with the first monitoring program

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In addition the questions we must ask are likely to be much different in deep water. Where we concentrated on benthic impacts on the Continental Shelf, we must now ask: will there be any benthic impacts after drill muds have fallen through a mile or more of water?. Clearly we face entirely different kinds of issues in the deepwater, issues whose shape we can still only dimly perceive.

The deepwater is only one area where we are proceeding into new territory. The Department of the Interior is considering offering tracts along the northern edge of Georges Bank in the proposed February, 1984 Lease Offering. The wisdom of offering leases in this area I will leave to other discussions, but it is clear that new problems will have to be faced by the Task Force if leases are sold in this region.

Finally, the EPA is actively considering moving to a general NPDES permitting system for Georges Bank oil and gas drilling. The Task Force must give careful consideration to the implications of general permits for any future monitoring programs.

The Department of the Interior has already extended the jurisdiction of the Task Force to cover the entire North Atlantic, and continues to give high priority to the monitoring program funding in its Environmental Studies Program. I think the Department recognizes the importance of the Task Force and is committed to using it in future management decisions, and I would like to express my appreciation for that commitment.

As we move into the next phase of the Task Force's job, I am quite optimistic that the overall record of success of the Task Force will be built upon. I have only two major negative observations from the experience to date, one of which I have already mentioned and that is the occasional confusion among the federal agencies about what level of representation is appropriate. Though I am loathe to interfere with federal agency decision making, I do think that the closer to the actual management decisions a person is, the better he will serve both his agency and the Task Force.

The other negative observation concerns state participation on the Task Force. States were made non-voting members of the Task Force primarily to avoid bringing the Task Force under the restrictions of the Federal Advisory Committees Act.

Though there is some merit in keeping the Task Force as a relatively informal group without the additional bureaucratic strictures of Federal Register notices etc., it should be remembered that the states are major decision makers in the OCS

permitting process through the consistency provisions of the Coastal Zone Management Act. A modification to the Advisory Committees Act which would permit full state participation on the Task Force would be in keeping with the history of the Task Force and the spirit in which it was established.

In sum, Mr. Chairman, I believe the Biological Task Force has admirably achieved its objectives, and with some minor modifications of the kind I have just suggested is well suited to address the challenging issues that still confront it.

I mentioned at the outset that the Task Force was established in part to quiet the controversy surrounding Lease Sale 42. I doubt if any group could quiet that controversy, and so I cannot fault the Task Force for failure in that mission. But the Task Force has been, and should continue to be able to, help make the search for, and perhaps the production of, oil and gas resources in the North Atlantic a responsible endeavor.

Thank You.

Mr. D'AMOURS. We will now hear from Doug Foy, very much involved with the current status of sale 52.

STATEMENT OF DOUGLAS FOY

Mr. Foy. Thank you, Mr. Chairman. I am pleased to be here.

Let me first correct one typographical error in my written testimony. It appears on page 4. It should read, on the fourth line from the bottom, the first word is "converged," and it should read "conveyed."

I would like to focus my brief summary comments this morning on three major issues: Inventory leasing by the Department of Interior, which has been the subject of some discussion already this morning; the authority of the biological task force, and the synthesis of the scientific research that is being undertaken on Georges Bank.

Finally, look a little bit at the problem that no matter how good the science is, it is not a panacea, and will not resolve some of the risk issues that have been raised this morning by the chairman.

Let me first return to inventory leasing.

I think there is an interesting process for transition going on, transformation of the Department of Interior's view of its leasing strategy, and Georges Bank is a good example of that.

As the chairman has noted this morning, at one point we were told there was a relatively substantial amount of oil on Georges Bank, and that justified proceeding with leasing, and that occurred back in lease sale 42. Since that time the estimates have been reduced dramatically, cut to 3 percent of the original estimates for oil on Georges Bank. And yet it appears to have had no effect whatsoever on the leasing activity of the Department of Interior.

What we are now told about the reliability of the resource estimates, oil estimates, are that they are hypothetical, unreliable, can only be substantiated by extensive leasing and exploration activity on Georges Bank. That differs substantially from what the Department tells us in other areas of the country where the estimates

happen to be high, are touted as quite promising, reason to proceed, reliable, whatever.

It seems to me that we are facing a situation where the Department has converted what Congress intended to be a very careful balancing of resource potential versus environmental risk into an inventory process—let's go out and lease as much area as possible, let's discover whatever oil is out there, and then we will proceed with production.

Let me get to the question of production that was raised by the chairman earlier. There is no separation at the moment between exploration and development on Georges Bank or in any other area. There is an environmental impact statement required at the production phase. But what you need to remember is that the ability to terminate oil activity is very limited under the Outer Continental Shelf Lands Act. It is quite obvious once the areas are leased that we will have production.

There is another aspect to the environmental impact statement at the production phase that makes it somewhat questionable as to whether it is very useful. The Department needs only prepare one EIS in production, and the timing of that production EIS is not specified in the legislation. So you could have one exploratory well come in and, before any further exploration information is available, you could have an EIS prepared on the production phase. It would say, yes, let's be forward. And that would be the end of it. There would be no further environmental analysis required.

I would go back to a suggestion that the chairman made earlier and that I made in my written testimony. There should be a serious effort to separate exploration from development—whether that means separate leasing, whether it even means you have to pay the oil industry to do the exploration in a particularly vulnerable area like Georges Bank, or whether it simply means that the decision point for production is a much more substantial decision than it now is. I don't know the answer. But one of those alternatives has to be selected. Otherwise, as the situation now stands, once the areas are leased you will see us proceed right through production. We are leasing them apparently based on what Interior now claims is hypothetical resource information.

I would also ask why is the resource information so bad. We have an entire agency full of geologists that are supposed to be telling us what is out there. We spend a good deal of money on geological research. I question whether these resource estimates are as bad as the Department would now have us believe. And it seems to me that there is either a question of incompetency in the agency's own ability to estimate, or a lack of will to do the job well, or in fact we are facing a serious impossibility of estimating at all, in which case the entire balancing process is worthless.

Let me turn briefly to the biological task force and some of the questions regarding its authority.

It seems to me the task force has done a pretty good job developing a monitoring program for Georges Bank. One point about the monitoring program that is important to keep in mind is that it was not funded by the Department of Interior for at least 2 years after the biological task force proposed it. And that delay resulted in significant loss of available information. What happened before

the next lease sale, sale 52, was that none of the monitoring results were available.

I have attached to my testimony a chronology on the last page of the science that was permitted on Georges Bank and compared it to when the FEIS was prepared. You will see none of the reports from any of the sciences were in hand when the final environmental impact statement was prepared. In other words, as far as the public is concerned, is information they rely on in the EIS not based on any of the scientific results from the research on Georges Bank, which raises a very important scheduling issue.

If we are going to pay for high quality research in an area like Georges Bank, we should wait for the results before we lease again. How can we possibly in the future lease sales make decisions on the science we are performing if we don't wait for the results? In this case all the scientists were telling us there would be 3 years required to develop adequate science, and yet the lease sale, sale 52, came after only 1 year of the science was in hand.

As far as synthesis of the science goes, remember there are a variety of scientific studies now underway on Georges Bank, some by the biological task force, some by Interior, some by NOAA, some by EPA. Those studies are not carefully synthesized at the moment. The Department of the Interior is not required in any specific way to tell us what all those results say, and how they all fit together. They tell us in the environmental impact statement. But as we see, they didn't wait for any of the results in the environmental impact statement. So there is very little effort to synthesize those results.

As a consequence, we know very little about how this panoply of science fits together.

Finally, let me turn briefly to the question of what all this science in the BTF means for Georges Bank, and what are some of the possible alternatives that Congress might consider with respect to regulating or legislating on this activity.

Remember that no matter how much science we do on Georges Bank, we may not discover the extent of the harm until it is too late to correct the harm, and the classic example of that situation is the major driving force on fishing in Georges, frequently major year classes of a given species. For instance, you will have a large year class of haddock, that will then sustain the haddock fishery for 5 or 10 years perhaps. If you destroy a major year class, you may not have another major year class for another 10 years. You may seriously impair the fishery, but not know for many years that in fact the year class has been destroyed.

The science may tell us that the harm occurred, but it may tell us after the fact. And the whole point that I think Congress tried to reach in the Outer Continental Shelf Lands Act originally, and I think now needs to try to reach again, is that the balancing of that risk, the risk that the harm may be irreparable, has to be taken before you lease. And I would suggest that there is a variety of ways to do that. We have mentioned separating exploration from development.

A second possible way is to reemphasize and emphasize again and again and again, resource protection in an area like Georges Bank is of the highest priority, that it has to take preeminent place in the decisions made by any agency in that area. Perhaps in other

areas where you have fewer natural resources or fisheries of that consequence, perhaps you are willing to make different resource decisions in terms of pursuing oil and gas. But on Georges Bank it deserves the highest possible protection. That means, even if the field is insignificant but developed, it should be developed with the most expensive and most reliable protection.

For instance, one of the things that has been told us on Georges is that they would not use tankers to move the oil—they would not use pipelines, they would use tankers, because the field was too small to justify the expense of pipelines.

We would argue that because of the fishery, they should be required to use pipelines, regardless of the size of the field. And if the field is too small to justify the construction of a pipeline it is too small to develop. And the same is true for barging the drilling fluids. Drilling fluids were not barged off Georges Bank because it was believed to be too expensive to do so. It should not be too expensive. If it is too expensive, they should not be drilling there.

Let me close my comments with that. I thank you all for the opportunity to testify. I will look forward to any questions.

Mr. D'AMOURS. There will be questions, Mr. Foy.

[Statement of Mr. Foy follows:]

PREPARED STATEMENT OF DOUGLAS FOY

I. RESOURCE ESTIMATES

The question of resource estimates has always loomed large in the issue of oil and gas leasing on Georges Bank. During Lease Sale 42, CLF and countless others argued that six days supply of oil did not justify jeopardizing the world's most productive fishery.

The Department of the Interior's response was to promise that they intended to:

start small, find the best spot, find out what is there, find out what the problems are, and then make a determination where to go further, whether to find more oil or gas in Georges Bank, if there is anything there to find.

CLF v. Andrus, Preliminary Injunction Hearing Transcript (McNaught), November 2, 1979, pp. 3-83.

Because of these promises, Interior was allowed to proceed with Lease Sale 42, to: "start small . . . find out what is there." And as a direct result of this investigation, resource estimates for Georges Bank have plummeted. Lease Sale 52 estimates have been slashed from 1.73 billion to only

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56 million barrels of oil -- a 97% reduction. Gas estimates have been comparably reduced. As the First Circuit Court of Appeals noted in oral argument on June 6 of this year: Interior once thought Georges Bank was Saudi Arabia; now it thinks it may be Post Office Square.

The law requires that Interior now reconsider the wisdom of opening Georges Bank to oil and gas activity. The Federal District Court has held that the Environmental Impact Statement (EIS) for Lease Sale 52 must study anew the benefits of a 56 million barrel oil project versus the environmental costs to the Georges Bank fishery. And similarly, under the Outer Continental Shelf Lands Act (OCSLA), the Secretary of the Interior must re-balance the new potential for oil and gas against the potential for environmental damage.

The Secretary has fulfilled none of these mandates. The EIS is an outdated document, with only a one-page addendum on the drastically reduced oil resource figures. The District Court, in issuing its recent injunction against Lease Sale 52, noted:

the final EIS describes the facts and circumstances of a lease sale that has become a fiction . . . the 'broad, informal cost benefit analysis' required . . . no longer has particular relevance to Lease Sale 52.

CLF v. Watt, Preliminary Injunction Hearing Transcript (Mazzone), March 28, 1983, pp. 17-18.

Interior has two arguments in defense of holding Lease Sale 52 given the new resource estimates. Initially, it

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argued that the estimates were reduced, and therefore so were the risks. This is difficult to assess, for the actual risk reduction was never discussed or quantified.

Interior's second argument appears to have been adopted only after the first began to falter. Now DOI appears to maintain that the resource estimates are merely "hypothetical", and can never be confirmed or deemed reliable until there is extensive exploration.

Interior thus appears to disavow its own resource estimates. This new tactic has alarming implications. Interior would have us believe that oil and gas estimates are never too low to ban drilling. In their view, OCS lease sales should always proceed, resulting in a process of "inventory" leasing. Clearly, this was not the intention of Congress. The OCSLA never suggests or endorses inventory leasing. On the contrary, the Act requires that the timing and location of leasing shall be based, among other things, on:

existing information concerning the geographical, geological, and ecological characteristics of such regions

(and) a proper balance between the potential for environmental damage, the potential for oil and gas, and the potential for adverse impact on the coastal zone.

The Act gives the Secretary the authority to obtain proprietary information in order to make informed leasing decisions. If resource estimates are as meaningless as Interior would now have us believe, then either the agency is performing its

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estimation job incompetently or the careful balancing Congress mandated is a hopeless gesture. In either event, the remedy is not to lease every square foot of seabed. Instead, Congress should require that resource estimates be prepared more accurately.

I should add at this point that the "hypothetical" nature of resource estimates also calls into question Interior's ability to obtain fair market value for its leases. Lacking accurate estimates, how can the Secretary ever determine a reasonable price for lease sales? Again, Congress's clear requirements in the OCSLA would have been thwarted by Interior's cavalier view of its resource estimation obligations.

If Interior continues to pursue its new concept of inventory leasing, CLF believes that swift, decisive Congressional action will be necessary. Otherwise, every lease sale will be followed by Interior's declaration that another sale is necessary to more accurately determine the nature of the resource. There is no logical end to the cycle, unless Congress requires either: (1) a more serious Interior effort to prepare resource estimates, or (2) separate exploration leasing, so that the right to develop any resources discovered is not converged along with exploration rights. In other words, if we are to have "inventory" leasing, Congress should create a true inventory program. Exploration rights should be all that are sold until the full extent of the oil resource is known.

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At that time, appropriate balancing decisions can be made regarding the wisdom of proceeding with development.

The First Circuit described Lease Sale 42 as an "uneasy calculus" between oil estimates and fishery resources. Today, as oil and gas potential have plummeted, the value and reliability of the fishery have, if anything, grown. A balance which three years ago was an "uneasy calculus" is no longer even a close call. Yet Interior's dangerous concept of inventory leasing ignores the crucial "balancing" test of the OCSLA. As a result, an area which should presently not be leased is once again (pending litigation) up for sale.

II. THE BIOLOGICAL TASK FORCE (BTF)

CLF believes there are three important issues regarding the Georges Bank BTF Monitoring Program that should be considered: (1) the Department of the Interior's use of the Monitoring Program to date; (2) the future directions and goals of the BTF; and (3) the broad implications of the Monitoring program for the future of the Georges Bank fishery.

A. Interior's Use of the Monitoring Program

The Department of the Interior exhibits an astonishing ambivalence regarding the Georges Bank monitoring program. On the one hand, the monitoring program is widely touted as an example of its environmental sensitivity; simultaneously, Interior completely ignores the results and timetable of this major scientific effort when making major policy and leasing decisions.

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During litigation over Lease Sale 42, Interior promised that "the data collected through every phase of exploration and operations on Georges Bank will provide a complete and tested system for analyzing and preparing for future leasing operations in virgin offshore territories." Yet Interior failed to fund the Biological Task Force for two years after the sale. Only when EPA ordered monitoring as a condition of NPDES permits was the Monitoring Program begun. This delay lost two years of important baseline data.

Interior has since pursued its plan for a second lease sale in the Georges Bank area. No attempt was made to await important monitoring results from Sale 42. Perhaps conveniently, those results were not available at the time of the Sale 52 decision, and therefore were ignored by the Secretary.

Attached to this testimony is a copy of the chronology of Lease Sale 52, prepared in chart form by CLF staff. It is clear from the chronology that every monitoring report from Lease Sale 42, purportedly so important for future lease sale decisions, was completed after the final EIS for Lease Sale 52. No substantial monitoring data were incorporated into the lease sale process.

Interior's attitude has important and troubling implications. OCS monitoring programs may be regularly proffered as panaceas for assorted environmental woes; a catch-all for all future adverse impacts; or, more simply, a delay tactic. ("Don't worry, we'll study the problem later.") Unless checked, Interior will continue to approach OCS science backwards: there is no problem if there is no information.

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B. Future Directions for the BTF

The Biological Task Force must aggressively begin to counter this inverted science. The BTF must stress, and Interior must recognize, that baseline data should play a more dominant role in choosing where and when to lease, and not merely be used to regulate OCS operations already underway.

The BTF may approach this problem by pursuing the responsibilities set forth in its founding charter. To date, the Task Force has focused almost exclusively on the Monitoring Program. Yet its other duties, according to its charter, include:

- 1) identifying zones of special biological significance;
- 2) recommending specific studies for these zones;
- 3) recommending criteria for the adverse biological effects on the Georges Bank ecosystem; including, where feasible, the establishment of specific standards; (and)
- 4) recommending mitigation measures for biological resources.

It is also crucial that the BTF be given a more authoritative role. Presently, the BTF recommendations are purely advisory and are readily ignored by Interior. BTF positions and recommendations should be granted far greater weight, and perhaps made binding in appropriate circumstances.

Members of the BTF should be carefully chosen from agency personnel active in the Georges Bank region, yet those with sufficient seniority and authority to render major policy decisions and commit their respective agencies to implementation.

Serious efforts should be directed to synthesis of scientific information generated outside the Monitoring Program itself. This, of course, is one of the fundamental purposes of an interagency task force. Little integration has occurred to date.

A review of the Sale 52 EIS confirms this conclusion. The EIS

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emphasizes the sheer quantity of Georges Bank science studies, without ever attempting to synthesize their results. A thoughtless catalogue of disparate scientific results is nearly useless in this OCS field.

Suitable monitoring programs, and the BTF generally, should be extended to any area proposed for leasing on or near Georges Bank. This includes deep water tracts well off the Bank proper. Finally, CLF notes that expansion of post-sale monitoring should not be done at the expense of important pre-sale studies.

These measures are necessary as the monitoring program expands into the larger, deeper areas off the continental shelf. Our scientific knowledge of these greater depths is rudimentary; yet deep water studies are inherently more expensive and the areas themselves more diverse geologically.

Innovative monitoring options must be explored to compensate for these complicating factors. Tracts should be sold only after scientific information is available (i.e. canyon tracts should not be sold before canyon sediment transport is better understood). Areas of special biological significance should be designated in order that studies may be initiated as soon as drilling is proposed. General reconnaissance studies will simply not be as successful in the deeper water areas. (In the Mid-Atlantic region, areas of special biological significance have been proposed and accepted. When one such area, Tom's Canyon, was proposed for drilling, the Mid-Atlantic Task Force set out special parameters for canyon studies.) Operators should help defray the expensive costs of scientific study in these deeper frontier areas.

BTF assumption of its expanded responsibilities and more

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innovative monitoring techniques must occur in order to offset rising costs, larger lease areas, smaller budgets, and above all, Interior's dangerous prevailing attitude: concurrent monitoring and leasing, coupled with the trend toward inventory leasing.

C. MONITORING IMPLICATIONS FOR THE FISHERY

Finally, I would like to touch briefly on the implications of monitoring for the Georges Bank fishery. The first year of monitoring data provides no basis for concluding that oil and gas exploration does not harm the fishery. Three years of accumulated data is the minimum necessary for a credible baseline study. And it is important to note that the Georges Bank monitoring program is primarily a long-term study. It is designed to assess the effects of oil and gas over the 40 year life of the field. It is certainly possible that many significant effects will become apparent only in retrospect. (This, by the way, is an important argument for ensured, long-term funding for the monitoring program. I wonder about Interior's scientific funding enthusiasm once all the leases have been sold. Will the monitoring program be terminated shortly thereafter, once its utility as a shield from environmental attack has passed?)

Scientists agree that long-term chronic damage may be difficult to distinguish from natural variability. Georges Bank, for instance, is distinguished by occasional strong "year classes" -- fish that are the predominant support of the fishery for numerous years. If one of these crucial year classes is lost to an oil spill or to chronic discharge, we may simply never know of its destruction. Only in twenty years, when the next strong year-class is long overdue, will we finally learn of the serious harm the fishery has suffered.

Any decision to lease Georges Bank for oil and gas activity

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must recognize this risk and this uncertainty. Monitoring is helpful and important; however, it is not dispositive and certainly does not eliminate or even minimize the risk of fisheries damage. Interior has chosen to use Georges Bank as a laboratory -- the effects on the fishery of oil and gas operations will be assessed, if at all, over a period that may extend for 40 years. In future years we may look back in horror at the damage we have caused this vital food resource. Are the oil and gas decisions of today the toxic waste disposal decisions of 20 years ago?

In conclusion, CLF would like to stress again our belief that the BTF and the monitoring program are comforting and important gestures to protection of the Georges Bank fishery. However, they are neither a final answer nor a cure for risk. The careful resource potential-- versus-- environmental risk decisions must still be made. Georges Bank, by all accounts, is a truly insignificant oil field. It is also our most productive domestic fishery, and an economic resource of enormous and perpetual value. CLF firmly believes that oil and gas operations -- even if subjected to the most vigorous scientific scrutiny -- may no longer be worth the risk to the fishery.

Thank you for the opportunity to testify on these important matters.

LEASE SALE 52
CHRONOLOGY

	EIS	CETAP	NMFS	BTF	Monitoring Program/BTF			
					1/2	3	4	5
1979								
Sept.				Charter				
Oct.								
Nov.								
Dec.								
1980								
Jan.								
Feb.								
Mar.								
Apr.								
May								
June				Draft Recs.				
July				Revised "				
Aug.								
Sept.								
Oct.								
Nov.								
Dec.								
1981								
Jan.								
Feb.								
Mar.								
Apr.		1979 Rept.		Recommen-				
May				dations				
June								
July								
Aug.								
Sept.	DEIS				Award			
Oct.								
Nov.	Hearing							
Dec.								
1982								
Jan.						Award		
Feb.								
Mar.								
Apr.	FEIS						Award	
May							1st Rept.	
June			Bio.Op.					Award
July					Draft?	1st Rept	2nd Rept.	1st Rept
Aug.								
Sept.		1980 Rept.					Draft	Draft
Oct.								
Nov.								
Dec.		Final Rept.				2nd Rept	Final	Final
1983								
Jan.					Final?	Final		

1/2 = Historical Sample Analysis

3 = Benthic Communities

4 = Trace Metals

5 = Hydrocarbons

Mr. D'AMOURS. Our next witness is Mr. Jim Costakes, who is here representing the New Bedford Seafood Council, and also representing the Seafood Producers Association.

STATEMENT OF JAMES COSTAKES

Mr. COSTAKES. Thank you, Mr. Chairman.

I appreciate being able to come here to testify. I think what I want to more or less indicate are the views of the fishermen. I will be very brief.

Mr. D'AMOURS. That is exactly why you are here, so we will have some input from the fishing community. Your testimony is short enough. If you want to go ahead with it, you can.

Mr. COSTAKES. Thank you.

My name is James Costakes. I am the director of the New Bedford Seafood Council, which is made up of approximately 150 vessel owners and 1,600 Teamster crewmen who fish out of New Bedford, Mass. I am also the general manager of the New Bedford Seafood Producers Association.

In terms of value of landings, New Bedford is the third largest commercial fishing port in the United States. It is our fishermen who go out to Georges Bank and who will be most affected by any oil spills or other environmental disasters that may occur on the bank.

As the committee knows, there has been a long battle to prevent or restrict the oil and gas drilling activities on Georges Bank. The creation of the biological task force was part of a compromise between the competing interests. Its purpose is to determine the environmental status of Georges Bank prior to oil and gas activities and thereafter monitor the bank to detect any changes.

To date there have been only a few exploratory drills made on Georges Bank. There are no offshore rigs currently in production. The fishermen I have spoken to have not noticed any difference in their landings that can be attributed to the drilling operations. We have not seen any adverse effects of the drilling activities. This is due to the small number of exploratory drilling rigs in operation, the brief period of time they have been in operation, and the fact that no spills or other major mishaps have occurred.

Although I am glad to report that we have not had any problems, the fact that we have not noticed any at this stage should not be grounds to reduce our preventive and monitoring activities. As additional lease sales are being proposed, we can expect more activity. More diligent efforts will be required.

The fishery resources of Georges Bank are too valuable to take any chances with. According to the National Marine Fisheries Service, in 1982 the New England region had commercial fisheries landings of 687 million pounds valued at \$374 million.

A very significant percentage of the total regional landings are of fish caught on Georges Bank. New Bedford alone had landings of \$84.6 million. Gloucester had landings valued at \$44.5 million.

The economic ripple effect of the fishing industry is significant. It is estimated that the direct ripple effect of the fish harvesting industry is 3½ to 4 times the value of the fish landed. In addition to the fishermen working on the vessels, there are shoreside jobs in

processing, packaging, services, repairs, transportation, and sales. The fishing industry is essential to the economy of New England. Georges Bank is essential to the fishing industry.

Let me remind the committee that although there have not been any spills, there have been problems. There have been reports of occasions where the anchor systems of the rigs have failed to hold. In February 1982 the world's largest oil rig, the Ocean Ranger, capsized in a storm off the Atlantic coast of Canada. The seas can be just as rough off the coast of New England.

In addition to the threat of an oilspill, there may be the long-range problems caused by the discharge of drilling muds and cuttings. We are not certain what the effect of the discharge of muds and cuttings will have on Georges Bank. No one can state for certain that there will be no adverse effects. Without regular, consistent monitoring of the area, we will not know.

The studies by the biological task force are essential if we are to learn what these effects are and how to protect this valuable resource. Strict enforcement of the Clean Water Act and the guidelines governing pollutant discharge elimination systems is essential.

The activities of the task forces should be expanded so that the proposed area for oil and gas activities can be studied prior to the commencement of the operations.

I urge this committee to continue to support the work of the biological task force and to continue its efforts to pass legislation creating an oilspill cleanup superfund.

Thank you for the opportunity to present the views of the New Bedford fishermen. We deeply appreciate this committee's ongoing interest in pollution control and the protection of Georges Bank.

I will be glad to answer any questions you may have.

Mr. D'AMOURS. Thank you, Mr. Costakes.

Since you are the last up, I will ask you the first question. It is an interesting one, because it occurs frequently during the congressional deliberations, at least before the Subcommittee on Oceanography. That is that some note that the fishing community and the oil and gas industry in the Gulf of Mexico get along very well and peacefully coexist, and really have no great problems amongst themselves.

However, in Georges Bank, the two industries appear to view each other with some hostility. I am just wondering, is this situation unique to the Georges Bank area, and do the two industries communicate, and if not why not, and what is the difference?

Mr. COSTAKES. I have been kind of involved in the last 10 or 12 years discussing several items with the oil companies, discussing possible traffic lanes to go to these offshore rigs, and several other items that we discuss. I think the potential is much more dangerous off the coast of New England than it is down in the Gulf of Mexico for a lot of reasons.

I think the tides are a lot stronger, the weather conditions are far, far worse than they could be in the Gulf of Mexico. I think those are part of the reasons that we always try to find some way to have a complete monitoring of all the activities going on.

Mr. D'AMOURS. Why is it that apparently, if we are to believe what we hear sometimes from people who come from that way,

Louisiana in particular, that there seems to be a much greater rapport between the fishing community and the oil community in Louisiana than there is in Georges Bank?

Mr. COSTAKES. Well, I don't know——

Mr. D'AMOURS. You mentioned risk, for instance.

Mr. COSTAKES. The risks are tremendous. I don't see where we don't cooperate. We are doing the seismic expeditions offshore here—I was instrumental in getting people onboard those vessels, local fishermen, to contact through radio or other means areas where they were going to be towing that long cable, mile and a half cable.

We had a lot of problems at that time because some of the fishermen were picking up these little seismic cables, and then when you came to ask who owns this large cable, everyone seems to say it is not mine. We have been on the phone to several oil companies trying to find out who it belonged to. Through a lot of arm-twisting I finally found out who they are.

It seems like it is one of those things where we always seem to be in a position, the so-called seismic vessels are on a leased basis, and they are not under the oil company's control. So if you go to the oil company and say, hey, I have a problem, they will say, it is not my problem, it is the seismic vessel's problem.

With that kind of animosity starting off, with these things happening, it is not too easy to say, come on, guys, do whatever you want, and have that great rapport.

Mr. D'AMOURS. Is there any basic difference between the fisheries in the gulf and the fisheries in Georges Bank, in terms of the quality of fish, for instance?

Mr. COSTAKES. Well, as we all know, Georges is the richest bank in the world, and the reason in part is because of the superior quality of the product. I am not sure if I can answer that question in terms of value. But in value, like I just indicated to you now, like New Bedford, for instance, and New England is probably the third largest in the Nation.

Mr. D'AMOURS. What determines the difference in value?

Mr. COSTAKES. Well, the quality of the product. Like down around the gulf there is a lot of nonedible product that is put into cat foods and other products like that.

Mr. D'AMOURS. You mean——

Mr. COSTAKES. It is all a food fish in Georges. As a matter of fact, there was a huge cat food plant in New Bedford several years ago, and they moved down to Mississippi and Alabama, somewhere in that area.

Mr. D'AMOURS. One of the differences in the values of the fish is that in the gulf they catch fish, a lot of the fish they catch are not for human consumption?

Mr. COSTAKES. That is right.

Mr. D'AMOURS. And that brings a lower price?

Mr. COSTAKES. Yes.

Mr. D'AMOURS. While they may catch more fish, the fish are not necessarily as valuable, and not necessarily for human consumption. Did I hear you say in the Georges Bank area it is all for human consumption?

Mr. COSTAKES. Yes.

Mr. D'AMOURS. I see.

Mr. COSTAKES. That is only part of it.

Mr. D'AMOURS. Do you have anything you would like to add?

Mr. COSTAKES. No. Except as I say, the environment itself, the weather conditions.

Mr. D'AMOURS. Yes, the weather and the gyre conditions in the bank.

Did you want to add something?

Mr. FOY. Mr. Chairman, there are at least a couple of other distinguishing features.

One, remember the Georges Bank is also a very prominent spawning and breeding ground for fisheries.

Mr. D'AMOURS. You mean migratory fish?

Mr. FOY. Yes, sir. So you have the possible interaction of pollutants with that spawning activity. In the Gulf of Mexico a lot of the spawning occurs inshore and is not necessarily coincident with where the rigs are. There has also been an interesting shift in the nature of fish caught in the Gulf of Mexico over the past 30 or 40 years. The Gulf of Mexico used to be predominantly a food fish catch. It has in the past 30 years turned to be predominantly a nonfood fish catch.

Mr. D'AMOURS. Predominantly?

Mr. FOY. I believe the percentage catch is more nonfood fish now than food fish in the gulf. Georges remains a food fish area. I don't think there is any effort to catch the nonfood fish on Georges, although they may do that.

Mr. D'AMOURS. Thank you very much.

I guess this question would be addressed primarily to Ms. Hughes and Mr. Colgan.

We have heard from biological task force through its current chairman, and we have heard from the Department of Interior.

By the way, is Mr. Danenberger still here?

OK.

Both of these witnesses testified as to the day-to-day impacts of OCS oil drilling as they are being monitored.

What about the possibility of a major oilspill?

Are the States studying this question and do you think the biological task force should be?

Ms. HUGHES. I am not sure I understand you, Mr. Chairman. Are you asking me if the States are studying the environmental issues surrounding the possibility of an oilspill or the technological likelihood of one?

Mr. D'AMOURS. I am thinking of both matters—the technological likelihood, but also the state of readiness to deal with such an eventuality.

Ms. HUGHES. Well, I can say that the States are studying it directly. I can't say, however, all of the New England States are represented on a regional response team that is overseen by the U.S. Coast Guard which, as you know, has jurisdiction over an oilspill offshore.

The Coast Guard and the regional response team worked with the Department of Interior prior to any drilling activity on Georges Bank in order to assure as best can be that there were personnel on the rigs offshore that were trained in the use of oilspill cleanup

and containment equipment, that the so-called best available technology was used if there was to be an oilspill, and that this equipment be located offshore, which is a situation that was different in the North Atlantic than it has been in any other OCS area.

The Coast Guard requires a 6-hour response time once a spill has occurred. And the onshore station facilities for the Georges Bank drilling is Davisville, R.I.—easily more than 6 hours away, should there ever be a spill that occurred.

So to answer your question, the States were involved in making sure that there were trained personnel and the most up-to-date equipment.

I will pass commenting on the equipment, but we did work with two Federal agencies in assuring that there were adequate safeguards, or as adequate as could be independent of drilling technology available before there was drilling on Georges Bank.

Mr. D'AMOURS. Are you satisfied currently, Miss Hughes, that the technology is sufficiently ready and close at hand to deal with an eventual oil spill?

Ms. HUGHES. The Department of the Interior did hold two independent and unannounced responses. One was purely and simply a communications response. They radioed a rig that there was a spill that had occurred hypothetically in order to test how quickly the offshore rig personnel could contact the onshore people. The appropriate Federal agencies were contacted. That happened really in less than an hour, and everyone was quite pleased with the shortness of time involved.

Then in addition, there was a spill—excuse me—there was a drill, again unannounced—well, it was planned for, but somewhat unannounced, to test the rig personnel, trained rig personnel in the deployment of the skimming barrier, the primary piece of equipment that is required to be kept offshore and deployed in the case of a spill. And all reports were that that was a very satisfactory drill as well, that the personnel were well-trained and were well-coordinated in getting the equipment into the water.

Mr. D'AMOURS. Do you see any need—to get to the second part of my question—for the Biological Task Force to get into this area?

Ms. HUGHES. I don't only in the sense there is a regional response team that is a part of the Coast Guard's responsibilities. To date the Coast Guard, the regional response team, made up of the State and other Federal agencies, and the Department of the Interior, have been able to cooperate quite well to date, and the people who are on the regional response team have familiarity with oil spill clean-up containment equipment, chemical disbursements. In other words, they have the technical know-how to do a good job.

I think the task force has a little bit different makeup for obvious reasons.

Mr. D'AMOURS. So your answer is no, you don't see any reason for the task force to get into this?

Ms. HUGHES. No.

Mr. D'AMOURS. How about you, Mr. Colgan, in terms of these questions?

Mr. COLGAN. With regard to the first question about the States' involvement, I would only amplify what Pat said on one point. In the initial review of exploration plans that we did back in 1981,

both Maine and Massachusetts made a conditional finding of consistency. One of the conditions was that the Department of the Interior conduct an equipment oil spill test deployment before drilling began.

That test was conducted in the summer of 1981 in Rhode Island Sound, prior to the beginning of exploratory drilling. The States had members present (I was present on one of the boats). That was another way in which we were involved with the oil spill issue.

With regard to the question of whether the task force should be involved, I concur with Pat that the task force is set up best to do other things, and that the regional response team and the States, through their consistency reviews, will continue to have the kind of overall oversight of the oil spill issue that I think is necessary.

Mr. D'AMOURS. I will address this question to anybody on the panel that wants to answer, perhaps all four of you.

You have heard Interior's testimony today, and you have heard the testimony of the current chairperson of the Biological Task Force.

As to the risks involved in exploratory drilling, why wait for the results of tests before making a decision if you have already predetermined that there is very little risk? Are you folks satisfied that, at least in terms of exploratory drilling, the risk is such that we need not consider or balance the potential gain in energy with the risks to the ecosystem?

Mr. Foy. Well, I am not personally persuaded of that. I think it is undoubtedly true that exploratory drilling, all things being equal, may be less risky than production activity. I would note, though, the Campichi well, for instance, that blew out, was I believe in a transition between exploratory and production activity, and therefore it is not reasonable to conclude that something cannot happen of major consequence before you actually go to full production.

It is also simply not clear how much exploratory activity has to occur before you start to see some effects.

I guess the point I would go back to, though, is that the balance as presently structured is supposed to be struck before leasing. Therefore, it is not enough to just say, well, don't worry about exploration, it is not going to cause any damage.

When you are selling leases you have to worry about what is going to happen all the way down the line in production as well, because you are making the commitment for the full process. And it seems to me pretty much a red herring to say well exploration is safe and we will worry about production later. You are going to have to worry about production since you are guaranteeing it will probably happen once you sell the leases.

Mr. D'AMOURS. But as to the exploration phase itself, one of the purposes of the Biological Task Force, as I understand it, was to determine whether or not the discharges from exploration, the muds and tailings and the like, did themselves present serious danger to an ecosystem, especially one as fragile as Georges Bank.

Are you all persuaded that the early findings in Georges Bank are sufficient for at least the purposes of balancing the risks?

Mr. Foy. Not at all. Because remember, as was stated earlier, you had a very limited amount of exploration on Georges Bank.

You could have a lot more even under the existing lease sale. You have sold a lot more leases than have been explored on Georges. There could be a great deal more exploration there.

The results as far as I am concerned from the BTF studies are very early and premature. It is virtually impossible to draw any concrete long-term conclusions about the results. And it is certainly not fair to say, based on 1 year's worth of results, we should not worry about exploration.

Are we talking about 8 wells or 108 wells or 1,008 wells? Part of it is a function of how many holes they drill, and once you sell them the lease they are free to drill a very large number of holes if they wish.

Mr. D'AMOURS. Does the State of Massachusetts or Maine wish to comment further on that question?

Mr. COLGAN. When you ask the question about the risk of exploratory drilling you get to the whole issue of what the risk of OCS activity is. There is, I think, an undeniable bottom line, which is that there is nothing government, or industry, or anybody else can do to guarantee that oil and gas activity anywhere on the Outer Continental Shelf is risk-free. It is just not possible. This problem is, unfortunately, stuck in that whole class of human activities that has some attendant risk to it.

The question is: How do you go about making decisions on what oil and gas activity is appropriate given the fact there is always going to be some risk. That gets to the balancing issue that the OCS Lands Act amendments attempt to set forth as the test for that decision.

It seems to me that, the results so far, are only preliminary. We have only completed data, collection. Much analysis and interpretation remains to be done before any conclusions can be drawn from a management point of view about the decision implications from those studies.

But it does seem to me that the initial results show that the major hypotheses that we attempted to test in the biological task force monitoring program, those being: that drilling muds could significantly affect the area immediately around the rig through accumulation and long-term disruption of the benthic community; that hydrocarbon discharges would accumulate in the sediments and also tend to be toxic and disruptive to the benthic communities which are the foundations of the food chain for the ground fish industry (the mainstay of Georges Bank fish) have been shown to be false. Those effects are not being found, based on what we have seen so far.

The conclusion I draw is that: for the kind of areas on Georges Bank which were studied, and the kind of drilling which was studied, there may not be a major problem from routine discharges. That is the only implication I can draw.

I draw from that an implication that exploratory drilling in some areas of Georges Bank from a routine discharge point of view is probably an acceptable risk. On other areas of Georges Bank, in the canyons, in scallop beds, near shore, in the great South Channel, the jury is, at best, still out.

My judgment right now is that those areas should not be leased, particularly where you find high value benthic commercial fisher-

ies, such as scallops and lobsters. I don't think the biological task force results so far provide much comfort in the way of leasing in those areas. I have stated several times to the Department of Interior, I think that those areas should be deferred for some time.

So I think you can draw some limited conclusions from what has been done. They are preliminary conclusions which deserve much additional interpretation and thought.

I draw from that another conclusion which is that: when you try to make decisions in government, you in the Congress or I in the executive branch in Maine, we are always faced with a fair amount of uncertainty. As I say, that is part of life.

The question is, When do you make the decision and how much information do you need at the time you make it?

The balancing test you have placed on the Department of Interior, and implicitly on those of us who participate in the OCS process actively, including the States, is a test that requires that we make a judgment about the reasonableness of the information available to the time we have to make the decision. If that test is failed, then the matter can be put off. If that test succeeds, then there is some justification for going ahead.

Mr. D'AMOURS. Is your conclusion that the exploratory drilling done in lease sale 42 demonstrates that it is probably safe, or relatively safe, based upon the amount of drilling that has been done to date? Would you perhaps alter that conclusion given Mr. Foy's point of a few minutes ago that there are still many, many tracts in that area that could yet be developed?

Mr. COLGAN. There were 63 tracts sold in sale 42, 8 have been drilled, 55 tracts are yet undrilled. Most of those tracts are clustered in a relatively small area in the central portion of the southern edge of Georges Bank. From the data that I have seen in the environmental reports, the environmental impact statements and the scientific literature, that area is relatively homogeneous in its environment. In the absence of a detailed environmental report which we get every time a tract is going to be drilled, I would conclude that the results of the biological task force studies are more or less applicable to that area.

I don't think they are applicable to the deep water and other areas.

Mr. D'AMOURS. I understand; that was clear.

In answer to my question, you feel even if we did develop the other 55 sites, that the early results should obtain?

Mr. COLGAN. I would expect them to at this point. But there is an opportunity to review that decision on each exploratory plan, and I would certainly want to undertake that opportunity.

Mr. D'AMOURS. Ms. Hughes, do you want to comment?

Ms. HUGHES. Charlie has covered it very well.

I think one point to make is that when States and other groups have the opportunity to review a proposed lease sale, we really inherently do our own balancing, conduct our own balancing tests in recommending to the Department of Interior what areas we feel should be leased at this time and what areas should not be. Really, I think in making that examination, we look really beyond exploratory drilling and to likely production and development.

As was pointed out, it is almost given that once a lease is sold for exploratory drilling, even with a production and development EIS, if it is a commercial find and it can be developed, it is very difficult to stop. But I think the other point that needs to be made is that generally the States are making a balancing test and recommending that certain areas not be leased, either because of a lack of environmental information or scientific data.

For example, in parts of the submarine canyons in the deep water area, as we are now faced with in this upcoming lease sale, or because information has come in which indicates to us that the area is much more important or sensitive than we were led to believe initially, and therefore either should not be offered again for sale or not included in a call area.

Mr. D'AMOURS. Do the States in making that balance, rely upon the resource information?

Ms. HUGHES. The resource estimates——

Mr. D'AMOURS. The resource estimates provided by the Department of the Interior and the USGS?

Ms. HUGHES. Yes.

Mr. D'AMOURS. You do rely upon them?

Ms. HUGHES. It is the only information we have to go on.

Mr. D'AMOURS. OK.

So Mr. Colgan and Ms. Hughes—Mr. Colgan, if I understand your answer to my question, you said you were satisfied with lease sale 42, that the exploratory process was not harmful, or not particularly harmful, at least until further information came in that was sufficient to satisfy any qualms you may have had, but that you felt differently about the exploratory process as it affects the deep water areas involved in lease sale 52.

Given that fear, and given the fact that the only way you can determine relative risks is through resource estimates provided by the DOI, would you agree or disagree with the Department of Interior's testimony this morning that there is no substantial risk posed in exploratory drilling, and that therefore the resource estimates are not all that relevant to that part of the process?

Mr. COLGAN. Let me give you my own interpretation of the resource estimates, and then try to address the question.

The resource estimates are done by the Department of Interior on a remote sensing basis. They do it on by geophysical examination, the same kind of preliminary analysis that the oil companies do. In fact, the Department shares much of the oil company's geophysical information. That information is not conclusive with regard to the presence of hydrocarbons on any specific tract or any specific basin.

The ultimate fact about oil and gas is that you have to drill to find it. I know of no other way to find out whether there is oil and gas there than to put a hole in the ground. So we use the resource estimates as general indications of an area's potential.

In one sense the resource estimates for Georges Bank are optimistic, because they tend toward natural gas, a relatively safer, and more beneficial energy resource than oil. In that sense the resource estimates are somewhat encouraging. But I would not conclude, either based on the resource estimates or on the environmental studies to date, that exploratory drilling is risk-free. The

question of substantial risk is another one. You apply the adjective "substantial" to the term "risk," and you get a question of how much is too much.

Mr. D'AMOURS. We all understand that point. But the question is given, as Ms. Hughes just said, that the only basis upon which you can make a judgment as to relative risk, substantive relative risk, granted, is the resource estimate that you are given.

Now, do you share DOI's view that they are not really worth a whole lot, and you cannot tell until you drill anyway, so go ahead and drill in any case, and the risk in terms of exploratory drilling is not really substantial anyway.

Do you share that view, or would you take issue with it?

Mr. COLGAN. I would take issue with that view to the extent that one could conclude from the resource estimates that one should drill in every instance.

I think the evidence is clear that one should not drill in every instance. We have actively opposed leasing in certain areas, such as the canyons. And I would take issue with that statement to the extent that one concludes from that that the resource estimates are irrelevant, or that the process of making a decision about a particular lease sale can take place in the absence of any definite determinations about where particular environmental risks are. I think you cannot conclude that leasing is safe in all areas, and that it should proceed therefore.

Mr. D'AMOURS. What standard would you use to determine whether leasing should go forward in sales 52, 84, and 96 in Georges Bank, if you cannot rely upon the USGS resource estimates?

Mr. COLGAN. My own standard in making that decision—and we in the States do have to make that decision is the presence of resources which are demonstrably at risk from known drilling hazards. And that includes particularly drilling mud discharges as a routine matter.

By way of illustration, the lobsters and scallops, are the clearest example of a high value fishery which can be located right under a rig. If you dump substantial quantities of drill muds on them, there is evidence in the scientific literature which indicates that both lobsters and scallops are detrimentally affected by drill muds.

On that basis, I have no problem recommending that those areas be taken out of lease sales.

I also have a problem with this notion of inventory. Doug talked about that a little bit.

My reading of the OCS Lands Act amendments and the original OCS Lands Act is that we are selling these leases for the production of oil and gas, subject to environmental constraints. Interpret "inventorying," to mean "let's find out what is there and then we will know what to do with it." I think this is a mistaken reading of that act.

We didn't pass the OCS Lands Act amendments to just go out and find out what is there. We passed it to go out and produce that oil and gas which is environmentally sound to produce because, as a nation, we have need of the energy.

So I have a great deal of trouble with the "inventorying" notion which the Department of the Interior interprets to mean that they

should lease huge areas of the Outer Continental Shelf, such as the 4,000-odd blocks that are proposed for the February 1984 lease sale.

I think that that is a mistaken notion. And I take great issue with the idea that we should be leasing, for instance, in areas of very low potential, such as on the top or the northern end of Georges Bank.

Mr. D'AMOURS. If we are not going to be able to rely on USGS estimates, that is, if we cannot accept low estimates, very low estimates as a reason for excluding systems such as Georges Bank, and there is no demonstrable harm at least to date, then would you not be, in effect, approving of the inventory basis, unless you can give me another standard?

One of the things I am getting at here is what Congress might do to provide a better standard.

Mr. COLGAN. Well——

Mr. D'AMOURS. You say you are against inventorying, but you are not for anything else that I can find, except possibly harm from drilling muds to benthic populations.

Mr. COLGAN. Let me then turn the statement around and say what I think we are for, which is that in areas where there is geologic potential for oil and gas, particularly high geologic potential for oil and gas, and where in the absence of specific, reasonably available information which indicates that there is specific harm to be done to that area, then we think it is worthwhile to go ahead and explore for oil and gas.

There is an opportunity later on in the process——

Mr. D'AMOURS. Is that when there is good reason to believe there is a large quantity of energy produced in the area?

Mr. COLGAN. I think there has to be a reasonable potential for commercial find, for commercially producible hydrocarbons.

Mr. D'AMOURS. How do you define that?

Mr. COLGAN. Well, there are I suppose two tests. One is a market test in the sense that if you put the oil lease up for sale—and it is bought, that is one test.

Another test, and I think one which the Department has failed to occasionally apply, is a reasonable estimate of economics of oil and gas production from the Outer Continental Shelf, and the possible size of hydrocarbon fields that are producible.

You take the sale 52 case, which is a good example. The 55 million barrels of oil, if it were located in one tract, would probably not be commercial. But the gas estimate might be.

Mr. D'AMOURS. You are back to your geologic estimate, aren't you?

Mr. COLGAN. You are back to some estimate.

Mr. D'AMOURS. Your first test is if the oil companies want to drill, you let them, because there is proof of commercial viability. If they are willing to buy.

Mr. COLGAN. That is one test.

Mr. D'AMOURS. And your second test is——

Mr. COLGAN. That test is: What do you as a responsible public lands manager, what information do you need to decide whether to offer that land for sale?

Some indication that there is oil and gas there ought to be your first test of whether you want to put it up in an oil and gas lease

sale. If there is no indication or very little, you should not be offering it, which I think is happening now with the Department's areawide lease sales.

Mr. D'AMOURS. Mr. Foy?

Mr. Foy. Thank you, Mr. Chairman.

Just one point in particular. It seems to me one of the issues to look at in the potential effects of exploration and the problems we are encountering with anticipating what the effects are going to be and how to make a decision is the growth in the size of these release sales.

We all agree that, based on the eight exploratory holes that were drilled on Georges Bank, perhaps there was not much damage. If there had been 63 holes drilled in each of the 63 leases, perhaps there would have been more damage. If there had been 200 holes drilled in the 200 leases that would have been sold in sale 52 there might have been a great deal more damage still. If there are 2,000 holes drilled in the next sale, there might be a tremendous amount of damage.

The problem we are facing here is that the Department of the Interior apparently has no limit to its appetite to lease for exploration. And instead of doing, as my testimony quotes, one of their comments that says we will go out and start small and find out what is there and what the problems are, and then decide where to go to look for more oil—the notion of starting small has gone out the window apparently sometime recently.

We are not starting small. We are not even close. These are gigantic sales.

Our ability to extrapolate from a very small scientific understanding of the effects of 8 exploratory holes to a sale that might include 2,000 leases, we just simply cannot do that. And the Department's response is just as the chairman says—let us go out and look and see what is there. And essentially it is a blunderbuss leasing approach and a heap of faith—we will not cause harm.

I do not think that there is any basis, based on any of the information we have to date, that a sale of the magnitude we are talking about here can be conducted without harming that resource. There is no reason for reaching that conclusion.

So one of the possible constraints that Congress might consider would be a limit on the accepted size of leasing in an area of the value of Georges Bank. Don't allow a 2,000 lease sale, don't allow even a 200 lease sale. Limit it so that we can be sure when we make a balance, saying exploration won't cause harm, we are basing that on the notion we are going to have 8 exploratory holes and not a potential for an open-ended number of holes.

Mr. D'AMOURS. You think the size of lease sale 42, Mr. Foy, would be a reasonable size to consider as a maximum?

Mr. Foy. Well, perhaps. Although I must say I am left with the notion that the resource estimates are worth something, that Interior's attempt to try to put distance between themselves and the resource estimates raises some serious questions in my mind as to their good faith.

I think the resource estimates are worth something. They are, remember, also based on the results of sale 42. And my conclusion is

based on the size, projected size of the field, it is not worth leasing at all now on Georges Bank. It is not worth the risk.

Mr. D'AMOURS. Given the latest projections?

Mr. Foy. Absolutely.

Mr. D'AMOURS. All right.

This will be my last question to this panel.

Do any of you have any concrete suggestions for the subcommittee and the Congress to consider as to ways in which we might set standards to determine the relative risks in cases of offshore oil leasing beyond the resource estimates we receive from USGS?

Now, I know, Mr. Foy, you have just given such a standard. But I want to give the rest of you an opportunity. Can you suggest any standard beyond resource estimates that might guide the Congress into setting some sort of reasonable basis upon which the Department of Interior or any other Federal agency could judge whether it is worth risking an extremely fragile ecosystem, in the case of Georges Bank, or, in some other case, somewhere else in the country.

Ms. HUGHES. Mr. Chairman, if I might answer that first, I think the most important thing the country needs is a national energy policy, part of which would include a review of leasing offshore lands for oil and gas development. And I think it is quite clear in this administration that the offshore leasing program is in fact the driving force behind the energy policy; that there is no—there has been no thought given to what are the various ways that we can contribute to our energy needs, and what is the most appropriate way to go about that, given market forces, given available technology, et cetera.

Mr. D'AMOURS. OK. And I appreciate that comment.

I fully agree with you, what you are saying is absolutely correct. That is something for the administration to address, and I wish I could be Mr. Watt just for a few years, to try to correct many of the things that this administration has instituted in environmental matters. But we don't have that option.

I am asking you if you can propose anything we might do in Congress that would give the States, the task force, and the Department of Interior, some standard by which we could expect them to make a fair judgment that considers the value of the resource and the danger to the ecosystem.

Is there any standard other than limiting size of lease tracts, as Mr. Foy suggested, that you can think of?

Mr. Foy. I can suggest eight possible things you might consider.

Mr. D'AMOURS. You say eight?

Mr. Foy. Eight.

Mr. D'AMOURS. There is a way of submitting matters for the record.

Mr. Foy. Require better resource estimates than the Department of Interior. Don't allow them to just get away with saying these things are not worth anything. They should be worth something. It seems to me—

Mr. D'AMOURS. They have been up until very recently.

Mr. Foy. Yes. Until the past year or so they apparently were worth a lot more than now.

Second, separate exploration from development, either specifically without giving lease rights to develop when you lease for exploration, or administratively by having a really firm decision point before any production can occur, a very strong reconsideration of whether it is worth proceeding and the capacity to stop if you choose to make the balance different.

Third, I think Congress should seriously consider withdrawing certain areas from leasing altogether—when Congress identifies they are extremely valuable and vulnerable, and Georges Bank would be a class example.

Mr. D'AMOURS. On that score, you are probably aware just a week ago today the Appropriations Committee did just that.

Mr. FOY. I understand that.

Mr. D'AMOURS. For fiscal year 1984, on Georges Bank.

Mr. FOY. I understand that. And I commend the Congress and the committee for that.

I know Interior has been complaining loudly about that, and I think in fact that is precisely what Congress should be contemplating.

Fourth, I would have some limit—maybe it goes back to the notion of separating production from exploration—a firm requirement for really extensive information on the size of the resource, that that information be in hand before any production can begin, because remember the way things happen now, you can have 200 leases going on Georges Bank and, as the exploratory plans are done and as they get results, they can start producing before the other results are in. And it seems to me to make a rational decision you have to have most of those results in hand before you should make a decision to proceed with production.

Fifth, emphasize again the importance and the priority of the natural resources in the oil and gas program. The oil and gas program views its role in life as being mineral extraction. Its role in life should be protection of natural resources and get the minerals out if you can do it without harm, more time between sales.

In an area as vulnerable as Georges Bank, we should stretch the sales out. We should not allow them to hold a sale and then before any of the scientific information is in or the resource information is in, they have another sale, and another one again. There was going to be another one next year.

Seven, don't allow economic cornercutting. Mandate from the start that even if it is a small field, if it is in a vulnerable area, they are going to have to spend top dollar to develop it. In other words, they are going to have to use pipelines, barges, they are going to have to take all the steps that would have to be done if it is a very valuable field.

That will make them more rationally approach whether they even want to go out to that field.

Eight, limit the size of sales.

Mr. D'AMOURS. Thank you very much.

Mr. Colgan?

Mr. COLGAN. Some of the things Doug mentioned I would concur with. On some I have problems. The one thing I would suggest as an addition to all that has been suggested is to require that the lease sales be focused on areas of geologic potential, and not be al-

lowed to stray off into areas that are relatively worthless from an oil and gas sense on the basis any known information, but that will eat up a lot of everyone's time in dealing with them.

I am thinking specifically of the areas close into shore in New England and in the Gulf of Maine.

Mr. D'AMOURS. Thank you very much.

Our last panel is Ms. Priscilla Chapman, executive director, New England chapter, Sierra Club; Ms. Kelly Rigg, national Outer Continental Shelf campaign coordinator, Greenpeace; and Dr. Robert C. Ayers, Jr., senior research associate, Exxon Production Research Co.

We welcome you. Once again, as I cautioned other witnesses, I would appreciate your being as brief as possible. I note that none of the statements are terribly long, particularly Dr. Ayers' statement. I would appreciate the other witnesses summarizing as best you can.

Ms. Chapman.

STATEMENTS OF PRISCILLA CHAPMAN, EXECUTIVE DIRECTOR, NEW ENGLAND CHAPTER, SIERRA CLUB; KELLY RIGG, NATIONAL OUTER CONTINENTAL SHELF CAMPAIGN COORDINATOR, GREENPEACE; AND ROBERT C. AYERS, JR., SENIOR RESEARCH ASSOCIATE, EXXON PRODUCTION RESEARCH CO.

STATEMENT OF PRISCILLA CHAPMAN

Ms. CHAPMAN. Thank you, Mr. Chairman. I appreciate the constraints of time. At the same time, the New England Sierra Club has been concerned with the potential effects of oil and gas drilling to the biological resources on Georges Bank for a number of years.

While I will try not to be too repetitive of what other witnesses have said, I think there are some things that clearly need stressing.

The Sierra Club's position has been until enough information is known to assure that drilling activities pose no threat to the natural resources, leasing in the Georges Bank area should proceed slowly and with extreme caution, if at all.

Recent drastic reductions in USGS hydrocarbon resource estimates, coupled with the Department of the Interior's failure to evaluate alternative sources of energy argue strongly that leasing on Georges Bank should be halted at least temporarily.

I found it interesting this morning, when Mr. Danenberger gave some examples of tracts where there had been high resource estimates, and then when they had drilled they had found insignificant finds of hydrocarbons. He did not also provide any examples which would be comparable to Georges Bank, where there are very low resource estimates and then there has been a major find.

Also I would like to stress the secretarial issues document for lease sale 52, the numbers in that document which relate to the value of the Georges Bank fishery compared with the estimated value of the entire sale for lease sale 52 appear to have been ignored by the Department of the Interior. There has been no balancing as required by section 18, and perhaps, as the chairman suggested earlier in this hearing, there is a need for Congress to spell out this requirement more clearly.

For these reasons, the Sierra Club strongly supports the legislation proposed by Representative Gerry Studds and Senator Edward Kennedy which would prohibit drilling in certain areas of Georges Bank until either the year 1990 or the year 2000.

In response to the question, Mr. Chairman, which you posed to the last panel of what can Congress do, I think I would answer that in the past we have traditionally considered it the Department of the Interior's role to be a steward of our natural resources. They appear to have sacrificed that role to a great extent during this administration. So perhaps it is necessary at this point for Congress to take action such as those actions suggested in the Studds-Kennedy bill, in which areas of particular biological sensitivity are identified and then they are removed from lease sales by legislation.

The Sierra Club believes that the creation of the Biological Task Force and the development and creation of the monitoring program have so far been of great value and importance. We would like to know in reference to the previous comments about the Department of the Interior's support for this program that it was our understanding that the program was funded only when the EPA required that results of the monitoring be incorporated into the NPDES permits.

We believe that the monitoring program provides a good beginning for ongoing efforts to evaluate potential impacts to the biological resources. And the monitoring studies appear to be well designed and well executed. One of the greatest concerns of the Sierra Club is the potential long-term effect of drilling discharges.

Even the final EIS for lease sale 52 acknowledges that there are serious gaps in the information we have about that problem. The EIS, in fact, mentions the possibility of suspension of sediments by accumulation and other possible long-term impacts.

The BTF monitoring program has developed some excellent baseline data which will enable assessment of the effects of drilling in the future. But the results which are available to date are not a full assessment of impacts of oil and gas drilling in themselves. There has only been a small amount of drilling to date over a relatively short period of time, so it is not surprising that there is no demonstrated impact. If impacts on the fishery were noticeable already, then certainly future drilling activity would be very dangerous.

We recommended that special attention be paid to the potential implications of the elevated barium levels found on block 410, particularly if future monitoring in this area indicates a consistent pattern.

And for that reason I did have concern, as I heard earlier in this hearing, there seems to be a possibility that lease sale 42 monitoring be discontinued, because it appears then we might not know how significant the findings we have already had on the elevated barium levels really are.

I did want to point out the EIS for 52 does indicate barium is a metal of concern. And we would take issue with the idea expressed previously that we should wait until the effects show up on the Georges Bank fishery. We would say it is too late when the effects have shown upon the fishery.

We have some recommendations for future activities of the BTF. Most of them have been mentioned before. I am simply going to refer to them and not go into a great deal of detail.

There was discussion before that studies should be designed specifically for lease sale 52, with particular emphasis on the deepwater tracts. We would certainly concur with that. The Department of the Interior apparently intended that leasing would go forward in these areas, although the current body of information about benthic populations, currents, and transport patterns is scanty at this time.

In reference to Mr. Danenberger's statement that Interior assumes there is no greater risk in the deepwater areas than in the areas in which drilling is taking place now, I would like to point out that the final EIS for lease sale 52 acknowledges that there are different organisms in lease sale 52 areas, and different current speeds. So we find that statement to be without basis.

We really need to know a lot more about lease sale areas. Previous witnesses have recommended integration of studies and information on Georges Bank and interpretation of these by BTF. We would certainly endorse that idea. I would simply like to add that that BTF should also determine whether there are information gaps in the research and if there are, make recommendations for other studies which should be funded.

There has also been previous reference to other BTF responsibilities which have been identified in the charter of the BTF. To date the group has concentrated on design of the monitoring program, although it was given other responsibilities. We would particularly like to see BTF use the information gleaned from the monitoring program and other studies to identify and develop recommendations for areas of special biological significance in the Georges Bank area, to develop criteria to determine significant impacts and appropriate measures. Possible recommendations could include some of the things referred to before, such as barging of drilling fluids off the bank, building of pipelines, and other measures.

But above all, the Sierra Club believes no further lease sales should be scheduled on Georges Bank until the biological task force has accomplished these recommended activities. It is important to keep in mind once oil companies own a lease, they have an economic stake to continue to the production phase if resources are found. We think it is very doubtful that the production stage would be stopped for environmental reasons.

Equally important as the question of what the BTF has done and should do in the future is the question of whether and how the Department of the Interior incorporates the results of the studies and conclusions of the BTF into its decisionmaking procedures.

We note that Interior initially scheduled lease sale 52 before the monitoring studies for sale 42 were published, before the task force developed any identification of biologically sensitive areas, criteria to determine impacts or mitigating measures, and before information to deepwater tracts was available.

We note further that the EIS for 52 did not consider all available and relevant information such as the information contained in the CETAP studies that relate to migration patterns of endangered species of whales.

Finally, the final notice of sale for 52 included, in addition to deepwater tracts, seven canyon tracts, despite repeated objections expressed by environmentalists, the fishing community, and the Commonwealth of Massachusetts, and despite the fact that the studies completed to date on Lydonia and Oceanographer Canyons indicate many gaps in our understanding of transport of materials up and down canyon walls, and potential transport off the bank into the canyons.

The Department of the Interior must revise its approach to the scheduling of lease sales and the preparation of environmental impact statements, substituting bona fide consideration and incorporation of all available scientific information into its decisionmaking for its present policy. The sensitivity of the Georges Bank area and the value of the ecosystem there dictate a policy of proceeding slowly with extreme caution.

With accelerated leasing and drilling programs in this area, it is possible that irreparable harm could already be done by the time impacts are revealed by the studies. Furthermore, the huge areas which are being offered for leasing, particularly as proposed in sale 82, make sound decisionmaking about exclusion of sensitive environmental areas based on scientific facts virtually impossible. If leasing is to proceed on Georges Bank at any time in the future, smaller areas must be considered.

In terms of funding decisions, while we support continued funding for the biological task force and for an expanded monitoring program appropriate to the sale 52 area, we believe that funds must also be provided for preleasing studies, particularly as mentioned before, for studies of the biological communities and physical oceanography of the deepwater areas.

We emphasize that if funds are limited, future lease sales must be scheduled in such a way that important information is available before leasing decisions are made.

I believe those are our important points.

Mr. D'AMOURS. Thank you for testifying.

[The statement of Ms. Chapman follows:]

PREPARED STATEMENT OF PRISCILLA CHAPMAN

My name is Priscilla Chapman, and I am the Executive Director of the New England Sierra Club. On behalf of our chapter, I wish to express our thanks to Chairman D'Amours and the subcommittee members for the opportunity to present testimony this morning.

The New England Sierra Club has been concerned with the potential effects of oil and gas drilling to the biological resources on Georges Bank for several years. We have participated in administrative procedures and legal action aimed at protecting the fishery. Our position has been that until enough information is known to assure that drilling activities pose no threat to the natural resources, leasing in this area should proceed slowly and with extreme caution, if at all. Recent drastic reductions in USGS hydrocarbon resource estimates coupled with the Department of Interior's failure to evaluate alternative sources of energy argue strongly that leasing on Georges Bank should be halted, at least temporarily. For these reasons, we strongly support the legislation proposed by Representative Gerry Studds and Senator Edward Kennedy which would prohibit drilling in certain areas of Georges Bank until either the year 1990 or the year 2000.

We believe that the creation of the Biological Task Force and the development and implementation of the monitoring program have so far been of great value and importance; they provide a good beginning for ongoing efforts to evaluate potential impacts to the biological

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resources. The monitoring studies appear to be well-designed and well-executed.

One of the greatest concerns of the Sierra Club is the potential long-term effect of drilling discharges. The BTF monitoring program has developed some excellent baseline data which will enable assessment of the effects of drilling in the future, but the results which are available to date are not a full assessment of impacts of oil and gas drilling in themselves. There has been only a small amount of drilling to date over a relatively short period of time, so it is not surprising that there is no demonstrated impact. If impacts on the fishery were noticeable already, then certainly future drilling activity would be very dangerous.

We recommend that special attention be paid to the potential implications of the elevated barium levels found on Block 410, particularly if future monitoring in this area indicates a consistent pattern.

We would like to offer some recommendations for future activities of the Biological Task Force:

1. Studies for Sale 52 and Future Sales. The present monitoring studies were designed for the area covered in Lease Sale 42. Further studies must be designed appropriate to Sale 52 and future sales. In particular, studies are needed in deepwater tracts, which were to be included in Sale 52 and will probably be included in future lease sales. The Department of the Interior apparently intended that leasing would go forward in these areas under Lease Sale 52, although the current body of information about benthic populations, currents and transport patterns, and other factors in these areas is scanty. The BTF should begin now to design these studies.

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2. Integration of Studies and Information on Georges Bank. The BTF is in a unique position because of its composition to review and integrate the studies and information which have been developed by the individual agencies represented on the Task Force. For example, valuable information is now available on the physical oceanography of Georges Bank, prime spawning areas, and endangered whales' habits and migration routes in the vicinity. The BTF is the appropriate forum for examining the significance of this body of information as a whole. As more information becomes available from studies of sediment transport in the canyons, water column studies, and studies of the effects of hydrocarbons on fish eggs and larvae, it should be incorporated in the continuing work of the BTF. BTF should also determine whether there are information gaps in the research, and if there are, make recommendations for other studies which should be funded.

3. Other BTF Responsibilities, Identified in its Charter. To date, the BTF has concentrated on design of the monitoring program. In its charter, however, it was given other responsibilities. We urge that the BTF now use the information gleaned from the monitoring program and other studies to identify and develop recommendations for areas of special biological significance in the Georges Bank area and to develop criteria to determine significant impacts and appropriate mitigation measures.

The Sierra Club believes that no further lease sales should be scheduled on Georges Bank until the BTF has accomplished these recommended activities.

Equally important as the question of what the BTF has done and should do in the future is the question of whether and how the Department of the Interior incorporates the results of the studies and con-

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clusions of the BTF into its decision-making procedures.

We note that Interior initially scheduled Lease Sale 52 before the monitoring studies for Sale 42 were published, before the Task Force developed any identification of biologically sensitive areas, criteria to determine impacts, or mitigating measures, and before information on deepwater tracts was available. We note further that the Environmental Impact Statement for Sale 52 did not consider all available and relevant information, such as the information contained in the University of Rhode Island CETAP studies, particularly that relating to migration patterns of endangered species of whales. Finally, the Final Notice of Sale for 52 included, in addition to deepwater tracts, seven canyon tracts, despite repeated objections expressed by environmentalists, the fishing community, and the Commonwealth of Massachusetts, and despite the fact that the studies completed to date on Lydonia and Oceanographer canyons indicate many gaps in our understanding of transport of materials up and down canyon walls, and potential transport off the bank into the canyons.

The Department of the Interior must revise its approach to the scheduling of lease sales and the preparation of Environmental Impact Statements, substituting bona fide consideration and incorporation of all available scientific information into its decision-making for its present policy. The sensitivity of the Georges Bank area and the value of the ecosystem there dictate a policy of proceeding slowly with extreme caution. With accelerated leasing and drilling programs in this area, it is possible that irreparable harm could already be done by the time impacts are revealed by the studies. Furthermore, the huge areas which are being offered for leasing, particularly as proposed in Sale 82, make sound decision-making about

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exclusion of sensitive environmental areas based on scientific facts virtually impossible. If leasing is to proceed on Georges Bank at any time in the future, smaller areas must be considered.

In terms of funding decisions, while we support continued funding for the Biological Task Force and for an expanded monitoring program appropriate to the Sale 52 area, we believe that funds must also be provided for pre-leasing studies, particularly as mentioned before, for studies of the biological communities and physical oceanography of the deepwater areas. We emphasize that if funds are limited, future lease sales must be scheduled in such a way that important information is available before leasing decisions are made.

In conclusion, we commend the work of the Biological Task Force and the progress of the monitoring program thus far. We recommend integration and interpretation of all Georges Bank studies by the BTF, expansion of its activities to include the other responsibilities specified in its charter, and the creation of further monitoring programs appropriate to the area of Sale 52 and future sales with particular emphasis on deepwater tracts.

Above all, we urge the Department of the Interior to adopt a far more conservative approach to leasing of tracts in the North Atlantic, one that will incorporate the latest scientific information and BTF recommendations in a wise decision-making policy that will serve to identify potential impacts on the biological resources before irreparable harm is done.

Thank you for this opportunity to testify today.

Mr. D'AMOURS. Ms. Rigg.

STATEMENT OF MS. KELLY RIGG

Ms. RIGG. Thank you, Mr. Chairman.

On behalf of the 400,000 Greenpeace supporters in the United States, I would like to thank you for the opportunity to testify today. First, I will address the topic of the Georges Bank biological task force and monitoring program with respect to its role in the Outer Continental Shelf planning process, and second, I will address the issue of balancing environmental risks with fluctuating resource potential estimates.

Mr. D'AMOURS. Given the fact that the biological task force has been addressed so frequently, I hope you will skip over those parts that tell us how it works and what it does, and that will shorten the testimony.

I will repeat for the record, and for your information, that your testimony as submitted will appear in the record, just as you submitted it. In other words, unchanged. So you needn't fear that your testimony will not appear just as you submitted it, whatever you say.

Also your oral testimony will be included.

Ms. RIGG. Thank you.

The most fatal flaw in the way the program is now designed concerns the timing of the studies with respect to the OCS planning process. We are only now seeing the results of the studies done during the first year of drilling under lease sale 42. Obviously, studies were not completed before lease sale 42 was held, and had lease sale 52 not been fought and prevented, the studies would not have been complete before that sale was held.

And now, with the planning for lease sale 82 in full swing, the outcome of the studies will not have been included in this planning process either. With lease sales scheduled to take place every 2 years, it is obvious that Interior has never had any intention of actually using these studies to develop wise resource management policies. Undoubtedly, though, the Department of Interior will proceed with its accelerated leasing plan for the North Atlantic, and use the preliminary conclusions from these studies, which to date have found no substantial damage, as a justification for continuing on its frantic course to develop all OCS resources. This is unwise, unjustifiable, and a gross breach of the public trust.

Second, the studies conducted under the monitoring program have taken a fragmented approach to a complex ecosystem. The components of the ecosystem include—although are not limited to—the benthic community, the planktonic community, fish and cetaceans, all living in an amazingly dynamic marine environment. But the studies focus on individual aspects of that ecosystem and even in this fragmented framework, not all aspects of the ecosystem have been studied.

For example, while the benthic community is being studied, the planktonic community is not. Moreover, the results of these individual studies have not been assembled and synthesized in a way that might give some preliminary indications as to how the various factors interrelate. This piecemeal approach cannot begin to give a

true picture of the exchange mechanisms between the various levels within the ecosystem, because in reality there are no truly distinct levels within an ecosystem. There is a whole, and unless the whole can be grasped, understanding isolated parts does little to enhance our knowledge.

Third, while the program was designed to monitor the long-term cumulative effects of offshore drilling, by studying the effects of exploratory drilling, it addresses only the impacts of exploratory drilling, and only in the present. The cumulative impacts from an accelerated development of Georges Bank, combined with the stress inflicted by oil-laden formation waters discharged during the development and production phase won't be estimated by the present studies.

These studies will only show what is happening as a result of activities that have already occurred. Of what real value is a studies program that is designed specifically to tell us the nature of the environmental destruction we have just committed?

Even the information we do have has limitations which preclude its use in drawing final conclusions, especially in light of the fact that the results now available cover only the impacts of the first year of drilling, when only a few dry holes had been drilled. This can't possibly demonstrate long-term cumulative impacts.

The studies conducted as part of the Georges Bank monitoring program, as well as studies of Georges Bank conducted under the Bureau of Land Management's environmental studies program acknowledge some of their own limitations. The following quotes from reports indicate the acknowledged limitations.

Georges Bank benthic infauna monitoring program—final report, year 1, Battelle New England and Woods Hole Oceanographic Institution:

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Deposited drilling muds may damage the benthic invertebrate community through burial and smothering, clogging with fine suspended particles of gills, etc., of animals, or chemical toxicity. The extent of this damage and rate of recovery are not known.

Page 134. At station 13, the Mud Patch:

Sample residues from this station in July appeared "oily"; that is, after several rinsings in water and 70 percent alcohol, a surface sheen reminiscent of oil contamination persisted. Several specimens of amphipods from this station also appeared to be fouled by a dark, oily substance. Since this was observed in samples collected before drilling had started on the bank, this contamination must be from a source other than drilling activities. However, if this station has already been stressed by various forms of pollution, it may be difficult to distinguish changes caused by deposition of drilling muds from those caused by other sources of stress.

The accumulation of nutrients and sediments downstream of Georges Bank in this "mud patch" may be an indicator of the transport mechanisms on the bank. The mud patch may also be an area which will show negative effects at an early stage. It is worthwhile to note that the CETAP data shows the mud patch to be an area of sperm whale concentration.

All of the above-mentioned studies recommend further study of the Georges Bank region. This is the greatest indication that the researchers themselves realize that studies performed to date do not provide a complete picture of the dynamics of Georges Bank.

While the work already undertaken has added to our knowledge, it should be viewed as a minimal effort. In light of the problems with the current studies program, Greenpeace strongly makes the following recommendations:

There should be no new leasing of OCS tracts, or drilling of lease sale 42 tracts until:

All toxic chemicals can be traced completely through the ecosystem; a document is prepared which synthesizes all of the work done on Georges Bank to date; and a holistic model is developed which provides a framework for further studies that encompass the entire ecosystem.

The most important point to remember about the studies done to date is this: They represent the immense burden of proof incumbent upon the Federal Government to show that drilling will not interfere with the delicate ecosystem of Georges Bank.

With respect to fluctuating resource potential estimates:

Section 18 of the Outer Continental Shelf Lands Act (OCSLA) requires that the Secretary manage an oil and gas leasing program consistent with certain principles. The law states that:

Management of the Outer Continental Shelf shall be conducted in a manner which considers economic, social, and environmental values of the renewable and nonrenewable resources contained in the Outer Continental Shelf, and the potential impact of oil and gas exploration on other resource values of the Outer Continental Shelf and the marine, coastal, and human environments.

In the balancing equation, estimates of resource potential must be compared against the potential for adverse impact to various resources such as fisheries, endangered marine mammals, and recreational areas.

It is clear from Judge Mazzone's decision on lease sale 52 that the Department of the Interior failed to do an adequate analysis based on its own limited interpretation of the law.

Regardless of the error made by Interior in this particular case, section 18 should be interpreted in a broader sense. In particular, the one factor that has never been included in the balancing equation is the value of "the renewable and nonrenewable resource contained in the Outer Continental Shelf" as required by section 18. If we are to fulfill our roles as trustees of the Earth for future generations, we have to begin to weigh our priorities differently when we make balances such as that required by OCSLA.

The Department of the Interior, as managers of lands valued by competing interests, must be required to protect those resources over the long term. For this reason, as part of the balancing, a different kind of assessment should be included as a priority.

The life of the oilfield, as explained in the impact statement for lease sale 52, is estimated to be approximately 30 years. The life of the Georges Bank fishery, if protected, will remain as it is now, as far into the future as we can see. This should be part of the balance.

Moreover, the development of renewable alternative energy sources, which once developed also have an indefinite lifespan, is not considered in the EIS as a possible substitute for offshore oil and gas development. This, too, should be part of the balance.

Similarly, the environmental hazards should be compared between the various sources of energy alternatives, and should enter into the balance. I have oftentimes heard Mr. Watt claim that off-

shore development is necessary to reduce our dependency on foreign oil and increase national security. But never have I seen an objective look at the potential for developing safe renewable resources that would achieve the same goal.

While Greenpeace interprets the OCSLA as it is currently written to require this kind of balance, perhaps a requirement of this sort should be written into OCSLA in more explicit terms, to prevent Interior from continuing to shirk its responsibility.

Mr. D'AMOURS. Thank you.

[The statement of Ms. Rigg follows:]

PREPARED STATEMENT OF KELLY RIGG

On behalf of the 400,000 Greenpeace supporters in the United States, I would like to thank you for the opportunity to testify today. First, I will address the topic of the Georges Bank Biological Task Force and Monitoring Program with respect to its role in the Outer Continental Shelf (OCS) planning process, and secondly I will address the issue of balancing environmental risks with fluctuating resource potential estimates.

The Georges Bank Biological Task Force and Monitoring Program was established as the result of the first round of the struggle to protect Georges Bank from imprudent development under lease sale 42, and was designed to determine the effects and impacts of drilling on tracts leased under that sale. Our limited knowledge of the environmental properties existing out on the Bank was to be expanded to include the various mechanisms transporting the pollutants created by exploratory drilling into the sediments and tissues of the flora and fauna found in the lease sale area. Indeed, the studies were designed only to look at the actual impacts of drilling; predrilling baseline data was collected shortly before drilling began, and studies were meant to examine very specific possible effects. Some of the work in progress being conducted in laboratories under other studies programs were discontinued in light of the new program. Ostensibly, the Georges Bank Biological Task Force was to uncover new information in order to allow more informed decision-making, providing better resource management. But this method of studying the biological characteristics has encountered severe shortcomings.

The most fatal flaw in the way the program is now designed concerns the timing of the studies with respect to the OCS planning process. We are only now seeing the results of the studies done during the first year of drilling under lease sale 42. Obviously, studies were not completed before lease sale 42 was held, and had lease sale 52 not been fought and prevented, the studies would not have been complete before that sale was held. And now, with the planning for lease sale 82 in full swing, the outcome of the studies will not have been included in this planning process either. With lease sales scheduled to take place every two years, it is obvious that Interior has never had any intention of actually using these studies to develop wise resource management policies. Undoubtedly, though, the Department of Interior will proceed with its accelerated leasing plan for the North Atlantic, and use the preliminary conclusions from these studies, which to date have found no substantial damage, as a justification for continuing on

its frantic course to develop all OCS resources. This is unwise, unjustifiable, and a gross breach of the public trust.

Secondly, the studies conducted under the Monitoring Program have taken a fragmented approach to a complex ecosystem. The components of the ecosystem include (though not limited to) the benthic community, the planktonic community, fish and cetaceans, all living in an amazingly dynamic marine environment. But the studies focus on individual aspects of that ecosystem, and even in this fragmented framework, not all aspects of the ecosystem have been studied. For example, while the benthic community is being studied, the planktonic community is not. Moreover, the results of these individual studies have not been assembled and synthesized in a way that might give some preliminary indications as to how the various factors interrelate. This piecemeal approach can not begin to give a true picture of the exchange mechanisms between the various levels within the ecosystem, because in reality there are no truly distinct "levels" within an ecosystem. There is a whole, and unless the whole can be grasped, understanding isolated parts does little to enhance our knowledge.

Thirdly, while the program was designed to monitor the long term cumulative effects of offshore drilling, by studying the effects of exploratory drilling, it addresses only the impacts of exploratory drilling, and only in the present. The cumulative impacts from an accelerated development of Georges Bank, combined with the stress inflicted by oil-laden formation waters discharged during the development and production phase won't be estimated by the present studies. These studies will only show what is happening as a result of activities that have already occurred -- of what real value is a studies program that is designed specifically to tell us the nature of the environmental destruction we have just committed?

Even the information we do have has limitations which preclude its use in drawing final conclusions, especially in light of the fact that the results now available cover only the impacts of the first year of drilling, when only a few dry holes had been drilled. This can't possibly demonstrate long term cumulative impacts.

The studies conducted as part of the Georges Bank Monitoring Program, as well as studies of Georges Bank conducted under the Bureau of Land Management's Environmental Studies Program acknowledge some of their own limitations. The following quotes from reports indicate the acknowledged limitations:

1. "Assessing the Impact of Oil Spills on a Commercial Fishery," University of Rhode Island and Applied Science Associates, Inc.

On page 38 and 39, the authors have listed factors not addressed in the study:

1. Effects of oil spills on the food chain
2. Tainting of fish stocks through ingestion, absorption or bioaccumulation of hydrocarbons.
3. Contamination of sediments in spawning areas by acute or chronic hydrocarbon pollution, or drilling muds
4. Effects on adults, including lethal toxicity, and sublethal physiological changes affecting reproductive behavior or the viability of reproductive products."

Each of these four factors would be likely to dramatically affect the size of the fisheries stock, or the commercial value of the remaining stock. As such, this study should not be used as conclusive evidence that the Georges Bank fishery will not be severely impacted by OCS development.

In addition, it is stated on page 225 that the study did not extend to some of the most economically valuable fisheries species such as the lobster, and on page 226, it is admitted that the model has only been applied to "short term oil pollution impact analyses."

2. Georges Bank Benthic Infauna Monitoring Program - Final Report, Year 1,"
Batelle New England and Woods Hole Oceanographic Institution

Page 22 - "Deposited drilling muds may damage the benthic invertebrate community through burial and smothering, clogging with fine suspended particles of gills, etc., of animals, or chemical toxicity. The extent of this damage and rate of recovery are not known."

Page 134 - at Station 13, the Mud Patch, "sample residues from this station in July appeared 'oily'; that is, after several rinsings in water and 70 percent alcohol, a surface sheen reminiscent of oil contamination persisted. Several specimens of amphipods from this station also appeared to be fouled by a dark, oily substance. Since this was observed in samples collected before drilling had started on the Bank, this contamination must be from a source other than drilling activities. However, if this station has already been stressed by various forms of pollution, it may be difficult to distinguish changes caused by deposition of drilling muds from those caused by other sources of stress."

The accumulation of nutrients and sediments downstream of Georges Bank in this "Mud Patch" may be an indicator of the transport mechanisms on the Bank. The mud patch may also be an area which will show negative effects at an early stage. It is worthwhile to note that the CeTAP data shows the mud patch to be an area of sperm whale concentration.

Page 140 - "Unfortunately, there were no true reference (control) stations, sufficiently far from the rig site to preclude any possibility of direct impact, with which to compare results from the three benthic samplings."

Since the monitoring program began only shortly before drilling began, no substantial baseline data was collected. Therefore, the scientists attempted to use another site as a control reference. This apparently was not highly successful.

Page 4 - "Because of the problems with the wet-weight biomass technique, as discussed in this report, the method for determining biomass should be reevaluated. For at least one set of samples, another technique, such as decalcified wet weights or ash-free dry weights, should be used in order to establish a better estimate of secondary productivity."

3. "Analysis of Trace Metals in Bottom Sediments" Bothner, et al

Page 1 - "We estimate that no more than 18 percent of the barite discharged during drilling remains within 6 km of the drill site in Block 312."

Bothner et al assumes that the remaining 82% has dispersed. However, while

the concentration may decrease, their toxicity and their presence does not disappear. The lack of knowledge surrounding the dispersion rate and process will not help mitigate future effects of cumulative and chronic discharges in an increased development scenario. For example, if there is an increase in the quantity of drilling muds discharged in future development, we might see a threshold effect, i.e. in small quantities we see no effect, until at some critical level, we are suddenly faced with a contamination problem.

4. "Cetacean and Turtle Assessment Program (CeTAP)", University of Rhode Island

Page 5 - The CeTAP study area did not extend beyond the 1830 meter isobath.

Lease sales 52 and 82 both offer tracts which seem to have drawn high oil industry interest well beyond the 2000 meter isobath.

All of the above mentioned studies recommend further study of the Georges Bank region. This is the greatest indication that the researchers themselves realize that studies performed to date do not provide a complete picture of the dynamics of Georges Bank.

While the work already undertaken has added to our knowledge, it should be viewed as a minimal effort. In light of the problems with the current studies program, Greenpeace strongly makes the following recommendations:

- There should be no new leasing of OCS tracts, or drilling of lease sale 42 tracts until:
 - All toxic chemicals can be traced completely through the ecosystem
 - A document is prepared which synthesizes all of the work done on Georges Bank to date
 - A holistic model is developed which provides a framework for further studies that encompass the entire ecosystem.

The most important point to remember about the studies done to date is this - they represent the immense burden of proof incumbent upon the federal government to show that drilling will not interfere with the delicate ecosystem of Georges Bank. If studies were to show an impact, this impact would be a significant find, as we have been looking at a limited portion of the ecosystem. However, if no impacts can be found, the burden of proof remains great to claim that none exist.

REDUCTION IN RESOURCE ESTIMATES

Section 18 of the Outer Continental Shelf Lands Act (OCSLA) requires that the Secretary manage an oil and gas leasing program consistent with certain principles. The law states that "Management of the Outer Continental Shelf shall be conducted in a manner which considers economic, social, and environmental values of the renewable and nonrenewable resources contained in the outer Continental Shelf, and the potential impact of oil and gas exploration on other resource values of the outer Continental Shelf and the marine, coastal, and human environments."

In the balancing equation, estimates of resource potential must be compared against the potential for adverse impact to various resources such as fisheries, endangered marine mammals, and recreational areas.

It is clear from Judge Mazzone's decision on lease sale 52, that the Department of Interior failed to do an adequate analysis based on its own limited interpretation of the law. Just prior to the publication of the final environmental impact statement, resource estimates decreased by 97%,

and Interior failed to perform a new risk/benefit analysis for the lease sale, instead claiming that lower resources would equate to lower environmental risks. But the change in risk due to the change in resource estimates is not proportional, and Interior must not be allowed to pretend that it is. Indeed, the drilling of an exploratory well involves a degree of risk, whether or not there is a million or a billion barrels of oil underground. But weighing on the other side of the balance are the potential benefits that society might receive should the risks be taken. When those benefits decrease by 97%, clearly, a new balance is struck.

Regardless of the error made by Interior in this particular case, Section 18 should be interpreted in a broader sense. In particular, the one factor that has never been included in the balancing equation is the value of "the renewable and nonrenewable resources contained in the outer Continental Shelf" as required by Section 18. If we are to fulfill our roles as trustees of the earth for future generations, we have to begin to weigh our priorities differently when we make balances such as that required by OCSIA. The Dept. of Interior, as managers of lands valued by competing interests must be required to protect those resources over the long term. For this reason, as part of the balancing, a different kind of assessment should be included, as a PRIORITY. The life of the oil field, as explained in the impact statement for lease sale 52, is estimated to be approximately 30 years. The life of the Georges Bank fishery, if protected, will remain as it is now, as far into the future as we can see. This should be part of the balance. Moreover, the development of renewable alternative energy sources, which once developed also have an indefinite life span, is not considered in the EIS as a possible substitute for offshore oil and gas development. This too should be part of the balance. Similarly, the environmental hazards should be compared between the various sources of energy alternatives, and should enter into the balance. I have often times heard Mr. Watt claim that offshore development is necessary to reduce our dependency on foreign oil and increase national security. But never have I seen an objective look at the potential for developing safe renewable resources that would achieve the same goal.

While Greenpeace interprets the OCSIA as its currently written to require this kind of balance, perhaps a requirement of this sort should be written into OCSIA, in more explicit terms, to prevent Interior from continuing to shirk its responsibility.

Thank You.

Mr. D'AMOURS. Now we will hear from Dr. Ayers. Welcome.

STATEMENT OF ROBERT C. AYERS, JR.

Mr. AYERS. Thank you, Mr. Chairman. My written statement was brief for two reasons: One, I have limited knowledge. The other is I had to carry it all the way from Houston, so I had to have it brief.

My name is Bob Ayers. I am a senior research associate at Exxon Production Research Co. in Houston. I hold a Ph. D. in physical chemistry and a B.S. in chemical engineering both from the University of Texas at Austin. I have been with Exxon for 21 years and have spent much of this time working in the field of environmental conservation.

During the past few years I have concentrated my research efforts on the fate and effects of drilling discharges in the marine environment. I am a member of the National Research Council Panel on Fate and Effects of Drilling Discharges in the Marine Environment.

I also serve on several industry committees concerned with environmental issues and am representing the American Petroleum Institute and the Offshore Operators Committee today.

I have been asked to address certain aspects of the Georges Bank biological task force and the Georges Bank monitoring program. I assisted the task force in the development of the program and

serve on the Georges Bank Monitoring Program Scientific Review Board.

I have four points that I would like to make.

Point No. 1. I believe that the task force and Interior both acted in a very responsible manner. The monitoring program is well designed, well manned, scientifically valid, cost effective. It is being carried out by some of the best scientists on the east coast. They are doing an exceptional job.

Point No. 2 is that industry supported this program from its inception. Our position was based on the belief that the program would show that exploratory drilling could be accomplished on the Georges Bank without significant environmental impact.

And this belief, of course, was based on results of several million dollars worth of studies conducted in other Outer Continental Shelf areas as well as the historical evidence of 26,000 wells drilled offshore with no significant adverse impact on fisheries. This is 40 years in the Gulf of Mexico and about 80 years in California.

Furthermore, we believed the results from a scientifically sound study of this type, funded by government, would be more acceptable in the eyes of the public than a similar study funded by industry.

Point No. 3 deals with the results of the program itself. So far the only changes in chemistry observed are low-level increases in barium content near the well site. These are low levels. I think the highest level of increase we have seen was up around a factor of 4. You can contrast this to the other studies in the OCS in low-energy environments, where we see increases by a factor of 20 to 30.

Again, the barium we are talking about is barium sulfate. This is insoluble; it is inert; it results from the barite discharges.

More importantly, no biological impacts have been detected at any station which could be attributed to drilling activity. Now, these findings are consistent with and substantiate earlier site specific studies conducted in other high-energy environments.

My point is there is no question that the Georges Bank area is a very productive one, but now we are finding it is very insensitive to drilling discharge, and this is what you would expect in this type of environment.

Point No. 4 is this program can be of great value to both policy-makers and industry. Many of the findings have application outside the North Atlantic and can serve as an aid for anticipating effects in many other undeveloped areas of the Outer Continental Shelf by those responsible for preparing lease sale stipulations and discharge permit conditions.

I would like to add a little bit, just on what I heard today. I think Interior is getting a little bit of a bad rap about not taking care of the resources. Drilling discharge effects, there is no question, when they occur, are highly localized. Interior does have lease sale stipulations in areas of special biological significance. The one that comes to mind is the Flower Garden Reefs, about 100 miles offshore Texas. Corals are the most significant species that we have found as far as sensitivity to drilling discharges. They are most sensitive. There are lease sale stipulations that limit how close you can drill to the reefs as well as other mitigating measures that have been imposed by Interior, and additionally by EPA.

Just a word or two about resource estimates. I don't work in that area, but I do know they are very difficult, and the Interior estimates are useful, but we certainly do our own. We don't all come to the same conclusion. Sometimes you find somebody bidding \$50 million on a lease, and another company bidding \$10,000. That gives you an idea about how difficult it is.

I guess that is all I have to say right now.

[The statement of Mr. Ayers follows:]

PREPARED STATEMENT OF DR. ROBERT C. AYERS, JR.

My name is Bob Ayers. I am a Senior Research Associate at Exxon Production Research Company in Houston. I hold a Ph.D. in Physical Chemistry and a B.S. in Chemical Engineering both from the University of Texas at Austin. I have been with Exxon for twenty-one years and have spent much of this time working in the field of environmental conservation. During the past few years I have concentrated my research efforts on the fate and effects of drilling discharges in the marine environment. I am a member of the National Research Council Panel on Fate and Effects of Drilling Discharges in the Marine Environment. I also serve on several Industry committees concerned with environmental issues and am representing the American Petroleum Institute and the Offshore Operators Committee today.

I have been asked to address certain aspects of the Georges Bank Biological Task Force and the Georges Bank Monitoring program. I assisted the Task Force in the development of the program and serve on the Georges Bank Monitoring Program Scientific Review Board.

The Biological Task Force was organized in 1979 to assess potential adverse biological impacts of offshore oil and gas operations on Georges Bank and recommend mitigating measures if needed. The Task Force is made up of representatives of federal agencies who are voting members and representatives of state agencies who are non-voting members. The Task Force meetings are open to the public and serve as a forum for concerned groups to express their views on environmental issues associated with offshore oil and gas activities. The most significant product of the Task Force to date has been the monitoring program to define the impacts of drilling discharges on Georges Bank.

In early 1980, the Task Force formed a Working Group with the charge of developing a monitoring program. Dr. Suzanne Bolton, who was then with EPA, chaired the Working Group. Federal, state and independent scientists participated. I served as Industry advisor to the group.

I would like to point out that Industry supported this program from its inception. Our position was based on the belief that the program would show that exploratory drilling could be accomplished on Georges Bank without

significant environmental impact. This belief was based on results of studies conducted in other Outer Continental Shelf areas. Furthermore, we believed that results from a scientifically sound study of this type, funded by government, would be more acceptable in the eyes of the public than a similar study funded by Industry.

In the spring of 1981 the Working Group submitted a proposed program to the Biological Task Force. The Task Force approved the proposed program and recommended it to the Department of the Interior. Interior elected to fund the program for a minimum of three years and engaged Battelle New England, Woods Hole Oceanographic Institution, U. S. Geological Survey, Science Applications Inc., and Taxon Inc. as contractors to conduct the study. As an added precaution, Interior organized a Georges Bank Program Scientific Review Board to act as an advisory group to the project and review the results.

The Georges Bank Monitoring Program is unique in that it is the only broad area study of this type initiated prior to oil and gas development. Other studies in undeveloped areas have been relatively short term with assessments limited to the well site area. Intensive studies covering large areas have been conducted, however, these took place in areas already exposed to years of oil and gas activity.

The Georges Bank program includes intensive sampling and analysis of benthic communities and bottom sediments. Collections of six replicate biology samples and three replicate chemistry samples at each of the 46 stations are being made on a seasonal basis. Twenty-nine stations are positioned in a tight radial array around one well site at a water depth of 80 meters. A second group of three stations are near another well site in 145 meters of water. These two sets of stations are located near well sites to detect possible near field impacts. The remaining stations cover a broad expanse of the Bank and nearby potential depositional areas in order to assess possible area wide impacts.

The program was initiated in July, 1981 before exploratory drilling began on Georges Bank. Over the next fourteen months eight wells were drilled. At this time, results covering the first year of monitoring have been published. So far, the only changes in bulk sediment chemistry that have been observed are low level increases in barium content near the well sites. The barium is in the form of insoluble, effectively inert barium sulfate and results from drilling discharges containing barite. More importantly, no biological impacts have been detected at any station which could be attributed to drilling activities. These findings are consistent with and substantiate earlier site specific studies conducted in other high energy environments.

In summary, I believe that both the Task Force and Interior have acted in a responsible manner. The monitoring program is well designed, well managed, scientifically valid, and cost effective. It is being carried out by some of the best scientists on the East Coast and they are doing an exceptional job.

The program can be of great value to both Policymakers and Industry. Many of the findings have application outside the North Atlantic and can serve as an aid for anticipating effects in many other undeveloped areas of the Outer Continental Shelf by those responsible for preparing lease sale stipulations and discharge permit conditions.

Mr. D'AMOURS. As is my practice, I seem to always begin questioning the witness who last testified. You have that honor today.

A couple of things. In picking up on your very last statement, you said you do your own resource estimate studies rather than relying on Interior.

Mr. AYERS. We invest hundreds of millions of dollars—you are going to do a little work yourself.

Mr. D'AMOURS. I appreciate that. As I understand it, isn't the Interior Department supposed to have access to proprietary information that you have in order to enhance their own ability to make judgments?

Mr. AYERS. They have access to cost well data; they have access to some of the other data we have. Everybody doesn't interpret it all the same way.

Mr. D'AMOURS. Do you have data that they don't have access to, because of proprietary reasons?

Mr. AYERS. I really had better not address that, because I just flat don't know. We may or may not. I am not sure.

Mr. D'AMOURS. I wonder if Mr. Danenberger is still here. I asked him once before and he was. I am told he just left—

Mr. AYERS. Even if we all had the same information, we would still come to different conclusions.

Mr. D'AMOURS. You made another statement which I don't recall seeing in your written testimony, which I read recently. You said that there was no evidence of any impacts to fisheries in the gulf—

Mr. AYERS. From drilling discharges.

Mr. D'AMOURS. From drilling discharges or other oil production activities.

Mr. AYERS. I didn't say that. I said drilling discharges.

Mr. D'AMOURS. Do you have evidence of impacts from their oil activities?

Mr. AYERS. There are some impacts I think that come from dredging activities in coastal Louisiana.

Mr. D'AMOURS. I am talking about oil production.

Mr. AYERS. Dredging activities associated with all the coastal activities, some of which are oil and gas. I know of no fisheries impact. I have seen none that had anything to do with discharges of oil and gas operations.

Mr. D'AMOURS. Given the fact that there were no baseline studies conducted in the gulf, and given the fact, as Mr. Foy and Mr. Costakes just testified, that there has been a shift from predominantly food fish to predominantly nonfood fish in the gulf, do you think maybe we might be able to conclude there has been something which occurred there?

Mr. AYERS. I am getting out of my area again. The menhaden catch has gone up a lot. This is the kind of fish they were talking about. I think that may be a matter of demand rather than anything else. I think it would be more appropriate to look at the gulf coast fish of interest like shrimp and oysters and see how they have changed. My understanding is they have not.

Mr. D'AMOURS. You are not suggesting that the gulf fishermen would fish for the least remunerative species, are you, for any reason?

Mr. AYERS. If they make more money doing it. They are going to go—

Mr. D'AMOURS. Exactly. Is it not true there is more money in food fish than junk fish?

Mr. AYERS. Yes. But I guess they get more pounds of the junk fish. I am getting a little bit out of my area.

Mr. D'AMOURS. But if you are getting out of your area, it is not I that took you there. You got out of your area when you said there were no impacts on the fisheries. If you want to qualify that statement now by saying you really don't know, I withdraw the line of questions.

Mr. AYERS. I won't withdraw that. I say nobody has shown any impact on fisheries. I think I would know about it if they had.

Mr. D'AMOURS. You cannot now say, then, you are out of your area.

Mr. AYERS. You are asking me why the menhaden catch has increased. I think it is because of an economic factor. I think you might ask one of the fishery guys. I think people usually do things for economic reasons. If they make more money catching menhaden than shrimp, that is what they will do. I am not saying the shrimp catch has gone down, either. I think it has increased.

Mr. D'AMOURS. The shrimp catch has in fact gone down. And people do things for noneconomic reasons sometimes, not frequently enough perhaps.

Mr. AYERS. Well, tell me, has the shrimp catch gone down?

Mr. D'AMOURS. That is correct.

I am advised by staff that the National Marine Fisheries Service has reported that it has gone up in New England, but down in the gulf.

Mr. AYERS. One year, two years, five, consistent?

Mr. D'AMOURS. Over a 2-year period, I am advised.

Are you familiar with any baseline studies conducted in the gulf against which such impacts could be measured?

Mr. AYERS. Just historical evidence is what I am talking about now.

Mr. D'AMOURS. Let me go on to—do you have something to say?

Mr. AYERS. No.

Mr. D'AMOURS. I will ask this question of our other two witnesses, either one or both of you may choose to answer. What are your thoughts about the Interior Department's argument that when you reduce resource estimates for a lease sale, as they did in sale 52, that the risks of an oilspill are commensurately or proportionately reduced? Do you know of any reason, any facts from which that conclusion could be drawn?

Ms. RIGG. The problem is that if you are drilling in an area where there is a vague resource potential estimate, you don't really know how much is out there. At the same time, the impact statement says there might be three spills over 1,000 gallons. Well, how much is "over 1,000 gallons?"

We have an elusive amount of gallons being spilled. No matter how many gallons of oil are out there, if there is one major oilspill, it could be catastrophic for the fisheries and for endangered marine mammals. As far as balancing goes, it is not a matter of less oil

accompanying a smaller chance of an oilspill. The point is that the relative weight in the balance changes.

If there is one oilspill and the resource potential is high, you could make the argument—I would not—that that oil is worth taking that risk. If there is very little oil out there, and you are taking that same huge risk to the fishery, you have to ask the question is it worth it. And I would say no, it is not in this case.

Mr. D'AMOURS. But isn't it true the less drilling you do, the less apt you are to have an oilspill?

Ms. RIGG. It would depend on how the oil is concentrated. I don't think that they have any sense of how it is concentrated. If you could get the entire resource potential of Georges Bank off of one tract, it would be an entirely different situation than if you have that amount of oil spread out over 53 tracts, for example.

Mr. D'AMOURS. Ms. Chapman.

Ms. CHAPMAN. I pretty much endorse what Kelly just said. I think we should also bring up the fact that the Georges Bank area contains certain areas that are particularly sensitive, such as spawning areas. In those areas we may not be concerned so much as to the magnitude of what we are doing, but simply the fact we are doing anything there at all, any level of discharges at all. And that would not particularly relate to the resource estimates.

Mr. D'AMOURS. I will ask this of Ms. Rigg, if I may. You have said in your testimony, on page 2 specifically, that the BTF has taken a fragmented approach to a complex ecosystem. Could you expand for us, in view of the testimony of the other witnesses we have had today, on how an ecosystemwide study might be more informative, more valuable, and how you would design such a study, given earlier on the Biological Task Force did attempt to craft some kind of a study that would be on a more ecosystemwide pattern but could not do it. How would you improve on their procedures?

Ms. RIGG. I am not personally a scientist. In preparation for this testimony, I have read all of the studies. I have brought my comments and questions to several different scientists that I have the occasion to work with. This was one of the problems brought out by one of the scientists.

Mr. D'AMOURS. But are you looking for something—it is like my discussion with Dr. Ayers; you make a statement and then say you are not qualified to discuss it.

Ms. RIGG. I cannot personally say how to design a particular study. I don't think it is my job to design a study.

Mr. D'AMOURS. I agree. Let me ask you this. Are you saying that you would like there to be a study that would be based on a more ecosystemwide basis than we currently have? Is that what you are saying?

Ms. RIGG. Yes.

Mr. D'AMOURS. What I am saying is, that is great if you can do it. But can you do it? The Biological Task Force said it could not. I take them at their word, unless you have information that there is something they could have done or should have done that they didn't do.

Ms. RIGG. What I am saying is that the benthic infauna has been studied, for example, but as somebody said earlier, there have been

no studies of organisms in the water column. The main constraint Mr. Beller cited as the cause is that it is harder to do—it is harder to take samples in the water column and it costs a lot more money.

I think without having that information before us, we cannot know to what extent the planktonic community depends on the benthic community, or vice versa, to what extent do the fish depend on any of these things. We don't have a complete look at the picture.

If we are going to use money as a constraint, and we consider the amount of money coming in on those leases and the amount of profit that the oil companies must believe they are going to receive, something is very wrong. I think the design problems in the study are not scientific difficulties.

Mr. D'AMOURS. I appreciate that. Your answer is that you think the interaction of the various species within the water system, the dispersal of nutrients within the entire column, rather than just the benthic—the muds in the benthic population should be studied. That would be your recommendation. And you are suggesting that the only reason it wasn't done, as Mr. Beller said earlier, was a question of lack of funds.

Ms. RIGG. One of the studies showed that 82 percent of the barium hasn't been accounted for. The authors conclude that it is likely it has dispersed. They don't know exactly where it went. I don't understand how they can claim that it has probably dispersed and therefore is not harmful, if they have not studied it. What if it has dispersed in the tissues of the organisms in the water column.

Mr. D'AMOURS. Are you aware of any other agencies, such as National Marine Fisheries Service, conducting studies on the entire water column?

Ms. RIGG. To my knowledge, if there are studies going on, they have not been synthesized with the BTF studies.

Ms. CHAPMAN. Mr. Chairman, it is my impression there are some studies on the water column going forward. I believe they are under the National Marine Fisheries Service. I think our recommendation is that the results of those studies must be incorporated along with all the others.

Mr. D'AMOURS. I appreciate that. It is a good point. I also agree with it, as a matter of fact.

Mr. Ayers, a few moments ago, I thought you indicated there was something else you wanted to say. Before we close, I thought perhaps we should give you a chance to say it. Is there anything you want to add?

Mr. AYERS. I can't remember what it was. I guess I would like to comment briefly on this water column idea. All the impacts we have ever been able to observe, whenever they occur, have been on the benthos near the well site. The reason is that because of extremely rapid settling and dispersion, materials don't stay in the water column. Not in any concentration to be significant.

I feel like the task force program addressed the right thing. It would be interesting to know, we need to know, a lot more about the water column in general—flow of nutrients, things like that. But as far as the impact from drilling operations, which is what we were trying to do with that program, it is really kind of irrelevant.

Mr. D'AMOURS. Well—

Mr. AYERS. I don't object to the study of it. I just think as far as expecting any impacts from drilling, it is not where the impacts occur.

Mr. D'AMOURS. Well, Georges Bank, Dr. Ayers, is a rather unique ecosystem in that it has this gyre effect. Are you familiar with that?

Mr. AYERS. Yes.

Mr. D'AMOURS. So don't you think the fact of the gyre might cause us to take a more careful approach to the water column in Georges Bank than we would in other areas?

Mr. AYERS. If the discharges don't remain in the water column, and they are rapidly dispersed, in concentrations even undetectable, let alone significant from any kind of toxic impact, no. I think you are better off spending the money doing something else.

Mr. D'AMOURS. Where do you get the conclusion they don't remain in the water column?

Mr. AYERS. From other studies in other areas. There has been—

Mr. D'AMOURS. I might have missed you earlier. Did you refer to those studies specifically earlier?

Mr. AYERS. I talked about several million dollars' worth of research done in other areas. I have done some myself.

Mr. D'AMOURS. In other areas?

Mr. AYERS. Yes.

Mr. D'AMOURS. We just agreed the bank was different because of the gyre.

Mr. AYERS. The laws of physics will not change. The Georges Bank is an extremely energetic area. You are going to have higher dispersion rates there than almost anywhere else. It fits right in the picture of what we have seen, when we relate impacts with energy of the environment. The data we have gotten from the Georges Bank program is consistent with what we have seen elsewhere.

We saw bigger impacts in the mid-Atlantic where we did a study, in a relatively low-energy environment. And we saw barium levels 20 to 30 times above background instead of 3. I made the point—again, there is no question about the productivity and the value of the Georges Bank area. But I think we are also finding that it is very insensitive to drilling discharges.

Mr. D'AMOURS. Well, there is some evidence of that. But everybody who has testified seems to conclude that eight wells over a 2-year period is hardly enough to draw that as a firm conclusion. Do you think that we now have enough evidence to close shop on lease sale 42?

Mr. AYERS. No. I think we ought to continue with the monitoring. There is going to be a meeting tomorrow I am attending at Woods Hole. I don't want to give you an opinion on what we are going to do right now. But I think there might be a little shift in the emphasis of it to some of the deeper tracts. I don't know. I think we need to talk about that.

Mr. D'AMOURS. Many are questioning, as many of the witnesses did this morning, and as I do, frankly, whether or not leasing should continue in Georges Bank, given the very dramatic decrease in the resource estimates.

In addition, I have read reports that the exploration budgets of major oil companies have been dramatically reduced. Is the industry convinced that the payoff in Georges Bank is worth proceeding with development?

Mr. AYERS. I guess we will hold the sale and find out. I just don't know. There may be some companies that think yes, some that think no. I don't believe anybody is going to go out there and drill unless they think there is a good chance they will have some success.

Mr. D'AMOURS. Is Exxon going to be bidding?

Mr. AYERS. I don't know.

Mr. D'AMOURS. I am ready to conclude. Ms. Chapman.

Ms. CHAPMAN. Could I simply add something to that comment, which I don't think has been really explored today, because it doesn't really relate to the BTF. But one of the questions that has been consistently brought up over the last year about the offshore sales is the question of fair market value price.

It would be of great concern if lease sales were allowed to go forward that resulted in extremely low prices for tracts. But that appears to be a possibility under the way that the Interior Department is holding—is conducting lease sales.

Perhaps it would not cost an oil company a great deal to go out and buy up a huge number of tracts, if the fair market value is allowed to drop to very low levels, because of the low resource estimates. So I remain unconvinced that we can simply trust to the fact that the oil companies will not bid on these tracts if they do not believe there is a significant amount of oil there. I think there could be an attempt to simply buy up the tracts for the future at a low price.

Mr. D'AMOURS. Thank you very much. I don't want to get this into a debate. Did you want to say anything about that, Dr. Ayers? It sounds like a pretty good point, to me.

Mr. AYERS. You have to realize when you get a tract, you have to drill on it within a certain length of time. Drilling cost alone is going to be in the order of \$15 million. So I don't believe people are going to buy up tracts and then just go drill for the heck of it. They are not going to do that unless they feel they can make a significant return.

And the point that Bud made earlier is certainly true. There is a big lag in time between the time you find a field, delineate it, and build a platform and start producing. Certainly, I think the horror story that we had at the Hondo field in California is an extreme case, where we went and discovered the field in 1967 and didn't start producing until 1980.

I think that is an extreme case. But you are still going to have a few years, even if everything runs perfectly smooth, and you don't run into any kind of lawsuits or problems—you are still going to spend several years. It is going to be 4 or 5 years before you can get a platform in and start producing oil and gas.

Mr. D'AMOURS. Is there a level of resource estimate below which the industry will not explore?

Mr. AYERS. Sure, of course there is.

Mr. D'AMOURS. What is that level? In the Georges Bank area we are down to 57 million barrels—would you still would you go if it were 27 million? At what point would you say it is not worth it?

Mr. AYERS. It is going to be this. When your company—you make your estimate. You are not going to worry about anybody else. You will use whatever data you can. You are going to make your estimate, figure how much it is going to cost to build a platform, how much it is going to cost to build pipelines or tanker or whatever, and you are going to project crude oil prices.

You are going to do all this, and then you will come up with some situation. You are going to make a decision about whether you are going to go or not. There is an awful lot of factors that go into that. Every company has slightly different investment—

Mr. D'AMOURS. The DOI now estimates that there are about 57 million barrels on Georges Bank. At what point would the industry, if it agreed with the figures, decide not to explore?

Mr. AYERS. I cannot give you a number like that.

Mr. D'AMOURS. Why not?

Mr. AYERS. Because there are so many factors that go into that.

Mr. D'AMOURS. Would you do it for one barrel of oil?

Mr. AYERS. Of course not. There is a limit, you are right.

Mr. D'AMOURS. Can you give me some idea?

Mr. AYERS. I just cannot tell you what it would be. Georges Bank is a pretty expensive place to produce oil and gas.

Mr. D'AMOURS. Would you go in for a million barrels?

Mr. AYERS. It depends on where it is.

Mr. D'AMOURS. You might go in for a million barrels in the Georges Bank?

Mr. AYERS. I couldn't tell you that. You are asking me things that depend on a whole lot of difficult economic factors, that are all weighed together before an operator will decide to take that chance.

Mr. D'AMOURS. Surely there must be some parameters where it no longer becomes even attractive, where you can say clearly below 2 million barrels you would not even think of it, or 10 million barrels. Isn't there some such figure?

Mr. AYERS. I cannot give you a figure. I can tell you there is a cutoff point. But I don't know what it is. It is an extremely complex number to come up with.

Mr. D'AMOURS. Nobody has ever come up with that?

Mr. AYERS. They come up with it for every case.

Mr. D'AMOURS. Give me an idea of a few cases. What has it been in a few cases?

Mr. AYERS. I can't give you those numbers, because I don't work in that area. It is going to vary. You have a crude oil price projection. Look how that has changed in the last few years. Three years ago people were looking for crude oil prices to go through the roof. Now they are not. It is a cyclical kind of thing. It is complex. But there is a point in time when you are going to make your bid that you will know, you will have an idea in your own mind how much to bid on that lease and everything. It is all based on these kinds of numbers.

Mr. D'AMOURS. I am kicking a dead horse and I will stop.

I want to thank this panel again, all of you, for your testimony. That concludes this hearing. I want to note, for the record, that the Massachusetts Audubon Society and Dr. James Hain of Woods Hole wanted to testify and have submitted testimony.

[The statements of the Massachusetts Audubon Society and Mr. Hain follow:]



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STATEMENT OF MARSHA ROCKEFELLER, LEGISLATIVE LIAISON, MASS. AUDUBON SOCIETY
to the
HOUSE SUBCOMMITTEE ON OCEANOGRAPHY
concerning the
Georges Bank Biological Task Force
June 23, 1983

The Massachusetts Audubon Society is the oldest and largest state conservation organization in the country with 30,000 member households and over 13,000 acres of land. The Society has been concerned with leasing for offshore oil and gas exploration in the North Atlantic since the start of planning for the Georges Bank lease sale. We have worked to assure adequate environmental safeguards to protect the Georges Bank fishery and other marine resources.

The Department of Interior's (DOI) creation of the Biological Task Force (BTF) was a positive step toward filling a gap in the OCS leasing process in the North Atlantic. Regulatory authority for OCS activity is shared by the Environmental Protection Agency (EPA) and the U.S. Fish and Wildlife Service and the Minerals Management Service within DOI, and the National Oceanic and Atmospheric Administration within the Department of Commerce consults with DOI on endangered species issues. The formation of the BTF, composed of representatives of the three departments, created a framework for cooperative efforts to develop stipulations and recommend studies to protect the biological resources of Georges Bank.

The BTF's accomplishments so far are the development of a study of the trace metal concentrations in the sediments; a study of petroleum hydrocarbons in sediments, clams and flounder; a monitoring program to sample benthic communities in the Lease Sale 42 area; and an analysis of historical data from the OCS environmental benchmark study.

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These studies have produced baseline information which will be of great value when evaluating the effects of OCS activity on the environment over a long period of time; we have been pressing for adequate baseline data since 1975 when the Draft Environmental Impact Statement for Lease Sale 42 was published.

Lack of baseline data has been a problem in other areas where OCS activity has occurred. Without such data, there is no way to predict what impacts have occurred as a result of offshore oil and gas drilling.

We are concerned not with what the BTF has accomplished so far but with what still remains to be done.

The present monitoring program was designed to monitor the impacts from drilling on Lease Sale 42 tracts. We are now facing Lease Sale 52 and Lease Sale 82. Therefore, the BTF must expand its monitoring to include the tracts of these proposed lease sales. Since the BTF's mandate has been expanded to include Lease Sale 52, we expect that such a monitoring program will be developed and implemented. Along with increased responsibility must come increased funds if the BTF is to maintain the standards of research set so far.

In addition to developing a monitoring program, the BTF has yet to fulfill its other, mandated responsibilities.

One is the identification of zones of special biological significance. This is important for two reasons. First, once these areas are designated, lease stipulations can be written to provide special protection for those areas, EPA discharge permits (NPDES) can take special conditions into consideration, and other mitigating measures can be developed. Second, funds for environmental studies are limited. The designation of zones of special biological significance can be one criterion to prioritize which studies should be funded. With additional funding, the BTF could also expand its benthic monitoring program to do more extensive study of other components of the ecosystem.

Testimony of MAS on BTF
Page Three

Another mandated responsibility the BTF must assume is developing criteria for evaluating adverse biological effects on the ecosystem. Violating standards developed by the BTF can terminate or modify OCS activities. These criteria should be developed at the earliest possible date since they will be an important safeguard to protect the Georges Bank fishery.

The BTF must also begin to evaluate all ongoing, North Atlantic studies. With this overall perspective, they could identify gaps in scientific research. The task force should also translate the results of the studies into a form or summary that would facilitate their use in the decision making process. The greatest impact to the marine environment will result from chronic and accidental discharges during the production phase; the BTF should look ahead and determine what baseline studies will be needed in order to enter the production phase.

But the most critical question about the environmental studies in the North Atlantic is how they are being used in the decision making process. That the environmental studies and lease sale decisions have not been coordinated is a major weakness in the OCS leasing process as it has been conducted in the North Atlantic and other areas. The Department of Interior has maintained a rigid leasing schedule that has not been sensitive to environmental concerns.

Rather than designate Georges Bank a marine sanctuary, the DOI instead compromised and created the BTF. Once created, the DOI chose not to fund it. It was not until the EPA required funding for the BTF as a condition for issuing the NPDES permits for Lease Sale 42 that DOI came through with funding.

The BTF began the monitoring program and other studies but DOI maintained its schedule without regard to the completion of these studies. The USGS began a study of sediment transport and water movement in the canyon area in 1981 but when DOI proposed Lease Sale 52, the canyon areas were included in the sale--even though results from the canyon studies were not yet available. The USGS is just now preparing the report on the first year data. If the court had not issued a preliminary injunction on the sale, canyon tracts would have been leased before the results of the scientific study could be used in making decisions. This is one example of how the leasing process is not

Testimony of MAS on BTF
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being coordinated with environmental studies; in fact, it is a typical example.

To conclude, the BTF serves an important function in the process of OCS development in the North Atlantic. The task force must expand its monitoring program to include future lease sale areas and must begin to fulfill its mandates to identify zones of biological significance and to develop criteria for evaluating adverse biological effects on the ecosystem, to evaluate all ongoing North Atlantic studies, and assess future study needs to prepare for additional lease sales and the possibility of entering the production phase. The most critical need, however, is for DOI to modify its leasing process to incorporate the results of the environmental studies into the decision making process.

Thank you for the opportunity to submit these comments.

James H.W. Hain
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East Falmouth, MA 02536
(617) 564-4449

Subcommittee on Oceanography
Committee on Merchant Marine and Fisheries
U.S. House of Representatives

A Statement for the
Field Hearing on Georges Bank Activities

Boston, MA

27 June 1983

By way of introduction, I am a resident of Massachusetts--my home is south of Boston on Cape Cod. Like many other people in the Woods Hole/Falmouth area, I am a Ph.D. oceanographer. My area of interest and expertise is with marine mammals and endangered species in the continental shelf waters of the northeastern United States. Most recently, I served as a staff scientist on the four-year Cetacean and Turtle Assessment Program at the University of Rhode Island, under contract to the Department of Interior environmental studies program.

My comments pertain to scientific research in relation to the Georges Bank leasing activities. In particular, they deal with the Department of the Interior environmental studies and monitoring programs.

My statements are based largely on the premise that the scientific facts are at the very base of the public and private planning and decision-making process. In other words, there is a whole chain of events that is set into motion by the leasing process. The administration, Congress, the states, the industry, and various opinion groups all play important roles. But, the decision and planning all depend on consideration and evaluation of essential facts and information. Much of this information comes from the studies and monitoring programs.

It is my view that environmental studies and monitoring here in the northeast have been exemplary. My comments are directed toward continuing this record:

1. The Department of the Interior notes that it has invested more than \$300 million in Outer Continental Shelf studies since 1973. At first glance, this may seem like quite a lot. On the other hand, when this figure is divided by ten years (since the program was initiated in 1973) and again by the five regions of the U.S. (Alaska, California, Gulf of Mexico, Southeast, Northeast), the size of the number decreases. This is further true when one considers that individual lease sales commonly generate more revenues than this, and that in several instances the monies received from the sale of individual tracts have approached this figure.

While the lease sales generate considerable revenues for the federal government, the utilization of those revenues should be considered. The environmental and monitoring studies should be firmly and squarely established as a central component of the OCS leasing and exploration process. Appropriations from the Congress to DOI should reflect a concern for, and a commitment to, this item. Certainly there should be no decrease in the commitment of the Congress to environmental concern and study. I am also in favor of the revenue-sharing plan directed to support of Coastal Zone Management activities of coastal states.

2. At a meeting in May, I understood that there were severe budgetary constraints in the DOI environmental studies program, and that an effect of Secretary Watt's accelerated leasing program was a reduced studies program. In my view, this seems contradictory and is contrary to reasonable and careful progress. The environmental studies should go hand-in-hand with the associated leasing activities.

3. I have the impression that the DOI is de-emphasizing pre-lease studies and instead beginning to focus on post-lease studies. The studies preceding leasing activities in an area are important to assessing environmental impacts and preparing the EIS. Particularly in upcoming lease areas where required or suggested studies have not taken place, it is my view that, as a general policy, leasing should not occur in the absence of such studies. Where appropriate, pre-lease environmental studies should definitely be continued.

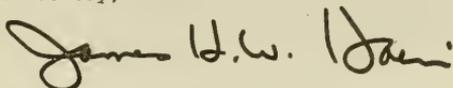
4. At present (and perhaps in the near future), we in the northeast are experiencing a lull or decrease in leasing activities. This is due in part to various court and legislative actions. My concern is that DOI will interpret this as a signal to correspondingly decrease the level of environmental studies--reasoning perhaps that since there is no leasing activity, there is no need for environmental studies. Assuming that there will be additional leasing activities in the future (an assumption I think most will recognize as probable), it is my view that this lull should be used to advantage. Needed studies should be initiated and/or carried forward, as appropriate. This is particularly true since very often studies require three or four years to produce useful results. Waiting until leasing activity again resumes and then calling for the required studies will not allow sufficient time for data collection. This may result in further delays or perhaps leasing activities proceeding in the absence of appropriate

environmental data. Therefore, simply stated, foresight and advance planning suggest that long-term studies not be tied too closely to the scheduling of shorter-term leasing activities. In many cases, the environmental studies need to be planned and in place well in advance of leasing activities.

In conclusion, I am requesting that the environmental studies and monitoring programs (along with the points I've raised with respect to them) be included among the items considered by this committee in its review of the Georges Bank exploration activities. It is my hope that Congress will make a renewed and continuing commitment to what is already a good record in this area.

Thank you.

Sincerely,

A handwritten signature in dark ink, reading "James H.W. Hain". The signature is written in a cursive style with a large, prominent initial "J".

James H.W. Hain, Ph.D.

Mr. D'AMOURS. The record will remain open for receipt and inclusion of their testimony in the record. We regret time didn't allow their oral testimony And that concludes this hearing. Thank you all for your attendance.

[Whereupon, at 1:40 p.m., the subcommittee adjourned.]

[The following was received for the record:]

STATE OF CALIFORNIA
 EXECUTIVE DEPARTMENT
 STATE PLANNING OFFICE

JOSEPH E BRENNAN
 GOVERNOR

RICHARD E BARRINGER
 DIRECTOR

June 30, 1983

The Honorable Norman D'Amours
 Rayburn House Office Building
 Room 2242
 Washington, DC 20515

Dear Representative D'Amours:

At the conclusion of my appearance before your committee on June 27, 1983 you asked for my and my fellow panel members' opinion as to changes in the standards for OCS decisions which the Congress might consider. In the pressures of time I was not able to provide the thoughtful answer which your question deserved. This issue is a most important one, and I would like to take this opportunity to expand somewhat on the changes which Congress should consider. I hope these comments reach you in time for inclusion in the record of the hearing.

Doug Foy suggested eight separate issues for consideration. I will take those issues as my point of departure, though not necessarily in the order in which Doug presented them.

1. Require Meaningful Resource Estimates. The resource estimates attached to Lease Sale 52 have become a major source of concern. It is important to understand how these estimates are derived, and what the limitations are in using them.

To develop these estimates, the Department of the Interior reviews its own and oil companies seismic survey data. This data is usually collected on a fairly wide geographic area. The data reveals to the geologist the presence or absence of geologic formations which may contain oil and/or gas. There are a wide variety of such formations, and identifying them in the seismic data is as much art as science.

Based upon the number and types of structures which a given interpreter finds, the geological information can be compared statistically to the past record of such formations in bearing oil or gas. It is this statistical comparison that leads to the resource estimates.

Any given type of structure will have had a varied history of containing oil and gas, and there will be a range of hydrocarbon potential for each structure type. These ranges can be statistically summed for all the structures identified in an area, and it is the mean or average of these summed ranges which constitute the resource estimate.

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This estimate is also "conditional" in the sense that the estimate is valid only assuming that oil or gas is present.

Resource estimates should thus be viewed as contained in the following context:

"If there is oil and gas present in an area, then on average we can expect there to be X amount of oil and Y amount of gas. There may be more or less than the average, or there may be none at all."

Statistics like resource estimates tend to be subject to two interpretations. Either they are ignored because of the conditions attached to them, or the conditions are ignored and the numbers are treated as if they were written in stone. Both approaches are equally mistaken.

The method of estimating potential hydrocarbon resources is well developed, and widely accepted in geology. The limitations on the estimates are in the quantity of data and skill of the data analysts. If you seek to assess the validity of the government's resource estimates, these are the areas where concentration should be focused. But the fundamental nature of the estimates as "best guesses based on past experience" should be fully appreciated.

2. Separate Exploratory and Production Leasing. This issue was extensively discussed during the OCS Lands Act Amendments debate. Those Amendments did clearly separate permitting between exploration and development, with specific state roles assigned at each stage. (The Coastal Zone Management Act also assigns state roles at each step.)

The problem with separate leasing is that the American OCS leasing system is based on auctions for the leases. This is a unique system in the world, and has numerous economic advantages which are well known. The system is based on the willingness of the private sector to pay the government often large sums of money for the right to drill. This accomplishes the public's need to have OCS exploration at lowest cost to the public. But there must be some assurance to the industry that if it finds resources, it will have the right to produce and sell those resources. Otherwise there is no incentive to begin any exploration.

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In short, separate leasing would be fundamentally at odds with the whole premise of the American OCS leasing system. The Congress might consider the system in place in other countries, such as Canada or Great Britain as alternatives, but it should be understood that any desire to completely separate production from exploration would entail moving to a different OCS leasing system.

3. Do not allow "economic cost cutting". This requirement is often explained in terms of requiring pipelines regardless of cost.

This approach sounds attractive, but it cannot be adopted in the absence of the full realization that the costs which are not "cut" are passed directly on to New England consumers. They are not born by the oil companies.

The question then becomes one of deciding whether consumers are to be required to pay higher prices for oil and gas than they would otherwise pay, or whether some risk is to be imposed on Georges Bank.

Congress may decide to impose the costs on consumers through such a requirement, but it should be prepared to defend its choice of doing so through an explicit finding that the incremental reduction in risks are greater than the increased costs to consumers.

4. Emphasize that oil and gas is only to be extracted if the natural resources of the area are protected. Ignoring for the time being the question of whether oil and gas are natural resources, this suggestion amounts to changing the balancing test of current law to a presumption against oil and gas and in favor of other resources. Such a presumption may be appropriate in certain circumstances, but applied universally it would radically alter the basic policy set forth in the OCSLAA.

A more appropriate change in the general balancing test might be to require that the Secretary of the Interior assure the maximum return to the nation from all the marine resources in the areas which he leases for oil and gas. This would set a national policy of attempting to make the best use of the oceans from all perspectives, including both fisheries and oil.

Choices could then be made about how to achieve best use. If conflicts were irreconcilable, preference would be given to the highest value resource.

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This change would entail a requirement that the Secretary of the Interior regularly consult with NOAA on how best to use marine resources. Such regular relationships between the agency responsible for oil and the agency responsible for fisheries can only improve OCS management.

5. Congressional exclusion of leasing in certain areas. Any Congressional action to limit leasing should be consistent with the balancing requirements contained in sections 18 and 19 of the OCSLAA or as modified as suggested above. Blanket exclusions of certain areas would not be consistent with those requirements.

However it may be appropriate to modify the standard somewhat for areas of unique ecological or commercial value, such as the canyons found on the Atlantic continental slope. In these areas, Congress could set a presumption against drilling in the absence of evidence that drilling would not be harmful. The Department of the Interior already has the authority to designate such areas in the stipulations attached to leases, although this authority has rarely if ever been exercised.

It should be recognized that limited drilling under closely supervised and monitored conditions might be necessary to discover whether harm would occur. In such areas, a small number of tracts, selected for both hydrocarbon potential and as part of a scientifically valid experimental design to examine the possibility of harm could be offered for lease. A special market for such tracts could be established, with the high bidder on all tracts winning the right to drill the first well, and other tract winners being allowed to hold off paying for their leases until a determination of environmental harm was made.

This system would be consistent with sound marine resource management, existing regulatory procedures, and existing leasing systems. Most importantly it would allow recognition of those unique and high value resources most deserving of special attention.

6. Limit the size of lease sales and spread out leasing. In the course of developing the concept of "areawide" leasing, the Department had agreed with a suggestion which Maine made two years ago that the "area" under consideration be that which had some potential for hydrocarbons. These areas are readily identifiable, and it was my impression that Secretary Watt had directed that sales would focus on these areas.

Unfortunately, the Department seems to be moving away from this idea. The Draft EIS for the next North Atlantic Offering lists the entire area as the preferred alternative. This attention to areas which Interior's own data shows to be of no geologic potential is most wasteful.

If Congress were to modify the leasing standards as I have suggested with regard to special areas, and in addition to limit attention to areas of geologic potential, there would be a significant improvement over the current system. Of course, the deletion of some areas such as that within 50 miles of shore would continue to be a necessity in some instances.

Such a system, combined with the kind of sound science which has been conducted so far, should allow leasing on approximately the schedule contained in the current Five Year Program. The New England states have consistently supported lease sales in the North Atlantic on a two year basis, and there is no evidence to date to indicate that recommendation is flawed.

It should be noted in this context, that the Department is currently planning to hold a lease sale in February, 1984, which could be within months of Sale 52, if the First Circuit Court of Appeals overturns the injunction against that sale. The Department has also allowed less than a year to plan this sale. Maine has deep concerns should the Department stick to its current plans to hold a sale in February, 1984.

In sum, the Committee should consider the following modifications to the OCS leasing system:

- Require the Secretary of the Interior to assure best use of all marine resources in making oil and gas leasing and permitting decisions.
- Limit leasing to areas with geologic potential for hydrocarbon potential.
- Designate areas where there would be a presumption against oil and gas development until an absence of harm could be demonstrated. Allow limited and closely watched leasing in these areas if necessary to establish the possibility of harm.

I hope these thoughts are useful to you and the Committee. I would be happy to provide additional information or assistance should you desire.

Once again, I would like to express my appreciation for your attention to these important issues.

Sincerely,



Charles S. Colgan
Senior Economist

cc: Rep. John McKernan
Douglas Foy
Pat Hughes
Jim Costakes

RADIOACTIVE WASTE DISPOSAL OVERSIGHT

WEDNESDAY, NOVEMBER 2, 1983

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON OCEANOGRAPHY,
COMMITTEE ON MERCHANT MARINE AND FISHERIES,
Washington, D.C.

The subcommittee met, pursuant to call, at 10 a.m., in room 1334, Longworth House Office Building, Hon. Norman E. D'Amours (chairman of the subcommittee) presiding.

Members present: Representatives D'Amours, Sunia, Boxer, Hughes, Tauzin, and Shumway.

Staff present: Howard Gaines, Mary Pat Barrett, Darrell Brown, Will Stelle, Margaret O'Bryon, Bob Deibel, and Becky Roots.

Mr. D'AMOURS. The subcommittee will come to order.

I am going to proceed at this time with my opening statement and we will get right into the testimony, except that lately the drill arranged here has been for someone to require a vote on the previous day's Journal, so we may well have to interrupt for 10 or 15 minutes shortly after we begin.

Today the Oceanography Subcommittee meets in an oversight capacity to receive testimony on the subject of radioactive waste dumping. Witnesses will include representatives from three Federal agencies—the Department of State, Department of Energy, and the Environmental Protection Agency, also Mr. Clifton Curtis will represent a coalition of environmental groups. In addition, the U.S. Navy and the National Oceanic and Atmospheric Administration have been asked to submit testimony for the record.

Among the topics we will hear testimony on this morning is the implementation of provisions enacted late in the 97th Congress and signed into law on January 6, 1983, which restricted any future issuance of ocean dumping permits for low level radioactive waste. These provisions included a 2-year moratorium on any such permit and a rigorous set of requirements, including affirmative congressional action, before any subsequent permit can be issued. These measures were adopted when the Congress became concerned about the increased interest of utilizing the ocean as a radioactive waste repository. More than a decade after the last radioactive waste was dumped by the United States, we saw proposals by DOE and the Navy to once again consider the ocean option and we learned that EPA was preparing draft revisions of ocean dumping regulations that would have relaxed the radioactive waste dumping criteria. All of this was coming at a time when this subcommittee had learned through a series of hearings that reliable information on past dumping was inadequate or nonexistent.

In enacting these measures Congress had two purposes in mind. First, we sought to provide needed time for additional research on the effects of radioactive waste dumping before any changes could be made in longstanding dumping policies. Second, we sought to give the Congress the ultimate responsibility for any such momentous policy changes. The question of possible future dumping of low-level radioactive waste continues to engender great concern among Members of the Congress. Therefore, I look forward to hearing about the impact these provisions have had on any continuing interest in the use of the oceans for disposal of low-level radioactive waste.

The second issue that the witnesses have been asked to address concerns the U.S. role in international policy decisions regarding radioactive waste dumping. I note that most of today's witnesses were with me last February at the most recent consultative meeting of the London Dumping Convention. At that time, the LDC contracting parties took up proposals to end international activities in radioactive waste dumping. In the end the parties agreed to a 2-year study of the issue. They also approved a nonbinding resolution urging a moratorium until the conclusion of the 2-year review. As many of you know, the U.S. delegation felt constrained to vote against that resolution. There is an honest difference of opinion as to whether we, in fact, had to oppose it. There can be little difference of opinion, however, over our delegation's failure to play a leadership role in shaping a resolution we could have supported.

Therefore, I look forward this morning to hearing about any subsequent reappraisals of our role in London and in future deliberations of that body on the radioactive waste issue. I look forward to hearing about the upcoming deliberations in the South Pacific concerning this same issue.

As I predicted, we have a vote on the Journal, which I will have to run to attend. I will be back within 10 minutes and we will begin at that time with the testimony. So we will stand in recess until that time.

[A short recess was taken.]

Mr. D'AMOURS. The hearing will reconvene. I want to ask unanimous consent and, therefore, order that the statements of Mr. Pritchard, Mr. Shumway, and Mr. Forsythe be included in the record.

[The statements of Mr. Pritchard, Mr. Shumway, and Mr. Forsythe follow:]

STATEMENT OF JOEL PRITCHARD, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WASHINGTON

Mr. Chairman, I would like to thank you for scheduling this timely hearing on the ocean disposal of radioactive waste material. The witnesses testifying today will provide us with the opportunity to ascertain what the current radioactive waste ocean disposal policy options are on both the Domestic as well as international Fronts.

This hearing will also give us a chance to focus on the following related issues: (1) what research has been initiated or completed on the effects of radioactive waste disposal at sea; (2) the technical and legal status of seabed disposal; (3) the effects of the radioactive waste amendments to the Ocean Dumping Act enacted in January, 1983; and (4) the United States Navy proposal to dump decommissioned U.S. Navy submarines off the United States coast, as well as the current status of the land disposal for radioactive waste.

These aforementioned issues are not easy, and I am hopeful that the witnesses today will provide us with useful information, and I look forward to receiving all of your testimony. Thank you.

STATEMENT OF HON. NORMAN D. SHUMWAY, A REPRESENTATIVE IN CONGRESS FROM
THE STATE OF CALIFORNIA

I would like to take this opportunity, Mr. Chairman, to commend you on your efforts in convening this subcommittee to hear testimony on the extremely sensitive matter of radioactive waste disposal. Further, I would like to express my appreciation to the expert panel of witnesses before us today for their concern with radwaste dumping as well.

There can be no doubt that disposal of radioactive waste has to be accomplished in a proper and responsible fashion. I look forward to hearing testimony on the domestic and international implications of ocean dumping—a particular form of radwaste disposal which has not been used in over ten years. In light of this nation's record of using alternate land-based methods, even the suggestion of change must require the utmost scrutiny our technology allows.

Of particular interest to me, Mr. Chairman, is the U.S. Navy's consideration to scuttle its aging nuclear submarine fleet off U.S. coasts. Present law forbids such action until at least 1985. I am especially pleased that the members of this subcommittee are being given every opportunity to review in a full and lengthy fashion any information pertinent to forthcoming Navy decisions. I am also confident that the Navy will go beyond normal procedures in its efforts to evaluate all conceivable factors associated with ocean dumping and its alternatives.

The draft environmental impact statement published in December of 1982 specified the waters off the coasts of North Carolina and northern California as possible dumpsites. The result in my California district was one of well founded concern. The prospect of having nuclear submarines dumped within several hundred miles of one's home is frightening. However, the provisions included in the Surface Transportation Assistance Act of 1982 which amend the Ocean Dumping Act set proper and stringent guidelines for careful congressional review before this could occur. It is our job today, to begin this careful review.

Again, Mr. Chairman, I thank you.

STATEMENT OF HON. EDWIN B. FORSYTHE, A REPRESENTATIVE IN CONGRESS FROM THE
STATE OF NEW JERSEY

Mr. Chairman, I appreciate the opportunity to participate in today's oversight hearing on ocean disposal of radioactive waste. I applaud you, Mr. Chairman, for your commitment and interest in this area.

Ten months have passed since Congress imposed the two-year moratorium on the ocean dumping of low-level radioactive waste. The purpose of the moratorium was to give the regulatory agencies, the scientific community, and Congress necessary time to further assess the effects of ocean dumping of radioactive waste, U.S. programs and activities in this area, and appropriate policy and management responses to the issues and concerns raised. The hearing today is part of that process. The ocean dumping of obsolete nuclear submarines and radioactive soil, subseabed disposal, as well as international radioactive waste dumping activities are all related issues of great concern of many Members of this Subcommittee.

This whole matter of using the oceans as the repository of man's every increasing pile of waste is one of the most difficult that we on this Subcommittee must address. I welcome the witness who will be appearing before us this morning and look forward to learning about your activities and concerns related to the ocean dumping of radioactive waste.

Mr. D'AMOURS. I understand that this panel has its own batting order for presenting testimony, so we certainly can accommodate your own desires in that respect.

We are going to hear from the State Department, from the Department of Energy and EPA. I am going to request and require that the witnesses confine their statements to 10 minutes, which means you will have to summarize as best you can your written statements, otherwise there won't be time to complete this hearing

in the time that we have allotted. If anybody has any particular hardship with that 10 minute rule, we will be glad to accept applications for hardship exemptions, but only upon application. Otherwise, we will expect that the testimony will be completed in 10 minutes.

So with that, and as determined by whatever batting order, you would like to select, go ahead.

STATEMENTS OF MARY ROSE HUGHES, DEPUTY ASSISTANT SECRETARY FOR ENVIRONMENT, HEALTH AND NATURAL RESOURCES, DEPARTMENT OF STATE, ACCOMPANIED BY SCOTT HAJOST, LEGAL ADVISERS OFFICE, AND DAVE SCHIELE, INTERNATIONAL RELATIONS OFFICER, OFFICE OF ENVIRONMENT AND HEALTH; GLEN SJOBLUM, DIRECTOR, OFFICE OF RADIATION PROGRAMS, ENVIRONMENTAL PROTECTION AGENCY, ACCOMPANIED BY TUDOR DAVIES, ACTING DEPUTY ASSISTANT ADMINISTRATOR FOR WATER, EPA; MICHAEL LAWRENCE, ACTING DEPUTY DIRECTOR, OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT, DEPARTMENT OF ENERGY, ACCOMPANIED BY JOHN E. BAUBLITZ, DIRECTOR, DIVISION OF REMEDIAL ACTION PROJECTS, DEPARTMENT OF ENERGY

STATEMENT OF MARY ROSE HUGHES

Ms. HUGHES. Thank you, Mr. Chairman.

I will lead off for the Department of State. My name is Mary Rose Hughes, I am Deputy Assistant Secretary of State for Environment, Health and Natural Resources. Accompanying me today from the State Department is Mr. Scott Hajost, of our Legal Adviser's Office, and Mr. David Schiele, of our Office of Environment, Health and Natural Resources.

I will summarize where I can, although I believe my prepared statement is very succinct and I ought to be able—

Mr. D'AMOURS. Your statement is rather short. You could probably read it in 10 minutes. That is your choice.

Ms. HUGHES. With your permission, I propose to do that.

Thank you again, Mr. Chairman, for this opportunity to see you again and to appear before the subcommittee to discuss the activities of the Department of State regarding ocean disposal of radioactive waste.

I propose to cover the following areas in my prepared statement:

First, the administration response to proposals to ban all ocean disposal of radioactive wastes, and followup to the relevant decisions taken at the consultative meeting of the parties to the London Dumping Convention in February 1983;

Second, preparations for a meeting of legal experts to discuss seabed emplacement of high level radioactive wastes and;

Third, U.S. participation in negotiations for a marine environment convention for the South Pacific region, in which there is a proposal for a regional ban on storage, dumping or other disposal of radioactive wastes.

You are already informed of the decisions that took place at the February 1983 meeting of the London Dumping Convention. Let me summarize that the issue at that time was a proposal by the Pacific Island States of Kiribati and Nauru to amend the annexes

of the London Dumping Convention. These amendments, if adopted, would have banned all ocean dumping of radioactive wastes. It was the position of the United States that documentation submitted in support of the proposal did not provide the required scientific or technical justification required under the terms of the convention and that the question should be reviewed to determine whether a ban was warranted on scientific or technical grounds. This position was accepted by consensus, with approval of a decision calling for a 2-year review of the question.

The delegation of Spain then introduced a resolution calling for a suspension of all radioactive waste dumping pending the outcome of the review.

The U.S. delegation was unable to support this resolution on the grounds that it prejudged the outcome of the study, the very purpose of which was to determine whether the dumping of low level radioactive waste was harmful to the marine environment, and was an attempt to circumvent the procedural requirements contained in article XV(2) that amendments to the convention annexes be based on scientific or technical considerations. The resolution, which is nonbinding, was approved by a majority of those present and voting—19 in favor, 6 opposed, 5 abstentions.

A scientific and technical review of the merits of ocean disposal of radioactive waste is now in progress in accordance with the decision of the consultative meeting of the parties to the London Dumping Convention in February. The International Maritime Organization (IMO) and the International Atomic Energy Agency (IAEA) invited the interested parties to submit relevant documentation for consideration by a group of experts which met at IAEA headquarters in September 1983. These experts, who represented a number of international organizations with a particular interest in the area, prepared a bibliography of relevant reference material for the use of an intergovernmental group of experts scheduled to meet in 1984 to review the merits of proposals to ban all radioactive waste dumping and make a recommendation to the next consultative level meeting in February 1985.

The State Department has been concerned over the limited progress which has been made in implementation of the decision calling for a 2-year study. We and other agencies would have strongly preferred that the September 1983 meeting go beyond the compilation of a bibliography, for example, by also addressing possible draft terms of reference for the 1984 intergovernmental meeting, or considering ways and means of encouraging involvement in the review by technical specialists from as many countries as possible.

This was not the case, however, and these questions will have to be dealt with at the February 1984 meeting of the contracting parties to the London Dumping Convention. We intend to pursue the matter vigorously in our preparations for the February meeting and to do everything possible in the coming months to facilitate a timely and professional review of the data so that a sound recommendation can be made to the London Dumping Convention contracting parties for action in February 1985.

I emphasize that the State Department is working closely with other interested agencies in the executive branch to insure that the administration position fully reflects our concern that the scientific

review be comprehensive and subject to an aggressive timetable that will insure its completion on schedule.

As part of this interagency process, the State Department has participated in a series of policy level meetings aimed at directing U.S. participation in the London Dumping Convention. Subgroups have been established on radioactive waste matters, other scientific matters, legal questions, and congressional liaison.

Related to the general issue of the effects of radioactive waste disposal on the marine environment, the Nuclear Energy Agency, part of the OECD, monitors dumping operations in the Northeast Atlantic dumpsite. The NEA is engaged in a study of the suitability of that site for use beyond 1984 and will report to the London Dumping Convention on the results of that study. This information will improve our understanding of the effects of radioactive waste dumping and will assist the parties in reaching a solution regarding the proposed ban.

On the separate question of seabed emplacement of high level radioactive waste, I should note immediately that we defer to the Department of Energy for a discussion of the technical aspects of the question. Department of State interest centers on the international research coordinated by the NEA and on the important question as to how the concept of seabed emplacement fits in with United States obligations under the London Dumping Convention. The NEA coordinated research is intended to determine the technical feasibility of permanently disposing of high level radioactive waste by placing it below the seabed.

We are now participating in an interagency process in anticipation of a London Dumping Convention sponsored meeting of legal experts, scheduled for December 12 to 14, 1983, which will focus on the question of whether seabed emplacement is "dumping" as the term is defined in the London Dumping Convention. The meeting will also consider possible mechanisms under the convention to control the seabed emplacement of high-level radioactive waste.

As I have stated, there is a coordinated international effort to determine the feasibility of disposal of high level radioactive wastes by placing them under the seabed. It is our understanding that it may be possible by 1990 to state whether sub-seabed emplacement is technically feasible and to define the risk to the marine environment. The Department of State favors continuation of this research and we expect the position of the United States at the December meeting to advance this objective.

It is our view that if the concept is determined to be technically feasible and if it is environmentally acceptable in accordance with our obligations under the London Dumping Convention to protect the marine environment, then consideration should be given to what changes, if any, may be required in the London Dumping Convention to provide a framework for the environmentally safe application of the concept.

There is little more detail that I can add at this point. As I have indicated, the technical expertise is outside the Department of State and we are still in the process of developing position papers for the December meeting. We will, however, be pleased to brief the subcommittee as specific positions are finalized.

A third subject area that I would like to cover today is negotiations on a convention for the protection and development of the natural resources and environment of the South Pacific region. The convention has a draft protocol on dumping and a draft protocol for cooperation to combat oil spills. The convention and protocols are part of a series of agreements negotiated under the Regional Seas Program of the United Nations Environment Program.

The concept is that the regional conventions should establish general obligations to promote environmentally sound development and to protect the marine environment in the respective regions. Specific obligations are then spelled out in individual protocols. The United States supports the concept and in March 1983 we signed a Convention for the Protection of the Marine Environment of the Wider Caribbean Region and a protocol on cooperation to combat oil spills.

Negotiations for the South Pacific agreement started in January 1983, in Noumea, New Caledonia. The second negotiating session is scheduled for November 7-16, also in Noumea.

A major difference between the draft agreement for the South Pacific and the agreement covering the Caribbean region—and the reason I raise the matter today—is that a number of states in the region wish to incorporate into the South Pacific agreement a ban on the disposal or storage of radioactive wastes. The U.S. delegation to the January negotiating session reserved its position regarding the proposed ban. The delegation indicated that the United States was not disposing of radioactive wastes in the ocean and had no future plans to engage in such dumping in the South Pacific.

The United States particularly emphasized the recently enacted amendments to the MPRSA suspending for 2 years EPA authority to issue permits for low level radioactive waste dumping and establishing strict criteria for later issuance of such permits. The delegation pointed out that the question of a worldwide ban on radioactive waste dumping would be discussed by the parties to the London Dumping Convention in February and that we considered this to be the best forum to discuss the issue.

As I have already indicated, the result of the London Dumping Convention meeting was the initiation of an international effort to determine whether a ban on radioactive waste dumping is warranted on technical or scientific grounds. We are participating fully in this effort. If it becomes apparent that low level radioactive waste dumping constitutes a threat to the marine environment, then we would support a ban on the activity.

This has not been established, however; nor has it been established that a special situation exists in the South Pacific region, which would provide a technical or scientific basis for a regional ban. Accordingly, the delegation to next week's meeting in Noumea will state the position that it is not appropriate to include a ban in the convention.

I emphasize that we are interested in bringing the negotiations for the South Pacific convention to a successful conclusion as soon as possible. We have been engaging in consultations with other participants in the negotiations in an attempt to bridge the differences among the parties before the formal negotiating session next week. It remains to be seen, however, whether it will be possible at

that meeting to reach agreement on the provisions relating to the storage and disposal of radioactive waste. In any event, we will be working toward early agreement on a convention which will serve the mutual interests of all the states of the region.

Mr. Chairman, thank you once again for the opportunity to appear before your subcommittee. I would be pleased to answer whatever questions you may have.

Mr. D'AMOURS. Thank you, Mary Rose. You made it in less than 11 minutes. That is very good.

We are going to withhold questions, of course, until the entire panel has testified, and we will next hear either from Glen Sjoblom, or Mr. Michael Lawrence.

STATEMENT OF GLEN SJOBLOM

Mr. SJOBLOM. Mr. Chairman, members of the subcommittee, I am Glen Sjoblom, Director of EPA's Office of Radiation Programs, and with me on my left is Mr. Tudor Davies, who is the Acting Deputy Director of the Office of Water.

I appreciate the opportunity to bring the committee up to date on the activities, both domestically and in the international scene, of the EPA, regarding disposal of radioactive waste in the ocean.

As the chairman indicated, the two key events in the past year have been the amendments to the Marine Protection Research and Sanctuaries Act and the adoption at the London Dumping Convention of the nonbinding resolution, as well as a chartering of an international scientific review of the merits of sea disposal.

The Marine Protection Research and Sanctuaries Act requires EPA to establish and apply criteria for reviewing and evaluating permit applications for ocean disposal of waste materials not prohibited by this act, including low level radioactive wastes. We have had studies underway since 1974 to help provide a scientific basis for evaluating any such permit applications.

I would like to review EPA's continuing and new research studies. I will paraphrase my statement, Mr. Chairman, because it is as you know, quite extensive.

Mr. D'AMOURS. That would be appreciated, Mr. Sjoblom, and your entire statement, as all statements, will in their entirety be printed in the record just as they have been submitted.

Mr. SJOBLOM. Thank you.

We have a number of national laboratories working for us in this area and I would like to briefly touch on a few of these, especially emphasizing the new work we have undertaken.

Lawrence Livermore National Laboratory in California is gathering and has been gathering data on radioactivity in marine biota and evaluating possible biological effects on marine organisms that may result from low levels of radiation exposure.

In the area of new research, this laboratory is investigating new methods for observing changes in marine organisms at various radiation levels. Such measures we hope could supplement normal radiation dose model predictions and possibly provide another effective monitoring technique.

Since 1980, the Brookhaven National Laboratory has conducted a number of studies and provided technical expertise to EPA and

predominantly their work relates to the performance of packaging materials. We have recently published a document and sent it out for review regarding sets of possible criteria for packaging of low level radioactive waste.

The Pacific Marine Environmental Laboratory, which is a NOAA laboratory, is helping us in examining the critical erosion velocity that could suspend particles that might contain radionuclides in the vicinity of the dumpsite. This is one of the critical parameters; that if the water velocity is low enough, then particles would not be suspended and would then stay in the dumpsite. We are interested in developing a device to measure what that critical erosion velocity might be. We hope to test that at sea in the near future.

Another new and interesting scientific project is starting at EPA's Environmental Research Laboratory in Narragansett, R.I., and as well in the nearby Marine Ecosystem Research Laboratory at the University of Rhode Island. There is a unique facility located there, which includes large tanks of seawater in which all seasonal variations of Narragansett Bay can be duplicated. The tanks contain natural sediments and marine organisms and can on land basically reproduce the ecosystem; not precisely, but as well as we know how.

Various pollutants can be added to these mesocosms, as they are called, to observe their fate and allow predictions of the consequences which might result from disposal in ocean waters. EPA is interested in evaluating whether or not this is a useful technique for determining the environmental effect of radioactive materials.

As you know, the EPA completed in September 1982 a comprehensive survey of Massachusetts Bay, an old dumpsite which was used in which about 2 percent of the former dumped U.S. radioactive wastes were dumped. We have completed an analysis of all of the collected samples of sediment, biota, water, and commercial and noncommercial species of seafood, and we found no radioactivity above normal background levels. This data was presented at an international symposium in Seattle in May of this year. The detailed data will be published, of course.

Attached to my testimony is a list of 37 reports and publications on EPA's ocean surveys and laboratory studies that have been completed to date, including 13 that have been published in the last year and a half. We have provided these to the staffs.

Our marketplace seafood monitoring is a joint effort between EPA and the Food and Drug Administration. We have sampled marine commercial seafoods from three cities in the vicinity of where the old dumpsites were because we feel that this is the most likely way to monitor any possible pickup. A total of 36 samples have been collected so far and only normal levels of background activity were detected.

In December 1982 the Navy Department released its draft environmental impact statement on the disposal of decommissioned, defueled naval submarine reactor plants. This document compared environmental impacts of land and sea disposal of defueled submarine reactor plants. EPA organized a team of 30 technical specialists to thoroughly review this environmental impact statement, including experts in oceanography, radioecology, ocean modeling, sta-

tistics, bioeffects, geology, radiochemistry, radiation dosimetry, corrosion, economics, and other matters.

These experts came from within the EPA, the National Laboratories that are doing various studies for us, or were hired from outside these already existing avenues to provide additional expertise.

EPA gave this environmental statement a careful review, because it represents the first serious consideration of ocean disposal of radioactive materials that has been submitted to EPA since we were given responsibility under the act in 1972. EPA initially submitted extensive comments to the Navy Department on June 29 and additional comments on July 29.

The amendments to the Marine Protection and Sanctuaries Act, as contained in the amendment to the Highway Improvement Act, were similar to language proposed earlier in House Rule 6113. The agency's views on this bill were provided in earlier testimony last year. We understand from the Congressional Record that these amendments—and you reiterated that, Mr. Chairman, this morning—were passed to allow additional information to be gathered from research such as I have been describing, and allow this to be done in a calm way.

While EPA is continuing studies and has added some new research to establish an improve scientific understanding, the net effect of the amendments may be actually to discourage research that would be beneficial to answering the difficult questions regarding potential fate and the impact of radioactive materials in the ocean.

A potential permit applicant has to evaluate whether the effort required to meet requirements is worth the cost in view the likelihood of Congress taking an action within 90 days. The whole effort could be nullified at considerable loss to the applicant and EPA by Congress simply not taking an action in the time required. If ocean disposal cannot be considered a reasonable alternative for practical purposes, then only land disposal options will be considered. Since we in EPA have also to be concerned with environmental protection of our land, and our food resources, we favor an approach to waste management that allows consideration of all reasonable disposal options consistent with our international obligations and a careful evaluation of the environmental effects of those options.

Such a waste management approach would allow waste disposal decisions that optimize protection for all parts of the environment.

I might add, the Environmental Protection Agency is currently involved in development of standards for the land disposal of both low level and high level radioactive wastes, so we are very much involved with all phases of this work.

Turning to the international effort, EPA has taken the initiative to periodically convene an interagency group of experts on policy level people to consider what we might do to develop our positions for future LDC meetings. One of the areas has been organized in a radiation work group. This group has met several times to consider the actions the United States should take. We developed in response to the Secretariat a list of documents and submitted them to the IMO and to the International Atomic Energy Agency. We intended to be involved fully in the international scientific review over the next 2 years.

During the last year and a half the International Atomic Energy Agency has hosted several meetings of technical experts to deal with technical issues related to ocean disposal. One such meeting was convened to provide guidance to contracting parties on environmental assessment methodologies for sea dumping. The United States provided several key experts in this area.

In July 1983, the IAEA hosted an advisory group to attempt to define the de minimus quantities of radioactive material that could be exempted from special permits under the convention. EPA participated in that. Recognizing that all radioactive materials contain some level of radioactivity, either from natural occurring radionuclides or or fallout, there is no such thing technically as nonradioactive materials, therefore, what EPA is assisting IAEA to do is to define "de minimus" so that we don't have to consider permit application for essentially nonradioactive materials.

There is a coming meeting in—

Mr. D'AMOURS. It has been 15 minutes, Glen. I will have to ask you to summarize as best you can.

Mr. SJOBLOM. Let me summarize then. EPA believes there is a continuing need for research to improve our scientific understanding of the ocean. Consequently, we have actively supported both domestic and international programs for this purpose and we are continuing to support new activities.

For an integrated approach to radioactive waste management we need to understand how radioactive materials may affect all parts of our environment. Although EPA has made no decisions on the merits of such disposal in the ocean, we share the concerns for protection of our oceans. For this reason, we have already put in our 1977 regulations very restrictive requirements for packaging of radioactive materials to assure the safety of marine ecosystems.

We have monitored all dumpsites. It has been through EPA research initiatives, both domestically and internationally, that we have the improved scientific basis and state of the art technology for assessing ocean disposal of radioactive materials.

In this regard, we suggest reconsideration of the requirements for a joint resolution of Congress to authorize EPA to issue permits. Perhaps this could be logically considered following the completion of the international scientific review of the merits of ocean disposal of radioactive materials. In the meantime, we will fully implement the act as written as well as our obligations under the radioactive waste and continue to carry out to the best of our ability the domestic and international activities I have described.

[The statement of Mr. Sjoblom follows:]

STATEMENT OF
GLEN L. SJOBLUM, DIRECTOR
OFFICE OF RADIATION PROGRAMS
U.S. ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE
SUBCOMMITTEE ON OCEANOGRAPHY
OF THE
COMMITTEE ON MERCHANT MARINE AND FISHERIES
UNITED STATES HOUSE OF REPRESENTATIVES

November 2, 1983

Mr. Chairman and Members of the Subcommittee:

I am Glen L. Sjoblom, Director of the EPA Office of Radiation Programs. With me today is Raymond Johnson, our project leader for ocean disposal regulations and ocean monitoring for low-level radioactive wastes. I appreciate the opportunity to bring this Subcommittee up to date on programs of the Environmental Protection Agency involving domestic and international activities related to the ocean disposal of radioactive materials.

During the past year, two important events have occurred that may have considerable significance for the future of ocean disposal as a viable alternative for radioactive wastes. Nationally, legislation was enacted on January 6, 1983, to amend the Marine Protection, Research,

and Sanctuaries Act to limit EPA authority for issuance of ocean disposal permits for low-level radioactive wastes for a two-year period, except for research purposes. These amendments also include detailed requirements for any permits to be considered after the two years. At the international level, the Contracting Parties to the London Dumping Convention (LDC), in February 1983, agreed by consensus to undertake a two-year review of the scientific basis for the ocean disposal of radioactive materials. In addition, a nonbinding resolution was passed calling for the suspension of all dumping at sea of radioactive materials until presentation of the report on the scientific review to the Contracting Parties. Both of these events reflect concerns at national and international levels for preventing possible contamination of the oceans from sea disposal of radioactive materials. The Environmental Protection Agency shares these concerns and has taken steps in our domestic and international programs to assure that factors key to protection of the marine environment and public health will receive careful scientific evaluation. My testimony today will review the status and purpose of these ongoing Agency programs.

DOMESTIC PROGRAMS

The Marine Protection, Research, and Sanctuaries Act requires EPA to establish and apply criteria for reviewing and evaluating permit applications for ocean disposal of waste materials not prohibited by

the Act, including low-level radioactive wastes. Although EPA published criteria for radioactive materials in 1973 as a draft and as final ocean dumping regulations in 1977, this Agency has not yet received a permit application for such materials. Consequently, we have not made any decisions on the acceptability of ocean disposal of radioactive materials by the United States. We have had studies underway since 1974 to help provide a scientific basis for evaluating permit applications. These include studies performed for us by national laboratories, universities, and private contractors and surveys of old U.S. ocean dumpsites for radioactive materials. I will briefly review EPA's continuing and new research studies.

Lawrence Livermore National Laboratory (LLNL)

Lawrence Livermore National Laboratory in Livermore, California, is gathering data on radioactivity in marine biota and evaluating possible biological effects on marine organisms that may result from low levels of nuclear radiation.

LLNL has been compiling a comprehensive report for EPA from a literature survey of background concentrations of selected radionuclides in sea water, sediments, and marine fish and invertebrates. This report will also include laboratory and field-derived bioconcentration factors for these marine biota. Such data will allow us to estimate the amount of radioactive materials that marine organisms could accumulate in relation to a given amount in the

water. It can also serve as a reference base to compare any future measurements we or others may make as part of environmental monitoring programs.

In the area of new research, the LLNL is investigating new cytogenetic methods for observing chromosome changes in marine worms related to various radiation dose levels. These studies are concerned with very low radiation doses that might be associated with ocean disposal of low-level radioactive waste and that are below radiation dose levels at which chromosome changes can be observed by traditional methods. This new technique detects chromosome changes by sister chromatid exchange, and we hope to perfect this technique as a tool for monitoring biological responses to radiation at levels well below those representing any potential harm to marine organisms. Such measurements could supplement normal radiation dose model predictions and perhaps provide another effective monitoring technique. Further studies are needed to evaluate the technique in relation to continuous radiation exposure to marine worms and radiation exposures for radionuclides ingested within the organisms, in contrast to external exposures.

In addition, the LLNL has been tasked by EPA to provide radionuclide analysis assistance to an international research and environmental surveillance program. This is part of the U.S. contribution to the Nuclear Energy Agency's efforts to monitor the

North East Atlantic dumpsite for radioactive materials. This international program, involving 12 countries, will be described in detail later in this testimony.

Brookhaven National Laboratory (BNL)

Since 1980, the Brookhaven National Laboratory has conducted a number of studies and provided technical expertise to assist the EPA Office of Radiation Programs. This assistance has included technical peer reviews of EPA contractor reports on ocean dumpsite surveys, technical advice on international monitoring programs, and identification of cost factors applicable to the evaluation of ocean disposal as an alternative for low-level radioactive wastes.

BNL has provided especially important information on packaging of radioactive wastes for ocean disposal, including the analysis of radioactive waste drums recovered from the three major dumpsites used by the United States in the past. In addition, BNL has developed radioactive waste packaging performance criteria for each component of waste packages, including the waste container, the waste, and the solidification matrix. BNL has evaluated specific solidification agents and packaging techniques in relation to these packaging performance criteria. This task includes evaluation of recent international progress and of emerging technologies for materials not yet applied to packaging for low-level radioactive wastes. BNL has also evaluated the intrinsic containment performance of metals with

induced low-level radioactivity.

Battelle/Pacific Northwest Division (BPND)

The Battelle/Pacific Northwest Division has been funded by EPA to provide scientific expertise in radiation protection and oceanographic sciences for technical guidance to U.S. delegations to international meetings of the London Dumping Convention, the Nuclear Energy Agency, and the International Atomic Energy Agency. This is to assure that the U.S. will bring to bear the best available technology for developing U.S. positions and contributions to these meetings.

Pacific Marine Environmental Laboratory (PMEEL)

Additional new research that EPA is supporting includes studies of critical threshold erosion velocities for sediments through an interagency agreement with the National Oceanic and Atmospheric Administration's Pacific Marine Environmental Laboratory and a subcontract with the University of South Florida. The current velocity necessary to resuspend sediment particles lying on the ocean bottom is known as the critical threshold erosion velocity. This is the current velocity at which sediments and any adsorbed radionuclides could be picked up by ocean currents and be carried away from a dumpsite. This

study includes the development and field testing of a device called a SEAFLOUME, which is designed to measure critical threshold erosion velocities at desired locations on the ocean bottom.

Marine Ecosystem Research Laboratory (MERL)

Another new and interesting scientific project is starting at EPA's Environmental Research Laboratory at Narragansett, Rhode Island, and the nearby Marine Ecosystem Research Laboratory of the University of Rhode Island to include consideration of radioactive materials in the development of EPA's approach to marine hazard assessment. This is part of EPA's effort to establish data requirements for ocean disposal permits and criteria for permit review for all types of wastes.

MERL has a unique facility that includes large tanks of sea water in which all seasonal variations of the Narragansett Bay can be duplicated. These tanks contain the natural sediments and marine organisms found in the Bay, to reproduce the Bay's ecosystem on a small scale called a mesocosm. Various pollutants can be added to these mesocosms to observe their fate and allow prediction of consequences which might result from their disposal in ocean waters. EPA is interested in evaluating the usefulness of mesocosm studies for determining the environmental impact of radioactive materials in ocean waters in conjunction with review of permit applications for the ocean disposal of such materials. Mesocosm studies will be used to test data requirements for exposures and effects that EPA is developing for

evaluation of permit applications. The information from mesocosm studies may also help us to design ocean monitoring criteria and to develop approaches to dumpsite designation.

Massachusetts Bay Dumpsite Survey

In September 1982, EPA conducted a comprehensive survey of Massachusetts Bay to determine the environmental effects of radioactive waste disposed in the Bay between 1946 and 1959. During those years, about 4000 waste packages containing about 2400 curies of radioactivity were dumped in a designated two mile diameter site about 15 miles out from Boston, in water about 300 feet deep. These disposals represent only about two percent of the total radioactive materials disposed of in the ocean by the United States. However, this dumpsite is in the shallowest water, is closest to land of any dumpsite, and is in an area of commercial fishing.

Prior to the 1982 survey, EPA gathered preliminary data on environmental conditions in the Bay with assistance from the National Oceanic and Atmospheric Administration (NOAA). In the summer of 1981, NOAA collected several sediment and fish samples from around the Bay, which were sent to EPA's Eastern Environmental Radiation Facility (EERF) in Montgomery, Alabama for radionuclide measurements. To assist in the design of a comprehensive survey, EPA requested NOAA to conduct side-scan sonar surveys in September 1981 to locate objects on the

ocean floor in the designated dumpsite and adjacent areas. NOAA did locate large numbers of objects in these areas; however, side-scan sonar signals can not distinguish radioactive waste containers from the multitude of other industrial wastes, dredge materials, and building demolition rubble disposed of in the site over the last 50 years or more. The side-scan data did provide information to determine where to collect sediments and biota for detecting radioactive materials that might have leaked from containers and to look for possible radioactive containers with underwater television.

During 1981, EPA also gathered all the information possible regarding disposals of radioactive materials in Massachusetts Bay from interviews with the people involved. These interviews included Mr. George Perry and Mr. John Santangelo, who were co-owners of Crossroads Marine Disposal, the only company licensed by the Atomic Energy Commission for disposals in the Bay. We also interviewed staff at the Massachusetts Institute of Technology, which was a source of nuclear wastes, and researched their files, as well as those of the Army Corps of Engineers and the Coast Guard. The most useful records were the licensee files retained by the Nuclear Regulatory Commission.

EPA used its ocean survey vessel, ANTELOPE, for conducting the Massachusetts Bay radiological survey in September 1982. The main emphasis of this survey was to collect a large number of sediment, marine biota, and water samples to detect the presence of any radioactivity that might be attributed to past dumping. We also used

an underwater gamma radiation detector to measure radioactivity directly on the ocean bottom. In addition, we attempted to observe waste containers with underwater television, but this had limited success. The scientific crew on this survey included members of EPA's Office of Radiation Programs, EPA's Water Office, the NOAA Office of Oceanography, the NOAA National Marine Fisheries Service, the Massachusetts Department of Public Health, the Massachusetts Division of Water Pollution Control, the staff of the U.S. House of Representatives Subcommittee on Coast Guard and Navigation, the Battelle New England Marine Laboratories, and Science Applications, Inc. of Newport, Rhode Island.

The total samples collected in this survey included 116 sediments, benthic and demersal biota from 30 trawls, 14 mid-water collections for nektonic and planktonic biota, 5 water samples, 12 measurements of radioactivity on the ocean bottom, 14 nautical miles of underwater television coverage on videotape, and 27 nautical miles of side scan sonar survey. The biota included 18 species of commercial seafoods and 9 noncommercial species. During the survey about 100 samples were selected for preliminary radiation measurements onboard the ship. All of these samples showed only normal background levels of radioactivity. All samples collected have subsequently been analyzed in greater detail by EPA's laboratory in Alabama. Preliminary data from this survey was presented in a paper at the International Conference on Radiactive

Waste Management in Seattle, Washington, May 1983. This paper concluded that the Massachusetts Bay survey showed no evidence of harm to human health or the environment resulting from past disposals of radioactive materials in the Bay. All of the detailed data and analyses will be reported in early 1984.

Reports of Ocean Surveys and Studies

Since 1974, EPA has conducted surveys of the four dumpsites at which more than 97 percent of the past U.S. ocean disposals of radioactive materials took place. In addition, as noted earlier in this testimony, EPA has supported studies at several national laboratories and universities. These surveys and studies have involved over 30 contracts and interagency agreements, each of which has required one or more reports. EPA's normal procedure after receiving final contractor reports is to have the reports carefully peer reviewed for technical quality by several scientific experts. We normally print 100 to 200 copies with an EPA code number and send copies to the National Technical Information Service (NTIS) for public distribution. In addition, these reports are provided to a list of interested persons, including Committee staff. The results of many of the EPA-funded studies have also been published in scientific journals or the proceedings of technical conferences. Attached to this testimony is a listing of 37 reports and publications on EPA's ocean surveys and laboratory studies completed to date, including 13 in the last year and a half.

Marketplace Seafoods Monitoring

EPA and the Food and Drug Administration initiated a program in 1981 for radioanalysis of commercial seafoods from three cities near the major formerly used U.S. ocean dumpsites, namely, San Francisco, California; Atlantic City, New Jersey; and Boston, Massachusetts. Samples were obtained at dockside from fishermen who fished in the vicinity of these dumpsites and were bringing their seafoods to the marketplace. Radioactivity measurements of these seafoods were made at the FDA Winchester Engineering and Analytical Center in Winchester, Massachusetts, and at the EPA Eastern Environmental Radiation Facility in Montgomery, Alabama. Since the food chain is the only significant way in which radioactivity from these old dumpsites could reach man, such sampling and analyses are the simplest way to determine the significance to man of these earlier operations. A total of 36 samples have been collected so far, and the analyses indicate only "normal" background levels of radioactivity. Because no significant radioactivity has been found in these seafoods, the FDA decided in 1983 that further analyses by their laboratory would not be warranted. However, we anticipate that the FDA will be able to continue collecting marketplace seafoods for analysis by EPA to allow detection of any

long-term environmental trends in radioactivity levels. EPA and FDA are working together now to produce a report on the samples collected through 1983.

Coordination with NOAA

In September 1981, EPA and NOAA completed a draft "Program Plan for Monitoring Radioactivity in the Oceans." This plan defined objectives in four areas: 1) baseline monitoring, 2) dumpsite assessment monitoring, 3) public health monitoring, and 4) research to improve monitoring. Since that time, EPA has initiated several parts of the monitoring plan, including the marketplace seafood program and the survey of Massachusetts Bay as discussed previously.

EPA is currently working with NOAA's National Marine Pollution Program Office to develop a plan for federal research and monitoring concerning ocean disposal of radioactive waste. This effort is to help NOAA update research and monitoring requirements in their existing five-year "National Marine Pollution Program Plan, 1981-1985."

Navy EIS Review

In December 1982, the Navy Department released for review their "Draft Environmental Impact Statement on the Disposal of Decommissioned Defueled Naval Submarine Reactor Plants." This document compared the environmental impacts of land and sea disposal of defueled submarine

reactor plants. EPA organized a team of 30 technical specialists to thoroughly review this EIS, including experts in oceanography, radioecology, ocean modelling, statistics, bioeffects, geology, radiochemistry, radiation dosimetry, corrosion analysis, economics, and cost analysis. These experts came from within EPA, and national laboratories through ongoing interagency agreements, or were hired by EPA as expert consultants. EPA gave this EIS a careful review, because it represents the first serious consideration of ocean disposal of radioactive materials submitted to EPA since we were given responsibility to regulate such disposals by the Ocean Dumping Act of 1972. EPA initially submitted extensive comments to the Navy Department on June 29, 1983 and additional comments on July 29, 1983.

Ocean Dumping Act Amendments

The amendments to the Marine Protection, Research, and Sanctuaries Act of 1972, as contained in section 424 of the Highway Improvement Act of 1982 (PL 97-424), are similar to language proposed earlier in H.R. 6113. The Agency's views on that bill were presented by Mr. Steven Schatzow at a hearing on June 16, 1982, before the Subcommittee on Water Resources of the Committee on Public Works and Transportation of the House of Representatives. Briefly, we believe that the requirements listed for a site-specific radioactive material disposal impact assessment largely duplicate existing requirements contained in

EPA regulations or in international criteria that EPA would apply. In addition, although the requirement to prepare a plan for recovery of leaking containers could be met, the actual recovery of large numbers of containers at the minimum recommended disposal depth of 4000 meters (2.5 miles) would not be technically or economically feasible. The possibility of leaking containers has to be evaluated in the review of a disposal permit application, and if the evaluation indicates a serious risk to man or the marine environment, then other containment or other disposal means should be used rather than relying on recovery plans.

We understand from the Congressional Record that the new amendments were passed in order to allow additional research regarding ocean disposal of radioactive materials and EPA's research has already been described. Although the Amended Act allows dumping for research purposes during the next 2 years, no one has requested a research permit from EPA since 1972, and there are no indications of any interests for research disposals in the future. In fact, dumping of radioactive materials for research purposes may not be technically useful because of the ocean's natural dilution and sedimentation processes which rapidly reduce the concentrations of radioactive materials in water. Thus, disposal of large amounts of radioactivity would be required in order to have measureable amounts in water or marine biota. Such studies might be done better in mesocosm tanks at the University of Rhode Island, as mentioned earlier.

While EPA is continuing studies and has added some new research to

establish an improved scientific basis, the net effect of the amendments may be to discourage research that would be beneficial to answering the difficult questions regarding the potential fate and impact of radioactive materials in the ocean. Potential researchers may feel that expensive research is not warranted in light of the permit requirements in the amendments, which are perceived to impose conditions whereby a permit may be virtually impossible to obtain. The main concern is for the provision requiring a joint resolution of Congress acting within 90 days of an EPA recommendation to authorize the Administrator to issue a permit. A potential permit applicant has to evaluate whether the effort to meet all of the impact assessment requirements, and other provisions of domestic and international criteria, is worth the cost in manpower and dollars when a decision rests on Congress taking an action within 90 days. The whole effort could be nullified at considerable economic loss to the applicant and EPA by Congress not acting in the time required. We are not sure that any permit applicant will take that chance and, therefore, we suggest that the joint resolution requirement be reconsidered.

If ocean disposal of low-level radioactive materials cannot be considered a reasonable alternative for practical purposes, then only land disposal options will be considered. Since we also have to be concerned with environmental protection of our land and its vital water

and food resources, we favor an approach to waste management that would allow consideration of all reasonable disposal options consistent with our international obligations and a careful evaluation of the environmental effects of these options. Such an integrated waste management approach would allow waste disposal decisions that optimize protection for all parts of the environment.

Revision of EPA Regulations

EPA first issued draft regulations governing sea disposal of low-level radioactive wastes in 1973. These regulations expressed our policy that radioactive materials should be contained to prevent their direct dispersion or dilution in ocean waters. Furthermore, under these regulations these materials must radiodecay to environmentally innocuous levels within the life expectancy of the containers or their inert matrix. These requirements were included in EPA's Final Ocean Dumping Regulations (40 CFR Part 220-222) published in 1977.

In 1975, the United States also became obligated to additional requirements for ocean disposal of radioactive materials as a Contracting Party to the International Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, also known as the London Dumping Convention (LDC). Annex I of the LDC prohibits from ocean dumping:

"High-Level radioactive wastes or other high-level radioactive

matter, defined on public health, biological, or other grounds, by the competent international body in this field, at present the International Atomic Energy Agency (IAEA), as unsuitable for dumping at sea.

Annex II of the LDC further states that when issuing permits for radioactive wastes not included in Annex I, the Contracting Parties should take full account of the recommendations of the IAEA.

In 1978, at the Fourth Consultative Meeting of Consultative Parties to the LDC, the IAEA presented a definition of high-level radioactive waste unsuitable for dumping at sea and recommendations for ocean disposal of other radioactive materials. The IAEA proposed definition was adopted by a resolution that states,

"Contracting Parties to the Convention will apply the Definition and implement to the best of their ability the Recommendations provided by the IAEA."

EPA believes that the United States is obligated to apply the IAEA Definition and should use the Recommendations as minimum requirements, although we might impose more specific or more restrictive requirements. To formalize our international commitments, we are considering incorporating the IAEA Definition and Recommendations into our regulations.

Ocean Dumping Inventory

To develop a sound scientific basis for permit criteria for radioactive materials, EPA has reviewed the past U.S. practices for ocean disposal of these materials and has conducted surveys of the major U.S. dumpsites where 97 percent of these disposal occurred. The unique information derived from these studies and surveys has resulted in this Agency becoming the focus of numerous inquiries from the public, environmental groups, and Congress. These inquiries were particularly concerned with what was known (or not known) about past practices, the types and quantity of radioactive materials disposed of in the oceans, and the locations of such disposals. To develop such information, EPA has requested assistance from several Federal agencies including the Nuclear Regulatory Commission (NRC), the Department of Energy (DOE), and the Department of Defense (DOD). These Agencies were asked to research their archives and provide pertinent historical documents to EPA.

From the extensive records provided by these Agencies, EPA is now compiling a detailed history of past U.S. practices and policies for ocean disposals of radioactive materials. Part of this report will include a quantitative inventory of past disposals which are summarized in the following table. This historical information will be available in the next few months.

Summary of Past U.S. Ocean Disposals for Radioactive
Materials in the Four Dumpsites that Received More
than 97 Percent of the Radioactivity

<u>Dumping Area</u>	<u>Number of containers</u>	<u>Curies of Radioactivity</u>	<u>EPA Surveys</u>
<u>Atlantic Ocean</u>			
140 and 220 Miles SE of Sandy Hook, N.J.	49,800	99,500	1975, 1976, 1978
Massachusetts Bay 15 Miles east of Boston	4000	2400	1982
<u>Pacific Ocean</u>			
Farallon Islands 50 Miles west of San Francisco	44,500	14,500	1974, 1975 1977
<u>Total of All U.S. Disposals (Approximate)</u>			
	112,000	120,000	

INTERNATIONAL PROGRAM

Since the Seventh Consultative Meeting of Contracting Parties to the London Dumping Convention in February 1983, EPA has taken the initiative to periodically convene a group of policy level officials from several Federal agencies to coordinate United States participation in the LDC. This group has met four times since April to address matters such as 1) EPA's role in coordinating LDC activities, 2) the legal implications of the LDC on domestic policy, 3) followup on LDC radioactive waste disposal issues, 4) coordination with other nations, 5) developing U.S. positions for the LDC Scientific Group, and 6) coordination with Congress and with the public in the drafting of U.S. positions. Several task groups have been established under this Interagency Policy Committee, including a Legal Work Group, a Scientific Work Group, and a Task Group on Radiation Issues.

Task Group on LDC Radiation Issues

This Task Group, chaired by EPA, has met three times to consider actions the U.S. should take in response to the LDC resolution calling for a two year scientific review of the basis for ocean disposal of radioactive materials. The primary work of this Task Group so far has been to compile an extensive list of U.S. government reports on studies pertinent to the LDC scientific review. The International Maritime Organization (IMO), as the LDC Secretariat, requested that all Contracting Parties submit copies of reports not readily available in

other countries, such as government or contractor reports. EPA sent 42 such documents to the IMO and the IAEA on September 2, 1983.

LDC Scientific Review

The Contracting Parties at LDC 7 adopted a resolution outlining a two step approach to the two-year scientific review. The first step was for the IMO and IAEA to request information from Contracting Parties, Member States, and Relevant organizations and then to convene a meeting of international organizations to assemble this information for review by an expert group. The second step was for this meeting of experts to review the scientific technical considerations relevant to proposals to amend the Annexes to the Convention related to the dumping of radioactive wastes.

The IAEA convened the meeting of six international organizations on September 19-23, 1983. This meeting assembled the submitted references into four categories:

- 1) Basic data on radiation effects and risks, basic radiation protection philosophy, international criteria, and guidelines for meeting these criteria,

- 2) Basic information and status of knowledge in relevant areas and critical assessments carried out by international organizations and their expert advisory groups,
- 3) Reviews carried out by nations and individual experts, and a selection of textbooks, and
- 4) Articles judged to be authorized and representative of the relevant scientific literature.

This bibliography will be forwarded to LDC 8, which will then presumably establish terms of reference and a date for the experts meeting sometime in 1984. The U.S. plans to participate fully in the LDC scientific review and to encourage a wide participation by scientific experts from other countries.

International Atomic Energy Agency Activities

During the last year and a half the IAEA has hosted several meetings of technical experts to deal with issues related to ocean disposal of radioactive materials. One such meeting was convened jointly by IAEA, IMO, and the United Nations Environment Program (UNEP) on August 30-September 3, 1982 to provide guidance to Contracting Parties on environmental assessment methodologies for sea dumping of radioactive wastes. The report of this meeting, issued as IAEA-TEC DOC - 296 in September 1983, also provides information on selection of

radioactive waste management options and on factors to consider in comparing sea dumping with land-based alternatives. In addition, this report reviews the factors to include in an assessment of sea dumping and provides an outline for an environmental assessment document for sea dumping of radioactive waste. The U.S. provided several key experts in this effort.

In July 1983, the IAEA hosted an Advisory Group meeting in Monaco to define de minimis quantities of radioactive materials that could be exempted from special permits under the London Dumping Convention. EPA provided two experts to this meeting, including the chairman. The present LDC requirements for various quantities of radioactive materials are shown in the table below.

Present Provisions Under the LDC Regarding Radioactive Wastes
According to IAEA INFCIRC 205/Add.1/Rev. 1

GENERAL PERMIT	SPECIAL PERMIT (Annex II)	PROHIBITED MATERIALS (ANNEX I)
Materials not regarded as radioactive wastes*	Radioactive wastes not included in Annex I	High-Level radioactive wastes

*Not presently defined by LDC or IAEA

Recognizing that all materials contain some level of radioactivity either from naturally occurring radionuclides or fallout from nuclear weapons tests, the IAEA noted in 1978 (INFCIRC 205/Add.1/Rev.1) that there is no such thing technically as "nonradioactive material." Furthermore, it is not the intention of LDC to treat all wastes as potential radioactive pollutants. Therefore, the IAEA is attempting to define a de minimis level of radioactivity below which a material will not be regarded as "radioactive" for purposes of the Convention. This Advisory Group drafted a proposed definition to include 1) materials for which ocean disposal would not result in a radiation dose above one millirem a year and 2) materials whose radioactivity is extremely low and not normally considered in the issuance of permits for dumping, such as sewage sludge, dredge materials, and construction debris. If this proposed definition is approved by the IAEA, it will then be submitted to IMO for consideration by LDC Contracting Parties.

The IAEA has also scheduled a technical committee meeting for November 28-December 2, 1983 to consider the oceanographic and radiological basis for the present LDC definition of high-level radioactive wastes considered unsuitable for sea disposal. The U.S. will send three experts to this meeting. Since the present definition was adopted by the LDC in 1978, several advances have evolved in principles of radiation protection and our understanding of ocean dynamics and modeling. These advances in technology will be evaluated to determine if the LDC definition should be revised. We do not anticipate any major changes in the definition.

Group of Experts on the Scientific Aspects
of Marine Pollutions (GESAMP)

GESAMP is an advisory body consisting of specialized experts nominated by Sponsoring Agencies (IMO, IAEA, UN, UNEP, FAO, UNESCO, WMO, WHO). Its principal task is to provide scientific advice on marine pollution problems to the Sponsoring Agencies and to the Intergovernmental Oceanographic Committee (IOC). Over the last 10 years GESAMP has produced about 20 reports on various ocean pollution topics. The most recent 1983 report, of interest to EPA regarding ocean disposal of radioactive materials, is Report and Studies No. 19, "An Oceanographic Model for the Dispersion of Wastes Disposed of in Deep Sea." This report is the result of a 1980 request by the IAEA for GESAMP to provide advice on the most suitable oceanographic models that would apply to sea dumping of not only radioactive, but also other hazardous wastes. The tasks were 1) to review present knowledge of pathways by which substances might be transferred from a deep ocean area back to man, 2) to recommend methods for calculating concentrations of substances released from containers to the water throughout an ocean basin, and 3) to assess the reliability of these calculations. This report will be a primary reference in the IAEA review of the oceanographic basis for the definition of high level radioactive wastes at the Vienna meeting on November 28, as mentioned earlier.

NEA Dumpsite Monitoring

The Nuclear Energy Agency (NEA) of the Organization for Economic Cooperation and Development (OECD) has been responsible for monitoring radioactive waste disposal operations at the Northeast Atlantic dumpsite since 1967. Periodically the NEA reviews these operations to determine the suitability of the site for continued use. The last review in April 1980 concluded that the site would be suitable for another five years and recommended that investigations be conducted during that time to improve our knowledge of transport processes in the North East Atlantic. A program plan for such studies was adopted by an NEA Executive Group in September 1981, under the title of Coordinated Research and Environmental Surveillance Program (CRESP). As of 1983, CRESP is supported by 12 NEA member countries and three international organizations including the NEA, IMO, and IAEA. EPA is sponsoring the chairman and a U.S. representative to the Executive Group that supervises the program and we also support technical experts for three of the five task groups which are implementing the program. Other U.S. experts are provided by NOAA, and by DOE through their Sandia National Laboratory.

About 35 to 40 scientists are contributing to the task groups with five areas of research emphasis: model development, physical oceanography, geochemistry, biology, and radiological surveillance. The modelling efforts include a description of release rates from waste packages in the deep ocean, dispersion of radionuclides in ocean waters

including interaction with sediments, and biological pathways including short-circuit mechanisms and dose estimations. Research in physical oceanography, geochemistry, and biology provide the necessary data to support the modelling work. Radiological surveillance research focuses on the collection and radioanalysis of seawater, sediment, and biota, evaluation of potential pathways for transport of radionuclides, and intercalibration of radiation measurements among participating laboratories.

The extensive studies underway by CRESP will likely require several more years to complete. However, the groups meet jointly about twice each year to review the results of ongoing research. The last meeting was held in September 1983, and the next meeting will be held in Hamburg, Germany in March 1984. This meeting will have special significance because the research data compiled at that time will provide the primary basis for determining the suitability of the North East Atlantic dumpsite for continued use.

NEA Dumpsite Suitability Review

The NEA is scheduled to review the suitability of the North East Atlantic dumpsite in 1984. The NEA will convene a group of experts for this purpose in June 1984 to conduct the initial site assessment on the basis of CRESP data and to draft a decision document. A final determination of site suitability will be prepared by a second meeting

of experts in November 1984. This whole site suitability review has added significance now in light of the LDC scientific review of the basis for ocean disposal of radioactive materials. Since the NEA dumpsite is the only area where ocean disposals of such materials have been ongoing for many years, the scientific studies of that dumpsite should provide the most up-to-date data for the LDC review and for evaluation by the LDC Contracting Parties when they meet in 1985 to consider proposals to ban radioactive materials from the oceans.

SUMMARY AND CONCLUSIONS

EPA believes there is a continuing need for research to improve our scientific understanding of the oceans. Consequently, we have actively supported both domestic and international programs for this purpose and we are continuing to support new initiatives. For an integrated approach to radioactive waste management we need to understand how radioactive materials may affect all parts of our environment in order to allow rational choices of disposal options that provide for maximum protection of the environment and public health. We are aware of public and Congressional concerns that EPA may allow the resumption of ocean disposal of radioactive materials. Although EPA has made no decisions on the merits of such disposal, we share in the concerns for protection of our oceans. For this reason, we have already put in our 1977 regulations very restrictive requirements for packaging of radioactive waste materials to assure the safety of marine ecosystems and public health. We are continuing to monitor old U.S.

dumpsites to evaluate any long term environmental effects that may occur and we are actively supporting the international monitoring program for the NEA international dumpsite in the North East Atlantic. Through EPA's research initiatives, both domestically and internationally, we have an improved scientific basis and state-of-the-art technology for assessing ocean disposal of radioactive materials as a disposal option. In this regard, we suggest reconsideration of the requirement for a joint resolution of Congress to authorize EPA to issue permits. Perhaps this could be considered following completion of the international scientific review of the basis for ocean disposal of radioactive materials. In the meantime, we will fully implement the Ocean Dumping Act as written, as well as our obligations under the LDC, and continue to carry out the domestic and international activities I have described.

This concludes my formal statement. I will be pleased to respond to any questions you may have.

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Mr. D'AMOURS. Thank you, Mr. Sjoblom.

Before proceeding with Mr. Lawrence, I would like to recognize Mr. Shumway of California for a unanimous-consent request.

Mr. SHUMWAY. Thank you, Mr. Chairman, I appreciate that.

I regret that I was not here at the very beginning of the hearing. I do have a statement, however, and I would ask unanimous consent that I be allowed to revise and extend my remarks at a point in the record shortly after the chairman's statement.

Mr. D'AMOURS. Without objection, that is so ordered.

[The statement of Mr. Shumway is on p. 519.]

We will now hear from the Department of Energy. Mr. Lawrence.

STATEMENT OF MICHAEL J. LAWRENCE

Mr. LAWRENCE. I am pleased to be here today to discuss the Department of Energy's subseabed disposal program for high-level radioactive waste and note that the Department's interest in ocean disposal of low-level waste from its remedial action program has been addressed in a statement which has been submitted for the record. Mr. Jack Baublitz, who has responsibility for that program, is present today to answer any questions you may have.

Mr. Chairman, the Nuclear Waste Policy Act of 1982, which Congress passed last year, establishes as a primary objective of our country's radioactive waste disposal program the development of mined geologic repositories for the disposal of high-level radioactive waste. Our program is set up and established to provide such a high-level radioactive waste repository in deep geologic formations capable of accepting waste by 1998.

Also, the act does provide for the continued and accelerated development of alternative means of disposal of high-level radioactive waste. Right now, the subseabed disposal program of the Department is the only such alternative being developed.

The DOE subseabed disposal program began in 1974, and in 1976 the Seabed Working Group, under the auspices of the Nuclear Energy Agency of the OECD, was initiated and formally constituted in 1977. This working group consists of eight countries plus the European Economic Community and is considering the feasibility of seabed disposal of high-level radioactive waste. In order to put this concept in the proper perspective, I have prepared a chart which is before you now, which I will just run through briefly to show you what the concept is for the disposal of high-level radioactive waste in the subseabed.

Radioactive waste, which would originate either at a reactor, reprocessing plant or a monitored retrieval storage facility, would be transported to a port facility by either rail, barge, or truck, where the waste would be put into a penetrator assembly and otherwise packaged, and then placed on a ship for transport to the disposal site. At that point, one of the the basic concepts would be used to put the waste into the ocean floor.

This could be done either through a free-fall penetrator, or a boosted penetrator launched from either ship or from a penetrator platform, or a drill rig could actually be used to drill a core in the ocean floor for implantation of the waste. We are talking about dis-

posal of high-level radioactive waste in about three miles of water; and depending upon the penetrator method chosen, the waste would be actually sunk between 100 to 400 feet into the ocean sediment, in which case the ocean sediment will close in around the waste providing a barrier for any release of the radioactivity to the environment.

The objectives of the program at this time are first and foremost to determine the feasibility of this concept. Based upon the drawing I have shown and the brief description I have just given, it certainly looks very simplistic, but obviously there is a lot of technology involved with this. The determination of feasibility will be based upon—

First, finding if there is a suitable site for such a concept;

Second, whether or not it can be implemented safely;

Third, determining if the radiological and environmental effects of such disposal are, in fact, acceptable; and

Fourth, determining if the institutional impediments to such disposal can be overcome.

The second objective of our program is to continue the international cooperation which has been going on in this program since 1977. Although mined geologic repositories on land are the primary thrust of the U.S. program, we recognize that other countries with high-level radioactive waste will be needing disposal facilities, and this represents certainly an interesting option for them, which should be explored if the United States wants to maintain its presence in this research.

Finally, we want to maintain the subseabed disposal option as a viable alternative for the U.S. program as well, for possible disposal facilities which may be required subsequent to our development of mined geologic repositories.

Turning to your specific interest in what the institutional issues may be in the subseabed program, on the national level certainly the Marine Protection and Research and Sanctuaries Act which was passed does bear on this. We recognize that before the United States could engage in any program to actively dispose of high level radioactive waste on an operational basis that congressional action would be required and authorization would have to be obtained from Congress.

On the international level, the London Dumping Convention also addresses this question. Deputy Assistant Secretary Hughes mentioned earlier in her testimony that in December an ad hoc meeting of legal experts will meet in London to discuss the London Dumping Convention's impact on that activity.

Finally, turning toward the Department of Energy's budget for the subseabed disposal program, I have also prepared a chart which shows the historical funding level of the program from 1975 to 1984, with the U.S. funding level in the hatched bottom part of the bars.

As you can see, the United States has represented and provided a major portion of the funding for this program over the years. Out of a cumulative total of about \$89 million through 1984, approximately half, or \$43 million, has come from U.S. funding. It is our intent that this funding level should be brought more in line with the larger share of the funding coming from foreign sources, but as

I indicated, the Department does support this activity and does intend to maintain its presence and play a very active role in the international program.

With regard to the 1984 budget, the Department of Energy's original request to Congress in January was for \$4.7 million, but committee action and congressional action allowed us to spend up to \$9.6 million for this program. As we have indicated in correspondence to the subcommittee, we now believe that the level of \$7.5 million for 1984 would be a reasonable amount, would be consistent with the Department's objectives of maintaining subseabed disposal as a viable option to its repository program, and would allow us to determine the feasibility of this concept by 1990, which does coincide with our needs for the repository program.

Based upon the information we currently have, we believe that this date and this funding level is acceptable by our foreign participants in the seabed disposal program. Included in the level of \$7.5 million for 1984, would be \$600,000 spent for physical and biological oceanography which would be looking primarily at ocean circulatory patterns and biological pathways for release of radionuclides to the environment, once in place in subseabed disposal. This amount of funding would go up substantially in later years as we move out toward the 1990 feasibility determination date.

That concludes my testimony. I would be happy to answer any questions you may have.

[The statement of Mr. Lawrence follows:]

STATEMENT BY
MICHAEL J. LAWRENCE
ACTING DEPUTY DIRECTOR, OFFICE OF CIVILIAN RADIOACTIVE
WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
BEFORE THE
SUBCOMMITTEE ON OCEANOGRAPHY
COMMITTEE ON MERCHANT MARINE AND FISHERIES
UNITED STATES HOUSE OF REPRESENTATIVES
NOVEMBER 2, 1983

Mr. Chairman and members of the Subcommittee:

I am pleased to appear before you today to discuss the Department of Energy's (DOE's) Subseabed Disposal Program. I will give a brief background on subseabed research and how it fits into the overall research activities called for in the Nuclear Waste Policy Act of 1982; outline the objectives and status of the DOE Subseabed Disposal Program; briefly discuss our international activities in the study of the subseabed concept; and provide a breakdown of our plans in this area with specific emphasis on fiscal year 1984 planned expenditures.

Introduction

The Nuclear Waste Policy Act of 1982, signed into law by the President January 7, 1983, established a national policy for the storage and disposal of high-level radioactive waste.

Under the Act, the Department of Energy has the responsibility to provide for the permanent disposal of high-level radioactive waste such as spent nuclear fuel or reprocessed spent nuclear fuel. In addition, the Act strengthened the role of States and the public in the process leading to permanent disposal. The Act provides a mandate and a set of rules for proceeding with the identification and selection of sites for a repository as well as for interim storage facilities in the event storage facilities are needed. The Act also established a funding mechanism for the program whereby the owners and generators of spent nuclear fuel and high-level waste must pay a fee for electricity generated by nuclear power in exchange for disposal services.

The Act also authorizes specific research and development activities; provides for international cooperation with non-nuclear weapon states in the field of spent fuel storage and disposal; and contains other provisions relating to radioactive waste.

Many isolation concepts have been discussed over the years. The concept of isolating nuclear waste in mined repositories deep underground was first advanced in 1957 by a committee of the National Academy of Sciences and has since been suggested and reconfirmed by other technical and scientific groups. As

part of assessing the overall strategy and to evaluate waste disposal alternatives, in 1979 a Draft Environmental Impact Statement (EIS) was published and comments received. The Final EIS was issued in 1980. Based on this EIS, in April 1981 a Record of Decision was issued by the Department of Energy adopting the mined geologic repository strategy.

The focal point for siting the first repository is in deep geologic formations in Washington, Nevada, Utah, Texas, Louisiana and Mississippi which contain potential sites for the first geologic repository. In addition, we are conducting literature surveys in the North Central, the Northeastern and the Southeastern areas of the United States to determine whether rock formations found in those areas possess characteristics for further investigation and for consideration in developing a second geologic repository.

Among the provisions for research and development, Section 222 of the Act directs the Secretary to continue and to accelerate research on alternative means and technologies for the permanent disposal of high-level radioactive waste from civilian nuclear reactors.

The seabed disposal concept is being studied and is the only alternative to mined geologic repositories currently being funded by the DOE. This concept is being studied nationally and internationally to determine whether it would be feasible to employ deep ocean sediment as a possible future repository medium.

Before I discuss the status, plans and International activities of the DOE Subseabed Disposal Program, I would like to describe the subseabed disposal concept.

Subseabed Disposal Concept

The concept of subseabed disposal of high-level waste is that of geologic emplacement of containerized high-level waste in sedimentary clay below the ocean floor. The scientific feasibility of the subseabed disposal concept has not yet been proven. However, the concept can be briefly described as follows:

Similar to the concept of mined geologic disposal, solidified spent fuel or high-level wastes would be placed in shielded shipping casks and transported by rail or truck to a specified port facility. At the port facility, the waste package would be placed in specially designed containers for burial in the stable sediments below ocean floor and then placed on ocean transport and emplacement ships. These ships would transport the waste packages to the subseabed repository site.

At the site, the specially designed waste containers would be buried ten's of meters into clay sediments. Based on preliminary information, the clay may provide a nearly impervious natural barrier which could prevent the migration of the waste, even if the waste container failed. These clay tombs would be located near the center of stable tectonic plates of the ocean floor under the hub of a surface circulating water mass. The potential sites would be sought away from shipping lanes and communications cables and in areas of low natural resources.

Following emplacement of waste in a subseabed repository, the repository site would be monitored to assure correct emplacement and to take any corrective action if necessary.

The subseabed alternative is not intended to replace mined repositories, but rather it is being assessed as a potential disposal alternative. Areas of both the North Pacific and North Atlantic are being studied to determine if there are feasible locations for subseabed disposal sites.

In the areas currently under study, the ocean is four to six kilometers--or about three miles--deep and the bottom consists of fine-grained clay sediments with an average thickness of 400 meters (1300 feet) overlaying the basement rock. These clay sediments have high sorption coefficients for some radionuclides.

In addition, while the ocean water is not considered a primary barrier to radionuclide transport, it would provide additional safety since it provides a barrier to accidental or intentional intrusion, and acts as a dispersal medium for decayed radionuclides which may eventually reach the water/sediments level.

Subseabed Disposal Program

Background

The Department of Energy and its predecessor agencies have been conducting research into the subseabed alternative for nuclear waste disposal since 1974.

To coordinate the international assessment of seabed disposal, in 1976 a Seabed Working Group (SWG) was established under the auspices of the Nuclear Energy Agency of the Organization for Economic Cooperation and Development (NEA/OECD). The SWG has conducted annual meetings since that time.

The United States is one of eight countries along with the European Community that fund research to assess the feasibility of seabed disposal. The international assessment of seabed disposal is coordinated by the Seabed Working Group under the auspices of the NEA/OECD. International support and shared programs are developed through the Seabed Working Group. The group's present membership includes the European Community, Canada, France, the Federal Republic of Germany, Japan, the Netherlands, Switzerland, the United Kingdom, and the United States. Belgium and Italy participate as observers.

Under the auspices of the Office of Civilian Radioactive Waste Management, the DOE Albuquerque Operations Office has lead responsibility for directing the DOE Subseabed Disposal Program. Sandia National Laboratories is the prime contractor with about 50 percent of the research and development subcontracted to academic and oceanographic institutions, including: Harvard University, University of New Hampshire, Oregon State University, University of Rhode Island, University of Washington, Analytic Sciences Corporation, Lamont-Doherty Geological Observatory, Naval Ocean R&D Activity, Scripps Institution of Oceanography, and Woods Hole Oceanographic Institution.

In accordance with Section 222 of the Nuclear Waste Policy Act, it is the policy of the Department to continue and to accelerate research, development, and investigations of alternative means and technologies for the permanent disposal of high-level radioactive wastes. As stated previously, the Subseabed Disposal Program is the only alternative disposal concept currently funded by the Department.

Program Objectives

The primary objectives of the current Subseabed Disposal Program are:

- (1) To determine the technical, environmental, and institutional feasibility of the concept of burying high-level radioactive waste in stable clay sediments of the deep ocean;
- (2) To cooperate with other Nations in the assessment of subseabed disposal; and
- (3) If the concept proves to be feasible, to keep subseabed disposal open as a potential alternative for the disposal of nuclear waste until at least the second repository is selected.

Cooperation with the seabed disposal programs of other nations is continuing with the goal to expand multinational support for field experiments through the Nuclear Energy Agency of the Organization for Economic Cooperation and Development (NEA/OECD).

Status of Subseabed Disposal Activities

In fiscal year 1983, the Subseabed Disposal Program published a Technical Status Report on the Subseabed Disposal Program and participated in the annual NEA Seabed Working Group meeting. At the NEA meeting, a five-year research and development plan was approved by all participants as a basis for coordinating completion of the international assessment of seabed concept feasibility by 1990. Deep ocean sediment samples acquired from the North Pacific site study areas were assessed, and technical data from North Atlantic study areas were acquired. The program completed the ocean circulation model and bench marked the model with field data acquired. Preliminary safety assessment studies of seabed disposal also were completed in 1983.

Within large regional areas, three locations have been identified and assessed in the North Pacific which meet provisional site criteria. No further site specific R&D for the North Pacific sites is scheduled at this time. Four study areas are being assessed in the North Atlantic with the objective of selecting in 1984 two study areas. In the future, if the subseabed concept proves to be feasible, a candidate site would be selected for detailed site characterization.

Predictive mathematical models for chemical, thermal and mechanical response of the sediment clay are complete, based on laboratory testing of deep ocean sediments. Field confirmation is still required.

International Subseabed Assessment

International cooperation benefits all nations assessing the feasibility of subseabed disposal. Such cooperation provides timely exchange of research results from other programs on subseabed disposal and provides an opportunity for a continuous peer review of the research and development programs.

Should the subseabed concept prove to be technically and environmentally feasible, it is reasonable to assume that international cooperation would be required to develop an operational repository. Such international cooperation is appropriate because the repository would be located under international waters and would need to meet applicable international standards and criteria established by recognized international regulatory organizations.

Since 1976, the Seabed Working Group (SWG) referred to earlier and of which the United States is a member, has coordinated data exchange, continuing research and the development of the seabed disposal concept.

The goals of the SWG are:

- o To provide a forum for assessing progress and planning for future Research and Development efforts;
- o To coordinate research vessel cruises and experiments;
- o To share facilities and test equipment and,
- o To maintain awareness of international policy issues.

As previously mentioned, in June 1983, the SWG approved a five-year research and development plan. The purpose of this plan is to coordinate individually-funded national programs assessing the feasibility of seabed disposal concepts and to plan joint experiments. This Five-Year Research and Development Plan can be divided into four tasks:

- (1) Develop the computational tools and collect the necessary data to make possible an accurate prediction of the feasibility of seabed disposal;
- (2) Locate sites in the deep ocean suitable for a high-level waste repository;
- (3) Develop the equipment and techniques necessary to transport and emplace wastes within the ocean floor; and,
- (4) Promote an institutional regime that will adequately regulate seabed emplacement and protect the environment.

These international activities of the SWG, and in which we are a participant, are governed by the awareness that even though current understanding of sedimentary geologic formations indicates they may be candidates for future high-level waste disposal facilities, much additional specific research and engineering is needed before a final determination can be made of the feasibility of the seabed disposal concept.

While technical and environmental feasibility studies are well underway, institutional feasibility is just beginning to be addressed and legal issues remain.

Institutional and Legal Issues

The concept of subseabed disposal of high-level wastes (HLW) raises interrelated regulatory and institutional issues. Although the Subseabed Disposal Program is a U.S. program, it is within an international context. For example, results of the Program's site assessment activities indicate that a subseabed repository would probably be located outside U.S. territorial waters and would thus be subject to the authority of multilateral treaties and international agencies.

At present, while the precise legal status of subseabed disposal under U.S. law is clear, the status under international is unclear. The Program currently assumes that if the concept proves feasible, and if a decision were

made to develop a subseabed repository, changes in existing treaties and federal laws would be required before a subseabed repository could be developed.

National Context

Two U.S. laws have major applications to subseabed disposal.

- The Nuclear Waste Policy Act of 1982 (NWPA) (PL 97-425) provides a legislative mandate for continuing research into alternative methods for disposal of HLW.
- The Marine Protection, Research, and Sanctuaries Act (MPRSA) (PL-92-532), known as the Ocean Dumping Act, prohibits the Environmental Protection Agency (EPA) from issuing permits for ocean dumping of HLW.

The explicit prohibition in the Ocean Dumping Act against issuing permits for ocean dumping of high-level radioactive waste resembles prohibitions found in the London Dumping Convention although they are not identical in all regards. It is reasonable to assume that, if the concept proves feasible, any U.S. efforts to develop a subseabed repository will require Congressional action.

International Context

The regulatory and institutional issues of subseabed disposal in the international context are linked to the London Dumping Convention (London Convention).

The London Convention defines "dumping" as any deliberate disposal at sea of wastes or other matter from vessels, platforms or other man-made structures, excluding the placement of matter for purposes other than disposal. The London Convention prohibits "dumping" of high-level radioactive waste and certain other materials. The question arises as to whether subseabed disposal constitutes "dumping" for purposes of the London Convention. While taking place at sea, under the concept of subseabed disposal, waste would be emplaced in the sediment rather than in ocean waters. Differing views have been expressed on this question, both within the U.S. and in other nations.

The NEA Seabed Working Group established a task group in 1982 to begin the study of legal and institutional issues surrounding seabed disposal with the objective of proposing possible institutional frameworks to be assessed for future implementation of subseabed disposal. The Consultative level

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of the London Convention, decided at its February 1983 meeting to convene an ad hoc meeting of legal experts to assist in the clarification of the circumstances under which seabed disposal of high-level radioactive waste and other hazardous wastes would be contrary to the provisions of the Convention. The ad hoc legal group is scheduled to meet December 12-14, 1983, in London, to begin its review.

The Department is working closely with EPA and with the State Department in the development of the U.S. position papers and guidance for the U.S. delegation for the London meeting.

At present, discussion of the national and international regulatory issues pertaining to subseabed disposal constitutes a preliminary exploration of various considerations that could affect a subseabed repository. Until the concept has been completely assessed, however, many of these issues will remain unresolved. If subseabed disposal is feasible and if a decision is made to develop a subseabed repository, then these issues will be addressed. Resolving these issues will require cooperation among representatives from the international, scientific and legal communities, relevant governmental agencies, and the interested public.

Subseabed Program Budget

Subseabed disposal activities are funded through congressional appropriation and not from the Nuclear Waste Fund. The DOE spent \$6.0 million on subseabed disposal research in FY 1983. The funds available for Subseabed Disposal research in FY 1984 are \$9.6 million of which the Department plans to use \$7.5 million for subseabed studies.

The FY 1984 Subseabed Program Budget based on \$7.5 million includes the following plans:

- Site Selection \$0.9M
Continue bathymetric mapping and evaluation of North Atlantic sites with the objective of recommending one or two sites for detailed evaluation.
- Emplacement Studies \$1.2M
Complete free-fall scaled penetration test in conjunction with other countries.
Design and develop field tests to demonstrate sediment hole closure following simulated waste container emplacement.

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- Thermal Response	\$2.1M
Complete the In Situ Heat Transfer Experiment (ISHTE) conceptual design.	
Fabricate the ISHTE test platform and equipment for field test deployment and recovery demonstration.	
- Sediment Chemistry and System	\$1.1M
Continue analysis of chemical and physical properties of deep ocean sediments as the primary barrier to radionuclide migration.	
- Physical and Biological Oceanography	\$0.6M
Continue Assessment of ocean circulations and potential biological pathways back to man as input into environmental and safety assessments.	
- Regulatory, Institutional and Project Management	\$1.6M
Continue participation in international agreements, continue assessment of legal and regulatory issues, and provide program coordination, technical support and Quality Assurance.	
TOTAL	\$7.5M

In addition to the U.S. Subseabed Program funding, the expenditure in FY 1984 by other countries participating in the Seabed Working Group is estimated to be approximately \$12 million.

Long-Range Strategies

The longer range strategies of the Subseabed Disposal Program are:

- (1) to fund the research and development program to report on the technical and environmental feasibility in 1990;
- (2) to continue with site assessment leading to the ability to recommend a subseabed repository site as a future repository, if the concept proves feasible;
- (3) to continue participation in the NEA Seabed Working Group and in multinational-funded field experiments with the objective of increasing contributions by other countries while reducing the percentage of U.S. funding for deep ocean experiments; and,
- (4) to continue to participate in interagency and international meetings on the subject of subseabed disposal with the intent of fully assessing the institutional aspects of subseabed disposal as a longer-ranged objective.

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Summary

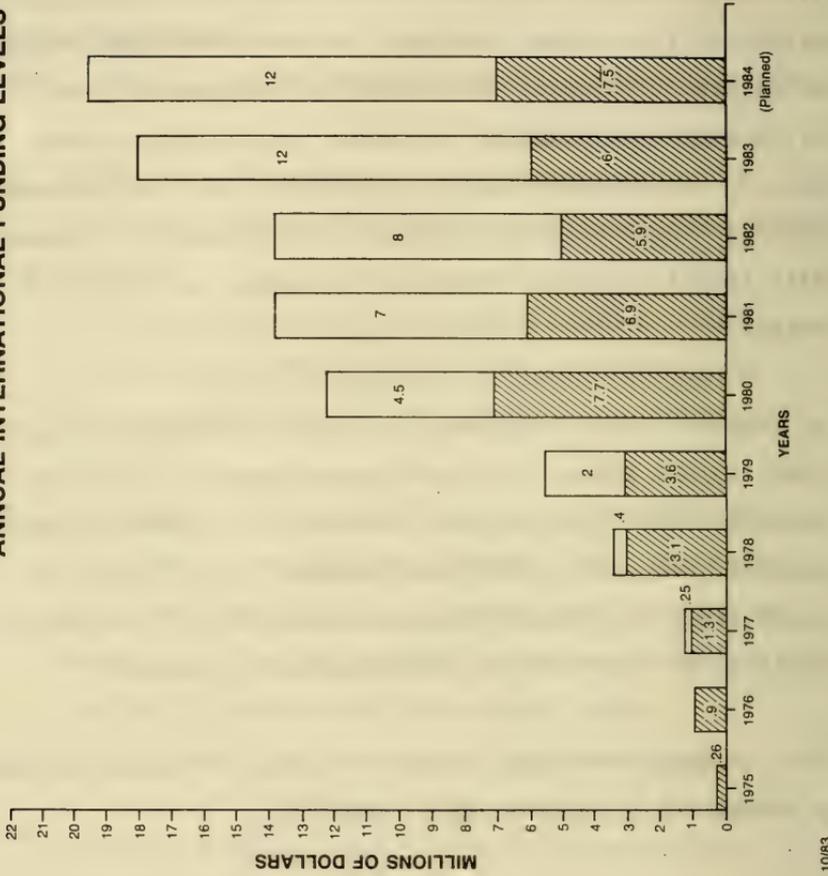
The results of studies sponsored by the Subseabed Disposal Program and those in which the U.S. has participated so far indicate that research into the subseabed concept as an alternative should continue since it may be a potential future option if it is proven feasible. We are continuing to support the program to acquire the scientific, engineering and environmental information to assess feasibility by 1990. However, an awareness must be maintained that the Subseabed Disposal Program is not a proposal for developing a subseabed waste repository; the purpose is to assess feasibility of the concept.

The purpose of the Program is to assess the feasibility of disposing of radioactive waste by emplacement within the sediments underlying the deep ocean as an alternative means of disposal. We plan to continue research in this area in coordination with other interested agencies in the Executive Branch as well as with the international community.

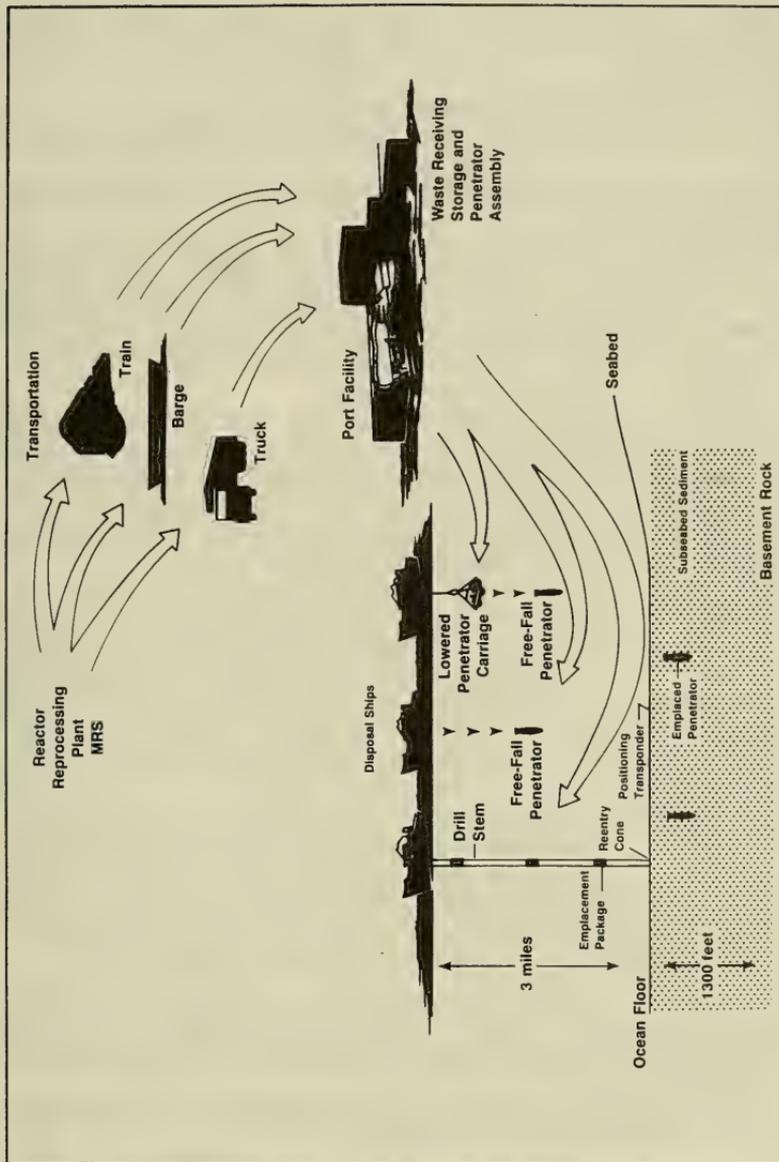
This concludes my formal remarks. I shall be happy to attempt to answer any questions you may have.

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SUBSEABED DISPOSAL RESEARCH ANNUAL INTERNATIONAL FUNDING LEVELS



Subseabed Disposal System Concept



Mr. D'AMOURS. Thank you.

I want to thank the entire panel for being as terse, laconic or whatever, as they have been, and staying within the time constraints imposed.

I am sure there will be several questions. I would like to begin, only because we ended there, Mr. Lawrence, with you on this funding.

For 1985, 1986, and 1987, what funding do you anticipate for the subseabed program?

Mr. LAWRENCE. We project that the U.S. contribution to this activity in the outyears from 1985 through 1990 would be on the order of \$12 million a year. Those numbers haven't been determined yet but our outyear projections do indicate a level of approximately \$12 million per year 1985 through 1990.

Mr. D'AMOURS. Thank you very much.

Mary Rose, on page 2 of your testimony you discussed the Spanish resolution that came up at the London Dumping Convention, and you say that we were unable to support the resolution on the grounds that it prejudged the outcome of the study. That is, that there was a presumption that there should be a moratorium or halt and there was a real danger in low-level disposal.

I was at the consultative meeting in London with you, as you know. In view of the fact that the purpose of the Convention is to protect the marine environment by taking, according to article I, and I quote: "* * * all practical steps to prevent the pollution of the sea by the dumping of waste and other matter that is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea."

Don't you think that the burden then, given this language in article I, should be to establish the safety of such dumping before one proceeds, rather than, as is EPA and State's position, at least at the London Dumping Convention, which was that the burden of proving harm was upon those who seek to prevent dumping?

Who, in your opinion, should have the burden of proof?

Ms. HUGHES. Mr. Chairman, perhaps my statement in its effort to be succinct was too succinct. There were actually several reasons for the United States position on this Spanish resolution, and I can go into those if you—

Mr. D'AMOURS. This is one of the ones that you mentioned. I would like you to respond to this one.

Ms. HUGHES. Under the terms of the London Dumping Convention, low-level radioactive waste disposal is allowed. It has been consistently allowed as an annex 2 substance. Now, your question I think is a broad, philosophical one of where the burden of proof ought to lie in putting substances either in annex 1 or annex 2 and I don't feel that I am technically qualified to answer that particular point.

But I can say, with respect to the Spanish resolution, that procedurally the United States delegation had a problem with what we felt was in substance an attempt to change the way the parties to the London Dumping Convention could deal with annex 1 and annex 2 substances without going through the procedural requirements contained in the terms of the convention itself and in previ-

ous decisions of the parties. I am informed that EPA can also comment on your question.

Mr. D'AMOURS. Well, before they do I would like to make one thing clear for the record. Again I don't want to make this a point of contention, but I was there, and I had the impression, the very clear impression, as shared by many others, that not only was this not a prejudging of the outcome by most members of the London Dumping Convention (as we all know the proposal passed very handily) but that frankly, there was a prejudging of the safety of nuclear waste disposal by the EPA and the State Department. I just wanted the record to show that there are things that happen at these international conferences that are very difficult to quantify. There was a variety of philosophical approaches on the part of the American delegation, not all of which were expressed as the official U.S. position.

I don't think there is anything philosophical, however, about establishing a burden of proof. That is a pragmatic procedural point. But there seemed to have been a prejudice there that this was safe and that we ought not to establish a moratorium because after all, there was nothing wrong with ocean dumping. I want to state that for the record and I will give EPA an opportunity to respond.

Mr. SJOBLOM. I want to remind everyone here that the provisions of the London Dumping Convention are very firmly based on the scientific aspects, otherwise the only way to do as the chairman suggests, would be to ban all dumping of everything in the ocean, and the meeting of the London Dumping Convention, in defining what was allowed and what was not allowed, referred in fact the matter of low-level radioactive waste to the recognized international scientific body to define what was the difference between high-level waste and low-level waste that could or could not be dumped, and what recommendations were good guidelines to use in order to prevent or minimize any effect of such dumping.

And those are also contained in recommendations of the IAEA that were adopted by all the contracting parties as a matter of good scientific principles during previous London Dumping Convention meetings.

So my view is that the approach that was taken at the LDC VII was challenging these very bases that the contracting parties themselves had agreed to in earlier meetings, namely, to put the procedural matters to rest, rather than to ignore them, and to ignore the scientific work that had been done up to that point and to in fact prejudice the answer.

Now, the United States did work, I might point out, and would remind you that we did work to try to obtain a consensus during the various breaks and so forth. We worked to try to get everyone to agree to a common position. We were in favor and fully supported the international scientific review of the merits of this subject. And I might reiterate from my statement that it has been at the behest of EPA and the U.S. delegations to these various meetings that the European dumpsite is being fully investigated today.

Mr. D'AMOURS. I remember the work that was done to try to achieve that consensus. The problem was that work didn't begin until the vote had already been ordered. It was much too late to do anything about it. At any rate, there was a last ditch effort made.

But still the fact is—and this is important because it reflects the approach that we take at these international forums—there was a great body of opinion at the LDC VII that low-level radioactive waste did or might constitute a threat to the marine environment, human health, et cetera, and that pending the outcome of a study there should be a moratorium, and you considered that a prejudging of the case. Yet the overwhelming majority of delegates considered a moratorium to be a prudent way to proceed when there was doubt. I wanted the record to show that.

My 5 minutes has expired.

Mr. SUNIA. On page 7 of the State Department testimony, it says, "The delegation indicated that the United States was not disposing of radioactive wastes in the ocean and had no future plans to engage in such dumping in the South Pacific Ocean."

Do I take that to mean we will never, never, never, ever have plans to conduct such dumping as we now state, or is that our position as far as this convention is concerned? I am reading from page 7 of the testimony.

Ms. HUGHES. If I understand your question, it is whether the United States has stated definitively that we would never ever consider dumping in the South Pacific. That is not what my statement is meant to reflect. What we told the South Pacific countries last January was that the United States was not dumping in the region and had no current plans to dump.

Mr. SUNIA. I see. The word current is not in here, so I guess when that is introduced it means somewhat different.

Ms. HUGHES. We currently have no plans to dump.

Mr. SUNIA. I wanted the record to be correct on that.

Now, presumably then, if we are not dumping now somebody else is doing it. Can we have for the record an indication of who might be doing that now?

Ms. HUGHES. I believe EPA can answer that question.

Mr. SJOBLUM. I am not aware of any country in the world dumping in the Pacific, let alone the South Pacific.

Mr. SUNIA. As of now?

Good.

Now, I want to know how we are receiving the views of our territories in the Pacific with regards to developing our position. Are we receiving it directly or are we receiving it through the Department of the Interior. Are we consulting with the Governors of the territories?

Ms. HUGHES. We are actively consulting directly through the State Department with our Pacific territories. A number of them were represented at the last negotiating round in January and we are hopeful that we will see them in Noumea again next week.

Mr. SUNIA. Thank you very much.

It would add to my knowledge greatly if you can clarify a point for me. Presumably, low-level waste dumping is not very bad, so therefore, it may probably be acceptable. Now, at what point do they accumulate to become not low level but high level? Does it ever accumulate to the danger level or does it remain low regardless of the volume that we dump?

Mr. SJOBLUM. Let me attempt to answer that question. The definition of high level radioactive waste that was derived by the Inter-

national Atomic Energy Agency specifies a concentration of radioactivity per unit of mass of dumped material. Now, that was derived with certain assumptions, one of which was that the dumping would go on basically indefinitely. I think they assumed 40,000 years.

Another one was that once the waste reached the bottom it would immediately disperse, in other words, taking no credit for any containment provided by the packaging. Credit was taken for the radioactive decay that occurs with all radionuclides. In other words, with time the amount of radioactivity is reduced in any material.

Mr. SUNIA. In 40,000 years?

Mr. SJOBLÖM. There is decay of radioactive materials all the time; they decay constantly. That is one of the basic principles. Now, your question was whether low-level radioactive waste could ever become high-level waste. Based on what I have just said the short answer is no. The total amount of radioactive material in a dumpsite would tend to increase as dumping proceeded. It, however, would reach an equilibrium because, of course, there would be radioactive decay as well as an increased amount of material dumped. At some point in time it would, the total amount of radioactive material in the dumpsite would then tend to level off.

Mr. SUNIA. Mr. Lawrence, does the Department of Energy agree with that?

Mr. LAWRENCE. Yes sir; we are operating our program for high-level waste disposal under the assumption that it would either result from unprocessed spent fuel from commercial power reactors or the resulting waste product of the spent fuel which is reprocessed and then solidified into a form suitable for disposal. But regulatory agencies such as the Nuclear Regulatory Commission or EPA can also determine that other materials constitute high-level waste requiring geologic disposal in some other form suitable for high-level waste disposal.

Mr. SUNIA. Thank you, Mr. Chairman.

I realize my 5 minutes are up. I have one more question.

Mr. D'AMOURS. If there is no objection and you only have one more question, I suggest you go ahead with it.

Mr. SUNIA. Thank you. This question relates to the market seafood survey procedures.

EPA, could you describe in further detail EPA, and FDA's market seafood survey procedures? I understand samples were collected from the Atlantic City area. What procedures are undertaken to assure that the samples tested are taken from an area close enough to the radioactive dumpsites to assure that scientifically valid test results are achieved? Does the migratory nature of these fish make it virtually impossible to use this type of sampling to determine the extent to which radioactivity has been released into the marine environment from these waste materials?

Mr. SJOBLÖM. Well, let me point out a few facts.

Basically, commercially marketed seafoods do not live at the bottom of the ocean. What we are attempting to do is basically provide some information to verify indeed that there is no impact from these old dumpsites.

One would not expect such to be occurring. Basically, the procedure is to do the best we can to take samples from as reasonably near these dumpsites as we know how to do, and basically, on the dock, the people collect the samples directly from the fishermen, based on interrogations as to where their fish catch was occurring.

That is about as good as we know how to do for a marketplace assessment.

I might point out that the EPA has also done studies in deeper water directly in the vicinity, and these reports have also been published. So, one really wouldn't expect radioactive waste at the bottom to be showing up at the surface in these vicinities.

This program simply provides a verification that that is in fact the case.

Mr. D'AMOURS. Mrs. Boxer.

Mrs. BOXER. Thank you, Mr. Chairman.

Mr. Chairman, I would like to say, as a Member of Congress, and as an American citizen, I would agree with the thrust of your remarks, I find that our position, our international position on ocean dumping is very embarrassing to me, because what we really are saying is that it may be true that ocean dumping of radioactive waste could be dangerous, but until we know for sure, let's keep on dumping, then maybe when we find out it has really gotten into the food chain, maybe we will take a tough stand.

I think if you are going to be conservative about health issues, what you should be saying is, let us just stop everything until we really know for sure, and I feel very strongly about that.

It reminds me of the days when Anne Gorsuch headed the EPA, they were taking time to rework their rules on toxic waste dumping on land disposal sites, and they were reworking the results.

While they were reworking, they suspended all the rules. So, for 90 days, anyone could dump anything anywhere. I think that if, indeed, it is one of our most important goals to protect the health of the American people, then we are on the wrong track in an international sense, and I am very sorry about that.

I would like to ask the EPA a question about the Navy proposed dumping of nuclear submarines, a subject which is very dear to my heart, and to my constituents.

You say that EPA has reached no decision on the disposal of waste, radioactive waste into the oceans at this time, but you did work with the Navy on their EIS stating that you sent 30 people into the field to take part in the study.

Does EPA have any position now on the dumping of these subs?

Mr. SJOBLUM. Under the terms of the act, EPA does not take a position unless there is a permit application filed with the agency. But recognizing that that could possibly happen after the Navy completes its process, the EPA wanted to make certain that all our technical, all the possible technical concerns that we might have, with the Navy analysis, were brought fully into focus at the time.

Mrs. BOXER. So the EPA position would be to wait until there is a permit application and not advise the Navy prior to that on its position.

Mr. SJOBLUM. That is correct.

Mrs. BOXER. Will EPA consider, should that come to pass, the fact that these subs are supposed to lose their radioactivity, these

reactors, in 30 years, and it might be prudent to therefore store subs on land for 30 years and then dump them into the ocean when they won't be a danger to anyone or even risk getting any radioactivity into the food chain?

Mr. SJOBLUM. One of the comments I believe we made was for the Navy to examine the timing as to when they have to make a decision, and to provide more information on the option that you described.

But as to either recommending or deciding which option the Navy should take, no, we do not do that. The purpose of an environmental impact statement, basically, is to provide in one place all of the relevant scientific and other information on all the options, so that a reasonable response and decision can be made.

Mrs. BOXER. I know, I am very aware of EIS and EIR's because I served in local government and we couldn't do anything without an EIS or an EIR. We also have a situation in the San Francisco Bay Area where 50,000 radioactive containers were dumped near the Farallon Islands, as you probably are aware, and that dumping continued for many years, starting in the 1940's.

I am very concerned about the movement of that radioactivity from those barrels into the fish and it is my understanding that studies have been made, but not released by EPA, regarding the movement of that radioactivity, and that it is very possible that the person who wrote that study may go public with that study, but EPA is not releasing it.

Could you tell me if there is any truth to that?

Mr. SJOBLUM. EPA did environmental surveys, EPA conducted environmental surveys of the Farallon Islands dumpsites in 1974, 1975, and 1977, and all the reports of that have been released.

Some of them were released in draft form, others were released in final form.

Mrs. BOXER. So far as you know, there are no studies dealing with migration of radioactivity from the barrels of fish. There are none that have been withheld from the public?

Mr. SJOBLUM. I don't know of any.

Mrs. BOXER. OK.

Thank you, Mr. Chairman.

Mr. D'AMOURS. We thank you, Mrs. Boxer.

I would like to address a question to Mr. Lawrence, but also would be very much interested in having EPA respond, particularly Mr. Davies.

One of the purposes of the moratorium, that was adopted by this subcommittee, this committee and the Congress, was to provide additional time for research on the effects of rad waste disposal.

We received a letter, however, from one of the DOE contractors saying the response of DOE to the moratorium has not been to collect the additional data, but to stop or to drastically slow all programs and, in fact, Mr. Coffman's statement, which is submitted into the record today, which I know you are familiar with, seems to reflect the position that all of the research is over and it is time to close shop.

Beyond that, information provided to the subcommittee by DOE contractors indicates that DOE support of the Marine Ecosystem

Research Lab in Narragansett, R.I., the so-called MERL facility, is being phased out.

Now, I question the wisdom of those moves for three reasons: First, EPA thinks very highly of the facility, the MERL, and thinks it will be useful in providing information on the effects of disposing of radioactive wastes. Yet DOE support is being phased out.

Second, it seems to me that the termination of research on ocean disposal alternatives rather blatantly disregards the intent of Congress, which was that research should continue, and, if anything, be accelerated to determine the effects of low-level rad waste disposal in the ocean.

And, third, given what I sense to be DOE and EPA and perhaps State Department disagreements here, there seems to be a lack of coordination between the various agencies we find represented at this table.

So I would like to have any of you who would be willing address that question for me, and I believe since DOE is primarily involved here, Mr. Lawrence should begin.

Mr. LAWRENCE. Thank you, since what you referred to, I do not believe relates to the high level waste disposal program, I would like to ask Mr. Baublitz, who is here from the low-level program to address the question.

Mr. D'AMOURS. That would be fine.

STATEMENT OF JOHN E. BAUBLITZ

Mr. BAUBLITZ. Mr. Chairman, I am John Baublitz, Director of the Division of Remedial Action Projects at DOE. I am representing Dr. Franklin Coffman, who provided the statement for the record on this subject.

I can briefly summarize the situation. The program element that was involved in this activity is called the formerly utilized sites remedial action program. It is a program aimed at identifying contamination that exists as a result of old AEC and predecessor activities which now exceeds current standards and needs some kind of remedial action treatment.

One of the approaches to that kind of problem is to either stabilize material where it currently exists, if that is feasible and suitable, or to move it to some other permanent disposal site.

In the process of evaluating options for that program, the use of ocean dumping of this material has been under consideration for a couple of years.

Over the past, approximately, 1 year, our efforts in that area have been under review in the context of the current moratorium and the current requirements that would follow the moratorium for getting a permit. The climate that is associated with those activities and our current need for long-range planning are such that we believe we now have adequate information from the work that has been completed to phase those studies out at this time for the purposes of the formerly utilized site program.

That has led to a decision recently to complete the activities that are currently under way during fiscal year 1984.

I might point out that this decision is in the context of an ongoing project, not in the sense of a research and development activ-

ity. This decision was made strictly on the basis that this particular research activity, which could not be justified on a continuing basis at this time for these particular project needs.

[The statement of Mr. Coffman follows:]

PREPARED STATEMENT OF FRANK E. COFFMAN, DIRECTOR, OFFICE OF TERMINAL WASTE DISPOSAL AND REMEDIAL ACTION, U.S. DEPARTMENT OF ENERGY

The Office of the Assistant Secretary for Nuclear Energy in past has funded limited studies to examine the technical, environmental, engineering, and institutional feasibility for ocean disposal of low-level wastes generated by the DOE's remedial action programs. These studies have aided us in comparing alternative costs and risks of the ocean disposal alternative with shallow land disposal. The Department considers that we now have adequate information on the ocean disposal alternative for planning our remedial action program in the coming years. Accordingly, the Office of the Assistant Secretary for Nuclear Energy is bringing all of its studies on the ocean disposal of low-level wastes to an orderly termination. No future work is planned in fiscal year 1985 and the minimum work to bring the project to completion will be conducted in fiscal year 1984.

Waste from remedial action activities in Middlesex, New Jersey, are currently stored on DOE property at the former Middlesex Sampling Plant. Because of the physical proximity of this site to ocean ports, the Middlesex waste has been used in our recent studies of the ocean disposal option. Our current plan for disposal of this material is shallow land burial at a site in New Jersey to be agreed upon by the State of New Jersey and DOE. Ocean disposal also is included as an option for analysis in preparation of an EIS for disposal of low-level waste stored at the DOE Niagara Falls, New York, site.

The Department of Energy continues to evaluate alternative methods for handling low-level commercial nuclear wastes. As mandated by the Low Level Waste Policy Act of 1980, commercial low-level wastes are the responsibility of the States. The Department is unaware of any current efforts by States to dispose of commercial low-level wastes in the oceans or marine environment.

As you are aware, Section 424 on the Highway Improvement Act of 1982 (Public Law 97-44), which became law on January 6, 1983, imposed a 2-year moratorium on the issuance of permits by the Administrator of the Environmental Protection Agency (EPA) for the ocean dumping of low-level radioactive waste. Following the 2-year period, no permit may be issued without the preparation by the permit applicant of a Radioactive Material Disposal Impact Assessment.

Mr. D'AMOURS. Thank you very much.

I am pleased to hear that DOE is taking that position with respect to low-level ocean disposal, but I wonder how EPA responds specifically to the phasing out of DOE support for the MERL facility, and there does seem to be a lack of coordination here.

Would Mr. Davies or Mr. Sjoblom, reply?

Mr. SJOBLOM. Well, the program in one sense was a cooperative effort between EPA and the Department of Energy. However, EPA is clearly interested in this in any event. There were two parts to the work that I described in my testimony. One, to integrate a consideration of low-level radioactivity waste disposal into the overall EPA hazard assessment program.

This is done through the Narragansett lab. The other work relating to that was the research work in the large mesocosm tanks located at the nearby University of Rhode Island.

It was this work that the DOE and the EPA were jointly planning to fund.

However, it is my intent to continue what we can to continue this work.

Mr. D'AMOURS. Mr. Davies, do you have any additional comments?

Mr. DAVIES. I very much welcome your endorsement of the MERL facility. I am former director of the Narragansett lab, and part of the skin of my back went to keep that facility going at one stage.

I agree with you that we should strongly endorse the cooperative research that can be done. It is a very unique facility in the world, and EPA has supported this facility to a very high level over the last few years.

We are now trying both through the Office of Water and through the Office of Research and Development, we are trying to diversify that support now and have very much welcomed the participation of Sandia and the Office of Radiation Programs in that activity, and I do welcome your endorsement of it, because it is the only place I think where we have the ability to replicate the marine environment, and we have tried to use it for ocean dumping research.

Thank you.

Mr. D'AMOURS. And you anticipate that your parent agency and the administration will continue funding this work?

Mr. DAVIES. Yes, sir, at a lower level than we funded it in the past. In past years, it has been funded at about a \$1 million level a year. It went back, on an EPA basis, to \$800,000 a year, but as you know, with inflation, that causes problems.

But we have managed to get Mellon Foundation money, Office of Radiation Programs has added to it, and Energy money, so that we can increment it back to perhaps somewhat its former level.

Mr. D'AMOURS. What do you think would be needed to get it back to its former level?

Mr. DAVIES. About \$2 million a year.

Mr. D'AMOURS. Thank you.

My 5-minute period has obviously expired. Are there any further questions from other members?

Mr. Sunia, do you have any further questions?

Mr. SUNIA. I want to make a brief comment.

Mr. D'AMOURS. You have 5 minutes to make a comment or ask a question.

Mr. SUNIA. I get back to this South Pacific convention. I gather from you, that until such time as real hard-core evidence is collected and put together, it will be difficult to really decide the future course.

My concern is, that we are placing the burden of proof on those small island nations, island countries in the South Pacific. We are really placing the whole question in a difficult position, because I think they have neither the capability or the sort of intelligence gathering systems necessary at this stage to produce the evidence that we need.

So, we may be depending on something that will not produce, and, therefore, we, ourselves are unable to really develop a solid position.

That is the comment I wanted to make. Thank you, Mr. Chairman.

Mr. D'AMOURS. Mrs. Boxer?

Mrs. BOXER. One last question, which is a rephrasing of one I made before to the EPA.

Again, the importance of understanding whether or not this radioactivity gets into the food chain is one that is, to me, of prime concern. Does any of your field research attempt to trace the movement of radioactivity through the marine environment, and if it has done so, what has been the findings?

Mr. SJOBLUM. Let me answer that in two aspects.

First of all, the EPA has, as I indicated, done surveys right in the immediate area of the waste, in all of the major sites.

And the second is that there is a quite extensive body of measurements that has been made over the last 30 years, indicating the degree to which radionuclides are assimilated from the marine environment into the marine life, and so we do have, though imperfect, but we do have a set of what we call concentration factors that can allow us to calculate what degree of uptake can occur, and this—

Mrs. BOXER. What does that mean, degree of uptake?

Mr. SJOBLUM. In other words, if at the ocean bottom, let us just suppose that radionuclides in the seawater are there in the vicinity of the dumpsite, marine organisms then that live in that vicinity do tend to pick up and in some cases concentrate those radionuclides and much is known about that relationship, and what we call a concentration factor is the ratio of the concentration in a marine organism to the concentration in the water.

That is based on internationally reported literature and there are standard values used in the assessment of effects on the food chain.

Now, again, there does need to be a continuing effort in this area. I might point out that this concept is not just used in assessing pickup in the marine life, in the ocean, but on land as well, in the vicinity of nuclear power stations.

Mrs. BOXER. Let's not get on the subject of the land.

Mr. SJOBLUM. It is the same relationship.

Mrs. BOXER. We are running out of time and I am a little frustrated with your answer. I wanted to know whether or not your people in the field specifically attempt to trace this movement, and you say, I assume you say they do, that you had people in the field at all these various dumpsites and that there is uptake at various concentration levels, so that in fact the radioactivity is getting into the fish in certain concentrations, is that what you have said?

Mr. SJOBLUM. What I said is that you can make calculation of what you think might get into marine life. We are not actually able to measure it or trace it because the levels are so low.

Mrs. BOXER. So, your studies show no radioactivity in fish.

Mr. SJOBLUM. There is, of course, radioactivity in all fish throughout the world, much of it and most of it is from natural radionuclides that have been present on the Earth since it began.

Mrs. BOXER. Your studies don't show any more radioactivity in fish that are found near dumpsites?

Mr. SJOBLUM. Generally no, that is correct, that has been the case in the European studies as well as the U.S. studies.

Mrs. BOXER. And you are satisfied with the amount of study that we have done on this, or do you feel we should continue?

Mr. SJOBLUM. I think we should continue these kinds of things.

Mrs. BOXER. But at this point, the EPA position is we should not eliminate the dumping of certain levels of waste into the ocean, because you really don't feel that you have got substantial data to show that it is harmful to the food chain?

Mr. SJOBLUM. We haven't taken a position on whether or not dumping should be done in this country, no, ma'am.

Mrs. BOXER. Will you be taking that position?

Mr. SJOBLUM. Only if there is a permit application.

Mrs. BOXER. And the Navy?

Mr. SJOBLUM. That is the requirement under the law.

Mrs. BOXER. I understand, I am not criticizing, I am trying to get to the point when you make your wisdom known to the world. I would assume maybe the Navy application will be pursued. That might be the time you would in fact speak out on this issue.

Mr. SJOBLUM. Possibly.

Mrs. BOXER. Thank you very much.

It has been very helpful.

Mr. D'AMOURS. What was the answer to the last question, when this is going to be officially or formally released? Was that answered?

Mrs. BOXER. I believe we have been informed when a permit application is applied for, then the EPA will speak out as to whether or not they feel it is a risk or not. They will use that as the vehicle.

Mr. D'AMOURS. OK, I have one last question, and it is directed mostly to the State Department I assume, Mary Rose, you are going to Noumea?

Ms. HUGHES. No, unfortunately, I will not be going.

Mr. D'AMOURS. Is that because of your termination with the agency?

Ms. HUGHES. No.

Mr. D'AMOURS. I thought you were staying on because you wanted to go to Noumea and stay at some of their exquisite hotels, like the Basil. But it is important to make this point anyway on the Noumea or South Pacific Regional Convention.

The United States is going to be there, and I understand from your testimony that the position that we are going to take there is going to be identical to the position we took in London, that is, to oppose the attempt by this regional conference to impose a moratorium similar to the moratorium that the U.S. Congress has passed, that is now the law of the land.

It just frustrates me terribly—I am not going to be at this one, and I don't know if any of my staff will but it frustrates me that the United States so cavalierly gives up its world leadership role in this area, even to the extent of taking positions that are inconsistent with its own laws. Having been in London and having seen the frantic last-minute attempts of yourself, Eric Eidsness and John Hernandez, the latter two of which have gone on to other pastures, as we know, it just frustrates me to see that we are going to fall into that same situation and once again give up our world leadership on the protection of oceanic environment.

Do I understand your testimony correctly that in fact, even given the last-minute attempts to save face in London, that we are going to go into this convention with the same position that we took in

London and we are going to fight in a regional conference to promote a position that ignores our own law?

Is that really what you are saying?

Ms. HUGHES. Mr. Chairman, let me clarify.

First of all, the U.S. delegation worked very hard to achieve what I think everyone present in London agreed was a great success.

Mr. D'AMOURS. No, that is not true, but go ahead.

Ms. HUGHES. In the Kiribati-Nauru proposal, two very small Pacific island countries were successful in elevating a very important international question to the highest level of attention that it could receive in London. It dominated the weeklong discussions.

We did in fact achieve consensus that this was a very important issue, and that it should be submitted to the requisite study. The United States, as I attempted to reflect in my testimony, is in the forefront of pushing to make sure that that study is comprehensive, is completed on time, and meets the requirements that it has to meet that the Kiribati Nauru proposal will in fact be given the fullest possible review. We, in answer to the comment earlier from Mr. Sunia agree that the smaller countries are certainly not in the position to provide all of the technical and scientific expertise they may wish to provide. We are aggressively attempting to make sure that all of the available scientific and technical expertise is brought to bear in this important question.

So I think that the United States definitely did exert a leadership position in London.

With respect to the Spanish resolution, if I could simply say for the record, that resolution followed almost immediately on the heels of the consensus that was reached on the Kiribati Nauru proposal.

That resolution, to the best of my recollection, and I think the meeting record also reflects this, was not circulated in advance for parties such as the United States to work on.

We, nevertheless, did, with the limited amount of time available to us there in the conference room and on the floor, attempt to insert modifying language that would have enabled the United States and possibly other countries, to support the Spanish resolution by consensus.

It is unclear at this time if any effort——

Mr. D'AMOURS. Was there a motion made to insert that?

Ms. HUGHES. Yes, sir, there was. The Canadian delegation offered a clarifying point that the resolution was in fact nonbinding and that in fact, what it attempted to do was to express the good-faith effort on the part of the parties to the London dumping conference not to dump while this important scientific review was under way.

Thereupon, the United States made a formal motion that the Canadian viewpoint be formally incorporated into the text of the Spanish resolution, and we were unfortunately overruled on a procedural point, and a vote was taken.

It is unclear to me whether or not, given the inflexibility of the Spanish delegation's instructions from their capital, whether any further effort on the part of the U.S. delegation to modify the text would have proven successful.

But I think the point is that we did try, and I know my own recommendation as a member of the delegation would have been to support the Spanish resolution if, in fact, the clarifying language sought to be inserted by the Canadians had been inserted.

All of this is fairly technical, I know, but I think it is reflected in the record of the proceedings and we feel very strongly that, as I said, even given the late circumstances under which this Spanish proposal was presented, the U.S. delegation did nevertheless attempt to achieve consensus that would have meshed very nicely with the consensus that we had earlier achieved on the Kiribati-Nauru proposal.

With respect to your comments on the South Pacific convention, we have, as I said in my testimony, not been aware of any regional considerations in the South Pacific that would dictate a regional ban.

In other words, we feel that the questions underlying radioactive waste disposal in the South Pacific are identical to the global questions that are now under intensive review in London, and we prefer to focus our efforts on that intensive review in London.

That is the position that we took in the past, and the delegation will take next week.

Mr. D'AMOURS. Why don't you support the moratorium? Why don't you go along with them on the moratorium?

Ms. HUGHES. Well, the various versions—

Mr. D'AMOURS. It is amazing to me how the bureaucracy can—I was there, I saw what happened, and I am beginning to wonder if I am now listening to the bureaucratic explanation of what occurred in London. You were hell bent to defeat the moratorium. Now you make it sound like you think it wasn't a bad idea.

If that is true, why don't you support it in the South Pacific?

Ms. HUGHES. If I can clarify again, none of the proposals in the South Pacific have been couched in terms of moratorium. They are all couched in terms of an absolute ban, some of them including a ban on—

Mr. D'AMOURS. Why don't you modify them? Why doesn't the United States go and try to convert the proposals into a moratorium consistent with U.S. law and LDC VII results?

Ms. HUGHES. As I said earlier, we attempted to reach a resolution of this issue in London by supporting the fullest possible scientific review. That review is under way now. It will hopefully be completed on schedule if the United States has anything to do with it. We feel that that would be the most responsible outcome.

Mr. D'AMOURS. There is no way, no way you are going to support any kind of moratorium, is there?

Ms. HUGHES. Well, I don't believe that the issue has been framed.

Mr. D'AMOURS. Why don't we exert leadership and frame the issue, we the United States, the traditional leaders in the world? Why don't we exert leadership consistent with LDC VII action and consistent with the U.S. law?

Why don't we do that?

Ms. HUGHES. As I have said, Mr. Chairman, we feel that the issue is being appropriately addressed in the context of LDC. That

is the forum that we feel is best able to address it, and we will support the outcome of the LDC review.

Mr. D'AMOURS. I don't want to keep whipping the horse. He has expired, and so has my time. It appears that there are no further questions from the members of the subcommittee.

Mr. TAUZIN. I have one, just one serious one.

Did the Soviet Union participate in the London convention?

Ms. HUGHES. Yes, it did.

Mr. TAUZIN. And you are not aware of any country dumping right now. Did the Soviet Union refrain from any ocean dumping of hazardous nuclear waste?

Ms. HUGHES. The Soviet position on both the Kiribati-Nauru proposal and the Spanish resolution was identical to the U.S. position, and I believe the Soviet rationale for its position was pretty much identical to the U.S. rationale.

Mr. TAUZIN. They are not for a moratorium either. We learned yesterday that Mr. Stockman estimated it would cost \$16,000 per fish if we protected our fish from acid rain. Have you made any statements, have you received any estimates from Mr. Stockman on how much it would cost to protect ocean fish from radioactive waste?

Ms. HUGHES. No, I haven't.

Mr. TAUZIN. I am anxious to get that figure. Thank you, Mr. Chairman.

Mr. D'AMOURS. I want to thank the panel for their attention and attendance this morning, and thank you all. I hope that the United States somehow might reconsider its position in the South Pacific, but I have no great expectations there.

Thank you.

[Recess.]

Mr. D'AMOURS. The meeting will come to order again.

We are now about to receive testimony from Mr. Clifton Curtis on behalf of the Clean Water Action Project, the Critical Mass Energy Project, and I won't name them all, several other environmentally concerned groups.

Before we begin, since I understand there are members who do want to submit questions for the record. I want to ask unanimous consent that any members of the subcommittee having questions may submit them to the witnesses for the record.

Mr. Curtis, we anticipate your testimony. I would appreciate it if you would also limit yourself to a summary of that testimony as the other witnesses did, and with that, you may proceed. We welcome you.

STATEMENT OF CLIFTON CURTIS, CENTER FOR LAW AND SOCIAL POLICY, REPRESENTING A COALITION OF ENVIRONMENTAL INTERESTS

Mr. CURTIS. Thank you, Mr. Chairman.

I appreciate the opportunity to testify today on behalf of the 17 environmental and other citizen organizations listed in my written testimony that has been submitted for your hearing record.

Working with and through the Center for Law and Social Policy, this environmental coalition has directed special attention to issues surrounding ocean disposal of radioactive wastes.

Radioactive materials are among the most dangerous pollutants for the marine environment. Much still needs to be learned about the risks associated with their disposal in the ocean.

Pending the results of further research and monitoring, neither the U.S. Government or other governments should permit our oceans to be used as a disposal medium for such wastes.

In my prepared testimony, Mr. Chairman, I address several domestic and international activities. The concerns and recommendations which we have presented deal with programmatic, legal and policy initiatives that are either ongoing or proposed. I would like to highlight those concerns.

On the domestic front, the earlier testimony and colloquy addressed several matters which we believe merit further attention.

First, reference has been made to the recent amendments to the Ocean Dumping Act. We believe that those amendments make beneficial changes to the law.

We support the adoption of the moratorium; the inclusion of the radioactive materials disposal impact assessment requirements; and the requirement that Congress give its approval to any preliminary permit approval by EPA.

The adoption of the moratorium reflects the view that a more deliberate pace is needed for consideration of the ocean option. It provides time for the completion of more detailed research and monitoring of the risks and uncertainties that exist.

As you indicated in your opening statement, the moratorium was premised on the fact that reliable information on past dumping was, and in our view, remains either inadequate or lacking.

Unfortunately, Federal officials appear to view the moratorium principally as a time for inaction on the research front. Mr. Sjoblom's earlier testimony, and Dr. Byrne's written submission on behalf of NOAA, which I took a brief look at earlier this morning, indicate that numerous studies have been completed or are ongoing. The information from those studies should be very helpful.

Very few of those studies, though, including the Massachusetts Bay field survey done in 1981-1982, appear to focus on risk assessment in relation to past U.S. dumpsites and potential future dumpsites.

They fail to address from a survey perspective the questions about deep sea ecosystems and food chain pathways from the site of radioactive waste through the marine environment, and ultimately, the potential hazard to human health.

While all of the studies mentioned in the EPA and NOAA testimony should assist those agencies and others in assessing the risks of radioactive waste disposal, a more accurate assessment of the hazards of past dumping still is needed, and past dumpsite and "test" site monitoring still is needed to provide data and a sound predictive capability and validation system.

Second, these concerns and others were presented in comments submitted by the environmental coalition to the Department of Navy in response to its draft EIS on the disposal of obsolete nuclear submarines.

As examples of outstanding issues which should be dealt with in the context of the moratorium, our comments addressed such concerns as: Difficulties in monitoring deep sea ecosystems; potential food chain pathways, which relates to the question that Delegate Sunia raised about the incremental effects of dumping; and indirect effects. These same concerns and others were addressed by EPA in an analysis that we viewed as a very thoughtful and constructive critique of the Navy's draft EIS.

As a result of these and other concerns, we recommended that the Navy delay the issuance of a Final EIS. Instead, they should direct their attention to answering outstanding scientific questions, and issue a supplemental draft EIS after the expiration of the moratorium. I note that it was encouraging to see that 53 members of the House of Representatives expressed similar views in a recent letter to Navy Secretary John Lehman.

Third, it is our view that further legislative action is needed in the context of the Ocean Dumping Act. To date, there is not enough adequate evidence of good-faith compliance by Federal agencies with the moratorium's intended purpose.

For this reason, we believe that the moratorium should be extended, that guidance should be given as to what is expected from Federal agencies during the moratorium in terms of a comprehensive research and monitoring program, and that a report on the implementation of that program be submitted to Congress at some appropriate future date.

It is encouraging to hear from Mr. Sjoblom, and to read in Dr. Byrne's written submission, that such a program is being developed, and that it is expected to be completed in 1984. Having participated as a witness in your subcommittee's November 1980 oversight hearing on this same issue, however, there is a distinct *deja vu* element to the representations being made today by EPA and NOAA.

Fourth, in relation to our recommendation that the moratorium be extended, we also believe that regulatory revisions relating to ocean disposal to radioactive wastes should be postponed until after the research and monitoring program has been implemented.

Fifth, Mr. Lawrence, of DOE, has described that Department's seabed disposal program for high-level radioactive wastes. With respect to those ongoing activities, our prepared testimony describes some instances where there should be greater opportunity for public participation. Program accountability also would be well served by making special efforts not to overlap environmental and technical feasibility work with later engineering feasibility work. Significant overlap blurs the program's breakpoint review opportunities. An example cited in my testimony, is the upcoming ISHTE study, the Institute heat transfer experiment. That study will provide important information that will be useful in determining whether to go forward with substantial engineering work.

Turning to the international front, as a first area of concern, reference has been made to the London Dumping Convention's moratorium and scientific review that is under way. As you know, I was a participant in the convention's seventh consultative meeting, representing Greenpeace International, which actively supported the adoption of the moratorium. The environmental coalition on whose

behalf I am giving this testimony today, similarly supports that moratorium.

We do not feel such a moratorium prejudices the risk review. I also can state that the issues raised by the Spanish resolution were in hand well in advance of that February London Dumping Convention meeting, so that the United States and other governments had ample time to prepare for the fact that that resolution would be presented if the proposed amendments were not accepted.

One comment in this regard. Congressman Tallon asked an earlier question about whether or not the U.S.S.R. supported the moratorium resolution. The prior witness from the Department of State misspoke in stating that the U.S.S.R. delegation voted against the moratorium resolution. They did not vote against it, they abstained, and I think that is a critical distinction.

My prepared testimony describes the current situation, the de facto moratorium that is in place. This is due, in part, to the Netherlands Government having announced that it has found land-based alternatives. It also is due to significant efforts by trade union groups in the United Kingdom, Switzerland, and Belgium, to boycott the handling and transport of radioactive materials slated for sea disposal. I also indicate in my prepared statement that a similar international resolution was adopted by trade unions in Madrid, Spain, last week.

At the eighth Consultative Meeting, participants will devote significant attention to the terms of reference for the subsequent intersessional scientific experts meeting. In that regard, we share the concerns expressed by Chairman D'Amours and Delegate Sunia, believing that the parties should adopt a burden of proof standard which requires prospective dumpers to come forward with authoritative evidence which clearly shows that dumping is safe.

Second, in earlier testimony this morning, the legality of seabed disposal under the London Dumping Convention was mentioned in the context of the current London Dumping Convention review of that issue.

In my role as counsel to Greenpeace International, I will participate in the mid-December intersessional legal experts meeting that will address this question. Greenpeace believes that seabed disposal of HLW is covered by the Convention, and therefore prohibited, since it is listed as an annex 1 substance. Reasons for that position are summarily stated in my prepared testimony. The environmental coalition supports that position, and it is our hope that the evolving U.S. position will reach a similar conclusion.

Third, another LDC matter involves the IAEA's work concerning revisions to the definition of HLW and the de minimus concept.

As the IAEA review goes forward, it is our hope that U.S. Government officials will press for the adoption of existing U.S. requirements, including those dealing with our isolation and containment concept and the qualitative definition of high-level radioactive waste, both of which are more stringent than the international requirements.

Fourth, the State Department witness, in earlier testimony, mentioned the U.S. participation in the development of a South Pacific Regional Seas Convention.

She indicated that the United States will oppose any efforts to establish a regional ban. Frankly, Mr. Chairman, I was extremely troubled by the exchange you engaged in with the prior witness, Ms. Hughes, in an effort to get her to acknowledge that there was a U.S. law on the books that we have a moratorium and that the United States would affirmatively encourage or support regional adoption of that moratorium as an alternative to supporting a full ban. But the responses I heard from Ms. Hughes were to the effect that, in the State Department's view, our domestic moratorium does not even exist.

A similar problem existed, as you know, in London, that is, a frustration with getting several members of the delegation to recognize, accept and make constructive use of the existence of the recent moratorium amendment to our domestic law.

With respect to the negotiations in Noumea, we believe the U.S. should reconsider its position offering support for the proposal to ban rad waste dumping if it receives widespread support from those nations in the Pacific who are most directly affected.

We also believe that the manner in which the Department of State has developed this position also needs to be changed with respect to future policy issues. There should have been opportunities for nongovernmental participation in the development of that position.

Finally, Mr. Chairman, my prepared testimony addresses the question of dumping in the context of President Reagan's recent EEZ proclamation. It is our understanding that the administration is developing an EEZ position on dumping. It is our view that unilateral actions such as that should be deferred for the present. Instead, such issues should be addressed as part of a comprehensive review of U.S. ocean policies.

For this reason, we support the concepts embodied in H.R. 2853, which would create a National Ocean Policy Commission. House passage of that bill 2 days ago was a significant step in that direction.

Mr. Chairman, thank you for the opportunity to present these concerns regarding U.S. policies and programs pertaining to ocean dumping of radioactive wastes.

We look forward to working with you on this issue now and in the future.

[The statement of Mr. Curtis follows:]

November 2, 1983

TESTIMONY OF CLIFTON E. CURTIS
ON BEHALF OF
CLEAN WATER ACTION PROJECT,
CRITICAL MASS ENERGY PROJECT,
THE FARALLON FOUNDATION, FRIENDS OF THE EARTH,
GREENPEACE, U.S.A., HUDSON RIVER SLOOP CLEARWATER, INC.,
NATURAL RESOURCES DEFENSE COUNCIL,
U.S. NUCLEAR FREE PACIFIC NETWORK,
NUCLEAR INFORMATION RESOURCE SERVICE
OCEANIC SOCIETY, PALMETTO ALLIANCE,
SCENIC SHORELINE PRESERVATION CONFERENCE, SIERRA CLUB,
SOUTHWEST RESEARCH AND INFORMATION CENTER,
UNION OF CONCERNED SCIENTISTS,
UNITED METHODIST CHURCH JOINT LAW OF THE SEA PROJECT
AND THE WILDERNESS SOCIETY

BEFORE
THE SUBCOMMITTEE ON OCEANOGRAPHY OF
THE HOUSE MERCHANT MARINE AND FISHERIES COMMITTEE
CONCERNING
OCEAN DISPOSAL OF RADIOACTIVE WASTES

I am Clifton Curtis, an attorney with the Center for Law and Social Policy, a public interest law firm in Washington, D.C. I appreciate very much the opportunity to present testimony today on behalf of the following seventeen environmental and other citizen organizations: Clean Water Action Project, Critical Mass Energy Project, The Farallon Foundation, Friends of the Earth, Greenpeace, U.S.A., Hudson River Sloop Clearwater, Inc., Natural Resources Defense Council, U.S. Nuclear-Free Pacific Network, Nuclear Information Resource Service, Oceanic Society, Palmetto Alliance, Scenic Shoreline Preservation Conference, Inc., Sierra Club, Southwest Research and Information Center, Union of Concerned Scientists, United Methodist Church Joint Law of the Sea Project, and Wilderness Society -- hereafter referred to as

the "environmental coalition".*/ Collectively, for many years these organizations have been involved actively in efforts to advance the protection, conservation and sustainable utilization of our ocean and coastal resources.

Working with and through the Center for Law and Social Policy, the environmental coalition has directed special attention to issues surrounding ocean disposal of radioactive wastes. Radioactive materials are among the most dangerous pollutants for the marine environment, in part because they are long-lived and because they can accumulate in certain parts of the ecosystem, including living organisms. Much still needs to be learned about the risks associated with ocean disposal of radioactive wastes. Some scientific studies suggest that the accumulation of these substances in our oceans could lead to severe ecological repercussions in species and biological processes, and that such substances could be hazardous to human health through food chain contamination. Pending the results of further research and monitoring, neither the U.S. government, or other governments, should permit our oceans to be used as a disposal medium for such wastes.

The environmental coalition appreciates greatly this Subcommittee's continuing interest in domestic and international issues surrounding ocean disposal of radioactive wastes. Under your leadership, Chairman D'Amours, during 1982 this Subcommittee, the full Merchant Marine and Fisheries Committee, and the full House

*/ A brief description of each of these organizations is attached as "Appendix A."

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adopted H.R. 6113, a bill which contained needed amendments to our domestic Ocean Dumping Act. That House action served as a precedent for Congressman Glenn Anderson's noteworthy efforts to attach very similar amendments to the Congressionally approved nickel-a-gallon gas tax increase bill which President Reagan signed in early January of this year.

On a more recent note, we appreciated very much the recommendations made in a September 30, 1983 letter from fifty-three members of the U.S. House of Representatives to Secretary of the Navy John Lehman, Jr., in relation to ocean scuttling of obsolete nuclear submarines. It was especially encouraging to see that the chairpersons and ranking minority members of both the full Merchant Marine Committee and this Subcommittee, as well as four other members of this Subcommittee, were signatories to that letter.

With respect to international aspects of radioactive waste disposal, the environmental coalition also is extremely grateful for the oversight role that you, Mr. Chairman, and your Subcommittee staff have exercised in relation to the preparation and presentation of U.S. positions in the context of the London Dumping Convention and regional initiatives.

This hearing is very timely. The parallel domestic and international moratoriums and scientific reviews of the risks associated with ocean disposal of radioactive wastes are approaching their midpoint. Public airing of U.S. governmental activities, programs and planned initiatives at this juncture offers an important opportunity to assess the adequacy of those

efforts. This hearing also provides the opportunity to review the status of ongoing domestic programs that are investigating ocean disposal options for both low- and high-level radioactive waste, and to review developing U.S. positions on several other current legal and policy initiatives pertaining to domestic, regional and international issues. The following two sections of my testimony address the environmental coalition's concerns and recommendations with respect to several of these matters.

I. Domestic Activities

From 1946-1970, the oceans off our U.S. coastline were used as dumpsites for low-level radioactive wastes. Available records indicate that approximately 90,000 canisters, with an estimated total activity of 95,000 curies, were dumped at sites in the Atlantic, Pacific and Gulf of Mexico -- with 99.5 percent of that amount dumped prior to 1963.

In 1970, the Council on Environmental Quality (CEQ) issued a report, entitled Ocean Dumping: A National Policy, which concluded that ocean dumping of low-level radioactive wastes presented a very serious and growing threat to the marine environment. Soon thereafter, the Marine Protection, Research and Sanctuaries Act ("Ocean Dumping Act") of 1972 was enacted. 33 U.S.C. §1401 et seq. Pursuant to Title I of that Act, no permits may be granted for dumping any high-level radioactive waste in the ocean. Permits for low-level wastes are permitted only upon a determination that "such dumping will not unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, or

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economic potentialities." 33 U.S.C. at §1412. Regulations and criteria were published initially in 1973, with the most recent substantive revisions thereto published in 1977. 40 C.F.R. Part 227. In addition to other criteria which tracks the statutory guidelines, those regulations appropriately carry forward the CEQ Report's recommendation that the oceans be considered a dumpsite of last resort, requiring a finding by EPA prior to permit approval that "there are no practicable alternative locations and methods of disposal...available,...which have less adverse environmental impact or risk to other parts of the environment than ocean dumping." 40 C.F.R. at §227.16(a)(2).

A. Recent Ocean Dumping Amendments

As mentioned in our introductory comments, early this year the Ocean Dumping Act was amended. Amendments to 33 U.S.C. §1414, Public Law 97-424, 6 January 1983. Those amendments made three beneficial changes to the Act in relation to ocean disposal of radioactive wastes. First, there is a two-year moratorium (until January 1985) on the approval of any permits, although limited "research" dumping might be permitted. 33 U.S.C. §1414(h). Second, following the expiration of the moratorium any permit application must be accompanied by a "Radioactive Material Disposal Impact Assessment." 33 U.S.C. §1414(i)(1). That assessment must address a variety of enumerated environmental and economic issues, include determinations by affected coastal states that the proposed action is consistent with approved Coastal Zone Management Programs, and incorporate comments and results of (1) consultations with state officials and (2) public

hearings in affected coastal states. Third, assuming that EPA preliminarily approves a permit for disposal of low-level radioactive wastes after the moratorium has ended, final approval is conditioned upon Congressional passage of a joint resolution within 90 legislative days after the EPA decision. 33 U.S.C. §1414(i)(4).

With respect to the domestic moratorium that is now in force, its adoption reflects the view that a more deliberate pace is needed for consideration of the ocean option. A principal objective of the moratorium, as evidenced by your Subcommittee's report on H.R. 6113, is to provide time for the completion of more detailed research into the uncertainties and possible impacts of radioactive waste disposal. That purpose was restated in the recent letter sent by House members to Navy Secretary Lehman.

Presumably, EPA would be the lead agency in directing such focused research efforts, with NOAA, DOE, the Navy, FDA and other appropriate federal and state agencies participating. Incorrectly, federal officials appear to view the moratorium as a time for inaction on the research front. While there have been several reports issued recently by EPA with respect to 1975-1978 field surveys and packaging performance criteria,^{*/} and one

*/ Development of a Working Set of Waste Package Performance Criteria for the Disposal of Low-Level Radioactive Waste, ORP/EPA 520/1-82-007 (November 1982); Materials for Containment of Low-Level Nuclear Waste in the Deep Ocean, ORP/EPA 520/1-82-005 (December 1982); Quantitative Mineral Assessment and Radionuclide Retention Potential of Atlantic 3800-Meter Nuclear Waste Dumpsite Sediments, ORP/EPA 520/1-83-003 (March 1983); 1978 Atlantic 3800-Meter Radioactive Waste Disposal Site Survey: Sedimentary,

report on monitoring that was published by NOAA, */ those studies reflect the culmination of research and analyses which were concluded without reference to the moratorium. While those studies should assist EPA, NOAA and others in assessing the risks of radioactive waste disposal, they are not a substitute for further research and monitoring focused on past dumpsites and test sites off our coasts.

In this regard, all of the participants in the environmental coalition endorsed a critique of the adequacy of the U.S. research and monitoring in relation to radioactive waste dumping that was published by the Center for Law and Social Policy in August 1982.**/ The findings and conclusions of that critique were that:

- ° the incomplete and inaccurate information that plague the issue of past ocean dumping of nuclear waste presents a serious problem which requires more complete elaboration in order to determine actual or potential hazards;
- ° there is not enough hard evidence to provide sufficient certainty that public health and environmental hazards will not result from past dumping practices;

Micromorphologic and Geophysical Analyses, ORP/EPA 520/1-83-0017; Survey of Benthic Invertebrates Collected from the United States 2800 Meter Radioactive Waste Disposal Site in the Atlantic Oceans, ORP/EPA 520/1-82-003 (June 1983); and Analysis of Ocean Current Meter Records Obtained from a 1975 Deployment off the Farallon Islands, California, ORP/EPA 520/1-83-0019 (August 1983).

*/ Triplett, M., et al., Monitoring Technologies for Ocean Disposal of Radioactive Waste, Rand Corp. Report prepared for NOAA, R-2773-NOAA (1982).

**/ That critique has been submitted previously to this Subcommittee, and is included in the full Merchant Marine and Fisheries Committee Report, Disposal of Decommissioned Nuclear Submarines, Hearing before the Committee on Merchant Marine and Fisheries, 97th Cong., 2nd Sess., 97-47 (1982), at 82-96.

° a good monitoring program of previously used sites off the U.S. coastline is both necessary and useful (1) to provide empirical data concerning such matters as toxicity, transport, and critical pathways, fates and effects of the radioactive materials, (2) to assure the public that such past dumping does not present any public health or environmental hazards, and (3) to provide scientific data which will contribute to responsible policies and regulatory requirements for the future; and

° a good monitoring program of "test" sites off the U.S. coastline, unmodified by prior dumping activities, is both necessary and useful (1) to provide baseline data that will increase our knowledge of the physical, geochemical and biological processes of the marine environment and routes back to man; and (2) to provide scientific data which will contribute to responsible policies and regulatory requirements for the future.

It is our view that those findings and conclusions still serve as constructive guidelines for further targeted research. The enactment of the domestic moratorium, the adoption of an international moratorium/scientific review (discussed in Part II below), and the findings contained in the 1982 monitoring report prepared for NOAA by the Rand Corporation, support the continuing validity of the conclusion contained in our 1982 critique, i.e., that:

...at present it is premature to reverse the existing U.S. policy of non-ocean dumping of radioactive wastes. Unless and until a more accurate assessment of the hazards of past dumping has been completed, and unless and until past dump sites and "test" sites have been monitored in order to provide empirical data and a sound predictive capability and validation system, no serious consideration should be given to the use of the oceans as a disposal medium for radioactive wastes.

B. Navy Interest in Scuttling Obsolete Nuclear Submarines

These and numerous other technical, legal and policy considerations were presented in comments submitted by the environmental coalition to the Department of Navy on 30 June 1983 in response to its Draft EIS on the Disposal of Decommissioned, Defueled Naval Submarine Reactor Plants.*/ The Navy's interest in ocean disposal of obsolete nuclear submarines is the most advanced federal agency program that is contemplating a return to the oceans for radioactive waste disposal. As examples of outstanding issues which should be dealt with in the context of the current moratorium, our comments to the Navy discussed eleven scientific and technical considerations which were not addressed adequately in the Draft EIS. Those issues include difficulties in monitoring deepsea ecosystems; potential pathways for transport of radioactivity toward humans; site-specific questions; potential availability of radioactivity in the deep ocean; cumulative impacts; indirect effects; irretrievability; and alternatives not considered. The Navy's failure to have answered those scientific and technical concerns in its Draft EIS deprives government officials, members of Congress and citizens of information which is essential to making informed decisions among alternative disposal methods. The coalition's comments on the Navy's Draft EIS also apply the legal requirements of the National Environmental Policy Act and the related CEQ guidelines,

*/ A copy of those comments have been previously provided to staff members of this Subcommittee.

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finding that the Draft EIS violates both the letter and spirit of those laws in a wide range of areas.

The Navy's Draft EIS serves to illustrate the importance of the current moratorium. Further research and studies are essential. As stated in the "Executive Summary" conclusion to our comments to the Navy:

Without a delay to undertake needed research, it is our view that the Navy's Final EIS will run the likely risk of illegally serving as a pro forma ritual preceding a predetermined result. To correct those deficiencies, a supplemental DEIS must be prepared, with its preparation awaiting the accumulation of relevant data during the two-year moratorium period. These corrective measures are necessary to meet both the letter and spirit of NEPA and the concerns of Congress which underly the recent amendments to the Ocean Dumping Act.

C. Further Legislative Action

Given our specific concerns in relation to the Navy's consideration of ocean disposal, we support the recent initiative by Congressman Duncan Hunter to amend the Ocean Dumping Act to prohibit ocean disposal of obsolete nuclear submarines (H.R. 4117). As part of the justification for his amendment, Congressman Hunter noted that there are "too many questions still unanswered about dumping radioactive wastes in the ocean." Press Release, 12 October 1983. Until there is adequate evidence of good faith compliance by the Navy and other federal agencies with the moratorium's purpose of completing further research, we believe that a permanent ban on submarine scuttling is warranted.

For this same reason, we believe that this Subcommittee, and the full Congress, should extend the current end-date of the moratorium (6 January 1985) by several years. Such an amendment to the Ocean Dumping Act should direct EPA and other federal agencies (1) to develop a comprehensive research and monitoring

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program, including targeted field surveys of past dumpsites and test sites (which would be selected as part of the program development), and (2) to submit a report on the results of that program to Congress, prior to the conclusion of such extended moratorium. Given federal agency reluctance to undertake further research, such amendments would provide federal officials with clearer moratorium guidance, including program end-points for budget purposes. The extended moratorium also would allow adequate time to budget the necessary federal resources, and to perform needed field studies and analyses so that the outstanding questions can be answered in a systematic fashion. In addition, an extended moratorium would enable U.S. officials to review the information, analyses and findings that are expected under the international scientific review that is presently in process.

Our request for the development of a research and monitoring program is not novel. General requirements for such a program already are contained in Title II (Section 1443) of the Ocean Dumping Act. Unfortunately, though, the Act does not provide any specific guidance in relation to radioactive wastes. As is well known, at this Subcommittee's last general oversight hearing on radioactive waste disposal, held in November 1980, EPA and NOAA officials advised the Subcommittee that such a program would be developed. As stated by one of EPA's witnesses at that hearing (Dr. Roger Mattson):

Both NOAA and EPA are committed to developing a monitoring strategy, and high priority is being given to the development of a concise, mutually agreeable, statement of purposes and costs for the ocean monitoring of radioactive materials.

During 1981, EPA and NOAA officials devoted significant resources towards development of that strategy. By September, 1981, a revised draft Program Plan for Monitoring Radioactivity in the Oceans was completed. As its "Purpose" stated, the monitoring plan was intended to fulfill five objectives, i.e.,

1. To establish an interagency program for systematically monitoring radioactive wastes and conducting research on the long-term effects of radioactive pollution in the oceans.

2. To provide scientific data for developing specific criteria to regulate any future disposal of radioactive wastes.

3. To acquire baseline data for areas not affected by dumping of radioactive wastes to serve as a reference for evaluating past or future dumping.

4. To conduct research for improving radiation monitoring capabilities and to understand the behavior of radioactive materials in the marine environment.

5. To test our present belief that previous ocean dumping of radioactive wastes is not a threat to health or the marine environment.

Regrettably, this EPA/NOAA revised draft program plan was never published for outside comment, nor was it ever completed.

Instead, it is gathering dust somewhere in agency files. That revised draft plan could serve as a significant base for the development of a comprehensive research and monitoring program which is as necessary now as it was in 1981.

On a related matter, the environmental coalition also believes that the Congress should provide EPA with guidance concerning revisions to the existing Ocean Dumping Act regulations for radioactive wastes. Since 1981, there have been indications that EPA was planning to issue revised regulations.

The simpler part of such revisions would involve the regulatory codification of international requirements which already are binding upon the United States as a Party to the London Dumping Convention. The more difficult aspects of such revisions, however, are the development of appropriate regulations which would take adequately into account the Ocean Dumping Act's Radioactive Disposal Impact Assessment requirements and the results of further research and monitoring during the moratorium. By extending the moratorium, the implementation of a research and monitoring program (and the subsequent report thereon) would provide a much sounder basis for the revision of regulations. For these reasons, the Act also should be amended to specify that revised regulations for radioactive wastes should not be promulgated until after the research and monitoring program report has been submitted for Congressional review.

D. Seabed Disposal of High-Level Radioactive Wastes

The Department of Energy, through its Sandia Laboratories, is engaged in a multi-year research and development program which is investigating sea-bed disposal of high-level radioactive wastes. The U.S. program is part of an international effort to assess the technical, environmental and engineering feasibility of the seabed disposal option. Since 1974, approximately \$36 million has been spent by the Department of Energy in developing and assessing this high-level radioactive waste disposal option.

The seabed disposal program is divided into four consecutive, yet overlapping phases: Phase I (completed in 1976) was the estimation of scientific and environmental feasibility based

on historical data; Phase II (1976-1988) is the determination of scientific and environmental feasibility drawn from newly acquired oceanographic and effects data; Phase III (1988-1993/95) would determine engineering feasibility and legal and political feasibility; and Phase IV (1993/95 to 2003+) would be dedicated to demonstration of disposal facilities. The overall technical system includes consideration of waste form, land transport to port facilities, possible container modifications at the port of departure, vessel loading, transport to deep ocean areas overlying stable, uniform clay sediments, the subsequent dropping or lowering of canisters that would be embedded in the seafloor, and isolation of the canisters in the sediments. To date the preferred method for disposing of canisters in the sediment would involve free-falling penetrators that would be released from a ship, fall through the water and, by force of their momentum, bury themselves in the clay sediment.

The consensus view of legal scholars is that seabed disposal of high-level radioactive wastes is prohibited under the current wording of the Ocean Dumping Act. If the ongoing R & D were to conclude that high-level wastes could be buried safely in the deep ocean sediments without harm to the marine environment, Congress could then be asked to amend existing law to allow such disposal. As the phased program approach indicates, however, such an amendment is premature at this time, since there are significant technical, environmental and engineering questions that need to be addressed and/or answered.

In the interim, we believe that DOE's program should provide broader public participation opportunities. In some respects the program has solicited public sector involvement, and those efforts (e.g., briefings and outside review of the 1983 program status document) serve as useful models for other federal R & D programs. Despite those constructive initiatives, we believe that the seabed disposal program also should open its annual program meetings to the public, with participation guidelines, and that it should provide periodic briefings concerning U.S. participation in international work that involves both technical and institutional concerns.

Program accountability also would be well-served by making special efforts not to unnecessarily overlap Phase II (scientific & environmental feasibility) and Phase III (engineering feasibility) activities. Significant overlap blurs the breakpoint review opportunities, and could lead to unnecessary expenditure of federal resources if the Phase II R & D were to trigger any "red lights". One example of Phase II activities that will be critical to the program's future is the completion of heat transfer verification tests, known as the In-situ Heat Transfer Experiment (ISHTE). Scheduled for deployment and recovery in FY 1986-1987, the data from those field tests will provide important information to help determine whether thermal modeling assumptions and measured properties of sediments can be used to predict thermal processes. The results of those tests should be in hand before major commitments are made to Phase III work.

E. State Activities

On 1 September 1983, California's Governor George Deukmejian signed into law State Assembly Bill 138, sponsored by State Assemblyman Dan Hauser and State Senator Barry Keane. That state law directs the California Coastal Commission (CCC), in cooperation with other state agencies, to use all available legal means to prevent dumping of radioactive wastes in the Pacific Ocean unless the CCC finds that the dumping would be consistent with that state's federally approved coastal management program. Several members of the environmental coalition supported and actively worked for the enactment of this state law. The law reflects the concern of the state officials and citizens with the risks of ocean disposal of radioactive wastes, stating that "the legislature finds and declares that the dumping of radioactive waste, including the scuttling of radioactive submarines, could adversely affect the California coastal zone." The "consistency" requirements of the Coastal Zone Management Act are a component of 28 federally approved coastal programs, offering states one important mechanism to ensure that proposed federal activities do not harm their marine and coastal resources. This requirement is similarly highlighted at the federal level through the recent Ocean Dumping Amendments (Sec. 104(i)(1)(F)).

II. International Activities

Coinciding with domestic efforts leading to the enactment of the Ocean Dumping Act, the United States was a leading force behind the adoption of the 1972 International Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matter ("London Dumping Convention"). To date, that Convention

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has been ratified by the United States and fifty-two other countries. Consistent with our domestic law, the Convention prohibits dumping of high-level radioactive wastes. Low-level radioactive waste disposal is allowed only after certain requirements have been met, including criteria for dumping that have been established by the International Atomic Energy Agency (IAEA) and special permit approval by the Organizations for Economic Cooperation and Development's (OECD) Nuclear Energy Agency (NEA).

A. Dumping Moratorium/Scientific Review

As you know, Mr. Chairman, at the February 1983 Seventh Consultative Meeting of the Parties to the London Dumping Convention, a moratorium resolution (LDC Resolution 14(7)) coupled with a scientific review mechanism was adopted by a vote of 19 nations in favor, with 6 opposed (including the U.S.) and 5 abstentions. That resolution called for an immediate two-year suspension of ocean dumping of low-level radioactive wastes, during which time a review of the scientific risks will be carried out by the Parties to the Convention.

While the moratorium resolution adopted at the Seventh Consultative Meeting is not legally binding on any nation, several delegations indicated at that meeting that it should be considered morally binding. Despite that request, three of the four nations which have been dumping radioactive wastes in recent years (the U.K., Switzerland and the Netherlands) announced immediately following the adoption of the resolution that they intended to proceed with dumping operations during the summer of

1983. The Japanese delegation, which is investigating actively the prospect of sea disposal of radioactive waste in the Pacific Ocean, also advised the Parties that an earlier offer not to begin dumping in the next two years should be ignored.

Despite the protestations by the dumping nations, no radioactive wastes have been dumped at sea this year, nor is any expected. This past spring, the Netherlands government announced that it would abide by the moratorium, stating that land-based alternative sites will be used. During the spring and summer, the transport trade unions in the U.K., led by the National Union of Seamen, adopted resolutions to boycott the handling or transport -- by road, rail or sea -- of any radioactive wastes slated for sea disposal. Agreement among those trade unions was reached by early July. That was followed by a formal nation-wide Trade Union Congress (TUC) boycott resolution that was adopted in early September by a vote of 7 million members in favor and 2.5 million members against, including a call for the support of other affiliated unions.*/ The boycott covers both 1983 and 1984, referencing the Parties' scientific inquiry and calling upon the U.K. government to investigate long-term alternatives to sea dumping. The courageous and exemplary action by the U.K. unions led to similar boycotts by transport unions in Switzerland and Belgium.

As a culmination to those trade union efforts, a similar boycott resolution was presented last week to the 34th Congress

*/ A copy of the TUC Resolution has been provided to the Subcommittee staff.

of the International Trade Federation (ITF) in Madrid, Spain. The resolution, which was adopted with the support of national trade unions throughout the world, states in part that the ITF:*/

EXPRESSES alarm at the policy of certain governments to use the world's oceans as dumping grounds for nuclear waste and at the consequential threat of radioactive pollution to marine life and, ultimately, the health and safety of ordinary people,...

NOTES [the adoption of the international two-year moratorium and scientific risk review],...

WELCOMES the opposition to nuclear waste dumping at sea expressed by numerous trade unions and trade union centers around the world,

APPLAUDS the action of those affiliates which have called on their members not to handle or transport any nuclear waste to be dumped at sea and have therefore prevented the dumping of nuclear waste at sea in 1983, [and]

URGES all affiliates to agree to join the boycott of nuclear wastes to be dumped at sea....

As a result of the trade union boycotts and decisions by national governments not to resort to the use of non-union personnel, a de facto moratorium appears to be in place, placing the spotlight on the scientific review now underway within the London Dumping Convention framework.

During this first year of the moratorium, the International Maritime Organization (IMO), the Convention's secretariat, and the IAEA are soliciting and gathering scientific information. Towards that end, the IAEA convened an international inter-agency

*/ A formal copy of the ITF resolution, as well as information on the vote and participants at the Madrid meeting will be provided to the Subcommittee staff as soon as it is available.

meeting this past September, and is expected to issue its meeting report and a technical document (containing a bibliography of pertinent reports and studies) by the end of 1983. At the Eighth Consultative Meeting, scheduled for next February, final plans will be drawn up for the intersessional meeting of scientific experts that will be held later in 1984 under the auspices of the London Dumping Convention. The results of that intersessional meeting will then be forwarded to the Ninth Consultative Meeting (February 1985), at which time the Parties will take whatever further action is deemed appropriate.

The Parties to the Convention and observers attending the Eighth Consultative Meeting will devote significant attention to the structure, format and other terms of reference for the subsequent intersessional scientific experts meeting. In this regard, we believe that the mechanism for the intersessional meeting has been correctly placed "[u]nder the auspices of the Consultative Meeting of the Contracting Parties," with expert participants drawn from "Contracting Parties, international and inter-governmental organizations and non-governmental organizations." Mechanism for the Preparation of an Expert Meeting..., LDC 7/12, Annex 6. Such an approach provides much greater assurance that diverse viewpoints will be reflected in any findings and recommendations prepared by that meeting.

We also believe that the terms of reference for that intersessional meeting should address the "burden of proof" concept associated with such a risk review. Traditionally, those who engage in (or propose) activities which risk harm to the

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environment take the position that others who question such activity must prove that it is harmful. We believe that such an approach is inappropriate, as a general principle, because all too often it is only the proponent of the activity that is in a position to perform the needed risk assessments studies. It is especially inappropriate, however, when the activity at issue involves substances as highly toxic and persistent as radioactive wastes. Given the potential damage that such substances can cause, we would strongly recommend that the U.S. delegation and others support and adopt a more responsible burden of proof approach, i.e., that prospective radioactive waste dumpers come forward with authoritative evidence which clearly shows that dumping is safe. It is our view that such an approach reflects a consistent extension of our domestic Ocean Dumping Act requirements, including those contained in the disposal impact assessment amendments.

Separate from these terms of reference-related concerns, it is essential that the selection of U.S. delegation members for the Eighth Meeting and the intersessional meeting (as well as other Convention-related meetings) be based on the individuals' knowledge and familiarity with the issues at hand, and an understanding and acceptance of applicable U.S. laws. Unfortunately, some of the U.S. spokespersons at the Seventh Consultative Meeting were either not well versed in the issues, and/or appeared unwilling to accept and constructively make use of the substantial similarities between our domestic moratorium and the international moratorium/scientific review that was under

consideration. In addition, the Department of State-imposed limits on the size of the delegation led to the absurd situation where one U.S. expert, who also happened to be the Chairman of the Convention's Scientific Group on Dumping, was not even an accredited member of the delegation. As a result, it is my personal view that U.S. credibility within the London Dumping Convention was diminished, and that the U.S. missed opportunities to forge support for a moratorium that could have been embraced much more broadly by the United States and others.

B. Legality of Seabed Disposal

While most of the work at the Seventh Consultative Meeting this past February focused on low-level radioactive waste dumping, several delegations made specific interventions concerning seabed disposal of high-level radioactive wastes. The Norwegian delegation, for example, noted the active seabed disposal R & D program presently underway by nine countries (including the U.S.) and the Commission of European Communities, under the coordination of the OECD/NEA's Seabed Working Group. It also noted that the Seabed Working Group had created a Legal and Institutional Task Team to consider, among other things, the legality of such operations under the London Dumping Convention. Several delegations expressed the view that matters concerning the interpretation and applicability of the Convention in relation to such disposal were the responsibility of the Parties.

As a result of the deliberations on this issue, a consensus resolution (LDC Resolution 15(4)) was adopted to establish a

mechanism to address the legality of seabed disposal under the Convention. That Resolution called for IMO to sponsor an intersessional ad hoc legal expert meeting, with the findings and report of that meeting forwarded to the Eighth Consultative Meeting (February 1984) for further appropriate action. That intersessional meeting has since been scheduled for 12-14 December 1983.

In my role as counsel for Greenpeace International, which has been accredited as a non-governmental observer at meetings held under the London Dumping Convention, I will participate in the December intersessional legal experts meeting. It is Greenpeace's view that seabed disposal of high-level radioactive wastes is covered by the Convention, and therefore prohibited.

Several reasons support this position. Summarily stated, protection of the marine environment is the foundation of the London Dumping Convention -- its object and purpose. In its preamble, articles and annexes, the Convention repeatedly emphasizes this concern as its driving force. As one response to that mandate, the Convention prohibits the dumping of certain wastes, including high-level radioactive wastes. In the Convention's definition of dumping, the phrase, "disposal at sea", could be interpreted narrowly to mean the final resting place of wastes -- with seabed disposal excluded from coverage because those wastes, if properly buried, are not in direct contact with "marine waters". Given the Convention's object and purpose, though, the only reasonable interpretation is that which defines "disposal at sea" to mean the place where dumping

activities occur. Any distinction between marine waters and the seabed and subsoil, for purposes of disposal at sea, would be inconsistent with the Convention's object and purpose. In addition to the Convention itself, there are several other international agreements which support such an interpretation of "disposal at sea". The most significant of those are the Convention on the High Seas, the Stockholm Conference and the Law of the Sea Convention. Moreover, this broader interpretation is preferred under principles of international law because it contributes to the continued effectiveness of the Convention.

If the Parties to the Convention were to adopt the position at the Eighth Consultative Meeting that seabed disposal is covered and prohibited under the Convention, any subsequent effort by seabed disposal proponents to amend the Convention would properly carry with it the responsibility of persuading the Parties that such disposal can be safely carried out in a manner that will ensure protection of the marine environment. The environmental coalition supports the position that Greenpeace has developed, and it is our hope that the evolving U.S. government position on this matter will reach a similar conclusion.

C. IAEA Review of Radioactive Waste Definitions and Recommendations

In addition to the above matters, the Seventh Consultative Meeting was advised by an IAEA representative of various tasks which that organization is carrying out as part of its technical and scientific advisory relationship with the Convention's Parties. Included among those tasks are technical committee reviews of three matters related to sea disposal of radioactive

wastes, i.e., (1) land-based alternatives, (2) environmental assessment methodologies and, (3) a definition of de minimus levels of radioactivity, i.e., a level of specific activity below which a substance would not be regarded as radioactive for purposes of the Convention. IAEA announced that a merged report covering the first two of those matters will be issued by the end of 1983, and that the de minimus report would be further reviewed by an advisory group during the summer of 1983.

At the de minimus advisory group meeting convened by IAEA in Monaco this past July, a report was prepared which contained various recommendations. One recommendation was a proposed definition for de minimus quantities of radioactivity for consideration by the Convention's Parties, subject to further review of certain dose limitation concerns by the International Commission on Radiological Protection (ICRP). The report also addressed the relationship of a de minimus dose rate to broader radioactivity release rate methods, requesting the IAEA to consider further the application of a release rate concept in relation to its de minimus findings.

The "release rate" concept, referred to above, is important in relation to the definition of de minimus, but even more important in relation to the definition of high-level radioactive wastes. In 1978, the IAEA issued a revised definition of high-level radioactive wastes, INFCIRC/205/Add.1/Rev.1, which included the use of release rate calculations that established upper limits on types of radioactivity that could be emitted. That concept focuses on dispersion and dilution as the principal

criterion for determining a definition of high-level radioactive waste which is unsuitable for dumping.

The IAEA has recently announced that a technical experts meeting will be held in Vienna on 28 November - 2 December 1983 to review and revise the IAEA's definition and recommendations for radioactive matters under the Convention. Based on a review of existing assumptions and models, revised release rate limits will be considered. It is our understanding that the results of that IAEA expert meeting will most likely be presented to a subsequent IAEA advisory group meeting that will be scheduled for October, 1984.

Revisions of the definition of radioactive wastes are extremely important in relation to the continuing effectiveness of the London Dumping Convention. The use, internationally, of a release rate approach in defining high-level wastes is much less stringent than the requirements under our domestic law. The regulations which have been promulgated under our Ocean Dumping Act are premised on the concept of isolation and containment. They require that radioactive wastes be packaged or containerized to prevent escape into the marine environment until the material has radiodecayed to innocuous levels. 40 C.F.R. §227.11(b)(1). Moreover, rather than merely relying on a quantitative measure of maximum release rates in defining high-level wastes, our regulations qualitatively define high-level wastes as (40 C.F.R. §227.30):

...the aqueous waste resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated waste from subsequent extraction cycles, or equivalent, in a

facility for reprocessing irradiated reactor fuels or irradiated fuel from nuclear power reactors.

In contrast with these domestic requirements, which we believe should be adopted internationally, the international reliance on a release rate approach opens the door to the possibility that high-level radioactive wastes could be dumped, as long as they meet quantitative requirements. Aside from the absence of our domestic requirements, one central problem with that approach is that the IAEA, and the proponents of higher release rate levels, have not come forward with demonstrated containment systems that control release rates in a quantifiable manner. Until such containment systems are developed, we believe that the definition of radioactive wastes unsuitable for dumping should be based, at minimum, on dumping rate limits and the initial specific activity of the wastes. Moreover, in order to feasibly carry out any sea disposal based on release rates, a program would have to be carefully developed which would require uniform packaging designs for various classes and types of wastes. Such packaging designs should be tested under both simulated conditions and in situ to establish acceptable standards of resistance to pressure, corrosion and leaching at the required dumping depths. These same concerns have been presented by the United States' delegation at past consultative meetings under the Convention.

Although U.S. officials have cited our isolation and containment requirements as an example of the appropriate caution and restraint that is needed, there does not appear to be a

consistent willingness to press for the retention of such standards in international forums. The environmental coalition believes that the containment concept is appropriate, and its retention should be championed by the U.S. as the IAEA review goes forward. Concerning the definition of de minimus quantities of radioactivity, efforts to define such quantities should be addressed in the context of the ongoing review of the entire definition for radioactive wastes. Any action by the Parties to the Convention on that definition should be postponed for further review in combination with IAEA's ongoing analysis of the definition of high-level radioactive wastes that are unsuitable for dumping.

D. Regional Initiatives

The London Dumping Convention is viewed by the Parties as the umbrella global agreement under which region-specific agreements are encouraged. The United States is currently a party to the development of two marine-focused regional conventions in the Caribbean and in the South Pacific. While the evolving Caribbean Regional Seas Action Plan has not yet formulated any specific protocols related to dumping, this issue is under active consideration in the current negotiations surrounding the development of a Draft Convention for the Protection and Development of the Natural Resources and Environment of the South Pacific Regions and draft protocols on dumping and on oil spills. Both the draft Convention (Article 10) and the draft protocol on dumping propose that no radioactive wastes be dumped in the Convention area. Several participating

delegations have put forward the proposal that the Convention area include both the 200-mile coastal zones of potential parties and the contiguous high sea areas. From 7-16 November 1983, representatives from the United States and approximately twenty other nations will meet in Noumea, New Caledonia to negotiate agreement on the draft Convention and dumping protocol in the hope that those documents can be presented to a plenipotentiary diplomatic conference in 1984 for final agreement and opening for signatures.

Hopefully, the Department of State's testimony today will explain the U.S. position that will be presented in Noumea. In that regard, we believe that the U.S. position should have been developed with an opportunity for timely public review and comment. The EPA/Department of State-sponsored Ocean Dumping Advisory Committee offers one useful mechanism for such outside review, but the Department of State chose not to use that forum, except for a very limited response to requests for information.

For purposes of the Noumea meeting, we have heard that the United States' position on radioactive waste dumping in the South Pacific will be that of opposition to any regional ban. Instead, the U.S. will recommend that nations in that region rely on national measures which are limited in geographical scope to their 200-mile coastal zones. Such a position suggests support for the Law of the Sea Convention's Exclusive Economic Zone (EEZ) concept, while at the same time ignoring that Convention's repeated references to the need for cooperative action among coastal states.*/ It also fails to take into consideration the

London Dumping Convention's admonition that "Parties with common interests to protect the marine environment in a given geographical area shall endeavor, taking into account characteristic regional features, to enter into regional agreements consistent with this Convention for the prevention of pollution, especially by dumping" (Article VIII).

We would encourage the United States to support the South Pacific nations in their efforts to address the issue of radioactive waste on a region-wide basis. Given the domestic and international moratoriums that are in effect, a ban on such dumping could be adopted with the understanding that the issue will be further reviewed after adequate scientific risk studies have been completed. Since there are no present plans for the United States to dump radioactive wastes in that region, such a position would not adversely affect our U.S. dumping program. Assuming that the proposal to prohibit radioactive waste dumping receives widespread support from Pacific-based nations, U.S. support for such provisions in the draft Convention and protocol would reflect appropriate deference to the desires of those nations who are affected most directly. Moreover, such a position would contribute to good will vis-a-vis United States' relations with those nations which could serve us well in other areas of mutual interest.

*/ Article 210 of the Law of the Sea Convention, which deals with pollution by dumping, specifically encourages states "to establish global and regional rules, standards and recommended practices and procedures to prevent, reduce and control such pollution" (emphasis added).

E. Dumping Within the EEZ

On 10 March 1983, President Reagan issued a proclamation declaring the establishment of a 200 nautical mile Exclusive Economic Zone for the United States. The establishment of an EEZ for the United States raises numerous legal and policy issues concerning implementation. Jurisdiction over dumping within the EEZ is one of those issues which we understand is currently under review. Although that issue is broader than our specific concerns regarding radioactive wastes, the environmental coalition believes that any U.S. position on EEZ dumping should be addressed as part and parcel of a comprehensive analysis.

The Ocean Dumping Act presently regulates any ocean dumping of wastes that are transported from the United States, as well as any dumping that originates from non-U.S. locations by persons connected with the United States (e.g., U.S. registered vessels). The Act also regulates dumping by any other persons within our territorial seas and contiguous zone. Therefore, the only non-regulated dumping within our EEZ is that which could be done seaward of the contiguous zone by persons not associated with the United States.

Pursuant to the London Dumping Convention, the Parties have agreed to collectively define "the nature and extent of the right and responsibility of a coastal state to apply the Convention in a zone adjacent to its coast" (Art. XIII). This provision was added to the Convention in 1972 because of the Parties' expectation that the Third U.N. Conference on the Law of the Sea would address this issue in the context of a Law of the Sea

Convention. As we all are aware, the Law of the Sea Convention does address EEZ matters in great detail. While the Reagan Administration has chosen not to sign that Convention, the EEZ Proclamation parallels the Convention in many respects. While ocean dumping is not mentioned specifically in the EEZ Proclamation, a U.S. decision to further regulate dumping in that zone would appear to be an example of the President's March 10th statement that the establishment of an EEZ "will also enable the United States to take limited additional steps to protect the marine environment."

From a narrow perspective, the extension of sovereign rights over dumping out to the edge of our 200-mile zone is a positive step. While all U.S. dumping already is regulated, such action would ensure that foreign governments and non-U.S. dumpers comply with our more stringent domestic requirements. From a broader perspective, however, we question the appropriateness of piecemeal application of the Law of the Sea Convention's EEZ-related provisions.

On balance, we favor the creation of a National Ocean Policy Commission of the type envisioned in H.R. 2853 as a prelude to further unilateral EEZ measures. Passage of H.R. 2853 by the full House on 31 October 1983 is a significant step towards the establishment of such a Commission. If the Senate were to follow suit in a timely fashion, the Commission would be constituted and would develop recommendations on a comprehensive oceans policy, including U.S. policies, laws, regulations and practices "to develop efficient long-range programs for research on, and the

conservation, management, and development of, marine resources" (H.R. 2853, §4(a)(2)(B)) (emphasis added). As its initial focus, the Commission would prepare an interim report within 6 months of its first meeting which would present recommendations for the EEZ, the continental shelf and related international policy issues.

In our view, a balanced review of ocean policies, with initial emphasis on the EEZ, is needed. Once such a review has been completed, a U.S. position on dumping could be developed, along with requirements for research, monitoring and other measures to ensure that due regard is given to conservation of our marine resources. Furthermore, a proposed position on dumping could be presented at that time in a manner which responds to the London Dumping Convention's requirement that EEZ measures be defined cooperatively by its Parties.

Conclusion

Mr. Chairman, thank you for the opportunity to present these concerns regarding U.S. policies and programs pertaining to ocean dumping of radioactive wastes. Our oceans are too important to permit them to be used as experimental dumping grounds for radioactive wastes. This Subcommittee and the full Congress already have taken constructive steps to ensure that this does not happen. We look forward to working with you in the continuing effort to develop policies and programs that will protect, conserve, and provide for sustainable utilization and development of our ocean and coastal resources.

"APPENDIX A"

CLEAN WATER ACTION PROJECT is a non-membership organization with headquarters at 733 15th Street, N.W., Washington, D.C. 20005, and other offices located throughout the eastern and midwestern United States. CRITICAL MASS ENERGY PROJECT, a non-membership group which has subscribers to its monthly journal and legislature reports comprising about 4,500 persons is located at 215 Pennsylvania Avenue, S.E., Washington, D.C. 20003. FARALLON FOUNDATION is a non-membership, non-profit public interest corporation, located at 86 1/2 Kappasa Marina, Sausalito, CA, which is committed to public education and scientific research on radioactive waste management and environmental protection. FRIENDS OF THE EARTH, whose principal place of business is at 124 Spear Street, San Francisco, CA, has a membership of 32,000 persons and is affiliated with "sister organizations" in 12 foreign countries. GREENPEACE, U.S.A., whose principal office is at 2007 R Street, N.W., Washington, D.C. 20009, is a national organization composed of local membership groups with 300,000 sponsors and donors. HUDSON RIVER SLOOP CLEARWATER, INC., is a non-profit organization with 5,000 members, offices at 112 Market Street, Poughkeepsie, NY, and supporting organizations all along the Hudson River. The NATURAL RESOURCES DEFENSE COUNCIL, whose principal office is at 122 East 42nd Street, New York, NY, and which has additional offices in Washington, D.C., and San Francisco, CA, as well as nine regional chapters, has 45,000 members. U.S. NUCLEAR FREE PACIFIC NETWORK, whose principal place of business is at 942 Market Street, Room 712, San

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Francisco, CA, is a coalition of environmental, disarmament and human rights groups that are located throughout the Pacific Basin. NUCLEAR INFORMATION RESOURCE SERVICE is a non-membership information clearinghouse organization with offices at 1346 Connecticut Avenue, N.W., Washington, D.C. 20036. The OCEANIC SOCIETY, whose principal place of business is Magee Avenue, Stamford, CT, and which has an additional office in San Francisco, CA, has 70,000 members. The PALMETTO ALLIANCE, located at 3125 1/2 Devine Street, Columbia, SC, is a state-wide public interest group incorporated as a non-profit organization to promote awareness of energy safety issues, particularly nuclear wastes. SCENIC SHORELINE PRESERVATION CONFERENCE is a non-membership organization whose principal office is 4623 More Mesa Drive, Santa Barbara, CA. The SIERRA CLUB whose principal place of business is at 530 Bush Street, San Francisco, CA, has a membership of approximately 350,000 persons, including persons residing in 62 foreign countries. SOUTHWEST RESEARCH AND INFORMATION CENTER, located at P.O. Box 4524, Albuquerque, NM, sponsors public interest research projects, and is the parent organization of the 6,500 member National Campaign for Radioactive Waste Safety. The UNION OF CONCERNED SCIENTISTS with its headquarters and principal place of business at 26 Church Street, Cambridge, MA, is supported by 150,000 sponsoring members living both within the U.S. and abroad. UNITED METHODIST CHURCH JOINT LAW OF THE SEA PROJECT is sponsored by the Church's General Board of Global Ministries and the General Board of Church and Society, is located at 100 Maryland Avenue, N.E., Washington, D.C. 20003. The WILDERNESS SOCIETY's principal place of business is at 1901 Pennsylvania Avenue, N.W., Washington, D.C. 20006, and has a membership of approximately 77,000 persons.

Mr. D'AMOURS. Thank you, Mr. Curtis.

I was pleased to hear your remark on what actually happened in London last February. You reassured me that yes, I was there.

In your testimony, you indicate, and you just did, that Federal officials appear to view the moratorium as an opportunity for slowing action or inaction on the research front, and you have mentioned some specific things that were or weren't being done.

Could you suggest ways in which you believe we should be proceeding in order to implement our research needs that are not now being done?

Mr. CURTIS. I can very briefly suggest some overview strategies and could suggest more specific ones in writing.

Mr. D'AMOURS. I recognize the difficulty and complexity of that question, and we will certainly keep the record open for you to submit the answer in writing, if you would prefer to do that.

Mr. CURTIS. I will just say as an overview statement, we have addressed the adequacies of research and monitoring by the Federal Government in a critique of a GAO report in the summer of 1982, and in the context of our June 1983 comments to the Navy on their Draft EIS. It is our view that further targeted research and monitoring is needed of past dumpsites off our Pacific, gulf, and Atlantic coasts.

EPA's testimony indicated that an inventory process is continuing. To my surprise, they have now upped the number of barrels that have been dumped from what had been previously thought to be around 90,000, to 120,000 barrels, from our dumping program between 1946 and 1970.

I think we need to look at some further targeted monitoring field surveys in places like the Farallon Islands, near the Santa Barbara area, in Massachusetts Bay, as well as in the Baltimore Canyon area off of the Atlantic coast.

I will submit a further response in writing that will be more specific about some of the types of strategies.

Mr. D'AMOURS. Thank you. I appreciate that.

[The information follows:]

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December 5, 1983

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The Honorable Norman D'Amours
Chairman, House Subcommittee on
Oceanography
Committee on Merchant Marine and
Fisheries
House Annex 2, Room H2-541
Washington, D.C. 20515

Re: November 2, 1983 Oversight Hearing on Ocean
Disposal of Radioactive Wastes

Dear Chairman D'Amours:

During the November 2, 1983 hearing which you convened to address domestic and international aspects of ocean disposal of radioactive wastes, you asked me a question in relation to the testimony which I presented. In both my written and oral testimony, I expressed the view that federal officials are not taking advantage of the current moratorium on radioactive waste disposal permits to complete more detailed research and monitoring with respect to the uncertainties and possible impacts of radioactive waste disposal. You asked me to suggest ways in which the U.S. government should be proceeding to implement our research needs that are not now being done. At the hearing, I gave an overview response in which I requested, and received your approval to provide a more detailed response in writing.

In my written testimony I referenced a critique of the adequacy of United States' research and monitoring in relation to radioactive waste dumping that was published by the Center for Law and Social Policy in August, 1982. The four principal conclusions of that critique were enumerated, reflecting the view of the environmental organizations that there exists a need for: (1) more complete and accurate information on past dumping practices; (2) hard evidence addressing the hazards of past U.S. dumping practices; (3) a monitoring program of previously used sites off U.S. coasts; and (4) a good monitoring program of test sites off our coasts that have not been modified by prior dumping activities. As I indicated in my testimony, those conclusions still serve as constructive guidelines for further targeted research.

The Honorable Norman D'Amours
December 5, 1983
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My written testimony and overview response to your question also referenced the environmental organizations' comments that were submitted to the Navy on June 30, 1983 in response to its Draft EIS on the disposal of obsolete nuclear submarines. Those comments addressed technical, legal and policy considerations, including eleven scientific concerns that were not adequately addressed in the Draft EIS. A few of those eleven concerns are submarine disposal-specific, in focus, but all of them represent issues which should be addressed in the context of a broader research and monitoring program. Those eleven issues include: difficulties in monitoring deepsea ecosystems; potential pathways for transport of radioactivity towards humans; site-specific questions; potential availability of radioactivity in the deep ocean environment; cumulative impacts; indirect effects; faulty cost estimates; irretrievability; inadequate consideration of other alternatives; potential for accidents; and other data deficiencies. Several of these concerns, among others, were similarly presented to the Navy last June by the EPA in its comments on the Draft EIS.

The concerns addressed in the Center's August 1982 critique, the environmental organizations' comments on the Navy's Draft EIS on scientific considerations, the EPA's comments as well as other comments on that Draft EIS, the various studies and reports cited by EPA in its written testimony at the November 2nd hearing, the Department of Energy's marine-related work on risks associated with sea-bed disposal of high-level radioactive wastes, and other information and concerns which have been pulled together for purposes of the international scientific review of low-level radioactive waste dumping and the Nuclear Energy Agency's Seabed Working Group (SWG) work on high-level sea-bed disposal, all represent examples of information which should be used as points of departure for purposes of developing and implementing a targeted research and monitoring program.

As discussed in my testimony at the hearing, the environmental organizations believe that the Congress should adopt an amendment to the Ocean Dumping Act which directs EPA and other federal agencies to develop and implement a comprehensive research and monitoring program and to submit a report on the results of that program within an appropriate timeframe. We also recommended that the current moratorium be extended to allow adequate time for that work to be done.

At the hearing the EPA witness indicated that both EPA and NOAA are currently developing a comprehensive research and monitoring program in relation to radioactive waste disposal in the oceans. NOAA's written submission advised that a working group has been established under Public Law 95-273 to "develop a coordinated national plan for research and monitoring to evaluate

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the marine option for disposal of low-level radioactive wastes, and to facilitate implementation of this plan by the appropriate agencies." It was encouraging to hear that such a plan is in process. As noted in my testimony, however, similar efforts were initiated in 1980-81 following a hearing before your Subcommittee on November 20, 1980. A revised draft of that plan was completed by the fall of 1981, but it was never finalized.

My written testimony listed the five objectives, or purposes, that were contained in the 1981 revised draft plan. With the exception of the fifth objective, the first four could be used as part of an amendment to the Act that would describe the contents of a required research and monitoring program. Consistent with the concerns expressed in our August 1982 critique and the June 1983 comments on the Navy's Draft EIS, however, the fifth objective, i.e., "to test our present belief that previous ocean dumping of radioactive wastes is not a threat to health or to the marine environment," should be revised. Instead of referencing any present beliefs based on extremely limited field data and preliminary assumptions, that objective should seek "to assure the public that previous dumping of any dumping of radioactive wastes is not a threat to human health or the marine environment."

Such legislative guidance in the Ocean Dumping Act along with the other amendments that were recommended in my written testimony, would assist both Congress and the federal government in carrying out their respective responsibilities. It would provide the Congress with a benchmark for assessing the adequacy of any program that is developed. With respect to the federal agencies, it would clarify any uncertainties that might remain as to the purpose of the moratorium, and it would provide program end-points that could be cited for purposes of securing the necessary budget resources.

In this response I have suggested some of the scientific concerns that need to be addressed in a comprehensive research and monitoring program, as well as language that could be used to provide statutory guidance in the development and implementation of such a plan. In preparing this letter I discussed these and other related issues with representatives of several of the environmental organizations on whose behalf my testimony was submitted. In talks with the Oceanic Society's President, Christopher Roosevelt, we discussed a mutual desire to develop a much more detailed set of research and monitoring strategies which would be prepared through a focused workshop-type review of the various sources of information cited earlier, among other data and analyses. While neither the Center for Law and Social Policy nor the Oceanic Society presently have the resources to undertake such an effort, we intend to pursue that idea.

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Ideally, we would like to sponsor such a workshop in 1984. The findings, recommendations and strategies could be used either as a basis for reviewing the proposed EPA/NOAA plan, assuming it is finalized by next June, or the workshop results could serve as a contribution to that ongoing effort. I will keep you and your staff apprised of our efforts in that regard.

I hope that this response adequately addresses the concerns raised by your question at the hearing. On behalf of the seventeen environmental and other citizen groups on whose behalf I presented my testimony, your interest and concern with respect to radioactive waste ocean disposal issues is greatly appreciated.

Sincerely,



Clifton E. Curtis

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December 19, 1983

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The Honorable Norman D'Amours
Chairman, House Subcommittee on Oceanography
Committee on Merchant Marine and Fisheries
House Annex 2, Room H2-541
Washington, D.C. 20515

Re: November 2, 1983 Oversight Hearing on
Ocean Disposal of Radioactive Wastes

Dear Chairman D'Amours:

By letter dated December 5, 1983, I submitted a written response to a question that you addressed to me at the November 2, 1983 hearing before your Subcommittee. Following that hearing, you forwarded to me five written follow-up questions that were propounded by the Honorable Edwin Forsythe. This letter addresses those questions and my responses.

Question #1: One of the terms of reference to be defined by the intersessional meeting of the London Dumping Convention is the concept of burden of proof. You mentioned that the U.S. should support the position that the prospective radioactive waste dumpers be responsible for showing clearly that dumping is safe. Noting the difficulty of proving a negative, what documentation do you feel would prove that radioactive waste dumping is safe?

Answer: In my written and oral testimony at the November 2nd hearing, I recommended that the Eighth Consultative Meeting of the Contracting Parties should shift the "burden of proof" requirements in relation to the international scientific review of the risks associated with low-level radioactive waste dumping. My testimony recommended "that prospective radioactive waste dumpers come forward with authoritative evidence which clearly shows that dumping is safe" (emphasis in original). To date there have been very few studies which have assessed the impacts of past dumping of radioactive wastes, either with regards the dumping that occurred off U.S. coasts between 1946 and 1970, or the dumping in the OECD/NEA-sanctioned Northeast Atlantic dumpsite. Targeted monitoring of those dumpsites would provide valuable information to assist in determining the safety of such activities. In the detailed comments that the environmental coalition submitted to the Navy last June in

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relation to its Draft EIS on obsolete nuclear submarine disposal, a copy of which has been provided to the Subcommittee, we recommended several specific monitoring strategies, including pathway/food chain effects studies (at pp. 16-32) that would provide useful documentation. Reliable risk assessment models also would contribute valuable information. "Proving" that dumping of low-level radioactive wastes is "safe" involves judgment calls. It is impossible, given the extremely long half-lives of some radioisotopes, to ever prove absolute safety, but much more needs to be done through marine scientific research and monitoring to ensure that such practices are safe, in a relative sense. The important point behind such a revised burden of proof is that the proponents of such dumping would have an affirmative duty to present authoritative evidence which shows that radwaste dumping is safe. To date the environmental organizations do not believe that enough attention and resources have been devoted to that effort by the proponents of such practices.

Question #2: In your opinion, has the development of the United States domestic policy and program implementation on ocean dumping of radioactive waste been open to public participation? If not, could you please discuss where public participation has been restricted or denied?

- a. You mentioned that the DOE research conducted by the Sandia Laboratories on subseabed disposal of high-level radioactive waste, while adequate, could be improved by broadening the opportunity for public participation. Could you please elaborate on what you would like to see involved in opening this process to public participation?
- b. Has the development of U.S. policy on international radioactive waste disposal been an open process and, if not, please elaborate on the areas of possible improvement?

Answer: In my opinion, the development of United States' domestic policy and program implementation on ocean dumping of radioactive wastes has not been open to public participation. The EPA/DOS-sponsored Ocean Dumping (advisory) Committee provides limited opportunities for the public to participate in the development of U.S. policies in relation to the London Dumping Convention, but there should be a similar mechanism (much improved) that would enable persons and organizations outside the government to participate systematically in domestic policy and program implementation. There have not been adequate opportunities to participate in the development of the EPA/NOAA comprehensive research and monitoring program that is now apparently under development again after a two-year hiatus. No

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documents have been released in support of that evolving program for public review and comment. The Navy's Draft EIS on the disposal of obsolete nuclear submarines offered a significant basis for reviewing their ocean disposal option, but several of the environmental groups and my organization found it very difficult to gain access in a timely manner to the back-up studies that could have been made available far earlier than was the case. Earlier and more complete access to backup technical studies would have facilitated more informed public input and comment. There were similar difficulties surrounding environmental organizations' efforts to receive pertinent data on the Department of Energy's examination of sea-disposal for FUSRAP wastes.

In response to Question #2(a), my written testimony indicated that the Department of Energy's Sandia Laboratories R & D program has involved the public through certain program review opportunities. Those public participation opportunities have been very useful. As stated in my testimony, though, the program's annual meetings and U.S. involvement in the international OECD/NEA Seabed Working Group should allow for public participation. This past week, I discussed further our concern regarding the annual meeting with Dr. Anderson, Director of the Sandia Laboratories. He informed me that the structure and format of future annual meetings is under revision. There should be procedures to allow non-governmental, non-program people to attend future annual meetings, including the technical discussions. Based on Dr. Anderson's initial comments on their planned changes, it appears that our concerns regarding participation in the annual meetings can be addressed adequately. With respect to the NEA's Seabed Working Group, we believe that the United States should press for the adoption of procedures that would enable non-governmental, non-program people to attend the task group and annual meetings as observers.

In response to Question #2(b), the development of U.S. policy on international radioactive waste disposal issues has not been an open process. U.S. positions are too often developed and finalized without any real opportunities for public participation. There has been too great a focus within the government on excluding outside participation until after the various government agency officials have agreed on a common position. When evolving U.S. positions are discussed publicly, they are generally discussed too late in the process to permit effective and thoughtful review of other views. The principal mechanism for improving this situation would be through better use of the Ocean Dumping (advisory) Committee. Dr. Tudor Davies of EPA currently chairs that committee. His leadership of the Committee has improved substantially the openness of the discussions from the way in which those meetings were convened

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and conducted in 1981 and 1982. Nonetheless, the problems of having committee meetings too late in the decisionmaking process, without adequate candor regarding governmental agencies' views and differences, require further attention.

Question #3: In your opinion, are the international ramifications of ocean radioactive waste disposal being addressed by organizations that represent the global spectrum of perspectives or are the involved organizations predominantly those countries that would benefit from radioactive waste disposal at sea?

Answer: The principal mechanism for international consideration of ocean dumping issues is the London Dumping Convention (LDC). Fifty-three governments have ratified or acceded to the LDC. At the meeting that are held under the LDC, twenty-to-thirty of those governments participate, along with several international agency observers and non-governmental observers. In recent years, the views expressed at LDC meetings have become more representative of the global spectrum of concerns, but there still needs to be greater involvement by other coastal and land-locked nations. The Law of the Sea Convention, when it comes into force, should assist in broadening the spectrum of views since that Convention provides for a de facto application of the LDC to all countries which ratify or accede to the Law of the Sea Convention.

Question #4: Could you please elaborate on the London Dumping Convention efforts to redefine disposable and non-disposable radioactive wastes or the "de minimus" definition?

Answer: In my written testimony, I discussed the IAEA's review of the high-level radioactive waste definition, as well as its review of a definition of de minimus levels of radioactivity. The IAEA has sponsored several meetings in recent years at which these and other issues have been addressed in the context of IAEA's technical and advisory relationship with the contracting parties to the LDC. The most recent such meeting was held at the IAEA headquarters in Vienna, Austria beginning November 28, 1983, at which time invited experts from various governments addressed those definitional and other related issues. It is my understanding that an IAEA representative will present a status report of its ongoing review of these issues to the Eighth LDC Consultative Meeting in February, 1984. It also is my understanding that a further technical IAEA meeting is being planned for the fall of 1984 to address these issues, and recommended changes to the existing definitions could be presented to the Ninth LDC Consultative Meeting in February, 1985 for approval or other action by the contracting parties.

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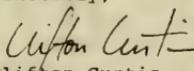
Question #5: If an adequately conservative model of ocean dumping of radioactive waste did show that such procedures could progress without harm to health and the environment, is there any reason such practices should not be allowed?

Answer: My personal view is that low-level radioactive waste disposal in the oceans should be allowed if such practices can be proven to be safe. It is impossible, however, in the abstract to know what is meant by an "adequately conservative model" which "show[s]" no "harm to health and the environment." With the advice and assistance of scientists, a review of the evidence needed to support those determinations would provide me with an informed basis for a real world "yes" or "no" to this question.

* * *

I hope that my replys to the above quetions are responsive to the concerns raised by Reprsentative Forsythe.

Sincerely,


 Clifton Curtis

Mr. D'AMOURS. Mr. Sunia, do you have any questions of this witness?

Mr. SUNIA. No questions.

Mr. D'AMOURS. Mr. Tauzin?

Mr. TAUZIN. No, no.

Mr. D'AMOURS. I want to thank you very much for the excellent testimony you have submitted, Mr. Curtis, and for waiting to get to your testimony.

I suspect the lack of questions, I am sure you know, doesn't indicate any lack of interest in your testimony, but perhaps general approbation of what you had to say. We very much appreciate your being here.

The hearing stands adjourned. We thank you all very much.

[The following was received for the record:]

ADDITIONAL QUESTIONS OF MR. D'AMOURS AND ANSWERED BY EPA

In 1977 EPA issued revised regulations implementing the Marine Protection, Research, and Sanctuaries Act. The regulations set forth the procedures to be followed and the criteria to be applied in reviewing applications to dispose of materials in ocean waters. The regulations governing the ocean disposal of radioactive wastes are based on the concept of isolation and containment, and in particular require that low-level wastes be packaged so that they will decay to innocuous levels within the life expectancy of the container and in quantities that will result in short-term, localized effects should the container rupture.

Keeping in mind that Section 109 of the Act directs the Secretary of State, in consultation with the Administrator of EPA, to take appropriate measures to encourage and promote the acceptance and implementation of the policies of the Act throughout the international community, is the United States promoting the concept of isolation and containment as is embodied in existing regulations on the international level?

ANSWER

Yes, the United States has promoted the concept of isolation and containment in the development of recommended criteria by the International Atomic Energy Agency (IAEA) for issuing special permits for radioactive materials. These criteria were published by the IAEA in August 1978 (INFCRC/205/Add.1/Rev.1) and adopted by the Contracting Parties to the London Dumping Convention later that year. Section B.1.3 states:

"It is essential that a general policy of continued isolation and containment of radioactive waste after descent to the sea-bed should be pursued through the use of suitable packaging to minimize to the extent reasonably achievable the radioactivity which might ultimately be released, thereby preventing unnecessary contamination of the marine environment."

This concept was a very controversial issue in international criteria development because the common practice was to require packaging of radioactive wastes only to the extent necessary to assure that the materials would sink to the ocean floor, after which the containers could release their contents and safety was determined by dilution and dispersion of the materials. Despite considerable opposition the U.S. was successful in getting the isolation and containment concept included.

ADDITIONAL QUESTIONS OF MR. STUDDS AND ANSWERED BY EPA

1. It is my understanding that the DOE unilaterally decided to terminate a joint DOE/EPA project at the University of Rhode Island, designed to study the effects of Middlesex, N.J., contaminated soils on a functioning ecosystem. The EPA planned to use the results of the experiment to help develop a methodology for evaluating ocean dumping permit applications. If DOE withdraws funding of the URI study, is the Radiation Program in a position to supplement the funding so that the year long experiment may commence?

ANSWER

EPA would like to see this evaluation proceed. However, the Office of Radiation Programs is not in a position to supplement funding for the MERL study, as previously planned, for this Fiscal Year. Alternative study designs and time frames may need to be examined.

2. In the absence of the URI study, does the EPA have adequate data to develop a methodology for ocean dumping of low-level radioactive wastes?

ANSWER

Extensive data does exist on the fate of radionuclides in the marine environment, but generally, estimates made with this data are probably higher than additional research may show are realistic for specific wastes. The planned work might permit testing before disposal, of how good our assumptions of biological, physical and chemical determinants of transport, and biological uptake are for particular wastes, and thereby permit better assessments.

3. What other low-level radioactive wastes are candidates for ocean disposal? Would the URI studies contribute to the understanding of the behavior of these wastes in the ocean environment?

ANSWER

The Navy is currently studying disposal alternatives for decommissioned, defueled submarine reactor plants, and has prepared a draft environmental impact statement (DEIS) to compare environmental impact considerations for both land and ocean disposal. The EPA has carefully reviewed the DEIS and submitted extensive comments during the summer of 1983. At this time, to the best of our knowledge, the Navy has made no decision regarding disposal of submarine reactors. The Navy has been sponsoring similar studies in aquaria at the marine laboratory at Sequim, Washington, over the last several years, to examine the particular factors involved with the radionuclides of interest in that instance. Several reports on this work were published.

Studies at the URI were primarily intended to focus on the effects from ocean disposal of unpackaged soils containing extremely low levels of naturally-occurring radioactivity. Information from other aspects of URI studies might also be applicable to ocean disposal of submarine reactors, including how partitioning, migration and transport of contaminants (i.e., trace metals and man-made radionuclides, such as cobalt-60) would occur in deep sea sediments.

4. On page 9 of your testimony, you discuss a research cruise of Massachusetts Bay. Do you know how much and what types of wastes were dumped in Massachusetts Bay and have you isolated specific dump locations? During this extensive cruise, how close to identified waste containers were you able to sample? If you were unable to confirm that you were, in fact, sampling in the immediate vicinity of dumped radioactive wastes, of what significance were any of the samples taken?

ANSWER

The 1982 EPA radiological monitoring survey in Massachusetts Bay was planned and conducted to adequately describe the radiological environment in four areas designated for low-level waste (LLW) disposal in 1952. Environmental samples were collected to determine whether previous dumping of LLW in these areas was cause for concerns pertaining to public health effects.

The EPA has reviewed available disposal records and interviewed people who were involved in LLW disposals in the Bay. We have determined that 4,008 containers of LLW were dumped between 1952 and 1959. In addition, 940 cubic feet of radioactive waste materials were encased in concrete molds and dumped in the Bay during the same period. The Atomic Energy Commission estimated that the total radioactivity was 2,440 curies at the time of disposal.

The LLW disposed were generally from commercial, academic, and medical sources. Some defense-related nuclear wastes may also have been dumped as early as 1946, however, EPA has not been able to document the amounts or types of the radioactive materials that were dumped prior to 1952. Typical items disposed of included: by-product radionuclides with isotope numbers ranging from 3 to 83; and, laboratory glassware and equipment, clothing, tools, chemicals or other materials that may have been contaminated with radionuclides.

In 1981, the National Oceanic and Atmospheric Administration (NOAA) conducted a sonar side scan survey of LLW disposal areas in the Bay for EPA. The EPA then designed an environmental sampling survey, based on the data provided by NOAA. A grid sampling pattern was established to acquire sediment and biota specimens that were both near concentrations of bottom objects charted by NOAA, and throughout the entire disposal area. Collection of sediment and biota for detailed post-survey radio-chemical analyses, as well as the measurement of in-situ radioactivity,

was conducted as planned. The significance of such sampling is that sufficient data were acquired to effectively statistically evaluate the radiological quality of the environment within each disposal area.

The 1982 EPA radiological monitoring survey was carried out in response to possible concerns over potential adverse public health effects from previous LLW dumping in the Bay. The sampling plan that was followed, and the amounts and types of specimens collected, accomplished that purpose, and showed no evidence of harm to human health or the environment resulting from past disposals of radioactive materials in the Bay.

ADDITIONAL QUESTIONS OF MR. FORSYTHE AND ANSWERED BY EPA

1. For FY 1983, 1984, and 1985, please detail the budgetary and personnel requirements for each of EPA's programs involved in researching, permitting, and monitoring ocean disposal of radioactive waste.

ANSWER

EPA's resources for programs involving research, development of criteria for reviewing permit applications, and monitoring past ocean disposal of radioactive wastes are summarized in the following table:

<u>Fiscal Year</u>	<u>Person-Years</u>	<u>Extramural Funds (Thousands)</u>
1980	14	850
1981	12	100
1982	10	550
1983	10	450
1984	10	450

The formal request for the FY 1985 budget has not yet been submitted to the Congress. However, our present plans would have us use about the same level of resources in that year as we would have used in FY 1984.

2. Please explain for the Subcommittee how the removal of the DOE support for the joint DOE/EPA marine ecosystem research being carried out at the Marine Ecosystem Research Laboratory in Rhode Island will affect that program's studies, activities, reporting, and results.

ANSWER

The technical study to be carried out at the University of Rhode Island's Marine Ecosystem Research Laboratory (MERL) was planned, from EPA's perspective, to support development of a consistent Agency approach to evaluating permit requests for ocean disposal of radioactive waste materials. We are funding the EPA Narragansett Laboratory at a level of \$150K this year to incorporate consideration of special needs of radioactive materials into the overall Agency approach. We intended that the parameters regarding transport, uptake and exposure to marine organisms, and correlated effects be tested in the mesocosm tanks, which mimic coastal field conditions. We wish to confirm our ability to model and predict behavior and fate based on smaller scale laboratory testing of key chemical, biological and physical parameters, and ascertain the usefulness of the MERL system in providing a critical check on our expectations for transport and effects for particular wastes and radionuclides.

When we learned of the Department of Energy (DOE) interest in testing the specific behavior of FUSRAP soils in the MERL tanks, we decided that a cooperative study, with cost-sharing, could provide both agencies with data for their respective purposes. Since the source term had already been carefully analyzed by DOE, EPA felt that FUSRAP waste would be suitable for assessing behavior of low-level radioactivity in the marine environment.

The fact that DOE may not participate does not change our Agency's view that the MERL study, such as the one we designed, would be useful in developing our permit evaluation framework. It does, however, force us to reexamine the study design in light of more limited funding for this year, or to consider the possibility of postponing the study for one year and funding the current scope of work in the next Fiscal Year or to look for some other funding mechanisms. Initiation and/or completion of the project may be delayed to some extent, which we are still in the process of evaluating.

3. Does EPA consider that its present monitoring and survey studies for radioactive waste disposal at sea will provide sufficient information to determine whether the resumption of ocean dumping will pose a threat to health and the marine environment?

ANSWER

The information derived from EPA surveys of old U.S. dumpsites is only one source of data which EPA would consider in determining whether the U.S. should resume ocean disposal of radioactive materials. Although EPA's surveys have indicated that past U.S. disposals have not resulted in harm to either the marine environment or human health, EPA would not allow future disposals to be carried out as they were in the past. The Ocean Dumping Act of 1972, and amendments of 1983, EPA Ocean Dumping Regulations of 1977, and London Dumping Convention criteria adopted in 1978 all impose more restrictive requirements. In particular, the 1983 amendments require that a disposal permit applicant prepare a Radioactive Material Disposal Impact Assessment that establishes the safety of any proposed ocean disposal for the particular wastes at a particular ocean site. Furthermore, an applicant must demonstrate the need for ocean disposal in contrast to other disposal options.

4. Does EPA see any problems with the "de minimus criterion" being developed as part of the IAEA proposal for reclassifying radioactive waste? What modifications would EPA see as necessary and are there any areas of specific concern that EPA would want addressed to assure that the definition is consistent with the requirements under domestic law, such as the Ocean Dumping Act?

ANSWER

The IAEA effort to define de minimis quantities of radioactive materials is based on the recognition that all materials contain some amount of radioactivity, either from naturally-occurring radionuclides, or fallout from nuclear weapons testing. Consequently, there is technically no such thing as a "nonradioactive" material. In the real world, however, there are a variety of materials whose inherent radioactivity is extremely low and which are traditionally dealt with as "nonradioactive" materials. These include dredge materials, sewage sludge, construction debris, and agricultural wastes, as examples. It is not the intention of the London Dumping Convention to require that all materials be regulated as radioactive materials. So the question for IAEA to resolve is where to establish a level of radioactivity that will distinguish between traditional "nonradioactive" materials and those which should be regulated as a low-level radioactive waste.

The main limitation on the proposed IAEA de minimis criterion is that it is based on a radiation dose rate limit (one millirem/year) that requires the use of an oceanographic model to determine the quantity of radioactive material which would correspond to the dose limit. Such models would have to show that radionuclides from the de minimis waste would not find their way from the ocean back to man by seafoods or other means which result in exceeding the dose limit. If the IAEA de minimis criterion was to be applied in the U.S., EPA would need to be assured of the adequacy of the models for verifying compliance with the dose limitation.

As far as the matter of consistency with domestic law, neither the Ocean Dumping Act nor EPA Ocean Dumping Regulations presently provide any guidance that distinguishes radioactive and "nonradioactive" materials. Such distinctions are now made on the basis of what is customarily or traditionally considered "nonradioactive" in relation to the source of the wastes. For example, waste material associated with nuclear processes are normally considered radioactive. Conversely, ordinary dredge materials or sewage sludge would not normally be considered radioactive. Therefore, the IAEA de minimis criterion could be helpful to EPA as a quantitative basis for making such distinctions in the evaluation of ocean disposal permit applications under U.S. law.

ADDITIONAL QUESTIONS OF MR. HUGHES AND ANSWERED BY EPA

1. In July of 1981, the Environmental Protection Agency, Office of Radiation Programs released a draft program plan for monitoring radioactivity in the oceans. Among other things, the plan was designed to establish an interagency program for systematically monitoring radioactive wastes and conducting research on the long-term effects of radioactive pollution in the oceans.

Could you provide additional information now with regard to 1) the status of that plan, and 2) to any monitoring activities which may have occurred at the Mid-Atlantic dumpsites since that time?

What future monitoring plans does EPA have for Mid-Atlantic area?

Container evaluation?
Water sampling?
Biota sampling (other than market-survey)?
Sediment sampling?
Current measurements?
Suspended particle measurements?

ANSWER

The 1981 EPA/NOAA draft program plan for monitoring radioactivity in the oceans has been implemented, in part, for some aspects of monitoring that were described in the plan. Examples include: 1) the 1982 EPA radiological monitoring survey in Massachusetts Bay, 2) the collection and analyses of marketplace seafood samples from Boston, Atlantic City, and San Francisco by EPA and the Food and Drug Administration (FDA) for determining levels of radioactivity, and 3) the collection of sediment and biota samples by NOAA ships operating in Massachusetts Bay for radioanalysis by the EPA.

No additional ocean bottom research at the Atlantic disposal sites has occurred since 1978. EPA's monitoring activities, with regard to radioactivity, since 1981 have focused on Massachusetts Bay and the Marketplace Sampling and Analysis Program with FDA.

The ORP has considered additional monitoring at both the 3800 and 2800 meter Atlantic disposal sites with our present levels of funding, and considering other program priorities, we are unable to launch any major survey efforts. Ocean bottom research is quite costly and, therefore, since we have visited each major site, and some more than once, we have subsequently stressed the types of studies in which EPA is cooperating in a larger effort, involving many related interests. We will attempt to take advantage of any other sampling programs conducted by others to obtain samples for radionuclide analysis. No specific studies of old Atlantic dumpsites are planned at this time.

We are involved and coordinating with a cooperative study with 11 other countries that are examining the North East Atlantic Dumpsite used by several European Countries. This provides high quality information at a small cost to the EPA. Thus, our efforts are multiplied many fold.

EPA is current evaluating container and matrix materials as part of its program to develop packaging requirements for radioactive waste disposal in the oceans.

2. Do you feel that the ultimate decision on whether low-level radioactive wastes should be disposed of in the oceans should be made by a Federal agency such as EPA or left to Congress to determine on the basis of public policy considerations?

ANSWER

Public policy considerations are very significant in making decisions on the ocean disposal of radioactive materials which are matters of great public sensitivity and concerns. EPA's goal, in addition to implementing all domestic and international requirements, is to assure a careful scientific evaluation of health, safety, economic, or other issues that are of main concern to the general public. EPA also is concerned with protection of all parts of the environment, not just the oceans. Decisions have to be made regarding disposal of all types of wastes that consider not only present needs, but also provide optimum protection for future generations. We believe it is important, for the long range interests of the United States, that no reasonable waste disposal options be foreclosed on the basis of public perceptions alone without a thorough technical evaluation. Responsible decisions have to be made that provide for waste disposal and optimize protection for all parts of the environment while taking due account of public perceptions, scientific evaluations, and regulatory criteria. We believe EPA has the technical capability and public sensitivity to make such decisions. We believe the Congress should exercise a strict oversight of the EPA implementation of the basic requirements of the law. Close cooperation and trust between EPA and the Oversight Committees is essential and desirable. We recommend that the authority for ocean disposal decisions regarding radioactive materials be returned to EPA.

ADDITIONAL QUESTIONS OF MR. D'AMOURS AND ANSWERED BY DEPARTMENT OF STATE

Q. On page 4 of your testimony, you indicate that the Department is working with other agencies in conjunction with the two-year study, and that four subgroups have been established.

What agencies have been involved with the study?

Have more than four subgroups been established?

What specific topics and issues have been discussed in each subgroup?

Who are the participants in each subgroup?

A. As I indicated in my testimony, the State Department has been participating in a series of policy level meetings aimed at improving United States' participation in the London Dumping Convention. Participation in the two-year study is one of the questions addressed at these policy level meetings. Of the four subgroups that have been established, only one deals with the radioactive waste study. That subgroup is chaired by the Office of Radiation Programs, in the EPA. Other agencies represented include NOAA, the Corps of Engineers and the Department of Energy. The subgroup was responsible for compiling reference material for transmittal to the IMO and IAEA for the meeting of experts which took place at IAEA headquarters in September 1983, for the purpose of compiling a bibliography on the effects of radioactive waste disposal at sea. It was on the recommendation of the subgroup that we urged the participants in the September meeting to consider terms-of-reference for the intergovernmental group of experts who will meet in 1984 and also to

consider ways of encouraging broad involvement in that meeting.

The other subgroups mentioned in my prepared statement are addressing different questions. The subgroup on "other scientific matters" prepared position for the October 1983 meeting of the London Dumping Convention Scientific Group and is preparing positions for the February 1984, Consultative Meeting of the Parties to the London Dumping Convention. The subgroup on legal questions has met to discuss the international and domestic legal implications of actions taken by the Contracting Parties to the LDC. The subgroup on congressional liaison provided a vehicle for preparing coordinated responses to requests for information and has been exploring ways to improve our liaison with members of Congress.

Q. Given the recent adopted amendments to U.S. law imposing a moratorium on ocean disposal of low-level wastes, would you please elaborate on how the Department of State intends to fulfill its Congressional mandate in section 109 of the Ocean Dumping Act to support specific proposals in international fora in furtherance of U.S. policies, with particular reference to the moratorium.

A. Section 109 of the MPRSA reads:

"The Secretary of State, in consultation with the Administrator, shall seek effective international action and cooperation to insure protection of the marine environment, and may, for this purpose formulate, present, or support specific proposals in the United Nations and other competent international organizations for the development of appropriate international rules and regulations in support of the policy of this Act."

(emphasis added).

The Department is presently seeking effective international cooperation to protect the marine environment in general and with respect to dumping in particular, on both a global and regional basis. We are an active participant in the LDC and international organizations concerned with dumping and have recently signed the Convention for the Protection of the Marine Environment for the Wider Caribbean Region which contains a dumping provision. Throughout negotiation of the latter convention, we strongly encouraged other states to become party to the global convention, the LDC. The Department is also

taking a leading role in negotiating a marine protection convention and dumping protocol for the South Pacific region.

With respect to the moratorium, the Department has strongly supported the LDC study so that consideration of the radioactive waste disposal issue can be properly addressed by the Consultative Meeting of the Contracting Parties at the appropriate time.

On balance, we believe that the Department has acted in international fora consistently with the sense of Congress expressed in section 109 and has promoted the protection of the marine environment from dumping.

ADDITIONAL QUESTIONS OF MR. FORSYTHE AND ANSWERED BY DEPARTMENT OF STATE

Q. In your testimony, you note that you are opposing a ban on radwaste dumping in the context of a regional convention for the South Pacific. You justify this position on the basis of the ongoing two-year LDC review. However, Article 8 of the LDC obligates states to reach regional agreements taking into account "characteristic regional features". This indicates that regional agreements can and should be based on needs or requirements of the region. Why should adoption of these provisions by a regional convention be precluded on the basis of LDC action?

A. Article VIII of the London Dumping Convention states in part, the following:

"In order to further the objectives of this Convention, the Contracting Parties with common interests to protect the marine environment in a given geographical area shall endeavor, taking into account characteristic regional features, to enter into regional agreements consistent with this Convention for the prevention of pollution, especially by dumping." (As a purely technical matter, it should be borne in mind that out of all the participants in the current South Pacific negotiations, a minority of them are actually party to the LDC as referred to in Article VIII. Of that minority, a number (admittedly the metropolitan States), have not supported a regional ban on radioactive waste disposal. Contracting Parties to the LDC, pursuant to Article VIII, are also obligated to endeavor to act consistently with the provisions of regional agreements. Because of that, we believe that stricter measures than those provided under the LDC, by such agreements require careful consideration in their negotiation.)

It is the State Department's view that such regional conventions should be based on appropriate scientific and technical considerations taking into account regional features. There are cases in which characteristic regional features provide appropriate scientific or technical bases for regional restrictions on dumping more stringent than (but consistent with) those contained in the global convention. An example of these would be the Mediterranean and Baltic Seas which are relatively closed and shallow bodies of water in which special precautions are warranted to avoid a dangerous build-up of pollutants. We are presently not aware of any such special regional characteristics in the South Pacific region which would provide a technical or scientific basis for special protection measures beyond those required in the open seas.

I would note that under the auspices of the South Pacific Regional Environment Program (SPREP), which was adopted by the 1982 Conference on the Human Environment in the South Pacific, a technical group was convened to review radioactivity in the South Pacific region to provide the States therein with an "objective and authoritative overview" of nuclear matters. As we understand it, the group has completed its work and a paper is being translated. From what we have been told, this technical review does not provide a scientific or technical basis to support a ban on radioactive waste disposal in the South Pacific Region.

Therefore, U.S. agreement to a regional convention banning all radioactive waste disposal in the South Pacific would have to be based on other than scientific and technical considerations which is not in accordance with the U.S. approach to international regulation of ocean dumping. Such an agreement by the U.S., which is part of the region, could indeed affect global LDC consideration of this issue after completion of the LDC study.

Q. If a global ban is not agreed to under the London Dumping Convention, would that negate the possibility concerning regional bans against the dumping of radioactive waste in specific areas?

A. As was indicated in the response to your previous question, there are cases in which regional features might provide a technical or scientific justification for restrictions more stringent than those contained in the global convention. Under certain conditions, such as might be found in a shallow semi-enclosed area, such as the Mediterranean or the Baltic which have long term flushing periods, it might be appropriate to institute a regional ban on the dumping of radioactive waste even though no such ban existed on a global basis. It should also be noted that pursuant to IAEA recommendations and guidelines, there are ocean areas where radioactive waste disposal could not take place.

ADDITIONAL QUESTIONS OF MR. FORSYTHE AND ANSWERED BY NOAA

Question

Please detail for the Subcommittee the NOAA budget for FY 1983 through 1985, for personnel and support activities related to the ocean disposal of radioactive waste.

- a. What is the level of resources now committed to studying effects of ocean radioactive waste disposal?
- b. What is the present level of effort that NOAA has currently detailed to interagency coordination? What is the direction and substance of this effort?

Answer

NOAA has no budgetary items associated specifically with one type of material disposed in the oceans or another. However, an attempt is made below to estimate and/or pro-rate resources in regard to radioactive waste disposal as requested. It also should be understood that forthcoming research proposals in FY 1984 -- particularly to NOAA's National Ocean Service and Sea Grant programs -- could include projects dealing with ocean disposal of radioactive wastes directly or indirectly. The total resources committed to activities related to the ocean disposal of radioactive waste are estimated to be \$98,000 in FY 1983, \$142,000 in FY 1984 (FY 85 budget still under review).

- a. The level of resources committed to research related to ocean disposal is estimated to be \$60,000 in FY 1983 and \$60,000 in FY 1984, (plus additional project matching funds). The project is a study effort on the "Advanced Deep Ocean Remotely Operable Work Vehicle." This is a Sea Grant project being conducted at Scripps Institute of Oceanography.
- b. The present level of effort for interagency coordination will be \$30,000 in FY 1984. The direction and substance of this effort is to coordinate Federal marine pollution research and monitoring activities as part of NOAA's responsibilities under the National Ocean Pollution Planning Act. This effort involves development of a coordinated national plan for research involves development of a coordinated national plan for research and monitoring to evaluate the marine option for disposal of low-level radioactive wastes. The plan will be developed by NOAA's National Marine Pollution Program Office (NMPPPO), through the auspices of the Interagency Committee on Pollution Research, Development and Monitoring (COPRDM).

Question

In the NOAA statement submitted for the record, it is mentioned that a NOAA-sponsored study to examine technologies needed to monitor radioactive waste disposal recommended the development of a reliable automated seafloor monitoring system. Is NOAA working on this recommendation in conjunction with other Federal agencies or in consultation with private industry?

Answer

NOAA is not involved in the development of an automated seafloor monitoring system for this purpose. We are keeping abreast of the related technologies developed in the on-going ISHTE (In-Situ Heat Transfer Experiment) of the Department of Energy and their contractors in which heat-sources will be buried in the deep seabed, NOAA has developed systems for surficial sediment sampling and pore-pressure measurements that could be made a part of such a system and has extensive experience in measuring ocean currents and ocean-floor sediment sampling and seismicity. Another endeavor, supported by funding from EPA, is developing the so-called "SEAFLOME" -- a device that measures critical erosion threshold velocity of sediments. This particular technology examines current velocities at which sediments (and adsorbed radionuclides) can be picked up and transported away from dump sites.

Question

Please define for the Subcommittee what NOAA's policy is going to be on the ocean disposal of radioactive waste: How is this policy consistent with the NOAA Ocean Dumping Program?

Answer

NOAA's general policy related to the disposal of municipal, industrial, low-level radioactive wastes, and dredged material in the marine environment is that waste disposal practices should be chosen to avoid significant risk of harm to living and nonliving resources in any environmental medium -- oceans, land groundwater, fresh water, air. If it is determined that disposal is the preferred option for a potential waste problem, then disposal practices likely to cause the least risk of significant harm, regardless of medium, should be chosen. NOAA does not oppose selection of the ocean as a disposal site if comparative assessment of all reasonable disposal option indicates that the ocean option poses the least risk of significant harm. If disposal in the ocean is currently causing or contributes to conditions that cause significant risk of harm to the marine environment, NOAA urges the timely assessment of alternative disposal practices and the selection of an environmentally acceptable practices.

It must be emphasized that NOAA, through its Ocean Dumping Program, does not regulate waste disposal in the ocean. Our role is to provide scientific advice to regulatory agencies on the possible impacts of various disposal options, based on the best available scientific information.

Question

What is NOAA's level of commitment to monitoring environmental impacts, if ocean disposal of radioactive waste is agreed to after the present moratorium is lifted?

Answer

NOAA would provide assistance in the design of monitoring strategies and/or conduct or participate in the conduct of monitoring, as necessary. In the event of selection of the ocean option for disposal of decommissioned nuclear submarines, NOAA would not be responsible for conducting the monitoring operation itself, but could provide assistance to other Federal agencies, as appropriate, in the design of monitoring programs for that specific disposal activity.

Question

Please detail the nature of NOAA's participation in the scientific meetings of the London Dumping Convention.

Answer

A NOAA scientist is a member of the U.S. Delegation to the Scientific Working Group (WG) of the London Ocean Dumping Convention (LDC), which meets annually to consider scientific and technical problems associated with dumping. Items addressed at the most recent meeting of the WG (October 1983) included guidelines for the uniform interpretations of LDC annexes; allocation of lead, cadmium and organosilicon compounds to appropriate annexes; and similar technical matters dealing with the application of LDC by the Parties. In addition, NOAA is a member of the Interagency Policy Committee for the LDC, being represented by the Deputy Administrator. This committee addresses legal and policy issues, and develops U.S. positions for both the meetings of the Scientific Working Group and the Consultative Parties. The NOAA Deputy Administrator and the NOAA Director of International Affairs were members of the delegation to the 1983 Annual Consultative Meeting of the LDC, and will attend the 1984 meeting in the same capacity.

Question

What will be NOAA's planned level of involvement in the Department of Energy's Subseabed Program? Is NOAA presently involved in designing studies that monitor environmental effects of the subseabed program? Will NOAA be involved in coordinating environmental and fisheries studies with other involved agencies?

Answer

The Department of Energy's subseabed program is a research effort examining one option for the disposal of high-level radioactive wastes. No decision on this option is anticipated for many years. Other than remaining cognizant of important milestones in this research, NOAA has no present plans to become involved directly in it. NOAA would have significant interest in, and contribute toward, the design of any studies that would monitor the effects of such disposal, particularly in regard to living marine resources, if this option were seriously considered. It is noted, however, that at point the scientific feasibility of subseabed disposal of high-level radioactive wastes has not been proven.

Question

In NOAA's submitted testimony, reference was made to a book entitled Radioactive Waste Disposal in the Ocean that will be published this month. Could NOAA synthesize the scientific findings of this volume for the Subcommittee?

Answer

The book, "Radioactive Waste Disposal in the Oceans", addresses the sources of radioactive wastes, radioactive substances in the oceans, strategies for disposal, and the biological and chemical basis/concerns of this disposal option. It examines a broad range of oceanic responses to radioactivity and identifies the information needed for management decisions on the subject.

ADDITIONAL QUESTIONS OF MR. STUDDS AND ANSWERED BY DEPARTMENT OF ENERGY

Question 1: Let me briefly review the background of the DOE budget for the subseabed disposal program, as I understand it. Initially, DOE contractors developed a plan and cost projections for a multi-year program to methodically study the feasibility of subseabed emplacement of radioactive wastes. The FY 84 cost proposal was \$9.6M. The Appropriation Committee report level was up to that \$9.6 level. The DOE has, however, only included \$7.6M in the program budget. Of the \$7.6M, only one project cited in your testimony and funded at a \$0.6M has a component which assesses an aspect of deep-water biology.

Question 1. (a): What program elements were deleted (from the \$9.6M level to the \$7.5M level) due to the lower level of funding? How will this reduced effort affect the time-table for completion of the feasibility determination?

Answer: The Department of Energy's original budget request for FY 1984 for the Subseabed Disposal Program was for \$4.7 million; however, Congressional action reported back a level of spending of \$9.6 million. As a result of that Congressional action and based on our overall program plans, we reassessed our plans. Based on that reassessment, we believe that the level of \$7.5 million for FY 1984 is a reasonable level to allow DOE to meet the timetable of determining by 1990 the feasibility of the subseabed concept. In

balancing the priorities of on-going activities in the Civilian R&D program and the start of new activities for the Subseabed Disposal Program, the Department is recommending a lower level of effort for some subseabed activities than would have occurred at the \$9.6 million level. At the \$7.5 million funding level, the timetable for determining feasibility of the subseabed disposal concept meets DOE's overall research and development priorities and schedules for implementing the Nuclear Waste Policy Act of 1982. A funding level above \$7.5 million would unnecessarily accelerate activities aimed at assessing the feasibility of the subseabed concept. The \$7.5 million funding level for FY 1984 provides a more gradual increase in the Subseabed budget from \$6.0 million in FY 1983 to a planning range of \$10 million to \$12 million a year in the future. Effective planning for the expanded FY 1985 budget can be done during FY 1984. Thus, some R&D items will not be started in FY 1984, but will be started in FY 1985.

Question 1. (b): Did the contractors who planned the multi-year program recommend these particular deletions? If not, at what level was this decision made?

Answer: Contractors principally provide identification of the technical content of the program and priorities and funding levels necessary to achieve a particular schedule. As customary, the contractor was consulted on the program elements but was not consulted on the final budget level recommended for FY 1984. Subsequently, the contractor has been consulted on the content of the program at that \$7.5 million level.

Question 1. (c): Some of these deleted studies are laboratories efforts requiring the use of cultures of organisms maintained at some expense under deep-sea pressure conditions. Are there sufficient funds to maintain these cultures during a year lapse of research?

Answer: The on-going culture studies will not be discontinued. The continued culturing of acquired deep-sea microbes will be maintained within the subseabed program. Since the deep-sea microbes are critical to future radiation sensitivity studies of deep sea biota, it is essential that they be maintained. Actual determination of radiosensitivity on microbe cultures and other deep ocean organisms will be deferred until FY 1985.

Question 1. (d): Please provide citations of the existing literature on deep-sea biota, their metabolic physiology, their capacity to assimilate and accumulate radioactive materials, and foodchain relationships which form the basis of the DOE decision to reduce or curtail biological components in either the low level or the high level radioactive waste disposal feasibility programs.

Answer: In the civilian nuclear waste program, the biological investigations were only deferred by one year in order to balance priorities. Thus, no search of the scientific literature was performed for use as a basis for the decision. The acquisition of both ocean circulation and mixing rates, and data on deep ocean biota are considered an essential part of assessing subseabed disposal concept feasibility. It is our intent these data will be acquired beginning in FY 1985.

Question 2: I understand that the DOE unilaterally decided to terminate a joint DOE/EPA project at the University of Rhode Island designed to study the effects of Middlesex, N.J., contaminated soils on a functioning ecosystem. In the absence of this experiment, what other studies can DOE cite that better define the path of radioactive materials in marine foodchains?

It is my understanding that the EPA planned to use the results of the experiment to help develop a methodology for evaluating ocean dumping permit applications. If the EPA has determined that this study is pertinent for an adequate base to develop ocean dumping methodology, how can the DOE determine that in the study's absence, there is adequate environmental information on which to evaluate whether ocean dumping is a viable alternative to land disposal?

Answer: DOE has been funding studies for several years to examine the feasibility of ocean disposal for low activity waste from the Formerly Utilized Sites Remedial Action Project (FUSRAP). The focus of this activity has been the waste material at Middlesex, New Jersey, due to its proximity to ocean ports. DOE's activities have been closely coordinated with ocean disposal work sponsored by EPA in order that the results of our studies could be utilized as additional input to EPA modeling and hazard assessment activities.

DOE's studies have been specifically directed toward identifying practical solutions for FUSRAP waste disposal, rather than toward performing generic R&D. With the passage of amendments to the Maritime Protection, Research and Sanctuaries Act in P.L. 97-424, a 2-year moratorium was placed on consideration of ocean disposal permits. All permits will now require specific congressional approval of a Radioactive Material Disposal Impact Assessment. Approval of the impact assessment will be followed by passage in

90 days of a joint congressional resolution to approve any recommendation by EPA for issuance of a specific permit. These requirements substantially reduce the viability of ocean disposal as a practical, near-term alternative for FUSRAP waste.

With sufficient data on ocean disposal already in hand for current project planning purposes, we are phasing out our study activity at this time. Although we believe the University of Rhode Island experiment is an excellent one for the purposes of EPA standards development and for basic research such as radioactivity uptake and pathway analyses, we cannot justify continued DOE support of it for near-term FUSRAP project needs. Our understanding is that the EPA is planning to continue their work in this area.

DOE will continue to have a longer term interest in the possibility of ocean disposal for FUSRAP waste should future institutional conditions favor it as a viable option.

Question 3: Since the enactment of the two year moratorium on ocean disposal of radioactive wastes, what research efforts has the DOE initiated to better define:

- (1) specific deep-sea populations
- (2) foodchain relationships in the deep ocean
- (3) seasonal and annual variation in deep ocean biological populations and sediment chemistry.

What studies are being conducted by any other members of the international community to provide data on these necessary parameters?

Answer: No field research efforts have been started during the two-year moratorium on ocean disposal of radioactive wastes. New field research efforts require cruises and there have been no biology cruises since 1979. The research effort has centered on analysis of archived samples from previous cruises.

The development of new equipment for deep-ocean biology, specifically the acoustic array for monitoring the mobility of deep-ocean biota and the Giant Conical Net to trap deep-ocean mobile nekton, has been deferred because of insufficient funds for fabrication or for ship time needed for testing.

Based on a recommendation from the Biological Oceanography Workshop held in 1981, a radiological data base was issued (SAND 83-1725, September 1983). This compilation is being used to provide data as input for the foodweb model. The report has also identified gaps in the existing data. We hope to fill these data gaps during the expanded program starting in FY 1985. International studies which provide data to the US program include: monitoring of the Nuclear Energy Agency low-level nuclear waste dump site in the Northeast Atlantic Ocean, analysis of the migration patterns of deep-ocean nekton. These studies are providing data which are being used in the biological modeling effort.

In addition to the foodweb transport model, the Subseabed Disposal Program has begun work on a deep-sea carbon model. This model will identify the biological processes which may be important in transporting nuclides from the deep ocean to man. These data can then be used in human population dose critical pathways analysis.

ADDITIONAL QUESTIONS OF MR. FORSYTHE AND ANSWERED BY DEPARTMENT OF ENERGY

Question 1

It is our understanding that DOE has recently cancelled or is planning to cancel its research programs dealing with low-level radioactive waste disposal in the ocean. For example, one program is a joint DOE/EPA project run from the Narragansett Lab that is trying to determine the biological effects of FUSRAP soils on marine organisms.

Is this information correct? If so, what is the justification for your decision?

What does this mean in terms of DOE's position on radwaste disposal at sea?

Answer:

DOE has been funding studies for several years to examine the feasibility of ocean disposal for low activity waste from the Formerly Utilized Sites Remedial Action Project (FUSRAP). The focus of this activity has been the waste material at Middlesex, New Jersey, due to its proximity to ocean ports. DOE's activities have been closely coordinated with ocean disposal work sponsored by EPA in order that the results of our studies could be utilized as additional input to RPA modeling and hazard assessment activities.

DOE's studies have been specifically directed toward identifying practical solutions for FUSRAP waste disposal, rather than toward performing generic R&D. With the passage of amendments to the Maritime Protection, Research and Sanctuaries Act in P.L. 97-424, a 2-year moratorium was placed on consideration of ocean disposal permits. All permits will now require specific congressional approval of a Radioactive Material Disposal Impact Assessment. Approval of the impact assessment will be followed by passage in 90 days of a joint congressional resolution to approve any recommendation by EPA for issuance of a specific permit. These requirements substantially reduce the viability of ocean disposal as a practical, near-term alternative for FUSRAP waste.

With sufficient data on ocean disposal already in hand for current project planning purposes, we are phasing out our study activity at this time. Although we believe the University of Rhode Island experiment is an excellent one for the purposes of EPA standards development and for basic research such as radioactivity uptake and pathway analyses, we cannot justify continued DOE support of it for near-term FUSRAP project needs. Our understanding is that the EPA is planning to continue their work in this area.

DOE will continue to have a longer term interest in the possibility of ocean disposal for FUSRAP waste should future institutional conditions favor it as a viable option.

In the area of high-level waste disposal, Section 222 of the Nuclear Waste Policy Act of 1982 directs the Secretary of Energy to continue and accelerate a program of research, development and investigation of alternative means and technologies for the permanent disposal of high-level radioactive waste from civilian nuclear reactors. In this regard, the Department's Office of Civilian Radioactive Waste Management is assessing the feasibility of sub-seabed disposal concept.

The Department plans to continue its assessment of the feasibility of sub-seabed disposal of radioactive wastes. The cancellation of the joint DOE-NE/EPA MERL experiment at the University of Rhode Island has no direct impact on the objective to assess concept feasibility of sub-seabed disposal of high-level radioactive wastes.

The subseabed disposal concept is the only alternative to mined geologic repositories currently being funded by DOE. The objective of the Subseabed Disposal Program is to assess the feasibility of containment and isolation of high-level radioactive waste within the stable geologic clay formation of the deep ocean floor. Therefore, the MERL experiment did not directly support the Subseabed Disposal Program.

Question 2: It is our understanding that DOE's current plan for disposal of the Middlesex, New Jersey, waste is shallow land burial at a site in New Jersey to be agreed upon by the State of New Jersey and DOE.

On what basis have you decided to adopt the land-based disposal alternative for these soils?

What is the status of your discussions with the State of New Jersey on the disposal of the material?

Answer: Stabilization-in-place has been adopted as the preferred disposal option for FUSRAP waste due to the large volumes of material involved and the impacts on existing disposal site capacity and on transportation costs. If stabilization-in-place is not technically or environmentally feasible, then shallow land disposal within the State where the material exists is preferred. Ocean disposal currently is not considered a practical disposal option for FUSRAP, although this strategy could change in the future.

The Department met with State of New Jersey representatives in August of this year to discuss (1) DOE plans for several New Jersey FUSRAP sites and (2) the identification of a FUSRAP disposal site location in the State. In followup correspondence, the Department provided a tentative schedule for cleanup of the New Jersey FUSRAP sites, including the construction of a disposal site, for State review and comment. We agreed with the State to target the beginning of the site selection studies for June 1984.

Question 3: It has been suggested that Congress consider extending the 2-year moratorium on low-level radwaste dumping because too many questions remain unanswered about dumping radwastes in the ocean, and that Federal regulatory agencies are not complying with the moratorium's purpose of completing further research. Further, it has been suggested that such an extension should direct EPA and other Federal agencies to: 1) develop a comprehensive research and monitoring program, including targeted field surveys of past dumpsites and test sites (which would be selected as part of program development), and 2) submit a report on the results of that program to Congress, prior to the conclusion of such extended moratorium.

Please comment on this proposal.

Answer: An extension of the 2-year moratorium on low-level waste disposal would not affect the Department's conclusion on the practicality of ocean disposal as an option for FUSRAP. If the Department were directed by Congress to participate in a comprehensive R&D effort on ocean disposal, such a program would be established. If the results of this R&D effort were to indicate the desirability and feasibility for ocean disposal, the practicality of the ocean disposal option for FUSRAP would be reconsidered.



Department of Energy
Washington, D.C. 20585

AUG 18 1983

Honorable Norman E. D'Amours
Chairman, Subcommittee on Oceanography
Committee on Merchant Marine and Fisheries
House of Representatives
Washington, DC 20515

Dear Mr. D'Amours:

Your July 29, 1983, letter requested information on the Subseabed Disposal Program budget and information on, inter alia, marine research on biology, and physical oceanography, etc. Enclosed is our response in a question and answer format.

The Department has studied the program and budget requirements for FY 1984 related to the overall objective of the program. We can achieve the objectives by increasing the budget of the program from \$6.0M in FY 1983 to \$7.5M. We believe that this approach will provide the type of research and development necessary to support the program. Accordingly, we have scoped the FY 1984 program at \$7.5M instead of the \$9.6M appropriated by Congress. The biological and physical oceanographic studies are maintained at \$0.6M in FY 1984. FY 1984 will be used to assure that appropriate planning occurs for the follow-on years.

For your information, we have included the planned subseabed program milestones for physical oceanography and biological research through 1990 as Table I. These milestones are consistent with our objective of achieving an assessment of feasibility by 1990 and our fulfillment of the intent of the Nuclear Waste Policy Act.

I appreciate your continuing interest and your support for the subseabed program. Our continuing to work together is highly important for the assessment of the seabed as a concept for disposal of nuclear waste.

Sincerely,



Robert L. Morgan
Acting Director
Office of Civilian Radioactive
Waste Management

RESPONSE TO CONGRESSMEN D'AMOURS AND PRITCHARD
HOUSE SUBCOMMITTEE ON OCEANOGRAPHY

- Q. Indicate how much (of FY 1984 SDP budget) will be spent on marine research on biology, physical oceanography, etc.
- A. A budget of \$7.5 million will continue the biological and physical oceanographic studies at the FY 1983 level of \$600,000 dollars, in addition to partial completion of several on-going studies such as field deployment testing of the in situ heat transfer experiment platform, scale testing of waste emplacement concepts, and development of models of radionuclide transport in deep ocean sediments.

The biological and physical oceanographic activities in FY 1984 will include:

- (1) A continuation of the development of the physical ocean mixing model and the biological food-web model as input into the safety assessment and environmental impact of subseabed disposal.
 - (2) Laboratory testing of the deep ocean sediment, microbial activities at high pressure, respiration rates of sub-ecosystems, and radiosensitivities of certain deep ocean organisms to determine the effects of microorganisms on a subseabed disposal system.
 - (3) Use of existing data from the literature on known biological systems and ocean circulation to determine sensitivity of the predictive models, as a basis for planning future data acquisition.
- Q. What is the Subseabed Program's long-term research agenda for determining the scientific and environmental feasibility of subseabed disposal?
- A. The long-term research agenda for determining subseabed disposal concept feasibility of subseabed disposal includes acquisition of data by 1990 to assess four major areas:
- (1) Site Assessment: Determining if there are stable sedimentary formations in the deep ocean which can effectively contain radioactive wastes.
 - (2) Emplacement Assessment: Determining if there are techniques for emplacement and isolation of the wastes which do not compromise the natural containment potential of the seabed sediments?

- (3) Radiological/Safety Assessment: Calculation of the radiological impacts of the total subseabed disposal system to determine the potential dose to man and effects on the marine eco-systems, resulting from normal disposal operations and assumed accident conditions.
- (4) Institutional Assessment: Determining if there are legal and institutional frameworks which exist or can be established to provide the domestic and international regulatory mechanisms to assure satisfactory operation and controls for a subseabed disposal system.
- Q. It is our concern that the subseabed disposal option be fully and rigorously investigated, especially its potential impact on the marine environment. We expect the U.S. to maintain its scientific leadership in the international research effort.
- A. Current activities in the Subseabed Disposal Program recognize that even though our understanding of deep ocean sedimentary formations indicates that they are candidates for potential future nuclear waste repositories, much additional specific research and engineering is needed before the feasibility of the concept can be determined. Some of the unknowns include the need to acquire site-specific data on ocean circulation and mixing, characterization of site-specific marine biology, potential path-ways back to man through the marine food-web, and the impact on the marine eco-system resulting from normal and accidental disposal operations. It is our plan to rigorously investigate these potential impacts of a subseabed disposal system.

Seven other nations are also assessing seabed disposal of radioactive waste. This international effort is coordinated through the NEA/OECD Seabed Working Group. Since 1977 the U.S. has and will continue to be a major participant in the NEA/OECD Seabed Working Group. One of the objectives of the U.S. participation is to be in a position to assess other nations seabed disposal programs and to influence decisions so as to protect the marine environment. Our continuing participation in the Seabed Working Group and our active research programs should maintain scientific leadership.

TABLE I
PROJECTED SUBSEABED DISPOSAL PROGRAM MILESTONES
FOR PHYSICAL OCEANOGRAPHY AND BIOLOGICAL RESEARCH

Physical Oceanography

- 1985 - Complete ocean basin circulation model
- 1986 - Complete site specific circulation model
- 1987 - Complete acquisition of ocean circulation data
- 1988 - Complete acquisition of site specific data
- 1990 - Report on environmental impact through ocean circulation system

Biological Research

- 1985 - Complete biologic transport model
- 1986 - Complete biological radiosensitivity assessment
- 1987 - Complete ocean basin biological assessment
- 1988 - Complete site specific biological assessment
- 1990 - Report on environmental and radiological impact on marine system
from a seabed repository

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6 December 1983

The Honorable Norman E. D'Amours
Subcommittee on Oceanography
2242 Rayburn House Office Building
Washington D.C. 20515

Dear Rep. D'Amours:

RE: COMMENTS TO THE MERCHANT MARINE & FISHERIES COMMITTEE
on the
OCEAN DUMPING OF RADIOACTIVE WASTE

Thank you for allowing us to include these comments to the record of the Committee's oversight hearing on radioactive waste ocean dumping. The comments briefly elaborate on the issues of EPA's scientific studies to monitor and research the consequences of past radioactive waste ocean dumping and the IAEA's "de minimus" standards for defining nuclear wastes to be dumped at sea. These issues and others of concern to Greenpeace were presented in the testimony for Clifton E. Curtis of the Center for Law and Social Policy for the environmental coalition on 2 November 1983 before the subcommittee.

Greenpeace believes that the historic radioactive waste dumpsites already provide the EPA with ample opportunity to examine the consequences of ocean dumping in the Atlantic and Pacific Ocean. A scientific review must attempt to determine the effects and fates of radionuclides on benthic and marine creatures. In particular, we would urge the EPA to investigate the old radioactive waste dumpsites to determine and publish:

- sublethal effects of radioactivity on benthic and other marine creatures;
- an ecosystems analysis of radionuclide transport within the particular marine food-chain;
- life-cycles of benthic and other deep-sea creatures and;
- other needed relevant data as listed in the environmental testimony.

Without this information, it is impossible for the EPA to understand the environmental consequences of ocean disposal and to conduct the type of balanced cross-media analysis that is required by the Ocean Dumping Act.

The lack of adequate or complete records kept on our past dumping operations¹, combined with the evidence of high-level nuclear waste dumping at sea before 1970² only adds to the imperative of checking the risks associated with ocean disposal by further first-hand looks at the old

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dumpsites. This is a continuing concern of many who realize that the time of greatest release of radionuclides from the old dumpsites into the marine environment could be during this decade or the next.

Of particular concern is the fate of the high-level nuclear waste lost at sea with the tragic accidents of two US nuclear submarines, the Thresher and the Scorpion. Consideration should be given by the EPA to the recovery of the Thresher and its spent reactor fuel from the Atlantic Ocean, in proximity to one of the worlds most productive fisheries at Georges Bank³. The Navy's finding of only Cobalt 60 at the Threshers debris, if accurate and resulting from a comprehensive analysis, would indicate that the spent fuel is still contained to date.

Conservative Navy estimates put the inventory of radioactivity in the Thresher debris at approximately less than 31,000 curies⁴. However, this figure appears unusually and unbelievably low considering that the Threshers reactor would contain a full inventory of fission products (though relatively low amount of actinides as the Navy fuel is highly enriched). Strontium 90, Cesium 137, Ruthenium 106 are all fission products that would be present as well as dozens of other elements of long and short-lived radioactivity.

In addition, please find attached to this letter a paper written for Greenpeace by Peter J. Taylor of the Political Ecology Research Group in Oxford, England, describing issues surrounding the current IAEA approach to defining wastes suitable for dumping at sea.

Thank you for your continued attention to these matters.

Sincerely,

Joyce E. Rosenthal
Campaign Coordinator

Footnotes

- 1- "Monitoring of Past Radioactive Waste Ocean Dumpsites and "Test" Sites is Needed To Provide Effective Assurances That There Are No Undue Hazards To Human Health and The Environment, And To Assist In The Development of Future Policies."

Prepared by Clifton E. Curtis, Center for Law and Social Policy
3 August 1982
- 2- The Nation, "The Marine 'Love Canal'," by Michael Kepp and John Markoff.
5 September 1981
- 3- U.S. Department of the Navy, Draft Environmental Impact Statement on the Disposal of Decommissioned, Defueled Naval Submarine Reactor Plants.
December 1982.

The Thresher debris is described in the DEIS as being approximately, "50 kilometers to the west" of the closest commercial fishing, "at a depth of less than 1000 meters." (Page D-A2)
- 4- U.S. Navy DEIS, page D-A6.

THE DEFINITION OF RADIOACTIVE WASTES SUITABLE FOR DISPOSAL
TO THE DEEP OCEAN

A critical comment on the IAEA proposal
for a 'de minimus' criterion

Peter J. Taylor,
Consultant,

for

Greenpeace (Netherlands) Ltd.

Introductory Note

The practice of dumping high volume low activity nuclear waste in the ocean was established in the late 1940's primarily by Britain, and to a lesser extent several other western European states, as well as the USA. The practice became controversial in the mid 1960's, particularly for the French, who had to abandon plans for dumping in the Mediterranean following international as well as domestic opposition. During this decade the USA, West Germany, Sweden and most other European states ceased to use this route, with the exception of Belgium, Holland and Switzerland. The U.K., however, increased its disposals and in the 1970's they accounted for 95% or more of the total activity dumped.

The waste has always been characterised as 'low-level', and consisting of such material as contaminated clothing and containers, a great deal arising from research and medical practices. At the time of the London Convention in 1972, when international rules were laid down to prevent the pollution of seas by waste dumping, considerable opposition was evident to programmes of nuclear waste disposal, and it was agreed that only 'low-level' wastes could be dumped. However, the body of experts who discussed this matter were divided, there being some who argued for a complete ban on radioactive materials.

It is generally agreed that two factors affected the decision to allow 'low-level' waste dumping: firstly, it had been argued that the amounts would be so small compared to the oceans' natural levels that they would have no health effects; and secondly, that virtually all states benefitted from the research and medical uses which gave rise to much of the waste. The Convention expressly ruled out the dumping of 'high-level' waste on the grounds of the amount of radioactivity involved, and also on the fact that this waste arose from reprocessing activities, which were linked not only to civil nuclear power production but also nuclear weapons programmes.

The London Dumping Convention (LDC), through the Intergovernmental Maritime Consultancy Organisation (IMCO), charged the International Atomic Energy Agency with the task of defining nuclear waste which was unsuitable for dumping. The Nuclear Energy Agency (NEA) of the OECD countries was given responsibility for monitoring and overseeing the dumping operations. The chief function of these organisations is the promotion of nuclear energy programmes, and although they have regulatory functions these are advisory only. Industrial interests are well represented within the NEA and the IAEA.

The industrial proponents of nuclear energy programmes have long felt that the 'high' and 'low' level criteria for suitable wastes was arbitrary and that the criteria for limiting amounts to be dumped was not based upon scientific assessment of the environmental impact.

However, it is evident that there are other factors involved in the revised definition besides a wish for scientific rationality. The expansion of civil nuclear power programmes is seriously threatened by the inability of its proponents to demonstrate a safe disposal option for the steadily accumulating highly active wastes. The highest levels of waste- the liquids arising from reprocessing, are heat producing and cannot be stored in a fail-safe condition: they are vulnerable to disruption of services. However, they occupy a small volume, and are stored within established sites. The larger volume of non-heat producing highly active wastes (termed 'intermediate'), however, present some embarrassment because they will soon require a special storage site and thus become a focus for public awareness of the 'unsolved' waste problem. In Britain, in particular, there has been intense opposition, often from county councils, to even a research programme of rock drilling for a land-based disposal site. The U.K. government recently abandoned its drilling research programme and is leaning toward 'interim' storage above ground. Its advisory committees are recommending a slow but steady increase in its ocean disposal programme. As recorded in the PERG critical review, the currently expanded dumping rate, if maintained for several decades will allow the U.K. to dispose of some of its more intractable alpha contaminated wastes. There remain, however, large accumulations of high-active waste (which the U.K. is anxious to categorise as 'intermediate') from the nuclear power programme, consisting of decommissioned or worn-out reactor components, sludges and resins, filters etc. from treatment plants, and the cladding from reprocessed spent fuel.

If the 'de minimus' criteria were adopted, nuclear states, (especially the U.K.) would be able to present the ocean as a relatively cheap and simple 'solution' to the high active waste problem. Their success would depend upon producing convincing models of the impact to human health and to marine biota, and with this in mind, a large research effort is under way. The early results of assessment have all maintained that current and immediately planned activities will have a negligible impact.

Assumptions of research programme into environmental impact

Given the apparent rationality of the de minimus approach, it can be seen that the research programmes into environmental effects become a crucial element in the acceptability of the criteria. The preliminary results of these programmes and the assumptions upon which they are based have been critically reviewed elsewhere. It is evident that some assumptions are not scientifically tenable, indeed, many of the acknowledged experts party to the IAEA research effort admit the inadequacies of the current models. Controversy exists over the paucity of oceanographic data (on upwelling, biological activity on the ocean bed, bottom-currents etc), and it is evident that the deep ocean floor is a more complex ecosystem than assumed in the early radiological models.

Whatever the limitations of models and the degree of controversy surrounding their ecological assumptions, there is a key underlying assumption within the whole de minimus approach, -an assumption which is not in itself rational or scientific, but social and political. This is the assumption of an 'acceptable' dose. This assumption structures all the research efforts and is the context for all the IAEA/NEA efforts. The base-line is held to be the ICRP recommended dose-limit of 500 mrem/annum for members of the public exposed to radiation from man-made sources, and a further recommendation that all doses are as low as reasonably achievable (ALARA principle), having regard to economic and social factors.

Thus the IAEA's whole revised definition rests upon the assumption that an internationally acceptable level of exposure exists for wastes dumped in international waters and which may give rise to radiation damage in populations other than those who produced the waste. This assumption is clearly questionable, especially when the waste arises from civil nuclear power programmes, as opposed to pure research or medical uses which might be held to be of universal benefit.

A closer look at the ICRP reveals that it is a heavily criticised body, in terms of its international role. A former ICRP chairman, and leading US authority on radiation protection, Prof.K.Z. Morgan, has charged it with conservatism in the face of recent research suggesting a revision of basic risk-factors, and the present chairman of the prestigious US National Academy of Sciences, BEIR Committee (Biological Effects of Ionising Radiation) has remarked that it a self-selected, self-perpetuating body, (elected within a core of professional radiologists), which is answerable to nobody, and has mixed scientific judgement (on risks) with economic factors relating to industrial practice, to produce recommended dose limits, (its aim being to equalise nuclear industry exposure risks to those of other industrial risks).

There are several assumptions in the ICRP approach, but the key one is that the nuclear industry can be classified along with other industries or activities (and risks) accepted by society. This may have been true in the 1950's when the limits were recommended, (and when the IAEA first recommended the application of the ICRP limits for ocean disposal practices), but it is clearly not tenable when large sections of the public, and indeed, whole states, (e.g. Austria) have decided that the nuclear industry does not provide a net benefit.

In conclusion, therefore, the ICRP dose limits, upon which the de minimus concept is based, cannot be viewed as universally acceptable. States which receive no direct benefit from other states' nuclear power programmes, or which regard the nuclear enterprise as uniquely dangerous to the earth's environment (through either accident risk, or weapons proliferation), have no reason to accept ICRP limits, and indeed, any radiation exposure from another state's nuclear programme.

There are other aspects relating to the assumptions of research, which we can briefly indicate:

- the process of quantification militates against researching the more subtle 'aesthetic factors' of environmental quality (which a former ICRP committee recommended should be taken into account, but failed to show how),
- there are no agreed limits for damage to marine biota, and in this case the usual assumption that protecting man protects other species is unlikely to apply,
- there is a requirement within the terms of the London Convention to research and compare land-based alternatives. Such comparisons are complex and have not been performed, and decisions have been arbitrary and heavily influenced by social factors- Germany and France, for example, have land-based alternatives for most low-level packages waste.

[Whereupon, at 12:05 p.m., the subcommittee was adjourned.]



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