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MILITARY RESEARCH AND DEVELOPMENT SUBCOMMITTEE

OF THE

COMMITTEE ON NATIONAL SECURITY

AND THE

FISHERIES, WILDLIFE AND OCEANS SUBCOMMITTEE

OF THE

COMMITTEE ON RESOURCES

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THE DISPOSAL OF RADIOACTIVE MATERIAL AND OTHER TOXIC WASTE IN OCEANS AND TRIBUTARIES

HOUSE OF REPRESENTATIVES, MILITARY RESEARCH AND DEVELOPMENT SUBCOMMITTEE OF THE COMMITTEE ON NATIONAL SECURITY AND THE FISHERIES, WILDLIFE AND OCEANS SUBCOMMITTEE OF THE COMMITTEE ON RESOURCES, *Washington, DC, Wednesday, December 6, 1995.*

The subcommittees met, pursuant to notice, at 1:42 p.m., in room 2118, Rayburn House Office Building, Hon. Curt Weldon (chairman of the Military Research and Development Subcommittee) and Hon. Jim Saxton (chairman of the Fisheries, Wildlife and Oceans Subcommittee) presiding.

Members present: Representatives Weldon, Saxton, Farr, Gilchrest, Hastings, Jones, Spratt, Ortiz, Pallone, Underwood, McHale, Geren, and Kennedy.

Staff present: Bill Andahazy and John Rayfield.

OPENING STATEMENT OF HON. CURT WELDON, A REPRESENTATIVE FROM PENNSYLVANIA, CHAIRMAN, MILITARY RESEARCH AND DEVELOPMENT SUBCOMMITTEE

Mr. WELDON. The subcommittees will come to order.

This morning, it gives me a great pleasure to cochair with Congressman Jim Saxton of the Subcommittee on Fisheries, Wildlife and Oceans what I call a landmark hearing. I call this a landmark hearing because, for the first time, we bring together other nations in a Congressional forum to discuss the environmental impacts caused by both the construction and destruction of the cold war, weapons that, thank God, we never had to see used, but today may be just as destructive, silently causing devastation of our ecosystem. We are all concerned about the potential impacts on radioactivity from exposed obsolete nuclear weapons or products of nuclear weapons that are improperly stored or haphazardly dumped in our oceans.

Last Congress, as the ranking member of the Subcommittee on Oceanography, Gulf of Mexico, and the Outer Continental Shelf, I worked closely with my good friend and chairman of that subcommittee, Solomon Ortiz, our honorable friend who is here with us today as he is also a member of this subcommittee, to begin to raise the awareness of our colleagues in the House regarding the importance of understanding the marine environment.

As a matter of national security, the U.S. military has long utilized oceanography as a tool for maintaining a strong national defense. Historically, however, the United States in a nondefense capacity has spent relatively little understanding our oceans while at

the same time spending billions exploring outer space, which I have supported, I might add.

Today's hearing, which focuses specifically on the dumping of radioactive material and other toxic wastes, will kick off a series of ocean hearings which will follow up on the work of the 103d Congress and hopefully provide us with a better understanding of the marine environment. Vice President Al Gore is behind this effort, and I would, without objection, submit a letter from the Vice President to me applauding this subcommittee and our colleagues on the Science and National Resources Committee for their cooperation in moving forward with this series of three hearings.

[The letter from Vice President Gore follows:]

THE VICE PRESIDENT
WASHINGTON

December 6, 1995

The Honorable Curt Weldon
Chairman
Subcommittee on Military Research
2452 Rayburn House Office Building
Washington, D.C. 20515

Dear Mr. Chairman:

As you know, the topics on which the Committee will focus during this series of hearings have been of interest to me for some time, and I am pleased to have this opportunity to share my perspective. As President Lyndon Baines Johnson said during his tenure, "The waters which flow between the banks belong to all the people." While the President was speaking about a domestic issue at the time, his message resonates today.

Oceans cover 71 percent of the Earth's surface, and we face a common threat to this precious resource. In this time of lean budgets, creative efforts to exploit existing research and technology efforts for dual purposes are not only sensible but essential. The United States has tremendous resources which only have to be harnessed, and the Committee's hearings represent a significant step in that direction.

As we approach the 21st Century, I welcome efforts to ensure that our country is well prepared to act on the basis of the very best data. I particularly want to thank you for your efforts in this regard. Your ideas and insight on these issues are important to me, and your continued support is essential.

Again, please accept my very best wishes for a productive series of hearings.

Sincerely,

Al Gore

AG/jec

Mr. WELDON. While our subcommittee has jurisdiction over oceanography in the context of military operations, there exists a unique opportunity for a joint effort in research exploration between the defense and civilian community. I am happy to announce that a major joint hearing examining the concept of technology development through partnerships has been planned for early next year, in fact, on January 25, between the Subcommittee on Research and Development, the Subcommittee on Fisheries, Wildlife and Oceans, and the Subcommittee on Energy and Environment of the House Science Committee.

In September 1993, I urged then-Chairman Ortiz to hold a hearing examining the dumping of radioactive waste in the Arctic Ocean. The intention was not to point fingers at the Russians for past environmental actions. As many of you remember, we were quick to hold the U.S. Navy accountable for its own actions. At the hearing, I pressed the Navy to declassify information on two sunken U.S. nuclear submarines, the *Thresher* and the *Scorpion*. Within weeks, the Navy complied, and those videos were broadcast on "Nightline" in the national media.

In addition, we just recently learned of the dumping of low-level waste in the 1960's off the coast of the Farollon Islands by the United States Government. I believe we should be held accountable for these actions, as well.

The intent of the 1993 hearing, however, was to assess the short- and long-term effects of dumping radioactive waste in the Arctic, to determine the extent of Russia's dumping practices, and to determine the lack of Russia's ability to store and dispose of future nuclear waste. My colleagues have been given a map, an Arctic portrayal of the world, and when you look at how close we are, we can quickly get a glimpse of how important it is for us to work together.

Of principal concern to the subcommittee in 1993 was a report prepared for Russian Federation President Boris Yeltsin by Dr. Aleksai Yablokov. As most of you know, Dr. Yablokov provided us with the first ever detailed report of Russian dumping activities. The Yablokov Report confirmed what many had been hearing for years, that the Russians had dumped over 2.5 million curies of radiation in the Arctic Ocean and the Sea of Japan over the past several decades, including 16 naval reactors from seven former Soviet Union submarines, the icebreaker *Lenin*; between 1959 and 1991, low-level liquid radioactive waste in the Baltic, White, Barents, and Kara Sea; and between 1964 and 1991, low and intermediate solid radioactive waste was dumped at sites in the Barents and Kara Seas.

It is an honor to have Dr. Yablokov testify before the subcommittees today and I want to stress the importance of his presence. A mere 5 years ago, it would have been unheard of for a high-ranking Russian official to come before a committee of this Congress to detail documented cases of Russian nuclear dumping. I believe this signifies an important first step toward a more open and honest relationship between the former Soviet Union and the Western World regarding the state of the environment in Russia and the world today.

I want to acknowledge to my colleagues who do not know Dr. Yablokov, in reading the reports as I do every morning, last week, I came across three articles, each of which documented problems inside of Russia. In each of the articles, which were criticizing Russia on its chemical weapons levels, on low priority on smaller nuclear weapons, and on decommissioning nuclear submarines, they quoted one individual and that is the individual appearing before us today, Dr. Yablokov. He is the leading authority in Russia on environmental matters and has the ear of President Yeltsin, which is all the more reason why we need to understand and work with him and share his perspectives.

While we are beginning to reveal the location and quantity of nuclear contamination worldwide, still little is known about the short- and long-term effects of dumping radionuclides and other toxic waste in the oceans, the health risks that may occur, and the impact to the ocean ecosystem as a whole.

Since 1992 and 1993 when this problem was first brought to us, there has been committee after committee, council after council, conference after conference, international meeting after international meeting to determine what impact this waste may have on the environment. But the truth is, there has been insufficiency in funding, insufficiency in leadership, and insufficiency in commitment to address this issue head-on with our international friends.

If we are to successfully address the problem, greater international cooperation is an imperative. The final report issued by the Office of Technology Assessment just recently, just several months ago, on nuclear waste in the Arctic stressed this point emphatically and called for increased expansion of international efforts. We need to go beyond the Arctic region in this cooperative effort.

I am happy to be here also as the chair of the Oceans Task Force of the United States branch of GLOBE USA, Global Legislators for a Balanced Environment, working with our counterparts in the Russian Duma headed by Nicholai Veransoff, the Japanese Diet headed by Akiko Dimota, and the European Parliament headed by Carlos Pimento and Tom Spencer. We are working together in the parliaments and legislative bodies of each of those nations and bodies on these common environmental problems.

I am also serving this year as the U.S. Vice President for ACOPS, the Advisory Committee on the Protection of the Seas. Through these two international organizations, we are successfully coordinating international efforts in regard to the world's oceans.

Finally, we are in the process of establishing an exchange program between Members of this Congress in a bipartisan manner with members of the Russian Duma who are working on defense issues as well as environmental issues in the context of the post-cold-war era.

Today, we are honored to have this distinguished panel of experts from the Russian Federation and Norway, and policy makers and technical experts from throughout our country. In addition to Dr. Yablokov, we will hear from Kare Bryn, Director General/Ambassador of the Resources Department of the Norwegian Ministry of Foreign Affairs who will give us the international perspective.

Prior to our hearing today, we had a press conference with the Bellona Foundation and highlighted the concern that many of us in the world have with the security agency in Russia, having just recently infiltrated their headquarters and confiscated photographs and documentation and computer systems and software that was being used to document some gross nuclear storage problems inside of Russia.

We are not here, however, to criticize Russia alone. We are here to say this is a world problem. We have not always been as forthcoming in this country and we are going to talk about that today in this hearing. But we are committing to work together, to use the resources of this subcommittee and the other involved subcommittees to make things happen. I pledge my full unequivocal support and I think I know that that is shared by our colleagues on both sides of the aisle, to have results that benefit the entire world community. Hopefully in that regard we can find solutions to these most vexing and difficult problems.

With that, I will yield to my distinguished friend and colleague and longtime leader on national security, the honorable gentleman from South Carolina, Mr. Spratt.

STATEMENT OF HON. JOHN M. SPRATT, JR., A REPRESENTATIVE FROM SOUTH CAROLINA, RANKING MINORITY MEMBER, MILITARY RESEARCH AND DEVELOPMENT SUBCOMMITTEE

Mr. SPRATT. Thank you very much, Mr. Chairman.

The room is full and we have important witnesses. I do not want to take much time. I want to start, though, by thanking you and commending you for calling this hearing. I once chaired the Department of Energy panel on this committee and our mission, part of it was to focus attention on the legacy of 50 years of nuclear weapons production.

We should acknowledge from the outset, and our chairman already has, that this is not a problem that is unique to the former Soviet Union. This is our problem, too. And the purpose of this hearing, as the chairman said, is not to point fingers at our former adversaries. It is to shed light on a common problem and an enormous problem for both of us.

Today, in particular, we bring attention to one phase of the problem which has received too little attention. We have tended to treat the oceans as someone else's problem, as a place to put things that is off our shore and off our national territory and therefore of no immediate concern to us but is eventually of immediate concern to everybody because the oceans belong to all of us and affect all of us.

I want to welcome our witnesses to our hearing today. Some of you have traveled great distances to come and we look forward to your testimony.

Safely disposing of the wastes that we have generated to support our nuclear arsenals during the cold war is a huge challenge and it will take staggering sums of money to deal with it. For our country alone, the cost estimates run from $400 billion to as much as $1.4 trillion, and as the chairman said, we have not yet stepped up to the funding challenge. Indeed, this very committee reduced the

funding request from the Department of Energy this year by $500 million for environmental waste and remediation at a time when we were plussing up the rest of the budget by $7.5 billion, so this is a timely hearing for this very committee.

I want to credit the Clinton administration for several steps it has taken to address this problem. I had the pleasure to go with Vice President Gore when he was Senator Gore under the Arctic Circle with the Navy to see what the Navy was doing in response to the strategic environmental initiative taken by the Senate committee, which Ms. Goodman had a hand in crafting some years ago. We are seeing the fruits of that today with the release of the enormous store of information that the Navy has amassed over the years.

I want to credit the President, too, for taking a bold step and declaring a moratorium on nuclear testing. It was not a popular step in every quarter but it has had a number of positive effects. The most important, of course, was the extension of the nuclear nonproliferation treaty, but it also gave the Russians a political cover to stop testing, and the testing they were doing at that time was no longer in Kajakistan, it was in the Arctic Circle and it was an active, ongoing source of radioactive pollution. This also gave both countries the opportunity to devote more resources and attention to cleanup and remediation.

This administration also reversed the longstanding U.S. policy and signed a pledge not to dump nuclear waste in the world's oceans as an addendum to the London Convention, a long overdue step for our Nation.

And finally, the administration has shown that it is committed to making the cleanup of national waste a budget priority.

Today, we are looking at just one aspect of the problem in the former Soviet Union, the dumping of nuclear waste at sea. The United States and the former Soviet Union are still paying for the cold war and will do so for decades to come.

I commend the chairman once again for calling today's hearing so that we have an opportunity to consider the consequences of nuclear dumping at sea, to begin thinking about what we are going to do about it, and for reminding my colleagues on this committee that this is but one part of an enormous problem which we have only begun to pay for and deal with.

Thank you very much, Mr. Chairman.

Mr. WELDON. Thank you, Mr. Spratt.

Are there other members who would like to make brief opening statements? Mr. Pallone.

STATEMENT OF HON. FRANK PALLONE, JR., A REPRESENTATIVE FROM NEW JERSEY

Mr. PALLONE. Thank you, Mr. Chairman.

I am an original cosponsor of your bill, H.R. 1154, that would amend the Marine Protection Research and Sanctuaries Act to close loopholes in our laws relating to the ocean dumping of radioactive waste. I know you have been a leader in this area and I want to commend you for your efforts.

But I came today, because even more important to me locally, because I represent a coastal district, is the second part of today's

hearing, which deals with the disposal of waste on the ocean floor. In 1988, Congress passed legislation that banned the ocean dumping of waste at sea. In that same year, the New Jersey State Legislature enacted our State's ocean dumping ban. Dumping at sea was a threat to our marine environment and to the health and economic well-being of those who are dependent upon coastal resources. It was the main reason I decided to run for Congress.

It is hard for me to believe that just over 15 years ago, there were more than 400 industries and municipalities which had permits or were seeking permits to dump waste in the ocean. Just 7 years ago, washups of sewage sludge and medical waste on the New Jersey Shore forced closures and scared tourists away to the point where we lost some $3 billion in potential revenue in the State of New Jersey.

However, thanks to the ocean dumping ban in 1993, New Jersey's coastal regions received about 14 million overnight visitors who spent some $10.3 billion and helped create over 171,000 jobs. I only mention that to show how important ocean water quality is to the New Jersey Shore.

Despite all the progress we have made on ocean protection and the clear policy statement of Congress on ocean dumping, in 1992, as was mentioned before, in the Merchant Marine Committee, our former colleague, Bill Hughes, our current chairman, Jim Saxton, and myself found ourselves fighting a backdoor attempt to reopen the ocean dumping ban. That year, advocates of a technology called deep ocean isolation sought to authorize the use of the ocean floor as a landfill. Clearly, they were reopening the ocean dumping ban even for research purposes and that would have represented a retreat from the strong action that Congress took in 1988 and from efforts to reduce, reuse, and recycle our society's wastes.

Today, we are once again faced with an attack on one of the most important environmental laws by a group of people who seem intent on dumping wastes at sea. Late yesterday, I found out that supporters of ocean dumping succeeded in getting a provision in the Commerce, Justice, and State conference report that we are going to vote on today that would have the Federal Government spend taxpayer dollars to develop a demonstration project on deep ocean isolation of waste. This language was not in the House Commerce report. It was not in the Senate Commerce report. But suddenly, mysteriously, it is in the conference report that we are going to vote on today without any opportunity to take that out of the conference report.

Deep ocean isolation and this tethered container technology in particular has already been specifically rejected by the Department of Commerce as not only unsafe but antithetical to U.S. and international law regarding the dumping of waste at sea. In addition, the Naval Research Lab has already analyzed the technology and in January of this year deemed it unacceptable.

I hope my colleagues will take full advantage of this hearing to join me in expressing their outrage over the appropriators' actions and their efforts to go behind the back of our subcommittee to reopen the issue of ocean dumping. This is not the first time in this Congress that appropriation bills have been used to deal with

things that should have gone through the authorizing committees, but I think it is particularly egregious in this case.

Ocean dumping is illegal. At a time when Congress is proposing to cut funding for the Environmental Protection Agency (EPA) by 21 percent and to significantly weaken many of our most important environmental protections, it is particularly irresponsible, in my opinion, and wrong to use taxpayers' money to fund experiments in ocean dumping of any kind of waste.

I do not want to take up your time because I know we are going to deal with this in the fourth panel, and that is later today, Mr. Chairman, but I am so concerned about it because of what is happening on the floor today and, of course, I am going to go over there at some point today to make my point during the debate on the conference report. Thank you.

Mr. WELDON. I thank the gentlemen.

Are there other members who would like to make opening statements? Mr. Kennedy.

STATEMENT OF HON. PATRICK J. KENNEDY, A REPRESENTATIVE FROM RHODE ISLAND

Mr. KENNEDY. Thank you, Mr. Chairman.

I first want to begin by commending you for your leadership on this issue. I also want to commend Bill Andahazy from the professional staff here for his effort in bringing today's witnesses to testify.

I would like to say that I look forward to working with you on this panel and on the Natural Resources Committee, to which I have just been appointed, to work on this to determine what the size and extent of the problem is and all the circumstances with which various forms of pollution can become really hazardous to the environmental security that I think everyone on this committee has an interest in, not only we in this country but countries all over the world, given the fact that 70 percent of our world's surface is ocean and we need to understand what we have done in the past and what we continue to do and what its impact is on our environment. Thank you.

Mr. WELDON. I thank my friend and colleague and would add that we are committed to doing the second of the three hearings on this topic in the area of the gentleman's district in cooperation with the Woods Hole and I look forward to that field hearing, as well.

I would like to insert the opening statement of the gentleman from New Jersey, Mr. Saxton, who, as I mentioned, is on the House floor now and will be joining us later this afternoon.

[The prepared statement of Mr. Saxton follows:]

STATEMENT BY THE HONORABLE JIM SAXTON, CHAIRMAN, SUBCOMMITTEE ON FISHERIES, WILDLIFE AND OCEANS, AT THE JOINT OVERSIGHT HEARING ON OCEAN DISPOSAL OF RADIOACTIVE MATERIALS: DECEMBER 6, 1995.

I am pleased to join with my National Security Committee colleagues today to examine the issue of radioactive waste dumping in the Arctic and the use of the abyssal plain for waste disposal.

Since I serve on both committees, it is nice to see this overlap of concerns. I would also note that the former Merchant Marine and Fisheries Committee, on which both Curt and I served, held hearings on both of these topics. I

am glad that despite the demise of that committee, Congress is still considering ocean issues.

Certainly the United States, and all the nations that border the Arctic Ocean, must be concerned about the dumping of radioactive and other contaminated materials there. Therefore, I look forward to hearing from both our international and domestic witnesses on the fate of material already disposed of in the Arctic Ocean, and on plans to prevent future contamination.

In preparing for today's panel on deep ocean disposal of dredged material, I looked back at my remarks about deep ocean disposal before the Coast Guard Subcommittee in 1993. At that time, I said that deep ocean disposal was "a

cockamamie idea driven more by profit than by rational environmental policy". At present, I have no reason to change my views.

Removing our wastes from sight is not the same as responsible management of those wastes, nor does it replace efforts to develop practical cost-effective ways to reduce the stream of waste we produce. Our efforts should be focused on pollution reduction so that we don't end up being forced to choose between a host of more unacceptable and less unacceptable alternatives. Despite my strong opposition to the dumping of land-based or nearshore-based waste in the ocean, I am interested in hearing what today's witnesses have to say.

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JS:jrm

Mr. WELDON. I would also like to include the opening statement of Chairman Don Young of the Resources Committee.

[The prepared statement of Mr. Young follows:]

STATEMENT BY THE HONORABLE DON YOUNG (R-AK) AT THE JOINT OVERSIGHT HEARING ON OCEAN DISPOSAL OF RADIOACTIVE MATERIALS: DECEMBER 6, 1995.

I am pleased that the Subcommittees are holding this joint hearing today. As the Member who represents the Arctic Ocean shoreline of the United States, I am, of course, very concerned about how that ocean is used. I look forward to the witnesses' assessments of the environmental fate of the material that has already been dumped into the Arctic Ocean, and what can be done to prevent additional contamination of the Arctic.

I also look forward to hearing from the panel dealing with deep ocean disposal of dredged material. Improved

scientific understanding of the environment and advances in technology have already improved our environmental management capabilities dramatically, and hold the promise for significant additional improvements. As our understanding of the deep ocean environment increases, we may find that deep ocean placement technology provides a disposal option for some materials that will improve near-coastal water quality, and avoid the need to develop additional land-based disposal alternatives.

I look forward to hearing from all the witnesses.

# # # # # #

DY:jrm

Mr. WELDON. Are there any other opening statements? With that, Dr. Yablokov, welcome.

STATEMENT OF DR. ALEKSAI V. YABLOKOV, RUSSIAN FEDERATION, INTERAGENCY COMMISSION ON ECOLOGICAL SECURITY, NATIONAL SECURITY COUNCIL

Dr. YABLOKOV. Thank you, Mr. Chairman. I ask somebody to show some pictures, if it is possible. It may be more informative than my written presentation.

I have to say that I deeply appreciated your invitation. I greatly appreciated such possibility to express my understanding of this situation, because the situation with Arctic pollution is not only a Russian problem. It is a problem for all Arctic countries, including the United States, Canada, and maybe even not only the Arctic but all countries which belong to the Northern Hemisphere.

For example, you know not only pollution from military Russian source but also from Great Britain is detectable, even in the Kara Sea, in the White Sea, especially in the Barents Sea.

This is the last minute before dumping of one of the nuclear submarines near shore in the new land. The dumping place is only 20 meters deep. It is a last minute life of submarine. So the 17 submarine was dumped near new land. The last expedition shows that only near submarine some radioactivity was slightly higher than in the Kara Sea, so it does not create immediate danger. We have time. We have time, maybe several years to improve the situation. I hope that in several years, we have the possibility to erase all of this submarine and to blaze it into safety deposition.

Mr. WELDON. Dr. Yablokov, you have to excuse us. Do you have these technical problems in Russia?

Dr. YABLOKOV. Yes, of course. It is typical. [Laughter.]

Dr. YABLOKOV. In my written text, you can see a more detailed explanation of what the Russian Government has done and tried to do in this direction. Some visible activity, especially in the last year. Just in the last month, my government approved a special Federal program to overcome the nuclear waste problem. It is a big, big project, many pages, but only $1 billion which they allocated to spend during 10 years. It is nothing, if you count the problem which we are facing and what we need for this problem, for radioactive contamination of the Arctic.

We will have a possibility to show my picture, or I can talk without the picture.

Mr. WELDON. If you can proceed, we will try to get it corrected. I think the light bulb went out. But if you can proceed without the photo, we will try to get it corrected and then put it up. Do you have photos you can pass around, Dr. Yablokov?

Dr. YABLOKOV. Yes. I will continue without pictures.

What we have to do, the scale of problem, we understand it is an enormous scale of problem, not only nuclear submarines which were dumped but also three installations in Central Siberia which produced military plutonium have an enormous amount of radioactive waste which are going to the Arctic Ocean, because as you recall, the northern slope. Asia has some slope to the Arctic Ocean and all waste is going to the Arctic sooner or later.

The official estimation and the minimal estimation is that 3 billion curies which are in the Yenisey River basin and the Ob River basin, and in several tens of years, maybe 100 years, no more than 100 years, all this radioactivity will be in the Arctic Ocean if we cannot do something just now or in the next years.

Mr. WELDON. Excuse me, did you say 3 billion curies?

Dr. YABLOKOV. Three billion curies. Three billion curies. Three billion curies.

The problem is also with so-called peaceful nuclear explosions. In the Soviet time, we conducted more than 100 peaceful nuclear explosions. The bulk of them, maybe about 35 or 37 of them were conducted in the Arctic. It is also an additional source of radioactive pollution.

But it is not only radioactive pollution. We have enormous oil and gas pollution. The amount of oil in the mouth of Siberia in the river, especially in the Ob River, jumped during the last 20 years 10 times and continues rising. Every year in Siberia, we catch about 200 million tons of oil. At least 5 million tons of oil we lost because of leaking, leaking in the pipeline, leaking during transportation and so on and so on and so on. All this oil is going into the northern ocean. Fifteen percent of the Bering Sea is covered by a film from oil.

I have to continue a description of the environmental pollution of the Arctic, but now I have to turn your attention to what we can do, what we have to do. First of all, we need a special agreement or treaty about Arctic protection. We were near to this treaty 2 years ago but it was the State Department of the United States who spoiled this treaty. We have practically full ready text of such a treaty for protection, a Russian-American treaty for protection of the Arctic, but your State Department, because here is some ridiculous, from my point of view, obstacles for this treaty stopped this activity.

Now, I think we have no possibility to repeat it because our military have now more powers than 2 years ago and for Russia's side, it would be an enormous problem to come back to this treaty. We have lost this possibility. But we tried to do something in this.

I will show you the level of radioactivity and the place where we produce plutonium, Krasnoyarsk-26, Tomsk-7, and Chelyabinsk-70. The first number is the radioactivity in surface water, 1 billion curies in Chelyabinsk and zero on the ground. In Tomsk, 500 million in the surface and 500 million on the ground dumping. And in the Krasnoyarsk, about 100 million curies in the lake and 600 million curies on the ground.

This map shows us the places for underground nuclear explosions, underground nuclear explosions. You can see how many nuclear explosions were conducted in the Arctic and all this radioactivity going to the Arctic. The next slide, please.

This shows us oil pollution, oil pollution in the Barents Sea. Now it is much more water polluted, not only in the Barents Sea but also in the Kara Sea. I took your attention, it is just before the famous leaking in the Komi Republic which took all public attention in last year. It is just before the Komi leaking we have such heavy oil pollution in the Barents Sea. Next, please.

This is interesting. This is a night view from space on the world. This is from the National Geographic map. Look for the angle, the right angle here is the brightest place all over the world. It is not New York, it is not Los Angeles, but it is Surgood. It is the Surgood region in Northwestern Siberia, the gas and oil deposition. Tens of thousands of gas storage creates such an enormous light which is located from hundreds and hundreds of kilometers from space. It has created not only light but it has created enormous pollution.

I fully agree with my friend Al Gore, who, in his book which was published 4 years ago, mentioned that the fastest way to stop climate change is to stop leaking and to stop gas storage in North Siberia. And the last one?

So what do we have to do now? This is a joke, of course, but this joke has a sense. All our problems are going to the Soviet past, going to the Soviet past. Yes, the cold war is over but we have an enormous problem, how we can conduct, how we can deal with the problem which was created during the cold war. You created this problem. We created this problem. Now we have joined our strengths to overcome this problem.

Thank you very much. The lights, please?

My first proposition was about the Arctic agreement. My next proposition is we need to do something with the London Convention. Until now, the London Convention, which is against any dumping, does not cover any pollution, any radioactive pollution from land. We know that fuel in Great Britain, in the reprocessing plant in France, continues to dump, practically to dump an enormous amount of radioactive contamination into the North Atlantic.

The next proposal, after the white book in Russia about dumping, we dream that other countries who conduct such activity also published its own book but we have no white book about dumping in the United States. We have no white book about dumping in Great Britain. We have no white book about dumping in Japan. We know the enormous scale of dumping in Japan, but nobody calculated it officially. We need such a calculation.

Also, I never mentioned it before but I mention it here, we have an enormous problem with Arctic pollution from space activity. Twenty-two million hectares in the Russian territory are highly polluted from space remnants, but not only territory, also Arctic pollution. The Arctic Ocean is highly polluted in several places in the Arctic Ocean. What is your English place where you are landing your space rockets?

Mr. WELDON. Cape Kennedy.

Dr. YABLOKOV. It is a more active place for landing all over the globe. It has a visible negative effect for the Arctic.

I think we have to support the Norway, American, and Russian agreement to overcome some enormous problem. We need to develop this agreement and maybe to raise the level of this agreement some.

This is my main proposal and my last note. It is just the right place and the right time to raise the question before the G–7. In several months, the G–7 has a meeting in Moscow specially devoted to the radioactive problem. It will be exactly in 10 years after the Chernobyl catastrophe. Just now, you have to elaborate some

new proposal and during the G–7 meeting it will be approved. This proposal is just the proper time.

Thank you very much for your attention.

[The prepared statement of Dr. Yablokov follows:]

ASET
Job #58132348
12/5/95

For Use in the Testimony of Alexei V. Yablokov
Committee on National Security
U.S. House of Representatives
December 6, 1995

1. On the current state of rivers feeding the Northern Arctic Ocean

There different types of pollution for the rivers in the various regions of the Russian Arctic:

Heavy metals (particularly mercury): the Northern Divina (the paper industry) and the Aldan, a tributary of the Lena River (the gold refining industry);

Petroleum products: the Pechora River Basin; the Ob' River Basin;

Phenols: the Northern Divina; the Pechora; the Lena; the Yana; the Indigirka and the Kolyma Rivers (decaying wood);

Radionuclides: the Yenisei (plutonium has been discovered at the mouth of the river due to in-line cooling of military reactors at Krasnoyarsk-26);

The Tobol River Basin (a tributary of the Ob' River) due to plutonium production at the Mayak Production Association (Chelyabinsk-70);

The Tom' River Basin (a tributary of the Ob' River) due to plutonium production at the Siberian Chemical Mining Plant (Tomsk-7).

2. The current state of research and methods of avoiding the influx of new pollutants

In the climate of very limited financial support characteristic of the current scientific environment in Russia research on radioactive conditions in the Barents Sea and Kara Sea were accelerated after the publication of the White Book on Radioactive Dumping in Russian Seas (1993) Maritime expeditions are conducted annually. Two such expeditions were conducted in conjunction with Norway.

At the same time the network of observation posts along the rivers and Arctic coastline is being curtailed due to budgetary financing shortfalls from the Russian State Committee on

Hydrometerology [Roskomgidromet].

There is no unified state plan to prevent pollution the Arctic Basin. The Federal State Committee on Northern issues--which repeatedly focused on the need to deal with pollution of the Arctic--was abolished two years ago. This committee was re-established by decree of the President of Russia one week ago.

Isolated measures which could help to stabilize the pollution level have been set forth in state programs for handling radioactive waste and dioxins adopted in the last two months. However, given budgetary financing levels (approximately one million U.S. dollars for radioactive waste and even less for dioxins) reveals the more symbolic rather than realistic nature of such programs.

A fundamentally new method of detecting radiation levels accumulated in the bodies of mammals (electro-paramagnetic resonance analyses of tooth enamel) have revealed that wild reindeer on Novaya Zemlya were exposed to enormous radiation doses prior to the termination of nuclear testing there. Large scale research utilizing this method has not yet been possible due to the lack of sufficient financial support.

3. The level of assistance from international projects in preventing new pollution

World Bank credits of one hundred million dollars is helping to reduce oil pollution in the Pechora River Basin.

A small amount of assistance from the Republic of Sakha (Yakutiya) to improve water quality in the Lena River has been obtained through the Northern Council.

Efforts to reduce air pollution emissions of some of the most hazardous regional polluters--the Sevronikel and Pechenganikel metallurgical plants on the Kola Peninsula--have been undertaken within the framework of inter-governmental accords between Russia and Norway. Seminars (courses) for mid-level management for dissemination of natural conservation and resource saving technologies in the Barents region (Murmansk and Arkangel Province, Republic of Kareliya have already been conducted for several years at the impetus of Norway.

There is an inter-governmental Norweigan-American-Russian agreement to provide assistance to Russia for treating liquid and storing solid radioactive waste in the Murmansk region.

4. The success of Russian organizations in environmental protection and nuclear security

A new federal law--the Russian Water Code--went into effect November 23, 1995. Article 104 of the Water Code expressly prohibits all discharge and disposal of radioactive and toxic substances in water bodies. This same law forbids a broad range of operations associated

with the possible hazardous pollution of water bodies, including pollution deriving from nuclear explosions.

Unfortunately, Article 42 of the federal law that went into effect on November 25, 1995 "On the Use of Nuclear Energy" authorizes the discharge of nuclear materials and radioactive substances in quantities that do not "exceed limits established by standards and regulations in the field of nuclear energy use".

The draft law "On Environmental Security" which has not yet adopted by Parliament (but has already passed through two reviews before the State Duma) stipulates a comprehensive ban on underground nuclear explosions, including those employed for peaceful purposes which have in the past had a substantial impact on radioactive pollution of the Arctic. Pollution of the Arctic by space-oriented operations has not yet been legally regulated (the Plesetsk Cosmodrome: the most extensively utilized space facility on earth). On September 1, 1995 at the impetus of the Russian Ministry of Atomic Energy, the government adopted a Targeted Program for Reprocessing and Recycling of Metallic Radioactive Waste (primarily salvaging of nuclear submarines) with anticipated costs of approximately five million U.S. dollars by the year 2002. This program stipulates the development of four systems for reprocessing of metallic radioactive waste with a total annual capacity of up to 150,000 metric tons. It is believed that Russia currently contains up to 600,000 metric tons of such waste (including more than 140 nuclear submarines that are no longer in service).

A State Commission for Comprehensive Resolution of the Problem of Radioactive Waste was established in 1993 (the chairman was Y. G. Vishnevskiy, Director of Goskomatomnadzor [Russian Federal Oversight of Nuclear Energy]. However, in June of 1995 the President of Russia (under severe pressure by the Ministry of Defense) to create that Goskomatomnadzor was to be stripped of the right to inspect nuclear and military radiation facilities.

On October 23, 1995 the government adopted the Targeted Federal Program "Handling of Radioactive Waste and Spent Nuclear Materials, Their Recycling and Disposal for 1996-2005" for a total federal budgetary financing level of near one million dollars. This program included (among other elements) the following measures affecting the Arctic region:

The design and construction on the Novaya Zemlya Archepelago of a facility for disposal of radioactive waste from salvaging of nuclear submarines (approximately 50 million dollars by the year 2005);

Upgrade and construction of new spent nuclear fuel storage facilities from nuclear submarines (approximately 20 million dollars from 1997 through the year 2005);

The modernization and development of facilities for conditioning liquid and solid radwaste at nuclear civilian fleet facilities (approximately eight million dollars from 1996 through the year 2000) as well as for the military fleet (approximately 11 million dollars from 1996 through the year 2005).

Survey radwaste disposal sites in northern and far-eastern seas (approximately 15 million dollars from 1997 through the year 2005);

Clean-up of the Yenisei and Tom' River Basins to eliminate radioactive contamination attributable to plutonium production reactors (approximately 11 million dollars from 1997 through the year 2000).

On November 2, 1995 the Russian government adopted the Federal Targeted Program Entitled "Establishment of a Unified State Automated System for Monitoring Radiation Conditions on the Territory of the Russian Federation" (EGASKRO) under which approximately 100 million dollars is to be spent by the year 2002 (beginning in 1997). However, there are serious doubts that this program will come to fruition due to a lack of financing.

5. The degree of impact of the London Conference and the Gore-Chernomyrdin Commission on reducing the need for nuclear waste disposal in the oceans.

Russia's acknowledgment of its obligations in 1993 deriving from the London Conference significantly changed the situation in naval forces which during the Soviet period assumed that the disposal of liquid radioactive waste in the Arctic and far-eastern seas was entirely acceptable. Such disposal practices have been nearly entirely eliminated in the Northern Fleet.

Discussions within the framework of the Gore-Chernomyrdin Commission have been useful for developing specific proposals to facilitate the development of projects for reprocessing of liquid radioactive waste in the Northern Fleet.

6. What research programs and international projects can be treated as priority areas for development of an effective program for prevention of nuclear and other waste disposal in ocean ecosystems?

An international agreement (accord or convention) on Arctic environmental protection is necessary.

It would be advisable for the U.S. to follow Russia's example and publish a White Book of its radwaste disposal sites at sea. This would provide a good political foundation for development of a joint American-Russian (possibly also involving Norway) program for clean-up of the Arctic seas to eliminate hazardous solid radwaste dumped into these waters.

It would advisable to develop a special international agreement for environmental protection from space activities (specifically the dumping of separable rocket booster stages containing hazardous rocket fuel into the Arctic seas).

A special convention (agreement or accord) or annex to the London Convention to prohibit radwaste disposal into the sea from coastal locations is required. Radwaste from Sella-

field and the Lya-aga (the British and French spent nuclear fuel reprocessing factories, respectively) have been dumped in enormous quantities into the ocean for many tens of years along extended pipelines from the sea coast and such waste is being discovered throughout the seas in the northern Atlantic and the Kara Sea.

It would be useful, as an extension and development of Russian-American-Norweigian agreements to prevent radwaste disposal in the Arctic, to develop a special program of international assistance for Russia to resolve the problems associated with organizing safe storage of the enormous quantity (estimated at over 40 million curie of radwaste from the Soviet Navy operating in the Muransk region (the problem of organizing safe storage of spent nuclear fuel from nuclear submarines and the problem of salvaging nuclear submarines and storing the submarine reactors). However, for political reasons, this program can only be developed after appropriate resolution at the presidential level between our countries.

Chairman of the Inter-Governmental Commission
on Environmental Security
Russian Committee on Security

(Professor A. Yablokov)

Moscow, 4 December 1995

Mr. WELDON. Thank you, Dr. Yablokov. We will have questions for you but we would like to hear from our distinguished Norwegian panelist, Mr. Kare Bryn.

STATEMENT OF KARE BRYN, DIRECTOR GENERAL/AMBASSADOR, RESOURCES DEPARTMENT, NORWEGIAN MINISTRY OF FOREIGN AFFAIRS

Mr. BRYN. Thank you, Mr. Chairman, ladies and gentlemen. It is a pleasure for me to participate in this hearing. I have prepared a written statement for the record and I will highlight the main points from that.

My thesis is that the problem is not so much the waste already dumped in the oceans but rather the spent nuclear fuel and radioactive waste that in the future may end up in the marine environment unless urgent and decisive action is taken by the international community.

To go back, Mr. Chairman, in spring 1994, the Norwegian Government presented the report to our parliament on the threat of nuclear pollution in areas adjacent to our northern borders. The background was the mounting evidence which had come to light after the collapse of the Soviet Union of safety deficiencies at nuclear facilities, as well as practices of dumping nuclear structures and radioactive waste in the ocean. Gradually, as contacts with the Russian authorities developed, we also became aware of their problems with storage facilities and the management of radioactive waste.

The debate on this report in Parliament took place in June 1994, and it led to a call for a plan of action and intensified cooperation both with Russia and other countries in order to deal with the problems. Such a plan was made public in March 1995.

To follow up the plan of action, the parliament also authorized approximately $20 million U.S. for this year and we expect that a similar sum is to be available for the financial year 1996.

So far, international cooperation has mainly focused on the operational safety of civilian nuclear powerplants. This, of course, is natural in the light of the Chernobyl accident and involves the amount of documentation available of unsatisfactory safety at Eastern and Central European nuclear powerplants. The nuclear safety accounts operated by the European Bank for Reconstruction and Development was a timely response by the international community to this challenge.

Mr. Chairman, looking at the threat to the marine environment which is the theme for this hearing, the situation is less clear and far more complex both technically and politically. Today, we have a very positive situation as far as the radioactivity in the northern seas is concerned. For instance, I could mention that the level of cesium-137 in the Bering Sea is about seven becerel [?] per cubic meter of water. This is the same level as can be found in the Atlantic Ocean. The level is almost 15 times higher in the Irish Sea, which no doubt is a result of the considerable emissions from the Sellafield reprocessing plant in the United Kingdom.

To preserve the favorable situation in the Bering Sea is very important, as here we find some of the richest fishing grounds in the world.

In order to map out the situation, Norwegian and Russian scientists have undertaken joint expeditions to the Soviet dumping areas in the Kara Sea and along the coast in 1992, 1993, and 1994. In these areas, several reactors with and without spent fuel, vessels, barges, and numerous containers with radioactive waste, as well as a large quantity of low-level liquid nuclear waste, have been dumped before 1991.

The main conclusion from these expeditions is that although leakages do occur, the radionuclides can be traced only in sediments in the very close vicinity of the dumped objects. However, we have no guarantee that this positive situation will continue. A regular monitoring program is definitely needed, but it seems clear that in the short run, other problems should be given higher priority as far as concrete efforts to prevent contamination is concerned.

If you can take some comfort from the investigations of the dumping sites, the opposite is true when it comes to the question of management, storage, and disposal of spent nuclear fuel and radioactive waste. We know that existing storage facilities are full and that many are in extremely bad condition. Here lies the potential for accidents, future dumping, and leakages to the marine environment if corrective action is not taken.

The question for the international community is, can we afford to leave the situation as it is and wait until the Russians have the economic strength to deal with the problems themselves?

Some countries have already demonstrated their willingness to start addressing these issues. Norway and the United States are now developing plans to assist Russia to upgrade and expand the plant for treatment of low-level liquid radioactive waste in Murmansk. A review meeting of the plans between Russian, American, and Norwegian scientists will take place in Oslo in a week's time. Hopefully, the construction phase can start early in 1996.

Another example of concrete action is the advisory committee which has been formed to consider the plans to deal with the storage of ship *Lepse*. The United States, France, Norway, and the European Commission and Russia are taking part in this cooperation. Here again, we expect concrete proposals to be put on the table in 1996.

These projects are very important in themselves, and really, I would say, invaluable in gaining experience to deal with central and local Russian authorities, but the main problem is not the civilian nuclear facilities but the military ones. Our cooperation with the Russian Navy and the northern fleet is much less developed than cooperation with the civilian authorities. The problem is manifold. The Russian Navy has exhausted their storage capacities. There is pollution coming from inland facilities which may spread through the river systems, as talked about by Dr. Yablokov.

In addition, at least 17 nuclear submarines which have already been decommissioned are lying around the shores of the Kola Peninsula. Spent fuel has been removed from less than one-third of them. The number of submarines taken out of service is growing steadily.

Of course, I think it is very important to state that the Russian Navy must set aside resources to address these problems. Our impression is that they are showing an increasing willingness to do

so. The question is if they can, even if they really tried, deal with the enormous backlog which for many reasons has developed.

A significant step was recently taken by the Russian authorities in developing a plan for the decommissioning of submarines. A Norwegian company financed under our plan of action has taken part in the development of this plan. I am sure we will hear more about this in the months ahead.

It seems to me that a key to addressing the waste problem in the Russian northern fleet is to build up relations with those organs responsible on the Russian side. Inter alia, for this purpose, a military expert group has been set up between Russia, the United States, and Norway. We hope that the group also will gradually expand its work to solving concrete problems.

Significant work in confidence building as well as in research has also been done through the pilot study which has been created by the North Atlantic Cooperation Council, in jargon called the NACC. The first phase of the pilot study was concluded in September this year. This study was the result of a Norwegian initiative in 1992 to exploit the new possibilities opened up by the end of the cold war and the creation of the NACC.

I believe it is fair to say that our expectations were met and that the first phase of the study was successful. The participation of more than 20 countries, as well as the final report on radioactive and chemical pollution problems bear witness to this. A phase 2 of the study has now been launched with broad participation and we have great expectation that the phase 2 will help us develop a common understanding of the challenges identified in the first phase.

Mr. Chairman, although each country must take the responsibility for its nuclear facilities, we cannot overlook the fact that the situation Russia finds itself in after the cold war is a very special one. Furthermore, the interdependence and transboundary character of the problems are such that we cannot afford to leave the situation as it is until Russia can deal with it herself. Therefore, an international effort to assist Russia and assist ourselves is urgently called for.

At the G–7 summit in Halifax this year, the G–7 leaders and President Yeltsin agreed to arrange a summit on nuclear safety in Moscow in April 1996. We have great expectations that the summit, in addition to considering the safety of nuclear reactors and illicit tracking of nuclear materials, also will address in a substantive way the problems of management and storage of spent nuclear fuel and radioactive waste.

The summit should initiate urgent work to further study these problems, as well as give impetus to international cooperation on concrete projects. An appropriate multilateral forum for coordinating activities should be identified.

Last, the summit should initiate discussions regarding how national efforts may be supplemented by multilateral financial assistance, for instance, as a parallel to the nuclear safety account operated by the European Bank for Reconstruction and Development. Thank you, Mr. Chairman.

[The prepared statement of Mr. Bryn follows:]

UNITED STATES CONGRESSIONAL HEARING TO ASSESS THE MAGNITUDE AND POTENTIAL IMPACT OF DUMPING RADIOACTIVE MATERIAL AND OTHER TOXIC WASTE INTO THE WORLD OCEANS AND TRIBUTARIES

6 DECEMBER 1995

STATEMENT BY

MR. KÅRE BRYN, DIRECTOR GENERAL
ROYAL NORWEGIAN MINISTRY OF FOREIGN AFFAIRS

Mr. Chairman,
ladies and gentlemen,

It is a pleasure for me to participate in this Hearing on radioactive waste issues. Let me right away state my main thesis which will guide my presentation: The problem is not so much the waste already dumped in the oceans, but rather the spent nuclear fuel and radioactive waste that may end up in the marine environment in the future unless urgent and decisive action is taken by the international community. My emphasis is on the challenges of radioactive waste management, with particular reference to nuclear facilities and activities in Northwest Russia.

I BACKGROUND

Nuclear activities raise questions of serious concern which need to be addressed by the international community. In particular, safety deficiencies at nuclear facilities and materials located in Central and Eastern Europe and the former Soviet Union pose a threat not only to the countries themselves, but also to the environment far beyond their borders. These threats require action by all countries concerned with preserving the quality of the environment and promoting nuclear non-proliferation.

Each country is ultimately responsible for the safety of its nuclear facilities and for solving any problems resulting from the operation of these facilities. However, in some instances the problems are so severe, the solutions so costly, and the transborder consequences of accidents or continued malpractices so frightening, that broad-based international co-operation is necessary to deal with them adequately and responsibly.

A number of nuclear facilities are located in Northwest Russia. These include i.a. a nuclear power plant on the Kola Peninsula, eight civilian nuclear-powered icebreakers, several storage facilities for spent nuclear fuel and radioactive waste, and the world's largest concentration of nuclear-powered naval vessels, the Northern Fleet. The Russian navy has more than 80 operational nuclear submarines and two nuclear-powered cruisers stationed at bases on the Kola Peninsula. In addition, at least 70 nuclear submarines have already been decommissioned, although spent nuclear fuel has been removed from only about 21. The number of submarines taken out of service is growing steadily.

The operation of these facilities are characterized by unsatisfactory safety standards. Radioactive waste and spent nuclear fuel pile up, and the decommissioned submarines are more often corroding at various naval bases than disposed of in a safe way.

II NORWEGIAN PLAN OF ACTION ON NUCLEAR AFFAIRS

The Norwegian Government has considered various ways and means of strengthening co-operation with the Russian Federation in order to improve nuclear safety and prevent radioactive pollution. The Government presented a report in 1994 to the national assembly, the Storting, on nuclear activities and chemical weapons in areas adjacent to our Northern borders. A Plan of Action to follow up the Report to the Storting was presented in March

1995. Approximately USD 20 mill. has been earmarked for projects in 1995, and a similar amount will be available to continue this important work in 1996. A number of projects have been identified in four priority areas:

- Safety measures at nuclear facilities.
- Management and storage of spent nuclear fuel and radioactive waste.
- Dumping of radioactive waste in the Barents- and Kara Seas, and inputs into the sea via rivers in the Russian Federation.
- Arms-related environmental hazards.

Norway and Russia have recently signed a Memorandum of Understanding concerning cooperation on nuclear affairs. The Parties agreed i.a. to establish a procedure for consultations at state secretary level in the respective Ministries of Foreign Affairs to facilitate co-operation on projects and similar activities in the priority areas specified above, including efforts to expand the political, technological and financial basis for such co-operation.

In addition, selected nuclear issues, i.a. the Norwegian-Russian expeditions to the Kara Sea, are on the agenda of the Joint Environmental Commission and its Expert Group on the investigation of radioactive contamination of the Northern areas.

Through the Report to the Storting, the Plan of Action and the MOU the Norwegian Government wishes to demonstrate its strong commitment to actively participate in a partnership with the Russian Federation, other countries, the EU and international organizations, in addressing one of the most serious threats to security, human health, and the environment.

Norway encourages other countries to formulate domestic policies and programmes for assistance to promote nuclear safety and the safe management, storage and disposal of spent nuclear fuel and radioactive waste, in particular in the Russian Federation.
These policies and programmes must be matched by an appropriate organizational structure as well as by sufficient funds for project implementation.

III RADIOACTIVE WASTE DUMPED IN THE BARENTS- AND KARA SEAS

The Norwegian-Russian expedition to the Kara Sea in 1992 was the first expedition to this area to investigate the dumping of nuclear material with participation of western scientists. The expeditions to the Tsivolki, Stepovogo and Abrosimov Fjords at Novaja Zemlja (1993, 1994) were the first international expeditions to the dumping sites. In addition to Norwegian and Russian scientists, observers from the IAEA and EU (from 1993) participated in the expeditions. According to the Russian Whitebook (1993) several reactors with and without spent fuel, vessels, barges, and numerous containers have been dumped in these fjords.

The main conclusion from these expeditions is that enhanced levels of artificially produced radionuclides in sediments collected in the very close vicinity of almost all localized dumped objects demonstrate that some leakages occur. The highest contamination of 137Cs, 60Co, 90Sr, or 239,240Pu is observed in sediments collected close to dumped containers in the Abrosimov and Stepovogo Fjords.

The levels of radionuclides in the waters, sediments and biota in the Open Kara Sea, however, cannot be attributed to the dumped objects, but rather to fallout from the atmospheric nuclear weapon tests, marine transport of effluents from European reprocessing plants, especially the Sellafield plant in the UK, marine transport of fallout from the Chernobyl accident, and transport by the rivers Ob and Yenisey.

The level of radionuclides in waters, sediments, and biota in the Kara Sea is very low compared to other marine systems, e.g. the Irish Sea, the Baltic Sea and the North Sea. The radiation doses from the present level of contamination are negligible.

Radioactive contamination in the Arctic is not an acute crisis, but rather a long-term problem if corrective action is not taken in time.

International structures already exist for data collection, risk analyses, environmental assessments, and monitoring:

- The Arctic Environmental Protection Strategy (AEPS) with the Arctic Monitoring and Assessment Programme (AMAP)

and

- The International Arctic Seas Assessment Programme (IASAP) in the International Atomic Energy Agency (IAEA).

Very few mechanisms exist, however, to prevent future releases.

(Cf. Report on the results from the Russian-Norwegian 1993 expedition to the Kara Sea, and the Extended summary of the results from three years of investigations (1992-94) in the Kara Sea).

IV THE LONDON CONVENTION

The London Convention of 1972 is a global convention on the prevention of marine pollution by dumping of wastes and other matter, including radioactive waste. The dumping of high level radioactive waste has been prohibited in accordance with the London Convention since 1974. In 1983 the parties to the convention adopted a voluntary moratorium on all types of radioactive waste. This was prolonged in 1985. The Inter-governmental Panel of Experts on Radioactive Waste Disposal at Sea, IPGRAD, presented its final report in 1993, followed by the adoption at the 16th consultative meeting of the London Convention of a total ban on dumping of radioactive waste. All parties, except the Russian Federation, have acceded to this ban.

Norway, the USA and Russia co-operate to upgrade and expand the capacity of the nuclear-powered icebreaker fleet's effluent treatment facility for low-level radioactive waste in Murmansk. The design phase of the project is nearly completed and hopefully the construction of the facility can begin shortly. This project figures prominently on the agenda of the Gore/Chernomyrdin Commission.

Norway is of the opinion that the Moscow Summit on nuclear issues should result in a Russian pledge to accede to the ban on dumping of radioactive waste at sea adopted in 1993 by the London Convention of 1972. The Norwegian-American-Russian project to expand the capacity of the effluent treatment facility in Murmansk should facilitate such a policy change.

V MANAGEMENT, STORAGE AND DISPOSAL OF SPENT NUCLEAR FUEL AND RADIOACTIVE WASTE.

According to a recently published United States General Accounting Office (GAO) report on nuclear safety, there are 221 nuclear facilities operating in the Former Soviet Union. 99 of them are located in the Russian Federation. The list in the GAO report does not include the nuclear-powered submarines, ice-breakers, and support ships in the Russian military and civilian fleets.

All nuclear facilities generate radioactive waste and spent nuclear fuel, the accumulation of which is a major problem. Few, if any, countries with nuclear facilities have arrived at satisfactory, long-term solutions to this problem.

Existing storage facilities in the Russian Federation are virtually filled to capacity and in very poor condition. Some of these facilities are located quite close to the Norwegian-Russian border and within a few hundred meters from fjords ending in the Barents Sea with some of the richest fishing grounds in the world. The more information we get, the more dramatic the situation seems to be.

Safe management, storage and disposal of spent nuclear fuel and radioactive waste from civil and military facilities are matters of urgency if we are to prevent accidental releases, leakages to the marine environment and further dumping. Assistance in this field will address a serious environmental threat which is also an important security risk.

The question for the international community is: Can we afford to leave the situation as it is and wait until the Russian Federation has the economic strength to deal with the problems herself?

VI INTERNATIONAL PARTNERSHIPS

International co-operation on safety problems in nuclear power plants is well established e.g. under the auspices of the EBRD, as a result of the decision of the G-7 Summit in Munich in 1992 to establish the Nuclear Safety Account (NSA). Valuable work is also done by the International Atomic Energy Agency (IAEA) and the OECD Nuclear Energy Agency (NEA) to improve safety at nuclear power plants.

Norway is prepared to continue, intensify and expand the emerging contacts between Norwegian, Russian and American defence communities with a view to preventing radioactive contamination from defence-related activities and installations. This is an attempt to pave the way for closer co-operation in order to address key problems relevant to the

protection of the Arctic environment. These problems include i.a. the accumulation of radioactive waste, spent fuel and decommissioned submarines at naval bases.

Significant work in confidence-building, as well as in research, has also been done in the NATO/NACC/CCMS Pilot study on cross-border environmental problems emanating from defence-related installations and activities. The study is a result of a Norwegian initiative in 1992 to exploit the new possibilities opened up by the end of the cold war and the creation of the North Atlantic Cooperation Council (NACC). The participation of more than 20 countries and the final reports on radioactive and chemical pollution bear witness to the success of the first phase of the study. Phase two has recently been launched with broad participation and with the following sub-topics:

- Hazardous constituents in defence-related activities, with the USA as the lead country.
- Transport of contaminants through rivers, deltas, and estuaries, with France as the lead country.
- Safe disposal of radioactive and mixed waste, with Norway as the lead country.
- Environmental risk assessments for specific defence-related problems, also with Norway as the lead country.

We have great expectations that phase two of this NATO/NACC/CCMS Pilot study will help us develop a common understanding of the challenges identified in phase one. It is important to identify the know-how and technologies needed as well as organizational aspects of managing defence-related environmental problems.

The Russian Federation, Norway, USA, France and the European Commission have established an Advisory Committee to co-ordinate their efforts to assist Russia to deal with the vessel "Lepse", which is used for storing spent nuclear fuel in the Murmansk harbour. We believe that the choice of technological solution to this problem, as well as the organizational model, may be relevant for other, similar projects, too.

A Norwegian-Russian project to formulate a programme for the complete disposal of Russian nuclear-powered submarines decommissioned from the Northern Fleet, may form the basis for future international co-operation concerning one of the most serious environmental threats in Northwest Russia. A Norwegian company, financed under our Plan of Action on nuclear affairs, is taking part in developing this programme. This and other projects indicate an increasing openness on the Russian side about nuclear problems, and an increasing commitment to address them.

As for other countries' and international organizations' co-operation with the Russian Federation concerning radioactive waste management programmes, I would like to draw your attention to the proceedings from the IAEA seminar in May 1995 on International co-operation on nuclear waste management in the Russian Federation.

VII THE WAY AHEAD.

The present economic situation in the Russian Federation makes it difficult for the authorities to fulfill their responsibilities in dealing adequately with nuclear safety and nuclear waste problems. Expanded and strengthened international co-operation is imperative if we are to find satisfactory solutions to these problems and thereby help prevent future Arctic radioactive contamination. Moreover, international co-operation is important to avoid unnecessary and costly duplication of work. The situation requires creative and flexible approaches by the international community. So far, management of radioactive waste has not attracted as much attention from the international community as the issue of nuclear safety at civilian nuclear power plants.

In order to facilitate international co-operation, we need an appropriate forum and adequate funds for addressing and solving the most pressing problems concerning the management, storage and disposal of spent nuclear fuel and radioactive waste (as a parallel to the Nuclear Safety Account).

An appropriate forum is emerging. A Contact Expert Group (CEG) for facilitating international co-operation on radioactive waste management projects in the Russian Federation, including technical, legal, organizational and financial aspects, is scheduled to have its first meeting early in 1996. The establishment of the CEG is the most important follow-up measure to the seminar on international co-operation on nuclear waste management in the Russian Federation, which was arranged in May 1995 by the IAEA, at the request of the Nordic Council of Ministers.

The seminar proceedings provide the first comprehensive picture of the waste management infrastructure of the Russian Federation to countries and organizations that may wish to begin or to extend co-operative programmes in this area.

The Russian delegation at the seminar demonstrated the resolve of the Government, the relevant Russian authorities and organizations, and the regions to deal speedily and effectively with the problem of radioactive waste management, in full collaboration with the international community.

Norway sees the establishment of the CEG as an interesting forum for future international co-operation on nuclear waste management projects, and would encourage the USA and other countries to participate actively in the CEG.

Norway welcomes the decision to arrange a G-7/P-8 summit meeting on nuclear issues in Moscow in April 1996. We have great expectations that the Summit, in addition to considering the safety of nuclear reactors and security of nuclear materials, also will address in a substantive way the problems of management, storage and disposal of spent nuclear fuel and radioactive waste. The summit should initiate studies as well as give impetus to international co-operation on concrete projects. The summit should initiate discussions on how national efforts may be supplemented by multilateral financial assistance, for instance as a parallel to the Nuclear Safety Account operated by the EBRD. Norway has prepared a paper

with our comments to the summit draft agenda. We hope our input will influence the outcome of the Summit next year.

Mr. WELDON. Thank you, Mr. Bryn, and thank you both for the excellent testimony. I am sure we will have a number of questions, so I will start off and just ask a few myself so that we can give everyone a chance to ask you questions and come back for a second round.

Dr. Yablokov, you referred to the London Convention. As my colleague and friend, Mr. Spratt, mentioned, this administration did, in fact, change the previous position of this country in regard to the London Convention. As a matter of fact, a number of us involved in the GLOBE organization here signed a letter to the President urging him to reverse that policy, to support the convention and make it the official policy of this country to stop the dumping. That is when I introduced legislation, which passed the House in the last session, to codify that. Hopefully, this session, we will get the Senate to follow suit to put it into law.

My question has to do with some recent reports that I picked up in a statement by Victor Kotsenko which appeared in the Moscow press on November 1 in regard to his prediction that Russia perhaps would make an announcement as early as December that it may resume the practice of dumping its liquid nuclear waste in the oceans. Would you comment on that and whether or not you think that is valid?

Dr. YABLOKOV. I only have to say that literally 10 days ago, we had the new Russian parliament pass a special new law regarding water code [?], a special article of this water code. Any nuclear dumping is strictly prohibited. But the situation is complicated, because after this law, our parliament passed the next law about the use of nuclear energy, and under the next law, using nuclear energy, they have passed some loophole and mentioned that, yes, nuclear dumping is principally prohibited, but in some cases it is possible under some condition and so on and so on and so on.

So now we have a contradiction between the laws. In the juridical sense, the water code is a much higher law than the ordinary law about nuclear energy, but let us see what happens. I do not know.

Mr. WELDON. Thank you, Dr. Yablokov. In your testimony, your oral and your written, you mention that you thought that 2 years ago we were very close to an agreement on solving some of the environmental problems but that there were delays. I think you specifically cited the State Department.

They are going to be testifying in the next panel, and perhaps they would disagree, but I would ask you to elaborate on your comments and what the Russian perspective is in terms of why the bureaucracy eventually caused that agreement to fall apart and tell us in your own observations what happened and where we are now in terms of perhaps restarting that process.

Dr. YABLOKOV. I can say that 3 years ago, 2½ years ago, I personally participated in the preparing of this law. I know that this law passed, maybe you have other procedure, but in Russia we have such procedure. Any international agreement has to pass through all Federal agencies and each Federal agency has to sign it, not quite to sign it, with some addition and so on.

We had been lucky that the Minister of Defense and all other powerful ministers signed this agreement, this draft agreement 2

years ago, and we hoped that this agreement will be signed by our President 2 years ago.

I had a discussion with the State Department here and I know that the State Department, it was the body here who strongly was against this law for some, I can repeat, ridiculous reason, some small, smallest, smallest disagreement, not principle but smallest formal disagreement with some formality, with some technical formality.

But now I feel that we have no possibility to pass such draft of law through our military, through our KGB, because during the last 2 years, the secrecy, the governmental secrecy has been arising enormously. Literally 3 days ago, my President signed, or 1 week ago, my President signed a special decree about state secrets. Under this decree—I have this decree with me—practically any Arctic investigation, any Arctic activity has the possibility to announce like classified activity.

So we have a real—it will meet with some active development of our military. We are past the point.

Mr. WELDON. Thank you. I have one final question before I turn to our ranking member for questions. Dr. Yablokov, it is no secret the Russian Navy is decommissioning a number of nuclear-powered submarines and decommissioning a lot of nuclear material. What happens if there are no additional dollars nor additional commitment to deal with the problem? What do you predict is going to be the result of this massive downsizing? As you have testified, there is a huge storage problem now that is not protected storage of nuclear waste and nuclear fuel. What is going to happen if the world does not respond to the problem that Russia has?

Dr. YABLOKOV. I mentioned, not now but in the press conference, I mentioned that during last year, my Government passed a special declassified resolution about organizing the commission of nuclear submarine and failed. But September 1, it was a special open declaration, open resolution of my Government, which looked like a good step for solving this problem. They created a special society, half government, half commercial society. They put some money to cut down this nuclear submarine.

It is an enormous problem, much, much larger than my friend from Norway just mentioned. We have 142 decommissioned nuclear submarines—142—not only in the Arctic but all over my country, and nobody knows what we have to do with such a huge amount of metal, a huge amount of so on and so on and so on.

It looks like this decision of my Government opens the door, opens the door. It is possible to involve some commercial capital money to solving this problem. Let us see what happens.

Mr. WELDON. Thank you, Dr. Yablokov.

I now turn it over to the distinguished gentleman from South Carolina.

Mr. SPRATT. Thank you very much, Mr. Chairman, and thank you both for your testimony. Unfortunately, I had to step out and I missed some of it, so if I repeat your question, I beg your pardon.

Basically, I want to ask a few fundamental questions. First of all, I am curious to know the sources of your information, the places where you obtained the information that you lay out in your testimony. Is this in the open domain? Is this information available to

you as a citizen or did you obtain it through the Academy of Sciences or as a member of the Duma?

Dr. YABLOKOV. My official position is chairman of Interagency Commission for Environmental Security in the National Security Council. My commission has 18 members. The first deputy minister of defense is a member of my commission. The first deputy KGB is a member of my commission. The first deputy minister of environment, chairman of land committee, chairman of water committee, chairman of hydro, metallurgical committee, and so on, such a top level of governmental body.

The main source of my information, it is official information which was previously classified. We tried action under law about state secrets. We have a law about state secrets, 2 years old. We have a special article, article 7, in the law about state secrets. Under this article 7, the law about state secrets, environmental information and information which could deal with public health has to be open, has to be open.

I used this law to open this information. My commission has a meeting every month, this official meeting, and we have received all information, classified information and open information. And after a meeting of my commission, I, going under this law, opened this information to the public. This is the main source of my information.

Mr. SPRATT. Are you satisfied that you have a good, comprehensive estimation of the waste, where it is and how much and what quantities?

Dr. YABLOKOV. No, of course not, because it is a difficult question, especially, for example—we discussed in my commission, three times in this year we discussed the problem of radioactive waste in different, radioactive waste which is generated from under destroying of nuclear arms, radioactive waste which we have in Myak, radioactive waste which, and so on. And after this discussion, the minister of nuclear energy several times gave us the full information when they collect especially for us.

The ridiculous situation is that nobody has information in Russia. Nobody has full information in Russia, part information collected by the Norwegian environmental organization, part information collected by Greenpeace, part information collected by my commission in their official way. When we put all this information together, we hope that we receive something near to real.

Mr. SPRATT. Has anyone attempted to develop a cost estimate, an estimate of what it would cost to clean up, remediate, correct these problems in Russia alone, or the former Soviet Union States?

Dr. YABLOKOV. We hope that we now understand the scale of the problem, not the detail but the scale of the problem. The scale of problem we know is a billion curies. We discussed 6 billion curies of radioactive waste we have in Russia or a billion curies we have in Russia. This is maybe 9 billion curies.

Mr. WELDON. Would you yield for a question?

Mr. SPRATT. Certainly.

Mr. WELDON. I am not a scientist, but just to put that into perspective, you say 6 billion curies. My lay understanding is that Three Mile Island at its worst gave off 15 curies of radioactivity,

and I see some heads shaking, so 15 curies and you are saying 6 billion curies is what the problem is in Russia?

Dr. YABLOKOV. Yes. A more visible unit for radioactive fallout is Chernobyl. All Chernobyl fallout, it was 50 million curies—50 million curies. It was all Chernobyl catastrophe, and 50 million, it is enough to cover all the globe, practically all the globe. You can reach Chernobyl fallout even in this room just now. So 50 million. We have at least 6 billion curies.

Mr. SPRATT. Is there any effort or program now in Russia to correct this problem, to clean it up?

Dr. YABLOKOV. Yes. I just mentioned, we have a huge program which passed through the Government October 23 and signed by my Premier Chernomyrdin, a Federal program about how to deal with radioactive waste and spent nuclear fuel between 1996 and 2005. But I mentioned the money which is allocated for this program, only about $1 billion, no more, but the problem costs, really costs hundreds of billion dollars. It is a visible step but it is absolutely not enough. It is only a first step, maybe the intention to solve the problem, not solving.

Mr. SPRATT. Mr. Bryn, could I ask you also your sources of information, where you developed the data that you presented?

Mr. BRYN. We had the same problem as Dr. Yablokov explains. We really talk about that we have three phases as far as dealing with these problems are concerned. The first phase is the gathering of information, the second is making the priorities, and the third is the operative one.

By and large now, in some of the areas, we have a pretty good view of the situation. As I mentioned, the expeditions we have had to the dumping sites around Novaja Zemlja. We feel we know what is there. We can then on the dumping side, at least, start to make priorities.

Where we lack information is obviously how the situation is in the northern fleet shipyards and also in the facilities inland. There, new information is coming to hand. We know the general picture that it is very difficult as far as the storage is concerned. We know that the number of submarines that is easily counted and so on. So one knows quite a lot, and probably enough to start a sort of international program which we feel is necessary.

But, as I said, I think it has to be an ongoing process to gather information while at the same time we make some priorities and start operational work. As I said, I am happy to say that at least Norway and the United States are cooperating on some start, really very small projects, but they give great promise for the future, not least in getting used to dealing with the Russian authorities, both centrally and locally, which is tremendously important, because we cannot force cooperation on the Russians. We have to stimulate the sort of cooperation, and I am particularly talking about the military establishment. Thank you.

Mr. SPRATT. Thank you very much.

Thank you, Mr. Chairman.

Mr. WELDON. Thank you.

Mr. Hastings.

Mr. HASTINGS. I just have one question of Mr. Bryn. You talk about the summit next year in Moscow. What countries will be par-

ticipating in that, and what expectations that there will be a solution, I guess, to all of this, or a start of talking about a solution, and is there anything in setting up this summit in Moscow that would have some sort of a binding agreement among those that are participating? First, how many countries are participating?

Mr. BRYN. Thank you. Of course, this is a meeting for the G–7 group of countries, the seven leading industrialized countries, the United States, Germany, United Kingdom, France, Italy, Canada, and Japan, then meeting together with Russia.

What can come out of it remains to be seen. The agenda covers three substantive items. The first item has to do with reactor safety. I think there we have international processes which have started and which really are working. The nuclear safety account under the EBRD is effective. A lot of work has been done to upgrade the security of power plants in the Soviet Union and other Eastern European countries.

The third—I skipped the second agenda point for the time being, but the third agenda item point has to do with smuggling, illicit trafficking of nuclear material, and I think there, what we would like to see coming out of the Moscow summit would be a plan of action, how to deal with it. That, again, I feel is very much an organizational problem. It has very much to do to establish procedures to account for nuclear materials and so on. I think it is solvable.

But where we have not seen the sort of international processes being set up is on the second agenda item, which has to do with the waste issue. That has very much to do, I think, with the lack of information which has been the situation up to now and which we have talked about. We feel now that there is much greater understanding in both Canada, the United States, and other countries among the authorities for these problems.

I had a meeting yesterday in the State Department here. I was in Ottawa on Monday. We have great hopes that what will come out of the summit will be establishing some processes, because obviously one needs to go further into these problems, like Dr. Yablokov said, to get information to make the priorities, because these are costly things.

And when we make these priorities, we also have to talk about the financing. There are positive signs that the Russian authorities are taking these matters seriously and also will be able to use quite considerable funds for them. But if we want a quick solution, a quick cleanup, we need to start to consider creating some much larger mechanism in order to assist the Russians.

And I would underline again, we are not talking here about a permanent situation for the next 50 or 100 years. This is a one-time operation to clean up a very deplorable situation which has come about through the political developments in the world during the last 30 or 40 years. Thank you.

Mr. HASTINGS. So the waste issue that you are addressing is not confined just to the oceans, is it, but it is also land-based waste then, also?

Mr. BRYN. That is right.

Mr. HASTINGS. That is all I have, Mr. Chairman.

Mr. WELDON. Thank you, Mr. Hastings.

And, in fact, the Bellona Foundation, which is here today, has a report which they will share with you on land-based problems. They were the target of an action by the security functions in Russia to confiscate their documentation, but they have photographs and documentation which they will give you.

Mr. Ortiz.

Mr. ORTIZ. Thank you, Mr. Chairman. Let me commend you for doing a great job. I know that you are very interested in the serious problems that we have worldwide.

Dr. Yablokov, I am happy to see you here again. I remember about 18 months ago when Chairman Weldon and I led a delegation to Russia. You gave us a very, very good briefing. I was just wondering, what has happened during the last 18 months? Is the problem getting worse, that we have more dumping sites than we had 18 months ago? Is the problem more serious? Are the international countries that we are working with, are they helping out? Can you give us more or less what has changed? Is it more positive change, more negative change in the last 18 months?

Dr. YABLOKOV. The situation is extremely controversial in Moscow. We had a dramatic presidential decree in July this year. Under this decree, the Gosatomnadzor, the nuclear regulating body in Russia, lost half of its power, at least half of its power, because under the new presidential decree, he has no possibility to inspect any military installation. This presidential decree had been signed, obviously after huge pressure from the military, because the military did not want to open its dirty places. The Nuclear Regulatory Commission was one independent body who showed us the hot topic, what we have to concentrate our energy on.

So this is a bad situation, but we have also a good situation, because I mentioned the new law about nuclear energy. Under this new law, which is now only newborn, two weeks, maybe, it was published 25 November, under this new law, the Government has to create a new Federal body specially devoted to the problem of nuclear waste. Nobody knows what it will look like, this body, who will belong, the minister of nuclear energy or some minister of environment, nobody knows, but it is under discussion.

Anyway, we have a decision that you have a new body which is doing something, something sound with the nuclear waste problem. It is good. So it is extremely controversial, also.

I am enthusiastic about the G–7 meeting in Moscow. We have no choice. We have to do something to prepare for this meeting. I know Russian custom. Now we have no good proposals, but 2 weeks before, we have very sound, good proposals, maybe some breakthrough. I hope for some breakthrough in this problem at the end of March.

Mr. ORTIZ. I would just like to have one more question for Mr. Bryn. Welcome again to this committee. Are we beginning to see an impact on marine life and human beings, people getting sick? Is this something that is visible now or is it something that is going to take years before it shows?

Dr. YABLOKOV. We are lucky. Until now, we have no real evidence about the harmful effect of nuclear dumping. I agree with my Norwegian colleague that all data through us, it is only local, only local influence. Yes, it is a huge amount of radioactivity created on

the new land in the Kara Sea, but the influence of this dumping, maybe several hundred meters about each place, and the Kara Sea, it has no fishing, practically has no fishing. In the Bering Sea, we have not any evidence that some level of radioactivity is rising in fish or in other organisms, no.

Mr. BRYN. Yes, and that is exactly our impression, as well. Our concern is that we want to preserve this very positive situation we have in the Bering Sea because of the fish resources, of course. For us, it is really to apply a precautionary principle which says that if there is a danger for irreparable damage, then one should act, even if one does not necessarily have full scientific knowledge at the time, because the odds here are very high, indeed.

It is those dangers which so far have not really developed in the worst way, as we talked about the nuclear submarine situation, the storage facility with the northern fleet, the runoff from the river systems, and so on. That could be catastrophes in the next ten, 20, 30 years, and so on. So that is the sort of preemptive action we are talking about and that is the important thing.

We must do those things now. You cannot wait, because if the damage has been done, it is too late, actually. But it is important to have in mind all the time that, as Dr. Yablokov said, as well, that dumping so far has not led to any catastrophe. We have come to the conclusion, as I said, that for us, the priority is not now to deal with those objects which have been dumped. Thank you.

Mr. ORTIZ. We thank both of you for your dedication and commitment to making this world a safer place. We appreciate your testimony today.

Mr. WELDON. I thank our colleague.

Mr. Underwood from Guam.

Mr. UNDERWOOD. Thank you, Mr. Chairman, and I, too, would like to commend you for this very important meeting. I know it is important on an international scale. It is very important to those of us who live in the middle of the ocean.

Dr. Yablokov, you have outlined a very sobering picture about the problems that are attendant to cleanup and storage and management of nuclear waste, and in the course of your presentation you indicated, without giving any specific sums of money, you said, well, maybe $100 billion would start to work us toward a solution of this.

I would like to just ask two questions off of that. One, what is Russia doing currently in terms of the expenditure of resources or the dedication of resources to this problem, and second, let us assume for the sake of argument that you had access to $100 billion. What would you do? How would you tackle the problem? What would you do in maybe two or three easy steps that someone like me can understand?

Dr. YABLOKOV. That is a difficult question. I have no good answer. I have to say that our military now tried to drain more power in my society, drain more budget money, and it will happen. Using this tendency, my commission, during the last meeting of my commission in the national security council last month, in November, raised the question about creation inside the military, inside the military forces, special environmental forces. If my military has more money, why cannot we use this money for the proper way, not

for military, for armament, but for battle with sicknesses of past military activity.

We have such a solution. We have such a resolution, an official resolution, and I hope that we maybe in the next half-a-year will try to create inside the military troops, specially environmental troops, which are fully concerned, which are doing something with radioactive pollution, with chemical pollution, with oil pollution. You have an enormous problem with oil pollution in the military, also.

So it is one of part of the solution to this problem, because, of course, we have no money, enough money to overcome this problem, obviously.

The next maybe not theoretically but maybe more wide question, in our energy policy, what is the nuclear cycle you have to conduct in Russia is a hot topic for discussion in our military and our nuclear industry. You have not here reprocessing in the United States. All spent nuclear fuel, you keep under special places. In my country, we have reprocessing. We have one place for reprocessing nuclear fuel in the South Ural, in Myak, is the name of this factory, Myak.

And we have a special presidential decree to create a new huge reprocessing plant in the Krasnyosk, but they have no money. They dream that they collect money from Switzerland, from Taiwan, from Japan, not from Norway but from Germany and so on and so on, and when they collect this money, they construct this reprocessing plant. But with the end of this reprocessing plant, plutonium, you see, plutonium. What can we do with plutonium? We need to create a new generation of nuclear power plant which works on plutonium fuel. We environmentalists are strongly against this plant.

But, you see, your question has no answer, has no good answer, because under discussion is the strategy, the strategy of reprocessing. If you continue to reprocess or are rising the scale of reprocessing fuel, there is an enormous problem with plutonium. Maybe during the G–7 meeting we have to discuss this problem, also.

Mr. UNDERWOOD. It seems like, based on your answer, you are going to engage in the kind of debate that we have engaged in here in this country about whether strictly defense appropriations and what you do with them and what are environmental issues, and I think there is a strong basis for arguing that they are so intimately related, particularly in an instance like this.

Dr. YABLOKOV. Yes.

Mr. UNDERWOOD. Mr. Bryn, this is perhaps a question a little far afield from you, but I caught in your testimony that you stated that the problem is not so much what has already been dumped but the management of future radioactive waste. Of interest to me are plans in the Pacific, such as those, plans that I do not agree with, but plans, for example, by the republic of the Marshall Islands to invite radioactive waste to be stored in those islands since they assume that those islands are already so polluted. What is your impression or opinion about those kinds of plans?

Mr. BRYN. I do not know those plans in detail, so it is very difficult to comment on them. But, of course, the main principle we tried to stick to as much as possible is that each country has a re-

sponsibility for its own waste and its own debris, so that is at least a useful point of departure. Thank you.

Mr. UNDERWOOD. Thank you.

Mr. WELDON. Thank you, Mr. Underwood.

Mr. Kennedy from Rhode Island.

Mr. KENNEDY. Thank you, Mr. Chairman.

When facing the problem, it seems to me first you do an inventory of the problem and you do a risk assessment. To me, I just want to clarify some of the questions that have been raised so far as to what you have participated in and what we have done as a country.

As I understand it, the International Atomic Energy Agency has already begun an assessment of the radioactive contamination due to dumped radioactive waste in the Barents and Kara Seas, is that not the case? So there is already cooperation between your governments and ours in determining just to what extent there is this dumping that has already taken place.

Am I to conclude from this that we have some pretty hard data from your slides that you showed of where there are problems and how much waste there actually is? We have scientific data on that, am I right?

Dr. YABLOKOV. Yes.

Mr. KENNEDY. So it seems to me what we need to continue to do is determine to what extent in the future that is going to become a problem, and it requires the best scientific kind of evaluation of where these radionuclides are and other toxic waste sites are and what is the possibility of them spreading, so you sort of do a risk assessment.

So what I am asking you is, is not this already taking place? I mean, I see the Arctic Monitoring and Assessment Program has already been up and its report is due this spring. I understand it is done in conjunction with your countries. It is an intercountry group that is doing this. They will be able to issue a report that will say pretty specifically where there are problems and what the hierarchy of our interest should be in terms of which problems we need to solve first, am I right?

I mean, are we going to get a pretty good map here? Not only do we have a map of all the sites, but we also have a map of which sites, in an order of priority, we would want to go after first as opposed to second or down the road. So that would answer my colleague's question as to where would we spend the money first if we had it. Is that pretty much the case?

So what I would like to hear from you, given the cooperation that seems has already taken place between our two countries, is where do we have an agreed-upon approach of the technical capabilities that we share in this world for determining what the extent of a given problem is and what the best technology is for mitigating that problem, whether it is capping it or excavating it and dumping it someplace else. To what extent do you think there can be common agreement on that issue, of what is the best way to go about this?

I want to hear your acceptance of my premise, and that is we have already got the map and we already have a list of priorities as to which are the hot spots and which are not. Am I to under-

stand that we also can draw predictive models scientifically as to what areas may cause the most problems in the future?

Mr. BRYN. Thank you. I partly agree with you, because we have those data more and more, not fully fledged perhaps yet, but as far as the present dumping is concerned, I think we are starting to get the data we need. What is needed for that is constant monitoring of the situation, that the situation is stable.

Where we do not have the data is the waste, including the decommissioned submarines which rest with the northern fleet, with the military, and I am talking now particularly about the Kola Peninsula problems. There, we lack the data. There, much is based on work like what is being done by Bellona, other groups, what we get out through official meetings, what Dr. Yablokov can tell us, but we do not really have scientific confirmed data for these areas and that is why we have felt that this is such a huge problem.

It involves so many structures and it is so much linked to high politics, really, that it is an area for the G–7 leaders at the summit in Moscow to start the sort of processes which will lead to the data.

Mr. KENNEDY. Let me just interrupt there. Is it that there is not data that is being disclosed? You are saying that is a problem, not everyone has come up with where the problems are on an objective basis, not scientific here, just on objective data of where the problem is? In your military and ours, there has not been a forthcoming set of hard data as to where the problems are, is that the problem?

Mr. BRYN. That is absolutely correct.

Mr. KENNEDY. All right.

Mr. BRYN. Let me add one thing. We have started a very interesting cooperation through what I call the pilot study under the North Atlantic Cooperation Council, the NACC. I think everybody has seen the reports which have come out of the first phase and are quite impressed with the ability to draw in experts both from the United States Navy and from the Russian Navy, and the second phase will take another couple of years to be on the table. I think we will bring some very interesting information out.

But in order also to get the right people to participate in that sort of work is absolutely necessary that the order come from the very top, and that, again to return to my favorite them, that if the G–7 Russia summit in April can start those processes, I think we are on the right track.

Mr. KENNEDY. It would seem to me, before anything else can take place, we need to do an inventory. We cannot determine what the problem is unless we have an inventory. So afterwards, I will look forward to hearing the other panelists. Once you get the inventory, then we can move on to determine to what extent these are problems and what extent they are not, and then what technologies to use to mitigate these problems and what technologies are not cost effective.

Mr. Chairman, I look forward to continuing this with the other witnesses.

Mr. WELDON. I thank the gentleman. His questions are excellent. During our second panel and third panel, we will talk about some of the things our agencies are doing to cooperate. I know there are some initiatives underway right now, both classified and unclassi-

fied, to share the process, perhaps a new process of understanding where problems are, and then we can, as you say, respond to them.

With that, the gentleman from Texas, my good friend, Mr. Geren.

Mr. GEREN. Thank you, Mr. Chairman. Let me just say I appreciate very much your working on this issue and bringing it to the attention of the Congress and of the American people.

I do not have any questions at this time. I most certainly have found this very disturbing, very eye-opening, and I look forward to this committee's continued work in this area and I commend our panel today for their work in this area.

Thank you, Mr. Chairman.

Mr. WELDON. Thank you, Mr. Geren.

I have a couple of followup questions and then we will thank you both for being here. I think we have allowed our members to ask their questions.

Dr. Yablokov, there have been some reports of dumping of high-level waste near Lake Karachi. Is that true? I understand that, in fact, this could be more severe than any other of the existing sites that we know about, and certainly it would even exceed the 1993 white paper, your report, the Yablokov Report. Since Lake Karachi drains into other rivers leading to the Arctic Ocean, could you elaborate on what you know about the dumping in Lake Karachi?

Dr. YABLOKOV. I am sorry, I cannot follow. Would you repeat, please, what is your question?

Mr. WELDON. The reports of dumping high-level waste near Lake Karachi and what extent that dumping has been. Are you aware of it, and if so, to what extent has that dumping been?

Dr. YABLOKOV. If I understand you correctly, I think the more dangerous situation is not with dumping but with radioactive pollution going through the Siberian River to the Arctic is potentially much more dangerous, because we can lift the dumped containers, the dumped submarines. It is possible to conduct in the next several years. But what we have to do with the huge, many, many times, much more polluted river.

For example, the latest situation in Myak, you know Lake Karachi is a more polluted, radioactively polluted place which contains about 1 billion curies in one lake. They covered it after the tragedy in 1961 when it was extremely dry season and some small [?] catches radioactive dust and cover the secret city, Chelyabinsk-70. After this, they tried to do something with this lake, but to cover it, it is concrete.

My government allocates 5 billion rubles for this in the last year, to cover this, and now it is near to the end of this process. But what happened, enormous pollution underground. Now, the lake is dead. There is a huge body, underground body of heavily polluted waters going through the Tobol River each year for 65 or 87 meters, in large this water underground leaves. If this process will be continued, in 5 years, the Tobol River, one of the tributaries of the Ob, will be highly polluted.

I asked my specialists, my advisors, my experts how we can stop it. Technically, it is possible. We need only $6 or $8 billion to stop the dispersion, the distribution, the ground distribution of this pollution. Nobody has such money, nobody.

Mr. WELDON. Dr. Yablokov, one final question. There is a press story running in the Western media this past week quoting Nicholai Veransoff, saying that the upcoming December elections for the Duma really have no candidates who are out front on environmental issues. And, in fact, Mr. Veransoff makes the case that there is one faction running, one party claiming to be an environmental group and he says there is no one in that party who, in fact, is concerned with the environment. Would you comment on that?

Dr. YABLOKOV. It is strategy for our political systems. We have one small official green party. This party belongs to some oil magnates. In my point of view, it is specially created to intervene in the Duma, not to solve the environmental problem but for other reasons, maybe half criminal reasons.

Now, I know only three or four visible environmental activists who have a good chance to be elected to the next Duma. One of them is Madam Zlotnica from Olenburg [?], one of the leaders of the green movement in the existing Duma. But let us see what happens. Let us see what happens.

Mr. WELDON. Thank you, and thank you both for your testimony. It was outstanding. We appreciate you being here and for making a long trip to our country.

With that, we will convene our next panel, Ambassador David Colson from the Department of State, Assistant Secretary for Oceans, International Environment; Sherri Goodman, Deputy Under Secretary, Department of Defense, for Environmental Security; and Dr. Alan Hecht, Principal Deputy Assistant Administrator for the Environmental Protection Agency, to discuss what, in fact, is happening within the U.S. Government and our agencies to assist in the problems that we have just discussed internationally, and I am sure to respond to Dr. Yablokov's comments.

Ambassador Colson, we appreciate you being here. We know you have to catch a plane back to London for the London Convention discussions, I assume, and we appreciate you coming out in spite of the fact that you will be on an airplane in a few short hours. We will allow you to go first, and if we have questions we will ask them of you. Then you can feel free to take off. Thank you.

STATEMENT OF AMBASSADOR DAVID A. COLSON, ACTING ASSISTANT SECRETARY OF STATE FOR OCEANS, INTERNATIONAL ENVIRONMENT, DEPARTMENT OF STATE

Ambassador COLSON. Thank you very much, Mr. Chairman. I do have a prepared statement and ask that it be placed in the record.

I had the privilege to testify for the administration before the House Oceanography Subcommittee on this subject in 1993 and I think perhaps the best thing I could do is simply note some changes that have happened in the last 2 years. I will hit four specific areas.

First, in respect to administration policy, in June 1994, after extensive interagency consideration, the President endorsed an Arctic policy for this Nation based on six objectives: Protecting the Arctic environment and conserving its biological resources; assuring that natural resource management and economic development in the region are environmentally sustainable; strengthening institutions

for cooperation among the eight Arctic nations; fourth, involving the indigenous peoples of the Arctic on decisions that affect them; fifth, enhancing scientific monitoring and research on local, regional, and global environmental issues; and finally, meeting post-cold-war national security and defense needs.

Mr. Chairman, it is within this framework that U.S. agencies now work on Arctic issues. This Arctic policy review, which was the first in over a decade, reflects the needs and realities of the post-cold-war era. Vigilance in the Arctic in defense of our national security will be no less, but we recognize that other objectives must be pursued, as well.

When there was last a hearing on this subject in September 1993, we had all just become aware of the Yablokov Report, which detailed Soviet dumping illegally of high- and low-level radioactive waste in the Arctic. We were intent at that time on achieving global international agreement on a prohibition on dumping in the ocean of high- and low-level nuclear waste. Fortunately, we achieved that in the fall of 1993 in the London Convention, which is the appropriate international forum. Unfortunately, Russia, as the only country, stood upon its treaty rights and opted out of this decision in respect of low-level liquid radioactive waste.

There are several ways one can look at this turn of events. It is, perhaps, honest recognition that Russia does not and has not the facilities to process and store such waste on land at the present time. On the other hand, it appears to reflect an unwillingness to give high priority to waste management within the Russian military system. After all, at least with respect to low-level waste storage and processing, the cost is relatively modest, certainly so when compared to the cost of a nuclear submarine or to the operation of a nuclear submarine.

To try to assist the Russian Government and assure against Russian dumping, we have acted on two fronts. First, at the September 1994 summit here in Washington, we secured a joint statement between Presidents Clinton and Yeltsin to solidify political commitment by Russia at its highest level not to dump radioactive waste in the ocean.

Second, together with Norway and Russia, we are working on the Murmansk project, which will provide the necessary facilities in the northern region. Dr. Hecht, I am sure, will go into this project in more detail. Likewise, we encouraged Japan in similar efforts in the Vladivostok region.

The third area where there has been progress is in international cooperation on Arctic matters. Bilaterally, in December 1994, within the Gore-Chernomyrdin context, we reached agreement on an Arctic contamination agreement that is particularly noteworthy in its provisions providing for access to important research sites. This agreement is not limited to radioactive waste investigation, as we assume that other contaminants may be of even greater concern, particularly in the near term.

Here I have to pause and speak to the point raised by Dr. Yablokov and the reflection that the State Department somehow did something with respect to an agreement that Russia proposed. I think it is fair to say that we did receive—we, the United States Government—received a proposal within the Gore-Chernomyrdin

context from Russia. The end result of the negotiation of that proposal was this agreement which was reached and signed by Vice President Gore in December 1994.

We certainly did not accept the first Russian draft. It was a draft that contained no particular commitment on Russia's part to do anything in particular and it has us essentially funding everything. I think that if we had accepted this, we would have been criticized.

We wanted an agreement that gave us access to important areas that we thought that our scientists needed access to and we wanted recognition that cooperation was a two-way street and we also wanted recognition that other contaminants, and others, I think, on these panels following us will go into the fact that other contaminants may be of, at least in the near term, even higher importance than the radioactive waste. We feel that we got that in the agreement that was finally reached.

Multilaterally, we continued to stress the Arctic Monitoring and Assessment Program as one of the key components of the Arctic environmental protection strategy. There is, as well, the Barents Council, a Norwegian initiative, and ongoing discussions of an Arctic Council that has been proposed by Canada.

Mr. Chairman, all of these are relatively new international initiatives and I must confess some concern about our ability to lead as we confront the funding and personnel constraints in front of us. Moreover, I must also note that the Arctic has become a bit of a fad. We need to guard against a proliferation of meetings, of institutionalization of new bureaucracies associated with Arctic cooperation and new initiatives which simply sap our strength and our resources and keep us from really accomplishing much.

Dr. Yablokov mentioned that he thought that the London Convention might be reconfigured to also deal with land-based sources of pollution. That, of course, goes outside of the mandate of the present convention and it is an area in which the administration, again, exercised leadership on in hosting a conference here in Washington just at the end of October on land-based marine pollution, including radioactive waste from land-based sources and developed a program of action in that connection, and we feel that that is the better vehicle through which to pursue international cooperation on land-based activities that pollute the marine environment

Finally, Mr. Chairman, on the research front, a great deal has been accomplished since 1993. Only since 1991 have our scientists begun to share data and to conduct collaborative research in the north of Russia, where the land and the river and the sea and the ocean pollution have international implications. Only in the last 2 years have joint Norwegian and Russian cruises investigated dump sites in the Barents and Kara Seas. Assessment of these and other findings in the International Arctic Seas Assessment Project of the IAEA are now beginning to be published. Joint cruises have also taken place off Russia's far east coast.

With funds supplied to the U.S. Defense Department, the Arctic Nuclear Waste Assessment Program during fiscal years 1993 through 1995, we have for the first time studies from a variety of areas, including in the Ob and Yenisey Rivers, which drain into the Arctic.

The assessment of the information generated continues. A great deal of work remains, however. Frankly, baseline information is lacking in many areas. That is why Arctic monitoring programs are so essential. Our domestic agencies work in a coordinated fashion through the National Science Foundation-chaired interagency Arctic Research Policy Committee and internationally within the framework provided by the International Atomic Energy Agency and the Arctic Monitoring and Assessment Program.

But again, Mr. Chairman, I have to note that the IAEA is a U.N. institution, and thus, it is within the target area as funding for U.N. agencies is slashed. Also, the new IAEA programs, such as the present Arctic work, must be done through voluntary contributions and there is likely to be less of that in the days ahead. Our support for AMAP, the Arctic Monitoring and Assessment Program, has largely been via a dedication of U.S. agency personnel and the small grants program that my bureau in the State Department has administered since fiscal year 1992. Unfortunately, that program may not exist in fiscal year 1996.

The Arctic cannot be monitored for free. The administration and the Congress need to work together to see how that might best be done. We have made a start by developing a coordinated Arctic research budget, as called for several years ago by P.L. 101–609 and reaffirmed in the administration's policy review. However, funding remains inconsistent, fragmented, and in some cases nonexistent.

In closing, Mr. Chairman, there is no lack of enthusiasm within agencies or internationally in establishing programs to tackle these issues, but we are all struggling with very real budget constraints and prioritization must occur among the many needs that we all have. The big question we face, frankly, is just where do these issues of Arctic contamination really stand in that priority list.

Mr. Chairman, thank you for the opportunity. I do have about a half hour and I would be happy to wait.

[The prepared statement of Ambassador Colson follows:]

TESTIMONY OF

AMBASSADOR DAVID A. COLSON

ASSISTANT SECRETARY (ACTING)
FOR OCEANS AND INTERNATIONAL ENVIRONMENTAL
AND SCIENTIFIC AFFAIRS

DEPARTMENT OF STATE

BEFORE A JOINT HEARING BY THE
SUBCOMMITTEE ON MILITARY RESEARCH AND DEVELOPMENT
OF THE HOUSE COMMITTEE ON NATIONAL SECURITY
AND
THE SUBCOMMITTEE ON FISHERIES, WILDLIFE AND OCEANS
OF THE HOUSE COMMITTEE ON RESOURCES

UNITED STATES HOUSE OF REPRESENTATIVES

6 DECEMBER 1995

Mr. Chairman:

I am pleased to appear before the joint Committees on National Security and Resources to discuss the problems of radioactive and other toxic contamination in the Arctic.

My presentation addresses these important issues from the international perspective and seeks to place them within the context of United States Arctic policy and the international mechanisms, both regional and bilateral, within which we pursue that policy.

In June 1994, President Clinton endorsed an Arctic Policy reflecting our unique and critical needs and interests in the region. This endorsement followed a broad interagency review of U.S. interests in the Arctic, based on analyzing and responding to post Cold-War challenges in the North in the areas of security, resources, science and the environment.

Let me review the policy briefly. It is based on the following goals:

-- Protecting the Arctic environment and conserving its biological resources.

-- Assuring that natural resource management and economic development in the region are environmentally sustainable.

-- Strengthening institutions for cooperation among the eight Arctic nations.

-- Involving the Arctic's indigenous people in decisions that affect them.

-- Enhancing scientific monitoring and research on local, regional, and global environmental issues.

-- Meeting post-Cold War national security and defense needs.

A major focus in the implementation of our Arctic policy has been to address the issues of radioactive and other contaminants in the Arctic. Particular concern has been generated by reports of potential radioactive contamination from the former Soviet nuclear weapons and other military programs, including illegal ocean dumping and other disposal of nuclear wastes and components, as well as discharges through rivers. A primary objective in the efforts to respond to these issues has been to secure the involvement of Russia in efforts to deal with them.

Turning to the international institutional framework relevant to the Arctic environment within which we implement this policy, there are two major global instruments that are specifically applicable to Arctic contaminants.

The 1982 United Nations Convention on the Law of the Sea sets forth obligations to prevent, reduce and control pollution of the marine environment from all sources. Though the United States and the other Arctic nations, with the exception of Iceland, are not yet Parties to the Convention, its marine environmental protection obligations are recognized as reflecting international law, binding on all nations.

Also of particular relevance to the problems of contamination in the Arctic are the Law of the Sea Convention's provisions on prevention, reduction and control of pollution from land-based sources, a topic to which I will return toward the end of my remarks.

The 1972 Convention on the Prevention of Marine Pollution by the Dumping of Wastes and Other Matter (the London Convention) implements the obligations of the Law of the Sea Convention with respect to ocean dumping. It includes a prohibition on the deliberate disposal at sea of high-level radioactive wastes and, in 1993, was amended to extend the prohibition to all radioactive wastes, including low-level radioactive wastes.

There are two primary multilateral channels directly applicable to addressing the contaminants in the Arctic.

The International Atomic Energy Agency (IAEA) is the international organization charged, inter alia, with promoting the safe use of nuclear energy and preventing radioactive contamination from any such uses, including in the Arctic.

At the regional level, efforts to address Arctic contaminants have been centered within the Arctic Environmental Protection Strategy (AEPS), a cooperative program among the United States and the seven other Arctic nations (Canada, Denmark, Finland, Iceland, Norway, Sweden and Russia). A primary objective of the Strategy is securing ongoing Russian involvement, particularly in light of the extensive pollution from past Soviet disposal of toxic waste and radioactive material.

The London Convention:

The 1972 Convention on the Prevention of Marine Pollution by the Dumping of Wastes and Other Matter (the London Convention) is the primary international agreement controlling the deliberate disposal of wastes at sea. The London Convention prohibits the disposal at sea of high-level radioactive waste. While the original provisions of the Convention permitted, under special permit, the dumping of low level of radioactive waste, the Parties adopted a voluntary moratorium on such disposal in 1985. However, concern arose both within the London Convention forum and within the IAEA over reports of significant at sea disposal of radioactive wastes by the Soviet Union and, later, Russia. As a result, the government of Russia committed itself to provide information and, in May 1993, released the Yablokov Report (or the White Book).

The Yablokov Report detailed Soviet and later Russian disposal practices in the Kara and Barents Seas and in the Sea of Okhotsk, the Sea of Japan and North Pacific Ocean, from 1959 through 1992. These practices included past disposal of high level wastes that violated the London Convention's ban and ongoing disposal of low level wastes inconsistent with the voluntary moratorium.

In November 1993, the Parties to the London Convention adopted an amendment that extended the prohibition on disposal to low level radioactive wastes. Under Convention procedures, the amendment would enter into force for all Parties, except for those that declared within 100 days of adoption (that is, by February 24, 1994) that they were unable to accept it. Russia abstained on the adoption of the amendment and later filed an

objection, thereby opting out of its provisions. At the same time, Russia indicated its intent to seek means of establishing the capability of adhering to the prohibition as rapidly as possible. As will be noted, the U.S. has sought, in a variety of ways, to work with Russia in fulfilling this commitment.

The International Atomic Energy Agency (IAEA):

In 1992 at the request of the London Convention, the International Atomic Energy Agency (IAEA) initiated an effort to evaluate the state of radioactive contamination due to dumped radioactive waste in the Barents and Kara Seas; to assess the risks to human health and the environment; and, if necessary, to examine possible remedial actions. Exploratory cruises to the dumping areas were conducted in 1992, 1993 and 1994. Since 1993, the U.S. has contributed a total of $270,000 from funds designated to support international organizations, and also provided the expert services of U.S. scientists to the Agency's Marine Environmental Laboratory. It is widely recognized that it was the U.S. contribution which made this program possible. The results of the IAEA's efforts are to be reported to the London Convention in 1996, and the collection and management of scientific data is being coordinated with the regionally-based Arctic Environmental Protection Strategy.

While it appears from the IAEA's evaluation that there are no significant regional or global effects at present from the dumped waste, the gradual deterioration of the barrier materials used to contain the contaminants could lead to future impacts. These could occur through contamination of the marine food chain, possibly resulting in the radiation exposure of humans through the consumption of fish and other marine foodstuffs. Since the wastes are lying in shallow waters, the possibility of radiation exposure by other routes -- such as the movement and transport of the waste packages by natural events (ice or storm action), or deliberate human action -- cannot be ruled out. The half-lives of the radioactive materials involved are very long (tens of thousands of years) and, therefore, the possible impact of climatic change has also to be taken into account. In order to provide answers to these questions, it is necessary to have a thorough understanding of the present and future physical, chemical, and biological characteristics of the environment surrounding the wastes and of the wastes themselves.

The Arctic Environmental Protection Strategy (AEPS):

The Arctic Environmental Protection Strategy (AEPS) was established in 1991. Its origins extend back to 1989, when the eight Arctic nations agreed to a process of creating an

informal, cooperative association for the purpose of studying the current state of Arctic contamination from all sources. The Strategy identifies six pollution threats requiring urgent attention, including radioactive substances, persistent organic pollutants, oil, heavy metals, noise, and acidification and there are four AEPS working groups addressing issues of contamination.

One of the principal working groups under the AEPS is the Arctic Monitoring and Assesment Program (AMAP). AMAP's first report is due in late 1996 or 97. It will be a comprehensive survey of the state of pollution in the Arctic, and will include coverage of persistent organic pollutants, heavy metals and radionuclides. NOAA is the agency responsible for coordination of U.S. data input. The U.S. has also supplied funding for general data compilation related to AMAP.

Another important working group under AEPS is that on Protection of the Arctic Marine Environment (PAME). PAME's final report, including U.S. data coordinated by NOAA, is due in March, 1996. The report is a survey of Arctic sources of Arctic marine contamination and existing legal mechanisms to address such contaminants. It is noteworthy that in both of these international scientific working groups, Russian scientists have been very forthcoming about their national problems. A third AEPS working group is devoted to studying the need for Emergency Prevention, Preparedness and Response (EPPR). The U.S. Coast Guard is playing a leading role in the development of this group's report. The group has used the recent oil spill in the Komi Republic of Russia as a real-life case study for monitoring. The subsequent clean-up effort is being used as a model for planning purposes.

One aspect of Arctic pollution which will not be addressed in detail in the AEPS reports is that of contaminants which originate outside of the Arctic, but are transported there by various means. The study of the transport mechanisms for pollutants is an area which requires further study, as is the impact of the pollutants on the plant, animal and human inhabitants of the Arctic.

Bilateral Efforts with Russia:

There are a variety of bilateral channels through which we seek to address issues of Arctic pollution, obviously most importantly with Russia. Many of the specific initiatives of this nature will be addressed by my fellow witnesses. I will refer to several of those directly relevant to Arctic contaminants.

President Clinton and Russian President Boris Yeltsin announced at their summit meeting in September 1994, that cooperation in the resolution of the problems of processing and storage of Russian liquid radioactive wastes in the North of Russia was an important component of any regime for effective protection of environmental quality and the natural resources of the Arctic. Specifically, their announcement stated that:

> The Russian Federation and the United States of America confirmed their readiness to cooperate in consistently preventing the dumping of liquid radioactive wastes, in accordance with the London Convention, and to proceed to a solution of the problem of Arctic pollution from all sources.
>
> To this end, Russia and the United States agreed to undertake, in cooperation with Norway and other interested countries, a step-by-step expansion and upgrade of the treatment facility in Murmansk. At the same time, Russia stated its intention to continue to abide by its voluntary commitment to prohibit the dumping of liquid radioactive wastes under the London Convention with a view to eventual formal adherence to the prohibition.

It is important for Russia to support the ban and not to dump in the ocean, not just in the Arctic but also in the north Pacific where Japan has concentrated similar efforts. Japan had agreed to provide up to $15 million to construct processing and storage facilities near Vladivostok, moving this issue to center stage in the Japan-Russia relationship. Japan has made it clear, however, that such financial assistance would be severely jeopardized if Russian dumping continues.

Whether we discuss the Murmansk facility or Vladivostok or dumping in general, we can assume the environmental side of the Russian bureaucracy is with us (and Japan) on the issue. However, the problem rests with the Russian Navy. The Navy is the institution with the budgetary responsibility to deal with the storage problem and we are endeavoring to work with them on this issue.

At the end of 1994, the United States and Russia signed an agreement on cooperation in dealing with Arctic contaminants - the Agreement between the Government of the United States of America and the Government of the Russian Federation on Cooperation in the Prevention of Pollution of the Environment in the Arctic. The agreement emerged from the Gore-Chernomyrdin process. Fully implementing that Agreement will take time. While the Arctic Environmental Protection Strategy remains the main forum for multilateral cooperation, this Agreement should help ensure access to a bilateral forum and to raise the profile of work already being done.

Another area involving U.S.-Russia bilateral activity has been in response to the major oil spill in the Komi region of Russia caused by rupture of pipeline. The spill including discharge into the Pechora River that flows into the Arctic Ocean threatened major environmental impacts. The U.S. was instrumental in facilitating World Bank involvement in cleanup operations.

The World Bank and the lead contractor for the Komi clean-up, Hartec of Anchorage, Alaska, report that, to date, 94 percent of the oil from last year's massive spill has been cleaned up. Hartec executed its activities in two phases - containment and clean-up. The six major spill sites required significantly different remediation strategies, and in some cases, total reconstruction of Russian-built siphon dams and dikes. Russian clean-up efforts prior to arrival of Hartec were minimal and intentional burning of slicks complicated clean-up drastically.

Before the onset of the Russian winter, Hartec had 500 Russians at work processing about 500 tons of oil per day, much of it re-injected into the pipeline; new equipment installed this Fall tripled the number of personnel involved and the processing rate. Repairs on the problem sections of the pipeline are reported to be finished and with clean-up activities essentially complete. Attention in Komi now turns to containment of residual oil. The World Bank projects a new pipeline will be constructed within 3-5 years.

Finally, a contract for an environmental monitoring program for the Komi/Kolva region will be awarded very soon. We noted to the Bank that the Russians have lobbied hard at the GCC and the AEPS for a more extensive program to cover the Pechora Basin as a whole (and thus, the Arctic). The Bank agreed that such a program would have environmental and political value. At last week's AEPS meeting, there was wide-spread regional support for such efforts with the aim of pollution prevention.

Land-Based Sources - The Global Programme of Action for Protection of the Marine Environment from Land-Based Activities

The most recent international undertaking that bears upon what must be a long-term effort to deal with pollution in the Arctic is a program of action that emerged from the conference held here in Washington one month ago aimed at protection of oceans and coastal areas from the impacts of land-based activities. The conference hosted by the United States, in partnership with the United Nations Environment Programme, adopted the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities. The Programme of

Action is designed to identify and facilitate practical steps to implement the legal obligations of states set forth in the United Nations Convention on the Law of the Sea to prevent, reduce and control impacts upon the marine environment from land-based activities.

Municipal, industrial and agricultural wastes and run-off resulting from land-based activities contribute most of the pollution load of the oceans. The impacts of these activities encompass the effects of a broad range of pollutants and harmful processes, including sewage (pathogens and microorganisms), persistent organic pollutants, radioactive substances, heavy metals, oils (hydrocarbons), nutrients, sediment mobilization, litter, and physical alterations and destruction of habitat.

The programme of action:

a) incorporates practical guidance for national programs, including a methodology for accurate identification and assessment of the sources of land-based impacts; and for establishing clear priorities for dealing with those sources;

b) calls for cooperation at the regional level, through legal instruments and action plans; and,

c) cooperative steps at the global level to facilitate effective action at the national and regional levels, including building national capacity for effective action; mobilization of financial resources in support of such action; and involving the relevant United Nations and other institutions in the implementation effort.

The United States is pleased with the results of the Washington conference. We consider effective steps to implement The Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities as a major priority for our oceans policy. The Programme stresses action at the regional level and I believe offers an important platform upon which to identify and apply "what works" in addressing problems of Arctic contamination.

Mr. WELDON. Thank you, Ambassador. I just have a couple of questions. I appreciate the work that has been done with the money that we spent, and as the chairman of this subcommittee have supported and will continue to support the administration in requesting dollars.

Unfortunately, in the past, while we have had the success of primarily Senator Stevens putting money in, in this year's defense bill, to my knowledge, there has been no money added and there was no request from the administration. Therefore, we are looking at a zero dollar amount for fiscal year 1996. That is unfortunate, and it is troubling in light of what we have heard today. Do you have any suggestions as to the administration planning on asking for some reprogram dollars or something that we can do to help prod some additional money in that area?

Ambassador COLSON. Mr. Chairman, it is dangerous for me to talk about money issues, but I think all of us that are interested in these issues have to be mindful of the budget processes and to fight our battles within them. Certainly, within the administration process, we will again be revisiting this as we plan for fiscal year 1997 and we have not given up on trying to find some money at least within the State Department to—the small grants program is a very small program, but sometimes if you can bump something with a $10,000 or $15,000 contribution, it really makes a difference. We will still be working within the Department so that once we do have a budget, maybe we are able to have some of that money.

Mr. WELDON. I extend my offer to work with you in a bipartisan mode to help accomplish that objective and to make sure that we do not renege on the financial commitment necessary. I am willing to stand up within my own party and make that case because I think this is an extremely important priority for this country and really for the world.

The ONR has been, I guess, the lead agency in this. Is that satisfactory from the State Department's standpoint in terms of this issue?

Ambassador COLSON. Mr. Chairman, I think, again, our job on an issue like this is to coordinate and take on the international side of the debate. We are not a technical agency in any sense. The money has come to ONR but they have worked with and through the established interagency process that NSF chairs to identify our priorities. They have worked and our agencies have worked within the Arctic Monitoring and Assessment Program that has been put together, so all of this has tied together rather well, I think. It can always be done a little bit better, but we certainly have no complaints in that respect.

Mr. WELDON. One of the questions I am going to ask our other panelists, both after you leave and the other panel, is in regard to the United States DOD-Russian DOD memorandum of understanding on environmental protection that was signed in June 1995, the Gore-Chernomyrdin Commission, which has the potential for removing the bureaucratic barriers that arise. I guess I want to get to the heart of the perception that perhaps there have been some within the naval-nuclear-environmental community who have not been maybe as forthcoming and as cooperative as maybe they

should be. Is that your assessment, and are there things that perhaps we could do to help prod that along?

Ambassador COLSON. I do not have that assessment. I do not have that knowledge. If you are speaking of our people and our naval officers and the Defense Department, I think there has been good cooperation within the interagency community.

I know that Deputy Secretary Talbot talked to former Deputy Secretary Perry about this at an earlier date to try to advance the cooperation with Norway and to bring our military into this, because we did feel that working sort of through the normal State Department to foreign ministry channels was not the right way to accomplish what we needed to accomplish with the Russian military. I think the kinds of military to military contacts that we are now having are essential and it is something that the Department of State certainly supports.

Mr. WELDON. So you are not aware of any opposition from the U.S. Navy's naval reactors program?

Ambassador COLSON. I am not aware of any, no, sir.

Mr. WELDON. That is a question I will ask the other panelists. I am giving them a heads-up in case they want to think about their answer prior to that question being asked.

I will now turn to my good friend from Guam, Mr. Underwood.

Mr. UNDERWOOD. Thank you, Mr. Chairman.

Mr. Ambassador, I was struck by the comment, I guess, that you said that some of the attention given to the Arctic is somewhat of a fad. Given the nature of the earlier panel, perhaps you could give me some reason to believe that it is a fad. How does this compare in terms of the dangers overall worldwide and what would lead you to make such a comment, at the risk of wanting the Pacific to be a fad.

Ambassador COLSON. Perhaps the use of the word "fad" was unfortunate, but I do find that oftentimes in international activities, there will become an issue that will be popular and it will become the source of funding for lots of meetings but not for any particular work.

I think that that is what we are finding today in many respects in the Arctic, that some government, some agency is interested in the Arctic. It is sort of a new issue. It was an issue that during the cold war we did not talk about Arctic cooperation because it really did not exist. Now that has broken down and there are lots of environmental groups, there are a lot of other countries interested in things Arctic.

My point was simply that we have to guard against a proliferation of nonproductive initiatives. We can get bogged down very easily with the limited resources that we have simply going off to meetings, flying in airplanes to talk about Arctic things and not getting anything done. It is one of these issues where just about every government has their own Arctic initiative and I think we have to guard against that and focus in and try to use our resources wisely and efficiently, and that sometimes means saying no to simply the interest in having meetings or forums and things like that.

Mr. UNDERWOOD. But it is not meant to delimit the impact or the presentation of the severity of the situation?

Ambassador COLSON. No, clearly not, and if I gave that impression, I apologize.

Mr. UNDERWOOD. Turning to some place a little bit warmer, I am sure that in the course of your own work you have had perhaps the opportunity to deal with the proposal by people in the Marshall Islands to do some nuclear storage on Bikini Atoll. I am curious. What has been the State Department's interaction with the Marshall Islands on this issue? Is there an official position? Are steps being actively taken to kind of dissuade them from this notion and what is the status of that?

I guess the logic of it is that they are going to store it on Bikini because it is already contaminated. Is that technically seen as land-based because of the possibility of seepage into the ocean? I know that it is supposed to have a geological base of some 18,000 feet.

Ambassador COLSON. On the latter point, I think in the way we categorize these issues, I think we would call that land-based. But I am generally aware of the issue. This is something that we have been deferring the technical issues to the U.S. Geological Survey and other agencies of the Government that have much more capability to judge the feasibility of this.

We have been also telling the Marshall Islands and the other South Pacific countries that we would like to see a more clear statement of the interests of the Pacific Island countries themselves in this project. It, as you know, is often the case that the small island countries of the Pacific do stand together on issues, whether it is fisheries or anything like this, and we think it is incumbent on the Marshalls to try to make their case to their neighbors before they really come to the United States Government asking for a blessing.

We have withheld that blessing. We have withheld criticism of it and we would like to see if they can develop some international consensus within the region that this is the right and proper thing to do before we take any sort of formal position on it.

Mr. UNDERWOOD. Thank you.

Mr. WELDON. Thank you, Mr. Underwood.

Mr. Kennedy.

Mr. KENNEDY. Thank you, Mr. Chairman.

I just want to ask the Ambassador what you feel in terms of the Arctic environmental protection strategy, you feel that this is the best way to go forward, that it is already a working program to bring into focus what the problem is and how to measure the problem, monitor it, and determine where the problems will be in the future? Do you think that is the hook to hang ourselves on in terms of the Arctic environment and what the former panel was testifying to? Do you think that is the best?

Ambassador COLSON. I think our general judgment is that the Arctic environmental protection strategy is a viable international cooperative mechanism through which we can accomplish the kinds of assessment and monitoring programs and coordinate the programs that the United States does, that Russia does, that Norway does, and the other Arctic countries do in the Arctic. We do not need to duplicate efforts and the Arctic Monitoring and Assessment Program helps us to avoid duplication.

It will also help us and is developing the map that you were speaking of earlier, where I think in another few months we will have the best compilation of information of the hot spots in the Arctic that we might have not only with respect to radioactive waste but with respect to a host of other contaminants that we are concerned about.

We have to continue to work these other parts of this puzzle. We have to work bilaterally with the Russians when that would seem to be the best way to proceed. We have to work trilaterally with Norway and Russia in other contexts. But I think for the general overview of scientific cooperation in the Arctic, that the Arctic environmental protection program and the component of that called AMAP, the monitoring and assessment program, is the area that we think is probably the best focal area.

Mr. KENNEDY. Thank you. Could I have Sherri Goodman talk to——

Mr. WELDON. Would the gentleman yield? We have not had them testify yet. I just wanted to finish with Ambassador Colson. He has to leave for a plane.

Mr. KENNEDY. Excuse me. I am sorry.

Mr. WELDON. That is all right. He has to go back to London. Do you have any other questions for the Ambassador?

Mr. KENNEDY. No.

Mr. WELDON. Mr. Ambassador, thank you. We appreciate your testimony and your willingness to work with us and we pledge our support to work with you.

Ambassador COLSON. Thank you very much.

Mr. WELDON. Thank you, and have a safe plane trip.

Ms. Goodman, thank you for waiting for us. Thank you.

STATEMENT OF SHERRI W. GOODMAN, DEPUTY UNDER SECRETARY OF DEFENSE FOR ENVIRONMENTAL SECURITY

Ms. GOODMAN. Thank you, Mr. Chairman and members of the subcommittees. I thank you for the opportunity to testify today. With your permission, Mr. Chairman, I will submit my statement for the record and I will summarize it for you.

I would like to address DOD's unique role in the effort we are discussing today, the criteria for our involvement, and our work to date. The Department's primary goal is security. In the Arctic, security means protecting human health and safety. It also means ensuring that the Arctic ecosystem remains healthy and resilient. Keeping the Arctic healthy avoids tension between adjacent nations who depend upon its resources for food, economic benefit, transportation, and research.

The Department of Defense role begins with national security. The threat of widespread contamination, real or perceived, is a threat to security. Protecting the environmental resources all States share is thus a critical component to protecting security. Additionally, the Department of Defense has an operational interest in retaining access to the Arctic sea lanes.

DOD has an array of environmentally-friendly tools upon which to draw. We have a Navy patrolling global waters, undertaking sophisticated scientific research in the course of its operations. We have environmental professionals deployed on U.S. bases around

the world, and we have the wisdom borne of 25 years of experience in integrating environmental protection into military activities.

Before I describe how the Department of Defense has applied these capabilities in the Arctic region, let me address the criteria for DOD involvement here. In the Arctic, as elsewhere, the Department must continuously scrutinize its activities to ensure that we achieve maximum return on our investment for the national security dollar.

The criteria for judgment in the Arctic are, first, to minimize political tensions generated by real or perceived pollution. Radioactive waste has attracted the most attention in this regard.

Second, to minimize the real threat to human health and the natural environment in the Arctic by military activities.

Third, to realize the best return for our investment of time and resources.

Fourth, to address environmental problems according to a risk-based analysis, as Congressman Kennedy has alluded to.

The source of much of the environmental security concerning the Arctic today stems from the Russian military, and that brings me to the fifth criteria, which is to measurably improve Russian military environmental management of nuclear and hazardous waste.

The good news is that the Department's and others' research to date indicates that there is not a significant immediate threat to human health and to the food chain in the Arctic, but good news should not lull us into complacency. The Arctic remains vulnerable to a host of commonplace toxins, such as heavy metals and persistent organic pollutants. We have a responsibility to do all we can to help ensure that an environmental disaster never occurs, because once it does, it could take decades or centuries to reverse.

Let me now briefly address how we have set DOD's capabilities to work with others in the Arctic. First, the Gore-Chernomyrdin Commission, which under the leadership of the Vice President, Vice President Gore, provides an enduring forum for bilateral cooperation. Because the Vice President and Prime Minister Chernomyrdin meet several times a year, there is plentiful opportunity for exchange. The Department of Defense is a full participant in a number of the committees, not only the National Security Committee but the Environment Committee, as well, and I have personally had the opportunity to present the Department of Defense environmental program to Russian defense and environmental officials at a Moscow meeting of the GCC.

Second, in June 1995, the Secretary of Defense, Dr. Perry, and his Russian counterpart, Minister Grachev, did sign a memorandum of understanding, as you referred to, Mr. Chairman, to facilitate military environmental cooperation. Under this agreement, we can share information and experiences in a wide variety of subjects, ranging from risk analysis as an environmental prioritization tool to environmentally sound weapons demilitarization to personnel education and training. We would like to commence developing project proposals under this agreement as early as possible.

Next, the Secretary of Defense, Dr. Perry, established the Arctic Military Environmental Cooperation Program, which we refer to as AMEC, at the request of the Norwegian Minister of Defense, Kosmo, in June 1994. This is a trilateral military-to-military dialog

among the United States, Russia, and Norway on Arctic military contamination. At the first trilateral meeting in Horton, Norway, in the spring, United States and Norwegian officials presented the results of our research on nuclear contamination in the Arctic and briefed Russian officials on the integration of sound environmental management practices into military activities.

Let me note at this point and respond to your question about the participation of the U.S. Office of Naval Reactors. Let me say they have been very productive participants in this dialog and overall in our Arctic military environmental strategy. In fact, the Naval Reactors Office has been an active participant on this delegation and was part of the briefings presented to the Russians on the United States nuclear fuel cycle.

We are still hoping to have a meeting early next year. What needs to happen now is engaging the northern fleet, the Russian northern fleet and the ministry of defense in this military-to-military dialog. This would be a useful step in encouraging the Russians to take responsibility for their actions and to improve environmental management of the active and decommissioned submarine fleet. In essence, we need to have the right Russian military participants attend these meetings in order productively to have a dialog that could lead to some specific proposals and to the Russian Navy taking greater responsibility for environmental management of their submarine fleet.

Next, the Department's Arctic Nuclear Waste Assessment Program, called ANWAP, is a 3-year-old effort begun by Congress to assess the nature and extent of nuclear waste in the Arctic region. The Office of Naval Research, as you know, conducts this program and Admiral Pelaez will address the program in detail during his testimony today.

So I will go now finally to the Murmansk initiative, which will be addressed in greater detail by Dr. Hecht, but the Department of Defense is a partner in that initiative. We have supported that project financially with the Government of Norway and other United States agencies to upgrade an existing low-level radioactive waste processing facility for use by the Russian northern fleet.

Let me conclude with two thoughts, Mr. Chairman. First, the Department of Defense views protection of the Arctic environment as important to national security, and second, we must focus on positively influencing the Russian military's environmental management.

Thank you for the opportunity to provide the Department's perspective today.

[The prepared statement of Ms. Goodman follows:]

DEPARTMENT OF DEFENSE AND DISPOSAL OF RADIOACTIVE MATERIAL AND OTHER TOXIC WASTE IN OCEANS AND TRIBUTARIES

STATEMENT OF

SHERRI W. GOODMAN

DEPUTY UNDER SECRETARY OF DEFENSE
(ENVIRONMENTAL SECURITY)

BEFORE THE
COMMITTEE ON HOUSE NATIONAL SECURITY'S
SUBCOMMITTEE ON RESEARCH AND DEVELOPMENT

AND

COMMITTEE ON HOUSE RESOURCES'
SUBCOMMITTEE ON FISHERIES, WILDLIFE AND OCEANS

DECEMBER 6, 1995

NOT FOR PUBLICATION UNTIL RELEASED BY THE
HOUSE NATIONAL SECURITY COMMITTEE
AND HOUSE RESOURCES COMMITTEE

Mr. Chairman, members of the subcommittees, I thank you for the opportunity to testify today.

U.S. Goals and Objectives

I would like to address with you today DoD's unique role in this effort, the criteria for our involvement, and our work to date. The Department's primary goal is security. In the Arctic, security means protecting human health and safety. It also means ensuring that the Arctic ecosystem remains healthy and resilient. Keeping the Arctic healthy avoids tension between adjacent nations who depend upon its resources for food, economic benefit, transportation and research. It also ensures that the Arctic environmental resources will be available for generations to come. DoD has developed strategic partnerships with other U.S. agencies and with members of the international community to further these security goals.

Department of Defense Role

The Department of Defense role begins with national security. The threat of widespread contamination, real or perceived, is a threat to security. Nations concerned with the quality of the air blowing over their soil, the cleanliness of the water at their shores or the health of the fish feeding their populations, cannot work together harmoniously. Protecting the environmental resources all states share is thus a critical component to protecting security. Additionally, DOD has an operational interest in retaining access to the Arctic sea lanes. Public sentiment opposed to Russian radioactive waste dumping could lead to restrictions on Arctic transit. To safeguard access for the U.S. military, we need to promote environmental stewardship by all militaries that operate in the Arctic.

DOD has an array of environmentally friendly tools upon which to draw. We have a Navy patrolling global waters, undertaking sophisticated scientific research in the course of its operations. We have environmental professionals deployed on U.S. bases around the world. And we have the wisdom borne of 25 years of experience in integrating environmental protection into military activities. Our soldiers, sailors and airmen work cooperatively with militaries with a long history of environmental protection, such as the Norwegian Ministry of Defense; and with those new at ecosystem management, such as the Russian Ministry of Defense. The Department's activities are guided fundamental policy goals, Executive Orders, and by specific agreements such as the *Agreement between the Government of the United States of America and the Government of the Russian Federation on Cooperation in the Field of Environmental Proection and Natural Resources* of June 1994, and the *Agreement between the United States of America and the Government of the Russian Federation on Cooperation in the Prevention of Pollution in the Arctic* of December 1994.

Before I describe how the Department of Defense has applied these capabilities in the Arctic region, let me address the criteria for DOD involvement.

DoD Criteria

In the Arctic as elsewhere, the Department must continuously scrutinize its activities to ensure that we achieve maximum return on investment for our national security dollar. The criteria for judgment in the Arctic are:

o First, minimize political tensions generated by real or perceived pollution. Radioactive waste has attracted the most attention in this regard.

o Second, minimize the real threat to human health and the natural environment in the Arctic by military activities.

o Third, realize the best return for our investment of time and resources; or more colloquially, to maximize the "bang for our environmental security buck."

o Fourth, address environmental problems according to a risk-based analysis.

The source of much of the environmental security concern in the Arctic today stems from the Russian military. The Russian Northern Fleet has operated for decades with little regard for the environment. The Fleet leadership asserts that it is working toward halting nuclear dumping and improving management practices, but much more needs to be done. That brings me to the fifth criteria:

o Measurably improve Russian military environmental management of nuclear and hazardous wastes.

The good news is that the Department's studies indicate the immediate threat to human health and the food chain in the Arctic is negligible. But good news should not lull us into complacency. The Arctic remains vulnerable to a host of commonplace toxins, such as heavy metals and persistent organic pollutants. Environmental disasters, once visited upon the Arctic, can take decades or centuries to reverse. We have a responsibility to do all we can to help ensure an environmental disaster never occurs.

Current DOD Activities

Let me now briefly describe how we've set DoD's unique capabilities to work with others in the Arctic region.

The Gore-Chernomyrdin Commission (GCC), under the leadership of Vice President Gore, provides an enduring forum for bilateral cooperation. Because the Vice President and Russian Prime Minister meet several times a year, there is a plentiful and predictable stream of political will to form lasting relationships, and present results. I have personally had the opportunity to present the Department of Defense's environmental program to Russian defense and environment officials at a Moscow meeting of the GCC. Within the Environmental

Working Group under the GCC, we and the Russians are exploring how intelligence assets developed during the Cold War can be used to characterize environmental contamination at military bases. We will exchange the first derived products next year.

In June 1995, Secretary of Defense William Perry and his Russian counterpart Minister of Defense Pavel Grachev signed a Memorandum of Understanding to facilitate military environmental cooperation. Under this agreement we can share information and experiences in a wide variety of subjects, ranging from risk analysis as an environmental prioritization tool, to environmentally sound weapons demilitarization, to personnel education and training.

The Secretary of Defense established the Arctic Military Environmental Cooperation program at the request of Norwegian Minister of Defense Kosmo in June 1994. It comprises a trilateral military-to-military dialogue between the U.S., Russia and Norway on Arctic military contamination. At the first trilateral meeting in Horton, Norway this spring, U.S. and Norwegian officials presented the results of our research on nuclear contamination in the Arctic, and briefed Russian officials on the integration of sound environmental management practices into military activities. We are still hoping to have a meeting early next year. Engaging the Northern Fleet in this military-to-military dialogue is a useful step in encouraging the Russians to take responsibility for their actions and improving the environmental management of the active and decommissioned submarine fleet.

The Department's Arctic Nuclear Waste Assessment Program (ANWAP) is a three-year old effort begun by Congress to assess the nature and extent of nuclear waste in the Arctic region. The Office of Naval Research conducts this research program. ADM Palacz will address the program in detail in his testimony today. The study found that no radioactivity from dumped Russian material is measurable except in very localized regions; that is, directly adjacent to some of the dumped material. Currently, there appears to be no risk to the coast of Alaska, or the Arctic basin as a whole from the radioactive waste disposal practices of the former Soviet Union. As part of the project, ONR is developing a model which will be useful to examine the risk from any type of contaminant (both radioactive and non-radioactive) entering the Arctic from any source. Using an earlier version of this model, it shows that even assuming a worst-case scenario for release of the dumped material, no radioactivity above background would reach Alaskan shores. What may be deserving of additional study is potential risk from heavy metals and persistent organic pollutants, emanating from industrial facilities near rivers flowing into the Arctic.

Finally, through the Murmansk Initiative DoD is partnering with EPA, AID, DOE and the Government of Norway to upgrade an existing low-level radioactive waste processing facility for use by the Russian Northern Fleet. The current facility services the civilian nuclear icebreaker fleet of the Murmansk Shipping Company, and has a capacity of 1200 cubic meters a year. After the upgrade, the facility will be able to process the high-saline wastes generated by the Northern Fleet, with a total capacity of 5,000 cubic meters per year. The Russian Navy and Ministry of Defense have indicated that they will use the facility, on a

fee-for-service basis, to process low-level radioactive waste from their active and decommissioned nuclear submarines. Storage facilities for this waste are reported to be 95% full at the present time. The Government of Russia has plans to further expand the facility to 15,000 cubic meters, in anticipation of accelerating the decommissioning process.

Summary

Thank you for allowing me to appear today to discuss DoD's environmental security goals, criteria and activities in the Arctic. I would like to conclude with two thoughts. First, the Department of Defense views protection of the Arctic environment as critical to national security. Although studies indicate that radioactive waste dumped in the Arctic seas does not pose a significant health risk today, some continued monitoring is appropriate. We must be equally conscious of the enduring effects of heavy metals, persistent organic pollutants and other military-generated toxins which have received less public attention.

Second, we must focus must be on promoting positive change in the Russian military's environmental management. DoD's role is to engage the Russian military on environmental management. Other U.S. agencies with differing missions and authorities can make contributions to creating institutional and legal infrastructure, business development, and public-private dialogue on environmental management. As each of these developments strengthens democracy, each contributes to national security. Thus in the field of environmental security, partnership between agencies and countries is a necessary component to promoting responsible environmental stewardship.

Thank you again for the opportunity to provide the Department's perspective on this issue.

-- End --

Mr. WELDON. Thank you, Ms. Goodman.
Dr. Hecht.

STATEMENT OF DR. ALAN D. HECHT, PRINCIPAL DEPUTY ASSISTANT ADMINISTRATOR, OFFICE OF INTERNATIONAL ACTIVITIES, ENVIRONMENTAL PROTECTION AGENCY

Dr. HECHT. Thank you, Mr. Chairman, members of the subcommittees. I am very pleased to have an opportunity to join this panel. I am not sure that EPA often has a chance to speak in a panel on environmental or national security.

You have my testimony and I would only like to highlight a few points, since I assume the testimony will be part of the record.

Mr. WELDON. Without objection.

Dr. HECHT. It is obvious that EPA's principal objective is environmental protection, the health and safety of U.S. citizens. This is, of course, predominately a domestic agenda, but many of the issues we face have an international dimension, and EPA's international program, of which we are dealing with one today, emanates from our responsibility to protect U.S. citizens from either transboundary pollution or, of course, global environmental threats.

In addition, EPA, as one agency of the Government, is an element, is an arm of our efforts to implement foreign policy, and in that regard EPA has had some responsibilities over the years to assist the State Department and other agencies of Government in carrying out these objectives.

For example, EPA has worked for many years with our Agency for International Development in assistance programs in Eastern Europe under the Seed Act and in the former Soviet Union under the freedom Act. More particularly, EPA has had a very long and productive history of cooperation with Russia dating back to at least 1972. The first environmental agreement, which was revised more recently in 1974, was in many ways a hallmark of cooperation during difficult periods of the cold war.

More recently, with the initiative of Gore and Chernomyrdin to establish a commission to deal with areas of cooperation across the board, EPA Administrator Carol Browner was asked to chair the environmental committee or the environmental working group of that activity and in that regard has brought the full resources of EPA to begin to address a number of these important bilateral issues.

At the same time on the international arena, our accession and our agreement in the London Convention, something that EPA was a strong supporter of, has given us an opportunity to work with Russia and other governments to facilitate their accession to the terms of the London Convention.

There are a number of important policy documents that have helped frame what we have done in Murmansk. Many have been mentioned already today, but let me just highlight a few. The Arctic environmental protection strategy is basically an agreement under which AMAP, this monitoring and research program, has been carried out. The United States-Russian environmental agreement, which was signed in December 1994, is an update and a renewal of the agreement that was signed in 1992.

The United States-Russian comprehensive Arctic agreement, which Ambassador Colson had referred to earlier, attempts to address in a comprehensive way issues in the Arctic. The Presidential Directive on the Arctic, which Ambassador Colson also alluded to just a few moments ago, are all frameworks in which implementation of any specific project at least has a policy framework.

Many of these agreements do not have a road map to implement them, but in at least the case I am going to discuss with you today, Murmansk, we are beginning to develop a kind of road map and a means by which the full resources of all of our agencies can be brought to bear on these problems.

Murmansk has been mentioned many times and you have been promised that I would say something in more detail about it, so let me deal with that. From our leadership on the environment committee of the Gore-Chernomyrdin process and as a result of Russia's difficulty in acceding to the terms of the London Convention, we have been very interested in seeking ways to ensure that radioactive dumping in all of the oceans and in the Arctic is stopped.

We have been motivated, I think to a large extent, by discussions with Norway. They have been a key partner in terms of our discussions with Russia and have been early-on in helping us to identify the opportunities that exist at the Murmansk facility. While it is primarily a facility for processing civilian radioactive waste, low-level waste, there are enormous implications and enormous opportunities that emerge from a successful collaboration between the United States, Russia, and Norway to upgrade this facility to process more than the current cubic meters of radioactive waste and, at the same time, to ensure that the Russian military uses it in their process of the decommissioning of submarines under the terms of international agreements.

So beginning in fall 1993, we began to have discussions with Norway and Russia and the United States about the technical issues related to this facility and what it would take to upgrade it to begin to process more of the low-level radioactive waste. In the course of the period since fall 1993, the facility in Murmansk has been visited by several technical groups. We have hosted Russian technical experts to the United States with the help of the Department of Energy. I believe, Congressman Weldon, you yourself have been at the facility. Many of my EPA colleagues have been there.

We are now at an absolutely crucial point in this process, because we designed this in three stages. There is the stage which is about to be completed, the assessment stage, which is can we expand the facility, whether technical difficulties, what kind of technology will be used, what are the engineering specifications, this whole range of assessment functions. That is about to be completed and next week in Norway we will have a meeting to finalize those assessment reports.

The second phase is the construction phase. That is to expand this facility and make it operational, to go from the 15,000 cubic meters of radioactive low-level waste to the 5,000 that it is being designed for.

And beyond that, there is another phase. There is the operational phase of assessing that we have done this correctly, that everything fits together, and that the Russian Government is going to

use that as a basis to expand their activities and their intention to use this facility to go beyond the 5,000 cubic meters to 15,000.

All of this has been enormously successful in the sense that we have completed the assessment stage. And while both Governments or all three Governments, the Russian, the United States, and Norway have from the data that are available, and it is not all the data, at least some assurance that the containment of the radioactive waste is not an immediate threat to the global food chain, this project, in our judgment, is absolutely crucial in laying a foundation for future work, and let me list a number of reasons why I think this is the case, because, in essence, this is the core, I think, of why this international cooperation is important and continues to be important.

First, by means of this project, we are building trust with the Russian Government, both in the civilian sector and in the military sector, and I think that is extremely important in terms of just being able to talk to each other and be able to discuss these issues in an open way.

The collaboration with Norway has been essential and lays the groundwork for further expansion with other governments. We have discussed the participation of Canada in this process and we think that the more governments of the Arctic region that are involved, the stronger will be the commitment to see this through to the end.

The ability to deal with the northern fleet has been one of the real successes in terms of this project. We have had meetings with the admiral and vice admiral of the northern fleet. They have indicated to us, and we can give you a very nice report of their assessment of the situation, their priorities, which will help us in future planning.

This is also a project which is now beginning to help us in terms of experience of how we put together a project like this, a project of design, construction, construction in Russia, which involves many agencies and three governments.

It is a project that addresses a specific problem with a result in the end which leads to a policy decision, which has led to a policy decision in the Russian Government to use the facility on the military side and to go beyond—go beyond—what we are able to do, but to take on the responsibilities to expand it later.

And finally, two other things. One, it is a model of how a number of Government agencies have been able to pool their resources, pool their authorities, and pool their interests together to accomplish something as described here. I will not take time to lament with you the difficulty, as I am sure you can imagine, there has been to get these resources together, but without the leadership under the Gore-Chernomyrdin process, which I think is a good example of why that is a good mechanism, and just genuine cooperation on the part of DOD and DOE and State and EPA to do this, I think we would have not been able to put the resources together to do the assessment stage and the resources to do the initial construction stage.

I will be very frank with you in saying, of course, that what happens in the future is very uncertain in terms of where our budgets are and in terms of what is available, but we have made effort to

leverage our resources, and I think our work with Norway has been a good example of this.

Finally, Mr. Chairman, there is one project which we have referred to several times today. It is really a bridge between what has emerged in public policy literature and certainly in the public literature about, "What is environmental security and how does it relate to national security?" The policy of the United States is that environmental security is part of national security.

In EPA, I think it is new to us to think in those terms, but the very important linkage here, nexus, is that as Russia continues to meet their obligations to decommission their military fleets, more waste is generated. That waste is a potential threat not only to their own citizens but to all the Arctic nations.

Automatically, the two of us here from Defense and EPA have a new relationship to begin to explore, and I know that from our point of view, as a policy issue, this opportunity to take the small leverage that EPA brings to the table and contribute to foreign policy development is something that we are very happy in EPA to be able to do.

In conclusion, Mr. Chairman, this has been a very successful first step. This is really, for me, an opportunity and I am very pleased to be here with Dr. Yablokov and Kare Bryn, people we have worked with over the years. This is the beginning of the future for us in terms of a new direction, and I would only like to end, I have brought with me, which I will give to you for the record, copies of a report done by our science board.

I am not sure this has been made available to this committee, but I do want to leave it with you, called Beyond the Horizon: Using Foresight to Protect the Environmental Future by the EPA Science Advisory Board, and I will give you that because in the end, among the many recommendations, it says, "The United States must begin to develop strategic national policies that link national security, foreign relations, environmental quality, and economic growth, and EPA should play a strongly supportive role in this process." We are using this example and our capabilities and our human resources to try and contribute in that way. Thank you, sir.

[The prepared statement of Dr. Hecht follows:]

TESTIMONY OF
DR. ALAN D. HECHT
PRINCIPAL DEPUTY ASSISTANT ADMINISTRATOR
FOR INTERNATIONAL ACTIVITIES,
U.S. ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE
JOINT RESEARCH AND DEVELOPMENT SUBCOMMITTEE
OF THE HOUSE NATIONAL SECURITY COMMITTEE
AND THE
SUBCOMMITTEE ON FISHERIES, WILDLIFE AND OCEANS
OF THE HOUSE RESOURCES COMMITTEE

DECEMBER 6, 1995

Mr. Chairmen, members of the subcommittees, I appreciate the opportunity to appear before you today. I would like to discuss EPA's role in addressing environmental contamination from past ocean dumping of radioactive and associated hazardous wastes. The focus of my testimony will be on EPA's efforts to address contamination in the Arctic, a region which we share with seven other nations, including Russia and Norway.

We are all familiar with the recent disclosures that large quantities of radioactive waste have been dumped into the Arctic seas by the Former Soviet Union. There has been great concern here and abroad about potential impacts from these past events to the fragile Arctic ecosystem and the health of U.S. and other coastal populations in the North. Now we know that the range and

magnitude of the radioactive contamination problems is even greater as the Russian Federation attempts to deal with the decommissioning and dismantlement of its vast nuclear submarine fleet. These problems range from the processing of low-level liquid radioactive waste to the transport and storage of spent and damaged nuclear fuel from the submarine reactors.

EPA recognizes that the Arctic is a fragile environment and that the impact of releases of radioactive and associated hazardous materials in this region may have unknown adverse consequences to the unique ecosystems involved. It is the potential for biological change that is of most concern to people. Therefore, a careful scientific approach must be used when considering the release of radioactive and associated hazardous contaminants into these Arctic seas. Since there are multiple sources of contaminants to the Arctic, we advocate a comparative approach to assessing risk so that the most important sources can be mitigated as quickly as possible.

You have asked us for a short synopsis of past U.S. dumping activity and current policy. The U.S. phased out all ocean dumping of radioactive materials by 1970. In that year, the Council on Environmental Quality issued a recommendation (Ocean Dumping: A National Policy) calling for cessation of any future ocean dumping of radioactive materials by the United States. In 1972, Congress enacted the Marine Protection, Research and

Sanctuaries Act (PL 92-532) which prohibited the ocean dumping of all high level radioactive waste.

At the international level, control of radioactive waste dumping in the ocean is addressed in the provisions of the 1972 London Convention (Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter) which went into force in 1975 and to which the U.S. is a party. Specifically, this Convention banned the dumping of high-level radioactive wastes and other matter, but, prior to 1993, did not address low-level radioactive wastes. In 1993, the London Convention was amended to prohibit the ocean dumping of radioactive materials containing more than *de minimis* concentrations of radioactivity. The U.S. Environmental Protection Agency (EPA) was a strong proponent of this amendment.

Continuing with the international picture, you have asked about the degree to which international partnerships are assisting in prevention of additional contamination in Arctic waters. These partnerships take two forms:

(1) formal agreements and mechanisms for cooperation, such as the:

- Arctic Environmental Protection Strategy (AEPS) of June 1991, between the eight Arctic countries;

- o International Atomic Energy Agency (IAEA), International Arctic Seas Assessment Program (IASAP);

- o Gore-Chernomyrdin Commission (GCC);

(2) informal agreements, such as, memoranda of understanding and records of discussion.

Under the AEPS, EPA is participating in two key working groups, (1) Protection of the Arctic Marine Environment (PAME), and (2) the Arctic Monitoring and Assessment Program (AMAP). PAME is developing a list of priority tasks to address Arctic contamination problems. Under AMAP, EPA is leading the U.S. effort and working with Norway to assess radiation sources and associated radiological consequences in the Arctic environment from all sources of radioactivity.

The IAEA's International Arctic Seas Assessment Program (IASAP) is assessing the environmental impact of the past dumping activities of the former Soviet Union in the Arctic marginal seas near Northwest Russia. Under this program, EPA is chairing the group of experts evaluating the performance of the barrier materials/packaging used to isolate the radioactive waste sources dumped in the Arctic marine environment. IASAP is also

studying transport pathways of radioactive materials released from these sources and relative risk to populations that may be exposed to radiation from any released radioactive materials.

EPA is the lead U.S. agency for the Environment Committee of the Gore-Chernomyrdin Commission. The Environment Committee of the GCC is the forum for facilitating cooperative projects at the highest levels in the U.S. and Russian governments. The key Arctic project in this forum is the Murmansk Initiative, an ongoing initiative that EPA, along with other federal agencies, Norway and Russia is taking to address one of these problems. I will describe this project to you in some detail later.

U.S. concern for the potential impacts on Alaska of past radioactive waste dumping by the former Soviet Union resulted in a three year research, monitoring and assessment program, the Arctic Nuclear Waste Assessment Program (ANWAP), which began in 1993. Although this program will be covered in much greater detail by scientific experts in later testimony, EPA is the lead organization in two key studies:

- evaluation of the two key barrier materials used in the packaging of the high-level radioactive waste dumped in the Kara Sea (furfurol and special steels),

- the immobilization potential of sediments in the Kara

Sea for radionuclides, such as Cesium-137 and Strontium-90.

These projects are being conducted with the cooperation of Norwa and Russian research institutes. These are examples of international informal agreements involving EPA.

I would like to complete my testimony by discussing the Murmansk Initiative in some detail. I feel that this project could be a blueprint for future U.S. international partnerships for effective prevention of further contamination of the Arctic environment by radioactive and associated hazardous materials.

In 1993, the Russian Federation identified a particularly urgent radioactive waste management problem preventing their formal adherence to the amendments to the London Convention that were negotiated that year. Their problem was the inability to process the large volumes of low-level liquid radioactive waste (LLRW) arising from the decommissioning of nuclear submarines. Consequently, they were also unable to fully meet their commitments under the START II agreement. At the London Convention Consultative Meeting in 1993, the Russian Federation made it clear that if interested countries could assist them in solving this problem in both Northwest Russia and the Far East, then Russia would be prepared to formally adhere to the prohibition under the London Convention which bans the dumping of

both high and low level radioactive wastes. We will focus our comments on the situation in Northwest Russia, since Japan is working on the problem in the Far East.

This problem has become increasingly urgent as the number of nuclear submarines taken out of operation (decommissioned) increased. By early 1995, about 125 Russian submarines had been decommissioned, mostly in the last five years, and another 40-80 nuclear submarines are expected to be decommissioned by the end of the decade. Most of these submarines are attached to Russia's North Navy in the Murmansk region of the Kola Peninsula. The waste is being temporarily stored both on land and in floating vessels, but this capacity is being rapidly exhausted and is reported to be 90-95 percent full.

EPA became active in this issue with the goal of facilitating Russia's signing of the amended London Convention. EPA's domestic concerns in the Arctic region have involved us in programs which may appear outside of our authorities and mission. Yet, environmental and national security interests in the Arctic are linked, and we have therefore begun cooperative international projects working with other federal agencies.

In 1994, the United States and Norway began exploring with Russia the possibility of expanding and upgrading the only operational Russian LLRW processing facility. This facility,

located in Murmansk, was designed to process the wastes produced by Russia's nuclear powered icebreaker fleet.

The concept for upgrading the Murmansk facility was presented at the Gore-Chernomyrdin Commission meeting in June 1994 by the EPA Administrator, Carol Browner. This concept was accepted by both Vice-President Gore and Russian Prime Minister, Viktor Chernomyrdin and was subsequently presented at the Summit meeting of the Heads of State. President Clinton and President Yeltsin issued a joint U.S.-Russian Summit Announcement on September 28, 1994 that cooperation on the resolution of the problem of processing and storing Russian liquid radioactive waste is considered an important component of more effective protection for the environmental quality and natural resources of the Arctic.

This project moved very quickly. On the U.S. side, the Environmental Protection Agency, the Department of State, the Department of Energy, the Department of Defense and the Agency for International Development have jointly collaborated on this Murmansk Initiative, within the context of U.S. Arctic environmental protection, pollution prevention and environmental security objectives.

In Norway, there has been active participation led by the Royal Norwegian Ministry of Foreign Affairs and including the

Norwegian Radiation Protection Authority, Ministry of Environment and Defense Research Establishment. The Russian Federation, including various ministries and institutes and the civilian operators of the icebreaker fleet have given their full participation and cooperation to this project. The participating Russian Ministries have included the Ministry of Foreign Affairs, Ministry of Atomic Energy, Ministry of Defense, Ministry of Environment, and Ministry of Transportation. Regional representatives from the Murmansk and Arkangelsk Oblasts and the Murmansk Shipping Company have also actively participated.

Since May, 1994, a series of technical discussions and exchange visits have been held between U.S., Norwegian and Russian technical experts, including two U.S.-Norwegian trips to Murmansk, two technical meetings in Oslo and a visit to the U.S. Hanford facility in Richland, Washington. These technical efforts resulted in a final engineering design, in November 1995, for expanding and upgrading the Murmansk facility. A meeting will be held in Oslo, Norway, on December 13-14, 1995 for the purpose of formally completing the design phase of the Murmansk Initiative and initiating the construction phase. Construction will get underway very soon thereafter. Financial support for the construction has been obligated and will be provided by Norway and the United States. Russia will provide in-kind assistance, including scientific and engineering support. The construction phase is scheduled for completion by early 1997.

While the LLRW processing problem may not be the most serious Arctic environmental threat from the perspective of environmental risk, it illustrates how effective partnering, team building, and sharing of technical know-how can help solve this and other more complex Arctic environmental security issues. Norway has been and continues to be a strong leader and partner in our efforts in this region.

Successful completion of this Murmansk Initiative can provide a bridge to addressing broader Arctic environmental contamination problems. Many of the remaining problems facing the Arctic nations are either direct or indirect consequences of the era of the Cold War. The nature of the environmental problems exceeds the ability of any one nation or any one governmental agency to successfully address. As the Murmansk Initiative has demonstrated, we need cooperative efforts between governments and cooperative efforts by the agencies or ministries of the participating governments to develop the processes by which the broad range of environmental problems in the Arctic can be solved.

I thank the members of both subcommittees for the opportunity to address these important matters.

[The report of the Environmental Protection Agency Science Advisory Board will be retained in committee files.]

Mr. WELDON. Thank you, Dr. Hecht. Thank you both for your comments and your testimony.

Can either of you come up with an idea of how much total U.S. dollars are being spent on the Arctic or the Arctic dumping problem, if you look at DOD, EPA, State, NOAA, and perhaps any other agency, the Geological Survey or whatever, any idea what that total amount is annually?

Dr. HECHT. I am not sure. Off the top, I have the total number that reflects all of the agencies' work under the Arctic environmental strategy, but the Arctic research community, which is here in full force today, has lots of documents and I think that we can get from them, from NSF, which is part of this group, or even the next panel, a good assessment of all the agencies.

Mr. WELDON. We will get that, I guess. It looks like we are going to get that, then.

Dr. HECHT. Separate from that, I can tell you that for just the Murmansk activity which I have just described, the assessment phase has been on the order of about $400,000, of which Norway has contributed $50,000. The construction phase is something on the order of $1.2 million, and Norway will contribute half of that; the United States Government will contribute half. And then beyond that is the operational phase.

So I would look to the interagency community that is here today to give you a good, solid number which reflects, I think, what all the agencies are doing.

Mr. WELDON. I have been very supportive of the money that has been spent up until now, both within the committee and on the floor of the House, defending our investment because of the importance in this area and the spin-off impact it is having. I was pleased to attend a conference hosted by one of our friends in the audience, Dr. Radvani, down at Mississippi State University, partially funded with money, to encourage the Japanese to step up to the plate and provide similar support for a solution out on the eastern part of Russia, which I understand now is moving along.

As a matter of fact, I got a fax to me that looks as though there is an effort by the Japanese to put as much as $20 million into a floating barge that will be used to dispose of low-level nuclear waste from submarine decommissioning, which is a success that is taking place.

So I am supportive of this and I would just ask Ms. Goodman if, in all the money that we are going to spend on environment this year in the defense bill, which, if I am not mistaken, and correct me if I am wrong, is about $13 billion if you take both nuclear and non-nuclear dollars that we are going to spend this year, do you think it is possible for us to find that $10 million that was not put in because it was not requested and because perhaps it fell through the cracks? Do you think that is possible that we could get from the administration some assistance in trying to find those dollars to keep that program going?

Ms. GOODMAN. Mr. Chairman, the answer to that depends on the Department having an authorization or direction to invest that money. The $13 billion you refer to, more of that is in the Depart-

ment of Energy's environmental management program, as you well know. The DOD program is about $5 billion, but it has been coming down.

We do not have the authority today to make that investment, other than if we are directed to do so by Congress. We have invested $30 million over the last several years at congressional direction in the Arctic Nuclear Waste Assessment Program, which Admiral Pelaez will address in his testimony. I think that has been wisely invested. I do think there are opportunities for wise, though modest, levels of investment in the future and we would welcome your support and congressional direction on that.

Much of the investment we make in this area really comes from what is called the Nunn-Lugar funds. That $30 million that is invested so far has been part of that funding. As you know, that is very important to Dr. Perry. It has also been a subject of much debate and discussion among the Congress. To date, much of that investment has gone to helping the Russians meet their treaty commitments, some of which, including $25 million that has helped the Russians dismantle their missile compartments, has some application in this area, although it is not designed exclusively to address environmental management practices, but further direction by Congress to us in this area could be helpful.

Mr. WELDON. I will just say on the record that you have my assurance that I will assist you in the administration's attempt or success in finding the money to reprogram for this, because a reprogramming request from the administration to us carries with it the authorization that is needed to fund the program. So if we, in fact, can get the administration to work with us in that regard, I will perform my task in helping you through the process and would just offer that to you for further consideration. I am sure we will be discussing that in the future.

One final question, and I appreciate you answering the question on the U.S. naval reactor program. I am not here to trash anyone, because I do not have any hidden agenda here. It is just to find out the facts.

I have been told, and I want to ask this question on the record just so I can get an answer, if not right now, perhaps for the record, that there was a specific request made by Nicholai Yegeroff, the Deputy Minister of Atomic Energy, back in, I think it was February, to bring a team of Russians over—this request was made through DOE so it did not go to DOD directly—to understand the way that we remove reactor compartments from our ships. They were going to go to Puget Sound, and then I think they wanted to go to Hanford to see how this material is, in fact, handled by us.

I have been told that that was never responded to nor was agreed to. Now, there may be reasons for that. Maybe there are security reasons. Maybe there are other things that I do not know about and perhaps maybe did not even occur. Perhaps you cannot answer this for the record, but I would appreciate a response to know whether or not—I know the reqeust was made, because I have a copy of Yegeroff's letter, but was there a response? Was it negative? And if it was negative, why, so that I can better understand.

Perhaps there are areas in which we cannot work with the Russians, and I need to understand that. But I do not have that answer now and I would appreciate it if you could help me get that, if you do not have an answer now, which I assume you do not.

Ms. GOODMAN. I am not personally familiar with it but I will get you the answer. I do know that under the auspices of the Department of Energy, a Russian delegation has been to Hanford and I will look into this invitation.

Mr. WELDON. I will give you a copy of the letter. Thank you.

Mr. Kennedy.

Mr. KENNEDY. Thank you, Mr. Chairman.

I wanted to ask Ms. Goodman about the statement that you made about the Department studies indicate the immediate threat to human health and the food chain in the Arctic is negligible. What is that based upon, what assessment?

Ms. GOODMAN. That is based on the studies that have been conducted by the Office of Naval Research, which Admiral Pelaez will address, as well as other research conducted by Russia and Norway. As I also said in my next sentence, that is not necessarily a sign for complacency. It is an indication that there is not an immediate risk to human health and that most of what we can detect today is localized as opposed to spreading throughout the Arctic.

But there is reason to continue to understand the Arctic environment better, particularly to understand the impact of chemicals and persistent organic pollutants. Those are as important, perhaps more important in their environmental effect than the radioactive contaminants.

Mr. KENNEDY. How is this measured, can you tell me? How are these assessments made? Can you give me a description of how the study was conducted?

Ms. GOODMAN. There were a whole series of studies, and what I would like to do is ask Admiral Pelaez in his testimony to address that so that he can give you the best technically accurate statement on that.

Mr. KENNEDY. That is terrific. Thank you.

If I could just ask Dr. Hecht, what you were talking about was essentially how prospectively we keep this stuff from ever getting dumped to begin with, just so that we can understand what your testimony was, because I think it is confusing for us, talking about ocean dumping, when we are thinking about all the sites out there, to distinguish between what has been dumped and what you are working on doing and that is building a facility so that they do not ever have to dump it. They put it and process it in the facility.

I applaud your efforts, but I just wanted to make that very clear, because the threat of contamination spreading is as much a part of keeping the thing from ever being dumped as it is keeping what has already been dumped from spreading. It may seem like I am splitting hairs here, but it was not clear to me. I think it is important for the committee later on to understand what you are doing is prospective and it is not looking back at what has already been done.

Dr. HECHT. You are quite correct. I think in stages, thanks to the report of Dr. Yablokov, and I think you really cannot underestimate the importance of that white paper, we have the history of

a series of dumpings, radioactive waste in the Arctic, with subsequent studies both by ship traverse and other means to determine whether that past dumping poses a significant threat to the Arctic nations.

The bulk of the information right now, as just described by Sherri and others, is that it is localized. It does not seem to have gotten into the full food chain and poses, at least for the moment, no serious environmental risk to the health and safety of the Arctic nations.

The problem is to make certain that we monitor and fully document where they all are and make sure there are no surprises here that we do not know about yet, and second, to ensure that as we go forward with further decommissioning, further retirement of vessels, that the ocean is not used as the disposal grounds for them. That means in the Arctic, a facility both for the liquid and the solid. In the Far East, as the chairman has pointed out, an area of an equal problem. And what we have done with our efforts in Murmansk is to ensure that we create the right policy and political framework and technical capability to move away from the ocean, in this case, Arctic dumping.

Mr. KENNEDY. Let me ask you finally, do we have hard science on how soluble and what the chemical compounds of all these different toxics are and the environment in the ocean that they are in, how deep it is, how cold it is, how much current there is, so that with each of these sites we can say that it is safe?

What I need is to hear that there is hard science that says, we know where this is. We know that this will not dissolve. We know the containers. The containers are two inches thick here and we do not have to worry about this thing deteriorating any time soon, and if it does, it is going nowhere because the current is not—I mean, do we have all that?

Dr. HECHT. I would say that my best answer to you is, let us do it in writing. But I think on the information that we have, one can draw certain conclusions, and the information that we have includes some of the information you are requesting, in addition to some modeling about how the currents are moving.

Mr. KENNEDY. But can we have predictive models? You can tell me now, we have an inventory of 10 sites, ones at this step, ones at this step, and here is how much we have of this radionuclide and you can give me the power of it and the like, and then we can use, given what we know about the ocean and the salinity and the temperature and the rest, and you can do predictive models saying when this is going to become a problem and when it is not. I mean, can you do that kind of a model?

Dr. HECHT. On principle, yes, but let me defer the question and get back to you in terms of really what is the quality of the data that we have now, what are the models that are available. It goes beyond what I have at my fingertips. Let me give you kind of the assessment that forms the basis of our current thinking.

Ms. GOODMAN. Congressman, I believe Admiral Pelaez will be able to address those questions for you in his testimony and, in fact, has prepared a briefing on those issues.

Mr. KENNEDY. Thank you very much.

Mr. WELDON. I thank our colleague and thank both of you for coming in today, for your excellent testimony, and I appreciate your follow-up to questions that need to be resolved. Thank you both very much.

Our third panel, the assessment panel, we are pleased to have join us Admiral Marc Pelaez, the Chief of Naval Research for the Department of the Navy; Dr. Garrett Brass, Director of the Arctic Research Commission; and Dr. Lawrence Gershwin, National Intelligence Council.

Thank you all for appearing. We welcome you to the committees and we will, without objection, enter your statements into the record as written and you can be prepared to discuss whatever comments you would like to make. We will start off with Admiral Pelaez. Thank you for coming in.

STATEMENT OF REAR ADM. MARC PELAEZ, CHIEF OF NAVAL RESEARCH, DEPARTMENT OF THE NAVY

Admiral PELAEZ. Thank you, Mr. Chairman and distinguished members. I do appreciate the opportunity to discuss this important program that the Office of Naval Research has been conducting for the Congress, actually. It was a congressional initiative, and I think a very good one.

The Arctic Nuclear Waste Assessment Program, and we have used the acronym ANWAP in a number of fora, was initiated in 1993 as a result of United States congressional concern over the disposal of nuclear materials by the former Soviet Union, as we have all heard. It had three principal science and technology objectives—and at the risk of burdening the committee, I am going to go through a little bit of that and try and answer the questions that the committee and its staff has posed—the magnitude and location of radioactive waste in the Arctic marine environment, the transport pathways of radioactive contamination through the Arctic basin and the present levels away from the various contamination sources, and third, the impact on the environment and human health from observed and projected radioactive contamination.

I would say that this program has strong linkages with both national and international organizations concerned with the Arctic environment, including, and I have a fairly long list in my testimony but I will summarize some of them, the U.S. Interagency Arctic Research Policy Committee, the Gore-Chernomyrdin Commission Environment Committee, the NATO Committee for Challenges in Modern Society, Norwegian bilateral cooperations, International Arctic Seas Assessment Program, Arctic Environmental Protection Strategy, Arctic Monitoring and Assessment Program, and the U.S. State Department, Department of Energy, and Environmental Protection Agency programs. So I think it has been conducted in very much a joint government and international program.

Russian participation in the program has been an area of particular emphasis, with over 10 percent, for instance, in 1995 of the funds going to Russian institutions. Russian collaboration included exchange of data, radionuclide source term characterization, a monitoring feasibility study, radiological dose assessment to large animals, cooperative surveys throughout the Arctic basin and Siberian

river systems, and a human health survey in the Tamyr region. Seven other countries have also participated in this program.

Mr. Chairman and distinguished members, before outlining some of ANWAP's accomplishments and addressing your interest in a future research agenda, I want to emphasize the tremendous leverage this program has enjoyed. The results achieved to date in addressing an acute problem of national concern would never have been possible in 3 short years without the prior decades of basic research investment by my organization in the Arctic. A high-quality pool of scientists with high-latitude expertise, reliable and accurate field instruments, and powerful numerical models were all available when we needed them.

This technology base grew from our sustained commitment to research in the Arctic. The $30 million of this particular program's effort has capitalized on more than $500 million of research over the last 30 years. This is a good example of how wise investment in science and technology pays dividends for national security in a world where threats may come in unexpected forms.

The over 70 different projects in this program include field surveys, laboratory experiments, modeling studies, and archival data analysis. Over 120 investigators from academic institutions, government laboratories and agencies, foreign institutions, and industry are participating.

I have brought several posters which I would like to refer to during my presentation, and I would point out that Lt. Comdr. Bob Edson is my program manager. He is an oceanographer in this field.

The first poster, and I know it is difficult to read but I think you can see it in context, shows the research surveys which this program has sponsored over the last 3 years in order to quantify the radionuclide levels and the relevant transport pathways. Twenty-three multinational and multidisciplinary cruises, including the submarine USS *Cavalla,* have conducted survey operations. These surveys have collected water, sediment, and biological samples and have covered the Eastern Arctic near the dump sites, the Ob, Yenisey, Lena, Kalema, and Anadyr River systems, the Kara, Laptev, East Siberian, Chuckchea, Beaufort, and Bearing Seas, and across the Arctic basin.

Surveys provide the necessary chemical, physical, and biological baseline data to understand environmental processes and to assess the potential threat of radioactive contamination to the Alaskan economy, for example, or the health of U.S. citizens in that region, which was one of the interests of the congressional mandate.

The results of the sampling support the preliminary conclusion, and I will say preliminary because, as I will state later, our final report will probably be out early in 1997 as we are still analyzing data, the preliminary conclusion that the radioactive waste disposal activities of the Soviet Union have to date not significantly impacted the Arctic environment.

On the next chart, one of the methods used for tracking radionuclide contamination is analysis of sediment cores. A representative core sample taken from the old estuary by the Woods Hole Oceanographic Institute is shown in this poster. These cores show a clear record of radioactivity levels back to the prenuclear age. A

peak radioactivity level is seen in the early 1960's, coincident with a cessation of the atmospheric testing of nuclear weapons. Levels fall off after this point, continuing to fall to the present day with the exception of a small signal from the Chernobyl accident.

Research surveys further upriver have supported the Russian reports that radioactivity is measured above background levels only when one gets within a few hundred kilometers of the nuclear facilities. Surveys of the Anadyr River, the closest major Russian Siberian river to Alaska, have shown a very clean, nearly pristine environment. Now, those sites that we talked about, the dump sites, the holding sites, the processing plants are not in that river system. It is only at very localized sites in the Kara Sea region that elevated radionuclide concentrations are identified.

The major conclusion from the program sampling so far is that the largest signals for regionwide radionuclide contamination in the Arctic marine environment appear to arise from atmospheric testing of nuclear weapons, nuclear fuel reprocessing wastes from facilities in Western Europe and accidents such as Chernobyl, in that order.

This program is not restricted to in situ sampling but has also developed a suite of very sophisticated models to analyze transport of radionuclides throughout the Arctic basin. The core of this suite is the Navy's operational polar ice prediction model, which has been adapted to address contaminant transport questions. It is important to note that this is a physics-based model requiring the latest supercomputing resources to operate.

Now, I have a presentation, both a poster of one piece of the output, but I have right here next to me, if we can turn the lights, Dr. Ruth Preller from the Naval Research Laboratory who is in charge of this model, and I have a video which should show the model running over a 10-year period.

[A video tape was played.]

Admiral PELAEZ. I think it is important to note that in that simulation, Mr. Chairman, it has some conservatism in it. It assumed a constant rate of discharge out of these rivers, but it did not give any consideration for settling that might occur, so we assumed full transport and mixing to be the case there, which does become more conservative. I cannot say it is the worst case because it was a constant introduction over a 10-year period.

But that is the sort of thing that we have the capability of predicting very accurately and being able to look at various situations of potential contaminants entering those three river systems. We have similar models that will show, for instance, contamination entering at other points.

While the physical processes which affect contaminant transport may vary from one contaminant to the next, it should be noted that this model, as well as the other models developed, are robust enough. They can show that transport throughout the basin. Therefore, the tremendous investment I believe that has been made in this has far-reaching applications, much beyond the specific mandate of this program.

At this time, radionuclide concentrations in Alaskan waters remain at background levels, and I am talking about the manmade radionuclides. Indeed, human radiation dosage from naturally oc-

curring isotopes, such as polonium-210 in fish, are 100 times higher than that from contaminated sources at present in Alaskan waters, both Arctic and Pacific. Our measurements of marine life thus far, and it tracks around the world, show that there are naturally occurring radioactive sources throughout the world that today we measure at 100 times the effects that we are seeing from any man-made, and that includes the nuclear weapons testing.

If disposal is controlled in the future, the main risk will be extreme contaminant releases from existing waste sites, particularly along the major rivers. This possibility remains one of the most intensive areas of research within our program. A major program goal was to develop innovative monitoring techniques and technologies. I think that some of the other witnesses said we need to have continuing monitoring and we are trying to assess and develop innovative technology and monitoring techniques to allow us to put in place a cost-effective monitoring strategy for critical transport and food chain pathways.

While United States monitoring efforts are aimed at waters near Alaska, this program is also working with the Russian investigators to develop monitoring strategies for Russian coastal waters.

The program is currently working on a formal, integrated risk assessment of the radioactive waste in the Arctic environment. This assessment is being accomplished by a team of individuals from institutions, laboratories which have had experience in this area. The first iteration of the risk assessment will be completed by late spring/early summer 1996 and our intent is to submit that for peer review by the scientific community to get any potential criticisms and be able to address them appropriately and incorporate them in our final risk assessment, which I believe, as I said, will be out in about spring 1997.

This program and the Navy, as a matter of policy, will ensure the prompt and accurate communication of the research results and the final risk assessment to the citizens of the State of Alaska, and we have had quite a bit of interaction with them as they are one of the concerned parties from the United States, and the American public and policy makers, of course. The details of environmental studies and all environmental concerns are clearly of the utmost importance to the Navy and to our national interests. Interaction with Alaskan Native groups is ongoing, and every effort is being made to integrate the local populus into the process and address their concerns.

Clearly, both research and monitoring must continue to guard against the threat of contamination of both domestic waters and international waters. We also recognize that potential contaminants include a broader spectrum of substances than the radionuclides investigated by direction in our program. The program's research will produce an initial integrated risk assessment that can be used to develop an effective research and monitoring strategy. Implementing such a strategy must be a multiagency endeavor. Interagency Arctic Research Policy Committee has begun this process, and the Navy will continue its active role in interagency coordinated activities.

The U.S. Navy is in a strong position to support any future efforts in this area, providing both innovative technology, sampling

systems, and numerical models, and an enhanced understanding, I will say, as a result of this program, of the environment to enable these powerful tools to be efficiently and cost effectively employed.

Mr. Chairman, that concludes my remarks.

[The prepared statement of Admiral Pelaez follows:]

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WILDLIFE AND OCEANS
SUBCOMMITTEE)

STATEMENT OF

REAR ADMIRAL MARC PELAEZ
CHIEF OF NAVAL RESEARCH

BEFORE THE

RESEARCH AND DEVELOPMENT SUBCOMMITTEE
OF THE
HOUSE NATIONAL SECURITY COMMITTEE

AND THE

FISHERIES, WILDLIFE AND OCEANS SUBCOMMITTEE
OF THE
HOUSE RESOURCES COMMITTEE

ON

OCEAN DUMPING OF NUCLEAR AND HAZARDOUS WASTE

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SUBCOMMITTEE) AND THE
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(FISHERIERS, WILDLIFE AND
OCEANS SUBCOMMITTEE)

REAR ADMIRAL MARC Y. E. PELAEZ
CHIEF OF NAVAL RESEARCH

RADM Pelaez became the 18th Chief of Naval Research on June 18, 1993. A native of Hollywood, Florida, RADM Pelaez is a 1968 graduate of the United States Naval Academy. He was promoted to the rank of Rear Admiral in 1993.

Following training in the Naval Nuclear Propulsion Program in 1969, RADM Pelaez reported aboard the USS SIMON BOLIVAR (SSBN 641), where he held various divisional and departmental assignments, culminating in duties as Engineer Officer. In 1972, he was transferred to the Naval Military Personnel Command, Submarine/Nuclear Power Division, where he served as the assignment officer for all nuclear trained junior submarine officers. Upon graduation from the Submarine Officers Advanced Course in New London, Connecticut in 1976, RADM Pelaez was assigned as Engineer Officer, USS TUNNY (SSN 682). After a successful three-year tour, he was transferred to the USS JAMES MONROE (SSBN 622), where he served as Executive Officer. During his tour, the JAMES MONROE was awarded the Battle Efficiency ("E") award and was chosen "Best Fleet Ballistic Missile Submarine" in the Atlantic Fleet.

In 1981, RADM Pelaez was assigned as Assistant for Research and Development Submarines, Naval Sea Systems Command, Washington, D.C. He was transferred in 1984, assuming command of the nuclear attack submarine USS SUNFISH (SSN 649). Under his command, the SUNFISH was awarded two meritorious unit commendations. After completion of this tour, RADM Pelaez became the program manager for the Advanced Submarine Combat System at the Naval Sea Systems Command. As a result of congressional direction to start a comprehensive submarine technology program, RADM Pelaez was detached in January 1988 to a joint assignment at the Defense Advanced Research Projects Agency (DARPA) as program manager of the Advanced Submarine Technology Program. After completion of his DARPA assignment, RADM Pelaez became Executive Assistant to the Assistant Secretary of the Navy (Research, Development and Acquisition) (ASN(RD&A)).

As the Chief of Naval Research, RADM Pelaez manages the science and technology programs of the Navy and Marine Corps from basic research through advanced technology development. Organizational entities reporting to the Chief of Naval Research include the four directorates of the Office of Naval Research (ONR); the Naval Research Laboratory in Washington, D.C. and its field activities; and ONR's overseas offices in Tokyo and London. ONR's annual budget of approximately $1.5 billion is allocated for research and development work conducted at universities, Navy laboratories, and industry.

RADM Pelaez reports directly to the Secretary of the Navy via ASN(RD&A). He is the Navy's science and technology executive, and ranks organizationally with Deputy Assistant Secretaries of the Navy.

RADM Pelaez's awards include the Defense Superior Service Medal, the Legion of Merit with gold star, the Meritorious Service Medal with gold star, the Navy Commendation Medal with gold star, the Navy Achievement Medal, a Navy Unit Commendation, three Meritorious Unit Commendations, the Battle "E" Ribbon, the Navy Expeditionary Medal, the National Defense Service Medal, and the Sea Service Ribbon (five awards).

RADM Pelaez is married to the former Sheila Prom of Miami Springs, Florida. They have two children, John and Jeannine.

STATEMENT OF
REAR ADMIRAL MARC PELAEZ
CHIEF OF NAVAL RESEARCH

Mr. Chairman, distinguished members of the Subcommittee and staff, I appreciate this opportunity to discuss the impact of radioactive waste disposed in the marine environment by the Former Soviet Union, and to discuss the Office of Naval Research's Arctic Nuclear Waste Assessment Program (ANWAP).

OVERVIEW

In the early 1990's, new information on environmental conditions in the Former Soviet Union (FSU) became available. One revelation concerned the large quantities of radioactive waste disposed in the marine environment and in the catchment basins of several Arctic river systems. The 1993 Yablokov Report to the President of Russia officially documented the scope of the radioactive waste problem and described disposal sites of both high and low level waste in both the Arctic and North Pacific. Other potential sources of radioactive contamination in the Arctic are the nuclear fuel processing facilities and nuclear power reactors in the water sheds of the Ob and Yenisey Rivers. These facilities have deposited significant waste into the environment with risk of contamination of the river systems draining into the Arctic Basin.

ARCTIC NUCLEAR WASTE ASSESSMENT PROGRAM

The ANWAP was initiated in 1993 as a result of U.S. Congressional concern over the disposal of nuclear materials by the Former Soviet Union into the Arctic marine environment. Total funding has been $30 million dollars over 3 years. The science and technology aspects of ANWAP are conducted by the Ocean, Atmosphere and Space Modeling and Prediction Division of the Office of Naval Research. ANWAP objectives are to determine:

a) the magnitude and location of radioactive waste in the Arctic marine environment;

b) the transport pathways of radioactive contamination through the Arctic basin and the present levels away from the various contamination sources; and

c) the impact on the environment and human health from observed and projected radioactive contamination.

ANWAP emphasizes impact on Alaska, and has strong linkages

with both national and international organizations concerned with the Arctic environment including the:

- U.S. Interagency Arctic Research Policy Committee;
- Gore/Chernomyrdin Commission Environment Committee;
- NATO Committee for Challenges in Modern Society;
- Norwegian bilateral cooperations;
- International Arctic Seas Assessment Program;
- Arctic Environmental Protection Strategy;
- Arctic Monitoring and Assessment Program; and
- U.S. State Department, Department of Energy, and Environmental Protection Agency.

Ten percent of the funds have gone to Russian institutions for research or logistical support, with over $1 million dollars committed in FY1995. Russian collaboration includes:

- exchange of data;
- radionuclide source term characterization;
- a monitoring feasibility study;
- a radiological dose assessment to large animals;
- cooperative surveys of the Kara, Laptev, and East Siberian Seas, the Ob and Yenisey Rivers;
- a human health study in the Tamyr region.

CAPITALIZING ON OUR RESEARCH BASE

Mr. Chairman and distinguished members, before outlining some ANWAP accomplishments and addressing your interests in a future research agenda, I want to emphasize the tremendous leverage this Program has enjoyed. The results achieved to date in addressing an acute problem of national concern would never have been possible in three short years without the prior decades of basic research investment by ONR in the Arctic. A high quality pool of scientists with high latitude expertise, reliable and accurate field instruments, and powerful numerical models were all available when we needed them. This technology base grew from our sustained commitment to research in the Arctic. The $30 million dollars ANWAP effort has capitalized on well more than $500 million dollars of effort for over 30 years. This is a good example of how wise investment in science and technology pays dividends for national security in a world where threats may come in unexpected forms.

RESEARCH ACTIVITIES

The 70 different projects in ANWAP include field surveys, laboratory experiments, modeling studies and archival data analysis. Over 120 investigators from academic institutions, government laboratories and agencies, foreign institutions, and industry are participating. Surveys provide the necessary

chemical, physical, and biological baseline data to understand environmental processes and to assess the potential threat of radioactive contamination to the Alaskan economy or the health of U.S. citizens. Twenty-three multi-national and multidisciplinary cruises (FIGURE 1), including the U.S. submarine CAVALLA, have collected water, sediment, and biological samples in the eastern Arctic near the dump sites, in the Ob, Yenisey and Anadyr River systems, the Kara, Laptev, East Siberian, and Beaufort Seas and across the Arctic Basin. Processes investigated include:

- ice uptake and movement of radionuclides and sediment;
- density driven currents on Arctic shelves;
- sediment dynamics in the Kara Sea;
- interactions between colloids and radionuclides in the Arctic river systems;
- corrosion of disposal barrier materials;
- identification of sentinel organisms for the monitoring and evaluation of Arctic radionuclide contamination;
- radionuclide levels and bioconcentration in Arctic animals;
- deposition of radionuclides due to interactions with phytoplankton; and
- sublethal biological effects from radionuclide contamination.

Transport modeling efforts account for marine surface and subsurface layers, coastal currents, estuarine and river water, and ground water over a broad range of spatial and temporal scales. Near-field modeling at dump sites includes sediment re-distribution physics and biology. Model validation and integration are key ongoing activities that build upon decades of previous research.

A major data compilation effort at the Naval Research Laboratory (NRL) uses a Geographic Information System to analyze changes in marine radionuclide levels over space and time. The three largest contamination signals in the Arctic region can be seen in Cesium-137 distributions in the surface layer (0-50m) of the ocean. Fallout from atmospheric bomb tests, which ceased in the early 1960's, resulted in elevated levels (10-20 Bq/m3) throughout the region that have since decayed considerably. Radioactive waste discharges from the Sellafield re-processing facility, which peaked during the early 1980's, can now be traced (10-30 Bq/m3) throughout the eastern Arctic basin following the major oceanic current systems. Trace amounts of this source have recently been detected in the western Arctic as well. In the 1990's, the Sellafield signal has decreased and the effects of the Chernobyl accident dominate, particularly in the Baltic (over 100 Bq/m3). Signatures of these events can also be seen in sediment cores throughout the region (FIGURE 2). At this time, concentrations in Alaskan waters remain at background levels,

consistent with model predictions(FIGURE 3). Indeed, human radiation dosage from naturally occurring isotopes such as polonium-210 in fish are two orders of magnitude higher than that from contaminated sources at present in Alaskan waters (both Arctic and Pacific). If disposal is controlled in the future, the main risk will be extreme contaminant releases from existing waste sites, particularly along the major rivers. Local sites of elevated radionuclide concentration from dumping and weapons testing have also been identified in the Kara Sea region.

Pre-existing and new radionuclide data as well as bathymetric, sediment, chemical and physical information are included in a major ANWAP data base project. This database effort is being conducted jointly with the Arctic Monitoring and Assessment Program and the International Arctic Marine Radioactive Contamination Database in Norway, and is jointly funded by the Norwegian government. The database project is also being coordinated with the International Atomic Energy Agency and Korean investigators to prevent duplication and ensure that all date is compatible and accessible to the worldwide scientific community.

MONITORING AND ASSESSMENT

A major ANWAP goal is to develop innovative monitoring techniques and technologies and an integrated cost-effective monitoring strategy for critical transport and food-chain pathways. While U.S. monitoring efforts are aimed at waters near Alaska, ANWAP is also working with Russian investigators to develop monitoring strategies for Russian coastal waters. This year, for example, a project was initiated to investigate monitoring dumped materials in Stepovogo Bay.

Research results are being synthesized into an integrated risk assessment for radiological dosage to man and the environment. These new tools enable evaluation of existing and future radionuclide contamination as well as other pollutants. The risk assessment includes consideration of extreme events such as river floods, dam failures, and accidents at civilian power plants and other nuclear facilities. An output of this effort will also be a sensitivity/uncertainty analyses to help guide future research. Factors with the greatest impact on risk will be given top priority for research.

COMMUNICATION

A continuing goal of ANWAP and the Navy, as a matter of policy, is to promptly and accurately communicate the results of the research and the final risk assessment to the citizens of the State of Alaska, and the American public and policy makers. The details of environmental studies and all environmental concerns are of the utmost important to the Navy and the U.S. policy.

Interaction with Alaskan native groups is ongoing, and every effort is being made to integrate the local populace into the process, and address their concerns at every step of the process.

CONCLUSION

Clearly, both research and monitoring must continue to guard against the threat of contamination of domestic waters. We also recognize that potential contaminants include a broader spectrum of substances than the radionuclides investigated by direction in our Program. ANWAP research will produce an initial, integrated risk assessment that can be used to develop an effective research and monitoring strategy. Implementing such a strategy must be a multi-agency endeavor. Inter-agency Arctic Research Policy Committee has begun this process, and the Navy will continue its active role in inter-agency coordinated activities. If funded, our contribution, consistent with our overall mission, will be innovative technology, both sampling systems and numerical models, and an enhanced understanding of the environment to enable these powerful tools to be efficiently and cost-effectively deployed. We look forward to continued working with the other agencies who are responsible for long term monitoring and risk assessment.

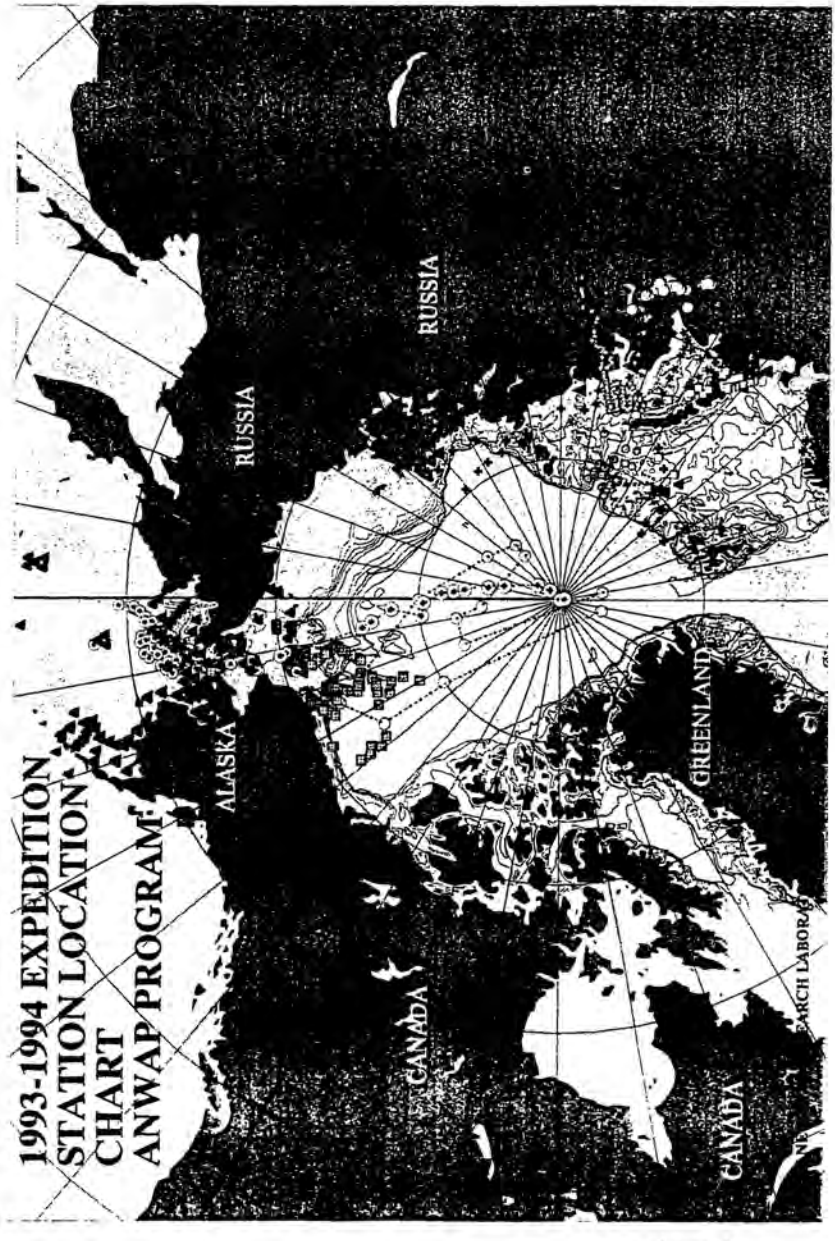

1993-1994 EXPEDITION
STATION LOCATION
CHART
ANWAP PROGRAM
ALASKA
RUSSIA
RUSSIA
CANADA
GREENLAND
CANADA

Figure 1

Cs-137 Distribution in a Core from the Ob River Delta

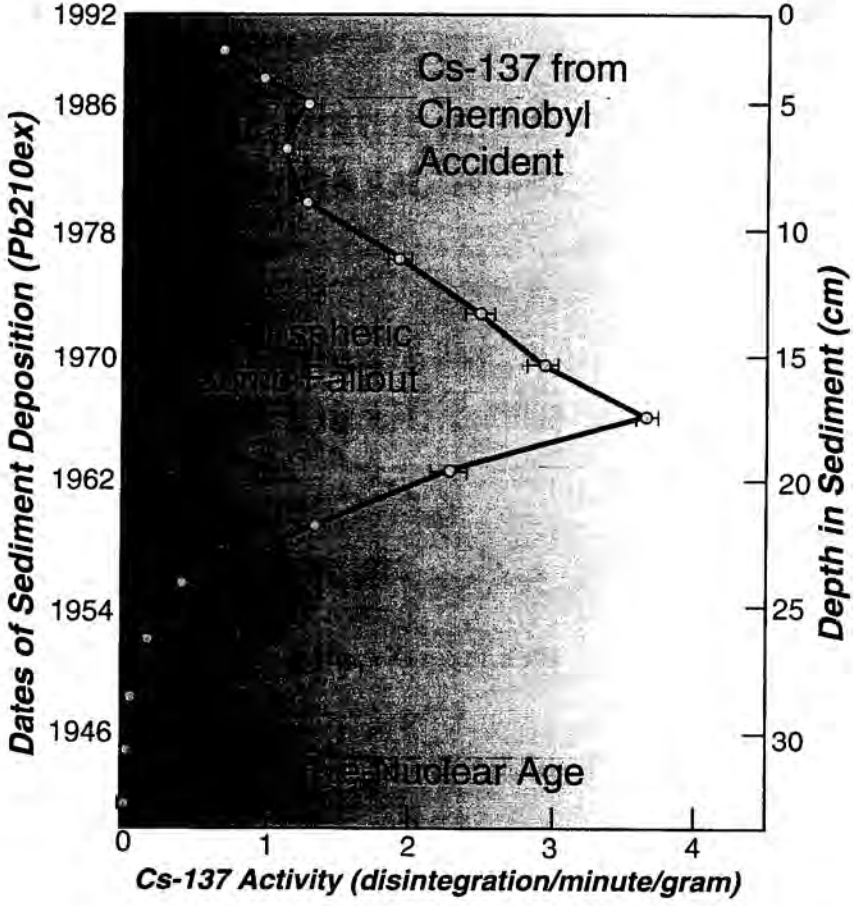
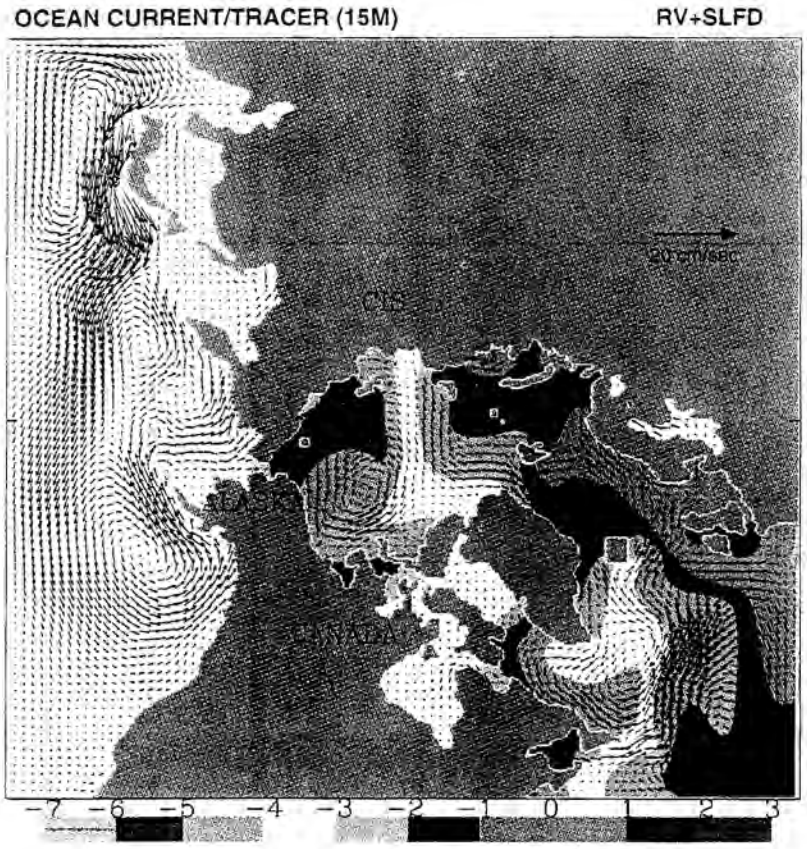


Figure 2



Levels of radioactivity (in PCi/l) in the surface level of the ocean at the end of ten years. Source locations are the Ob, the Yenisei and the Pechora rivers as well as Sellafield. Vectors represent surface level ocean currents.

Figure 3

Mr. WELDON. Thank you, Admiral.
Dr. Brass.

STATEMENT OF DR. GARRETT W. BRASS, DIRECTOR, ARCTIC RESEARCH COMMISSION

Dr. BRASS. Thank you, Mr. Chairman, for this opportunity. I did submit written testimony, which you have already agreed to enter into the record.

With me is Mr. George Newton, who is a member of the Commission and is here to answer any questions you may have on the scientific ice experiment with the Navy nuclear submarine that I will mention.

Mr. WELDON. Welcome.

Dr. BRASS. It is not necessary to elaborate on the testimony already given here on the extent of the threat of contamination of the Arctic, especially by emissions from the former Soviet Union. Environmental concerns were of a pretty low priority in the former Soviet Union and many potential contaminants are widespread and either uncontained or only partially and insecurely stored.

The United States has been fortunate. The reactor accident at Chernobyl occurred just a few short weeks after the annual dissipation of the stable Arctic haze layer, which would have trapped airborne contaminants and transported substantial amounts of radioactive byproducts of the accident to the United States.

Similarly, the Komi oil spill occurred during winter when the rivers and streams were frozen and the temperatures so low that the oil did not flow easily. A summertime spill, particularly in one of the oil fields closer to the seas and/or near a large and unfrozen river would probably not have been contained, much less cleaned up, and serious pollution of the Arctic Ocean and transport to our shores would probably have been the result.

One indication of the ongoing risk that we suffer is that in the former Soviet Union, an amount of oil greater than the amount spilled from the *Exxon Valdez* is spilled every day.

On page 21 of the Commission's goals report, the Commission recommended that the Interagency Arctic Research and Policy Committee's Arctic Contaminants Initiative be fully funded. This plan is included in one form in the biennial Arctic Research of the United States Interagency Arctic Research Plan and in a more detailed way in the blue-covered plan which I also submitted to your office.

This program envisions an attack on four key classes of contaminants: Persistent organic compounds, trace and heavy metals, radionuclides, and chronic hydrocarbon contamination. The program is based on an integrated, comprehensive assessment including data and information management, data rescue and synthesis, observations, process-oriented research, model development, and impact analysis and determination of risk.

Although constructed by IARPC to meet the Nation's needs and approved by the Office of the President when the biennial revision of the plan was approved, the plan is not included in the budget request nor is it, as far as I can tell, included in any way in congressional budget initiatives. The Office of Naval Research's Arctic Nuclear Waste Assessment Program has not been funded this year

and that program will be rapidly winding down as the currently appropriated funds are expended. The result is that the United States will have no organized program for the study of contaminants in the Arctic.

The Federal agencies have not remained passively on the sidelines even though the initiative was not passed, and we can look to two other programs, one ongoing and one proposed. The ongoing program is the scientific ice experiment, SCICEX. The Arctic Research Commission coordinated the signing of an MOA between the Navy, the National Science Foundation, NOAA, NSF, and the U.S. Geological Survey for a program of annual deployments of a Navy nuclear submarine into the Arctic Ocean.

This program, known as SCICEX, conducts an ambitious scientific program and in 1995 has just finished its program in the summertime. Four civilian scientists sailed in the USS *Cavalla* from Pearl Harbor through the Bering Strait and into the Arctic Ocean. The scientific program occupied 44 days and covered a track of 10,800 nautical miles. The 1996 expedition is under active planning. It will sail in the coming summer on the USS *Pogey*.

These studies represent the best way that intermediate and wide-ranging surveys can be carried out in the Arctic Ocean. The mobility and endurance of the nuclear submarine makes it a research platform without peer. The limited availability, the small size of the science party, and the limitations in onboard working space are obstacles which the scientific community has worked hard to overcome with the outgoing and thorough cooperation of the Navy and the active and enthusiastic participation of the submarine's officers and crew.

This is a unique activity for civilian science and it has gone extremely well and yielded important results which are entering the literature now. The oceanography meeting of the American Geophysical Union and ASLO, the American Society of Luminology and Oceanography, next February will have a session on Arctic oceanography every one of the 5 days.

We need to exploit this opportunity fully. The NOAA coastal Arctic initiative is a planned initiative, and I sent over to you the NOAA one-pager on that. There are more detailed descriptions of the plans and I think they are still evolving, so I am not going to go into any detail with them, but they do include integrated modeling of contaminant transport, establishment of an Alaska early warning system, the assessment of contaminated coastal sites, and an evaluation of risk to all comers.

You have asked about international cooperation and we want to reinforce what has been said about the Arctic environmental protection strategy. I will not go into any details on AEPS, but it is the view of the Arctic Research Commission and the Interagency Arctic Research and Policy Committee that that is a major forum for our international collaboration in understanding contamination in the Arctic.

Mr. Chairman, the Nation needs an integrated program to study fundamental questions in the Arctic, such as the paths by which materials of all kinds are transported in the Arctic and the processes which can transfer contaminants from one transport path to

another, such as the inclusion of contaminated sediment into sea ice, a process we know happens but do not understand.

We need an inventory of contaminants throughout the Arctic, particularly in the former Soviet Union, not just radionuclides but all of the contaminants that we have discussed already.

We need to rescue historical data which can help us understand phenomena such as the statistics of river flooding and the probability that the 100-year flood, the biggest flood that occurs in every century, can mobilize contaminants that lay dormant almost all of the rest of the time under normal river flow conditions.

We must look out for problems such as thaws of permafrost, which global change appears to be bringing to the Arctic. They can release from frozen soil where fluids are highly immobile into the mobile liquid realm large quantities of pollutants.

Mr. Chairman, members of the committee, contamination in the Arctic has a dangerous potential to affect the lives of citizens of the United States and of the world. The Federal agencies have been active in formulating plans for a comprehensive approach, but lack of funding has crippled and fragmented their efforts. I am afraid that the research, monitoring, and assessment necessary to meet the nation's needs has a low priority in the budgetary process, and as a result, the United States has not produced the integrated Arctic research effort of which we are capable.

Thank you, Mr. Chairman.

[The prepared statement of Dr. Brass follows:]

ARCTIC RESEARCH COMMISSION

TESTIMONY

before the House Research and Development Subcommittee and the House Fisheries, Wildlife and Ocean Subcommittee

Dr. Garrett W. Brass
Executive Director

Chairman Weldon, Chairman Saxton, members of the Committees, the Arctic Research Commission thanks you for this opportunity to discuss the important question of contamination in the Arctic Ocean. The Arctic Research Commission was established by the Arctic Research and Policy Act of 1984 (PL 98-373 as amended by PL 101-609) which also established the Interagency Arctic Research and Policy Committee (IARPC). IARPC is composed of representatives of the twelve agencies with research and/or policy interests in the Arctic. The IARPC agencies are responsible for the National Arctic Research Plan and, with guidance from the Commission, IARPC conducts a biennial revision of the plan. I have brought with me several copies of the Commission's Biennial Statement entitled *Goals and Priorities to Guide United States Arctic Research* (the Goals Report) and copies of volume 9 (Spring '95) of the journal *Arctic Research of the United States* published by IARPC which contains the most recent revision of the US Arctic Research Plan for the years 1996-2000.

I need not elaborate on testimony already given here on the extent of the threat of contamination of the Arctic, especially by emissions from the Former Soviet Union (FSU). Environmental concerns were of low priority in the FSU and many potential contaminants are wide spread and either uncontained or only partially and insecurely stored. The United States has been fortunate. The reactor accident at Chernobyl occurred just a few short weeks after the annual dissipation of the stable Arctic Haze layer which would have trapped airborne contaminants near the surface and would probably have transported substantial amounts of radioactive byproducts of the accident to the United States. Similarly, the Komi oil spill occurred during winter when the rivers and streams were frozen and temperatures so low that the oil did not flow easily. A summertime spill, particularly in one of the oil fields of closer to the sea and/or near a larger and unfrozen river would probably not have been contained (much less cleaned up) and serious pollution of the Arctic Ocean and transport to our shores would probably have been the result. We have been lucky - very lucky - twice.

On page 21 of the Commission's Goals Report the Commission "recommends that the IARPC Arctic Contaminants Initiative be fully funded." On pages 12-18 of the US Arctic Research Plan, IARPC describes the Arctic Contamination Research and Assessment Program. The publication of the Plan was approved by the office of the President. I

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have also brought copies of the Arctic Contamination Research and Assessment Program detailed description which includes budget figures for the various agencies who wish to participate in the program.

This program envisions an attack on four key classes of contaminant in the Arctic: persistent organic compounds, trace and heavy metals, radionuclides and chronic hydrocarbon contaminants. The Program is based on an integrated, comprehensive assessment including:

- Data and information management, data rescue and synthesis;
- Observations;
- Process-oriented research;
- Model development; and
- Impact analysis and determination of risk.

Although constructed by IARPC to meet the nation's needs and approved by the office of the President, the plan is not included in budget requests nor is it, as far as I can tell, included in any way in Congressional budget initiatives. The Office of Naval Research's Arctic Nuclear Waste Assessment Program has not been funded this year and that program will be rapidly winding down. The result is that the United States will have no organized program for the study of contaminants in the Arctic.

The Federal agencies have not remained passively on the sidelines even though the IARPC Initiative was not supported. We can look to one planned, two current and one recent agency activity focussed on Arctic contamination. These are: The NOAA Coastal Arctic Initiative, AEPS, SCICEX and AMAP.

The NOAA Coastal Arctic Initiative: The planned activity is the NOAA Coastal Arctic Initiative. I have brought with me a few of the summary discussion notices of the NOAA Coastal Arctic Initiative. This program is focussed on the problems affecting the coast of the Arctic including the following activities:

- Memoranda of Understanding for cooperation in the initiative between NOAA and other Federal and State of Alaska agencies;
- Formal accords and other arrangements for involvement in the initiative of the North Slope Borough and regional organizations;
- Preliminary assessment of the current extent and magnitude of contamination and biological effects in the US Arctic;
- Microcomputer-based information management and delivery system for the Arctic for officials, international organizations and students;
- Establishment of a long-term environmental and ecosystem monitoring network in the US Arctic;
- Establishment of an Alaskan Early Warning System so that catastrophic events can be monitored;
- Integrated modeling of contaminant transport and exposure pathways, especially

radionuclides and persistent organic pollutants; and

- Assessment of contaminated coastal sites in terms of potential risks to regional or local environmental quality, biota and ecosystems, habitats, human and coastal economies.

More information on this program can be obtained from NOAA as it develops its plans. I expect that NOAA will request funds for their Coastal Arctic Initiative in the next budget cycle.

The Arctic Environmental Protection Strategy: Many of the concerns expressed about Arctic contaminants are addressed by an international program known as the Arctic Environmental Protection Strategy (AEPS). AEPS is currently divided into five studies:

- The Arctic Monitoring and Assessment Program (AMAP);
- The Conservation of Arctic Flora and Fauna (CAFF);
- Preservation of the Arctic Marine Environment (PAME);
- Emergency Prevention, Preparedness and Response (EPPR); and
- The Sustainable Development Working Group.

The United States is a full participant in the AEPS and the IARPC Agencies are responsible for supporting participation in working groups and producing reports on US data and activities. Unfortunately, this program was adopted without a new funding base and the IARPC Agencies are forced to curtail current activities to provide funds for AEPS participation. In these time of budget stringency this task is difficult and international participants and observers have expressed concern to me that US participation in the AEPS system has been weak.

SCICEX: The Arctic Research Commission has coordinated the signing of a Memorandum of Agreement between the US Navy, the National Science Foundation, the National Oceanic and Atmospheric Administration, the Office of Naval Research and the US Geological Survey for a program of annual deployments of a Navy nuclear attack submarine into the Arctic Ocean. This program, known as SCICEX, conducted an ambitious scientific program to study the Arctic Ocean in 1995. Four civilian scientists sailed in the USS *Cavalla* from Pearl Harbor, through the Bering Straits and into the Arctic Ocean. The scientific program occupied 44 days and covered a track 10,800 nautical miles long. The 1996 expedition is under active planning and review now and subsequent expeditions are mapped out until 1999. These studies represent the best way that immediate and wide ranging surveys can be carried out in the Arctic. The mobility and endurance of the nuclear submarine makes it a research platform without peer. The limited availability, the small size of the science party and the limitations on onboard work space are obstacles which the scientific community has worked hard to overcome with the outgoing and thorough cooperation of the Navy and the active and enthusiastic participation of the submarine's officers and crew. This is a unique activity for civilian science in the Arctic and the junction of academic and military

cultures has gone extremely well and yielded important results which are entering the literature now.

ANWAP: The ANWAP study which Admiral Pelaez has/will described in some detail had a limited objective - the potential for contamination of the Arctic Ocean and adjacent seas by past and present submarine and icebreaker reactor operations by the FSU. But this program's limited objectives and short duration have only allowed us to glimpse what needs to be done.

The nation needs need a an integrated program to study fundamental questions in the Arctic such as the paths by which material of all kinds are transported in the Arctic, the process which can transfer contaminants from one transport path to another such as the inclusion of contaminated sediment into sea ice, a process we know occurs but don't understand well. We need an inventory of contaminants throughout the Arctic, particularly in the FSU and we need to rescue historical data which can help us understand phenomena such as the statistics of river flooding and the probability that the "100 year flood" can mobilize contaminants which have lain dormant for years. We need to watch and at the same time to develop the means to mitigate these risks when they occur.

Chairman Weldon, Chairman Saxton, members of the Committees, contamination in the Arctic has a dangerous potential to affect the lives of citizens of the US and of the world. The Federal agencies have been active in formulating plans for a comprehensive approach to the problem but lack of funding has crippled and fragmented their efforts. Furthermore, the provisions of the Arctic Research and Policy Act which require OSTP to "consult closely with the Interagency Committee and the Commission to guide the Office of Technology Policy's efforts (SEC. 110.(a)(2).)" have not been adhered to. Neither has the requirement that OMB "consider all Federal agency requests for research related to the Arctic as one, integrated, coherent, and multiagency request, which shall be reviewed by the Office of Management and Budget prior to submission of the President's annual budget request for adherence to the Plan (SEC. 110. (b)(1).)" I am afraid that the research, monitoring and assessment necessary to meet the nation's needs has a low priority in the budgetary process. As a result, the United States has not produced the integrated Arctic research effort of which we are capable.

Mr. WELDON. Thank you, Dr. Brass.
Dr. Gershwin, welcome.

STATEMENT OF DR. LAWRENCE K. GERSHWIN, NATIONAL INTELLIGENCE COUNCIL

Dr. GERSHWIN. Mr. Chairman, I would like to make a few remarks about some unique capabilities that the intelligence community has brought to bear on this problem and some observations we have on the Russian contamination issue.

The intelligence community has published a number of classified intelligence reports on the magnitude and nature of environmental contamination in the former Soviet Union and that includes a national intelligence estimate produced last year. In June this year, the CIA presented a classified report to several members of your committee. I would like to just briefly mention a few highlights of some of our analysis.

Regarding the Yablokov Report, April 1993, that report obviously presents a clear, credible picture of the magnitude of the former Soviet and Russian radioactive waste dumping at sea, and the CIA has, in many instances, corroborated that report. CIA analysis shows that solid and liquid radioactive wastes were dumped and that barges and ships that were possibly contaminated by or laden with radioactive waste were, in fact, scuttled.

Measurements indicate that the Arctic has also been contaminated by industrial sources. These pollutants include chemicals, heavy metals, and organics and are generally transported into the Arctic by atmospheric and water-borne paths and are generally accepted to be the primary components of what is known as Arctic haze, a phenomenon similar to lower latitude smog.

The CIA is aware of research being conducted on industrial contaminants in the Kara Sea, but I must defer comments on that issue to a closed and classified session.

Russian policy on nuclear waste is truly murky and subject to sudden changes because of the large number of organizations involved and constantly changing laws and decrees, some of which, in fact, are conflicting, as has already been observed today. Russia has several laws and Government decrees that stipulate procedures for accepting, handling, and disposing of nuclear wastes.

One murky area is the acceptance of foreign nuclear waste, which can be reprocessed but not permanently stored in Russia. However, Russia's definition of permanent storage is unclear and Moscow has not resolved whether or not it will accept nuclear waste from other former Soviet States and countries with Russian nuclear reactors.

Some of the Russian Government's recent actions send a troubling signal regarding Moscow's commitment to stopping nuclear waste dumping in the Arctic waters. For example, a presidential decree that was issued in July that has been referred to earlier rescinds an earlier edict that, in fact, established civilian oversight of the military's management of radioactive waste. This effectively, by rescinding this, effectively allows the Russian military to police its own dumping practices, uncontrolled by civilian authority.

According to a report released recently by the Norwegian environmental group Bellona, which works closely with Russian envi-

ronmental groups, the main nuclear storage facility of Russia's northern fleet is makeshift, dilapidated, and contains 1,000 times more radiation than the largest of this year's French nuclear tests.

While this report was being prepared, Bellona's offices in Murmansk were raided by the Russian Federal security service, essentially the successors to the KGB, which confiscated all of Bellona's materials on radioactive waste generated by the northern fleet and later called in for questioning many of Bellona's Russian contacts.

Bellona's experience attests to the growing difficulties that Western and Russian environmental groups confront in trying to monitor military nuclear waste management in the fact of nationalist political pressures, skepticism about foreign involvement in military matters, and especially the steady widening of the powers enjoyed by Russia's internal security services, and this trend, we think, is most worrisome.

Turning to some of the intelligence community's activities, we are now engaged in a number of new cooperative projects that bring unconventional resources to bear on these issues. As part of the Gore-Chernomyrdin Commission effort, the United States and Russia have agreed to share products derived from national intelligence assets to help solve environmental problems of concern to both countries. The proposed projects include a study of the Arctic.

In addition to the intelligence community, prominent U.S. scientists brought together by the Environmental Task Force are playing an important role in this endeavor. As many of you may be aware, the Environmental Task Force was established in 1992 to determine how our Nation's national security assets could help answer key environmental questions in addition to fulfilling their more standard intelligence and defense role.

The ETF brought together a team of about 50 prominent U.S. environmental and global change scientists, now known as MEDEA, who have been reviewing our most advanced reconnaissance satellite programs and Navy systems to determine what unique environmental and global change information could be derived from them. Working with both our intelligence and defense communities, MEDEA conducted several demonstrations that addressed specific environmental questions.

I would like to summarize those aspects of this work that would help address the environmental impact of radionuclide waste dumping in the oceans. Although MEDEA has not yet conducted a demonstration to determine specifically how national security systems could monitor radionuclide waste or help in risk assessment, it has demonstrated a range of environmental capabilities of these systems that have a direct bearing on their ability to provide such information in the future.

These capabilities fall into two broad categories. The first is the ability to detect directly and monitor the location of toxic pollution, either by observing the pollutant itself or by observing its effect on the local environment.

The second is the ability to provide information that can help predict the transport of a pollutant both down rivers and around the oceans, and thus its potential impact on other locations.

The best example of how our national security assets can monitor pollutants directly and determine their potential impact on other

regions is the so-called Komi oil spill. The Komi Republic of Russia became the focus of international attention last fall when the press reported a number of large oil spills. It is estimated that 100,000 tons of crude oil were spilled, an amount nearly three times the size of the *Exxon Valdez* disaster.

International concern was raised that spilled oil might make it into nearby rivers that feed into the Barents Sea, thereby polluting the Arctic Ocean. At the request of senior policy makers, MEDEA worked closely with intelligence community and NOAA and EPA analysts to determine the risk to the Arctic Ocean. Data from national security assets and other sources were analyzed to determine the location of the largest spills.

In addition, and perhaps more importantly, the specific type of permafrost terrain surrounding the oil spill locations was determined in this way. This information, combined with the knowledge that the oil was a high-paraffin crude, led to a consensus that these spills posed only a minimal threat to regions outside of the immediate area, mainly because the local marshes prevented much of the oil from reaching the major rivers.

The Komi oil spill demonstrates the ability of national security systems to provide detailed local information for characterizing and monitoring a pollutant. In order to understand the more global impacts, scientists and decisionmakers must be able to predict where the pollutant may be transported and how much of it will reach a given destination.

For ocean dumping of toxic wastes, this requires the use of models that predict the circulation of water bodies and the flow rate of rivers and tributaries. To be accurate, these models depend on inputs describing environmental conditions and processes that are not well understood for all parts of the world.

This is the second area where data from national security systems can have an impact. To improve existing transport models, several MEDEA investigations are estimating global ocean circulation patterns as well as flow patterns in coastal regions. This information is difficult or impossible to generate with other existing remote sensing systems and requires the unique attributes of the national security systems. The large classified Navy data bases are also rich with data and MEDEA is working closely with the Navy on these activities.

An important point here is that data taken by national security systems can be combined with data from civil systems to provide a much better base for the application of models developed by the Navy, NOAA, EPA, and the Department of Energy.

An upcoming MEDEA investigation that will have direct impact on the use of national security systems for monitoring oceanic pollution is the Arctic Climatology Study, which will combine United States and Russian data bases to provide an unparalleled global view of the Arctic. Russian hydrographic and ice information will provide a much finer view of Arctic processes than the United States currently possesses and this will significantly improve existing circulation models. In addition, this study will specifically investigate the use of radionuclides as traces for oceanic circulation patterns, thus providing a necessary validation of the models.

In summary, MEDEA activities directly relate to the problem of ocean dumping of radioactive and toxic wastes in three ways. First, MEDEA and the intelligence community have demonstrated the capability of national security systems to detect and monitor pollutant spills, to characterize the local terrain near the spill, and to use this information to predict the impact of the spill outside of the immediate area.

Second, a number of MEDEA activities are extracting oceanic information from national security systems and Navy data bases that characterize the processes needed to model circulation and transport of pollution. This environmental information can be used to improve existing circulation models and thereby improve their prediction of toxic waste transport.

Third, the working interaction between the scientific community and the national security community has enabled a rapid response with more complete information to environmentally-related policy questions. This, plus the greater openness of the intelligence community that has allowed results from national security systems to be discussed in an open forum, was used successfully in the Komi oil spill study and may be a useful model for addressing future pollutant problems. Thank you.

[The prepared statement of Dr. Gershwin follows:]

Testimony of Lawrence K. Gershwin, National Intelligence Officer for Science and Technology, 6 December 1995

Research and Development Subcommittee, House National Security Committee and Subcommittee on Wildlife, Fisheries and Oceans, House National Security Committee

The Intelligence Community has published a number of classified intelligence reports on the magnitude and nature of environmental contamination in the former Soviet Union including a National Intelligence Estimate. On 28 June 1995, CIA presented a classified summary to several members of your committee. At this time I would like to briefly summarize the analysis.

In early April 1993, the Russian Government released a report on radioactive waste dumping in the Northern and Far Eastern seas. It is known as the "Yablokov Report," after its principal investigator Dr. Aleksey Yablokov, at that time Special Advisor to President Yeltsin on Ecology and Public Health who headed the investigation. The report:

- Contains details about the dumping of radioactive waste, including used reactors from submarines, in the Northern (Barents, White, and Kara Seas) and Far Eastern Seas (Sea of Japan, Sea of Okhotsk, and northwestern Pacific Ocean).
- Lists 13 dump sites in the Northern Seas and 10 in the Far Eastern Seas.
- Indicated that between 1959 and 1992, more than 2.3 million curies[1] of radioactive waste were dumped in the Northern Seas, and 19,200 curies of radioactive waste were dumped in the Far Eastern Seas.

The Yablokov Report presents a clear, credible picture of the magnitude of former Soviet and Russian radioactive waste dumping at sea, and CIA has, in many

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1 A Curie is a unit of radioactivity. It is equal to 3.7 x 10 Becquerel; 1 Becquerel = 1 nuclear decay per second.

instances, corroborated this report. CIA analysis shows that solid and liquid radioactive wastes were dumped and that barges and ships probably contaminated by or laden with radioactive waste were scuttled.

Although intelligence cannot verify the accuracy of all the dumpsites reported in the Yablokov report, CIA believes that:

- Based on the observed movements of radioactive waste ships since at least 1979, the locations and types of wastes reportedly dumped are accurate.
- Civilian and naval ships probably began dumping liquid and solid radioactive waste in the Barents and Kara Seas and the Sea of Japan in the mid-1960s. Civilian ships probably have not conducted at-sea dumping since 1986.
- This at-sea dumping activity does not present a direct threat to US fisheries or personnel, including Alaska.

The probable contamination of the Arctic can be traced to the industrial and nuclear activities of many countries and regions - including Great Britain, the United States, China, Russia (and the former Soviet Union), and eastern Europe.

Past, present, and future sources of Russian radionuclide contamination in the Arctic include atmospheric testing of nuclear weapons from Novaya Zeml'ya and Semipalatinsk, intentional dumping of radioactive materials by the Russian Northern and Pacific navy fleets, and accidents including Chernobyl' and the Russian nuclear submarine Komsomolets which sank off the Norwegian coast.

Ambient radiation levels in the waters of the Arctic Ocean generally are similar to those found in other ocean basins. The threat to marine life is unclear, since no records are available on the exact composition of the waste and because the extent of radioactive leakage from containers is unknown. However:

- Studies by Russian and western scientists have noted an increase in the levels of Cesium-137 and Strontium-90 in Arctic waters following the Chernobyl' nuclear power plant accident in 1986.
- Based upon measurements taken during a 1991 international expedition to the Arctic polar basin, a Danish researcher stated that the radioactivity in the Arctic Sea areas is four times higher than the quantity of radioactive fallout would suggest.
- Russian researchers who took samples while floating across the Arctic Ocean on an ice floe between 1985 and 1987 have determined that much of the Arctic Ocean's cesium-137 contamination is concentrated in the top 200 meters.
- CIA believes that some of the cesium-137 probably originated in Russian plutonium production facilities and was carried into the Arctic by the Ob' and Yenisey rivers .

Based on known oceanographic conditions in both the Barents and Kara Sea dumping areas, any contaminants would tend to be dispersed and diluted thus increasing the difficulty of detection and decreasing environmental hazard.

Measurements indicate that the Arctic has also been contaminated by industrial sources. These pollutants are transported into the Arctic by atmospheric- and water-borne paths and are generally accepted to be the primary components of Arctic Haze -- a phenomenon similar to lower latitude smog. By the early 1980s, scientific studies had shown that chemicals, heavy metals, and organics were major components of Arctic Haze. CIA is aware of research being conducted on industrial contaminants in the Kara Sea, but I must defer comment on this issue to a closed, classified session.

The Yablokov Report, although thorough, may not be exhaustive. For example, in May 1993 a Russian government committee told Japanese officials that in 1987 a Soviet Navy helicopter crashed into the Sea of Okhotsk while carrying an atomic-energy battery, according to press reporting. While the Russians told the Japanese that no leaks were detected from the accident, the battery, which used Strontium-90 as its power source, contained more than 20 times the amount of radiation the Russians had

previously announced that they dumped into the Sea of Japan. This accident (with its radioactive source) was not included in the Yablokov Report.

Russian policy on nuclear waste is murky and subject to sudden changes because of the large number of organizations involved and constantly changing laws and decrees--some of which are conflicting. Russia has several laws and government decrees that stipulate procedures for accepting, handling and disposing of nuclear wastes. One murky area is the acceptance of foreign nuclear waste, which can be accepted for reprocessing but cannot be permanently stored on Russian territory. However, permanent storage has been the subject of a variety of definitions and the question of Russia's acceptance of nuclear wastes from other former Soviet states and countries with Russian nuclear reactors remains unresolved.

Some of the Russian government's recent actions send a troubling signal regarding Moscow's commitment to stop dumping nuclear waste in Arctic waters. For example:

- A presidential decree issued in July rescinds an earlier edict establishing civilian oversight of the military's management of radioactive waste--although Russia's chief nuclear safety authority, *Gosatomnadzor*, has complained all along that it has been denied access to information about the navy--and effectively allows the military to police its own dumping practices.

- According to a report released last month by the Norwegian environmental group, *Bellona*, which works closely with Russian environmental groups, the main nuclear storage facility of Russia's Northern Fleet is makeshift, dilapidated, and contains 1,000 times more radiation than the largest of this year's French nuclear tests.

- While the report was being prepared, *Bellona's* office in Murmansk was raided by the Russian Federal Security Service (FSB), which confiscated all of *Bellona's* materials

on radioactive waste generated by the Northern Fleet and later called in for questioning many of *Bellona's* contacts throughout Russia.

Bellona's experience attests to the growing difficulties which Western and Russian environmental groups confront trying to monitor military nuclear waste management in the face of nationalist political pressures, skepticism about foreign involvement in military matters, and especially the steady widening of the powers enjoyed by Russia's internal security services. Earlier this year, for example, the FSB publicly charged numerous Western aid and environmental groups with spying, and subsequently issued a series of shrill warnings about foreign threats to state secrets. Such retrogressive, Soviet-era trends will increasingly undermine efforts to monitor ocean dumping and, more importantly, to have the practice stopped.

For its part, over the past four years, CIA has stepped up its use of national technical means, and has worked closely with its colleagues in the Intelligence Community and US Government to provide requirements and to disseminate our analysis of technical collection to assess the potential levels of contamination by both radionuclide and industrial sources. Naturally, we also study available open source information. Although we cannot readily declassify our information on ocean dumping because of the sensitive nature of the national technical means used to obtain the data, we could provide further details in closed classified session.

The Intelligence Community is engaged in a number of new cooperative projects that bring unconventional resources to bear on these issues. As part of the Gore-Chernomyrdin Commission effort, the United States and Russia have agreed to share products derived from national intelligence assets to help solve environmental problems of concern to both countries. The proposed projects include a study of the Arctic. In addition to the Intelligence Community, prominent U.S. scientists brought together by the Environmental Task Force are playing an important role in this endeavour.

As many of you may be aware, the Environmental Task Force was established in 1992 to determine the role that our nation's national security assets could play in answering key environmental questions in addition to fulfilling their more standard intelligence and defense role. The ETF brought together a team of about 50 prominent U.S. environmental and global change scientists -- now known as MEDEA -- who have been reviewing our most advanced reconnaissance satellite programs and Navy systems, as well as a number of additional classified military and energy programs, to determine what unique environmental and global change information could be derived from these data. Working with both our Intelligence and Defense Communities, MEDEA is developing and demonstrating the capabilities of the national security systems to generate environmental information. These capabilities can be used to help monitor and predict the impact of ocean dumping of radioactive materials and other toxic wastes, and would offer a significant source of information for any future activity to assess the effect and magnitude of such dumpings on the world's oceanic environment.

Today I would like to summarize those aspects of this work that would help address the environmental impact of radionuclide waste dumping into the oceans. Although MEDEA has not conducted a demonstration to determine specifically how national security systems could monitor radionuclide waste or help in risk assessment, it has demonstrated a range of environmental capabilities of these systems that have a direct bearing on their ability to provide such information.

These capabilities fall into two broad categories. The first, is the ability to detect directly and monitor the location of toxic pollution, either by observing the pollutant itself or by observing its effects on the local environment. I will discuss in a moment a MEDEA demonstration concerning an oil spill in the Komi Republic of Russia that

illustrates this capability. The second broad category is the ability to provide environmental information that can be used as input to models to predict the transport of the pollutant, and thus its potential impact on other locations. For the purposes of the particular pollutants under discussion at these hearings --radionuclides and toxic wastes dumped into the world's oceans-- the main concerns would be circulation models that would predict how much of the pollutant would be moved around the major oceans, as well as flow models for individual rivers near the source of the pollution. I will describe some MEDEA activities that have determined the unique capabilities of our national security assets in gathering such information on ocean processes and some datasets that MEDEA has been coordinating that will provide information needed as input to models. Finally, I will briefly summarize an investigation that MEDEA will perform in FY '96 to address the question of radionuclide migration directly.

The best example of how our national security assets can monitor pollutants directly and determine their potential impact on other regions is the so-called Komi oil spill. The Komi Republic of Russia became the focus of international attention in fall 1994, when the press reported a number of large oilspills. The spills were concentrated along the main pipeline connecting the Vozey and Usinsk oilfields along the Kolva River, affecting about 175 acres of land and 25 miles of stream banks over a 22 mile section of the pipeline. It is estimated that 100,000 tons of crude oil were spilled-- an amount nearly three times the size of the Exxon Valdez disaster. International concern was raised that spilled oil might make it into nearby rivers that feed into the Barents Sea, thereby polluting the Arctic Ocean.

At the request of senior policymakers, MEDEA worked closely with Intelligence Community and NOAA and EPA analysts to determine the risk to the Arctic Ocean. Data from national security assets and other sources were analyzed to determine the

locations of the largest oil spills. In addition, and perhaps more importantly, the specific type of permafrost terrain surrounding the oil spill locations was determined. This made it possible to predict whether a significant amount of the spilled oil would flow through the local terrain and into the nearby rivers, or whether the local terrain would trap most of the oil, preventing further significant contamination. This information, combined with the knowledge that the oil was a high-paraffin crude led to a consensus that these spills posed only a minimal threat to regions outside of the immediate area, mainly because the local marshes prevented much of the oil from reaching the major rivers.

The Komi study illustrated that national security systems could provide detailed information concerning both the pollutant and the local environment that was essential in estimating the impact of the spill on a larger region. This and other studies demonstrate an additional capability that MEDEA has been developing over a range of its activities that will be very important to future evaluations: the ability to combine the talents available in the scientific community, civil government agencies, and the Intelligence Community to respond to policy-related questions concerning world-wide pollution effects. Integrating the expertise of the MEDEA scientists with the analytical resources of the Intelligence Community led to a quick and accurate response to the Komi oil spill. This, plus the greater openness of the Intelligence Community that has allowed results from national security systems to be discussed in an open forum, was used successfully in the Komi oil spill study, and may be a useful model for addressing future pollutant problems.

The Komi oil spill demonstrates the ability of national security systems to provide detailed local information for characterizing and monitoring a pollutant. In order to understand the more global impacts, scientists and decision makers must be able to predict where the pollutant may be transported and how much of it will reach a given

destination. For ocean dumping of toxic wastes, this requires the use of models that predict the circulation of water bodies and the flow rates of rivers and tributaries. To be accurate, these models depend on inputs describing environmental conditions and processes that are not well understood for all parts of the world.

This leads to the second area where data from National Security Systems can have an impact --general oceanography. Observations from national overhead systems can lead to better data on local winds and other meteorology, bathymetry, oceanic fronts, and tidal currents, as well as general circulation and upwelling areas.

To improve existing transport models, several MEDEA investigations are estimating global ocean circulation patterns, as well as flow patterns in coastal regions. This information is difficult or impossible to generate with other existing remote sensing systems, and requires the unique attributes of the national security systems.

The large classified Navy databases are also rich with data, and MEDEA is working closely with the Navy on these activities, to determine what unique environmental information the national security systems can provide, and to combine and coordinate the Navy databases with remote sensing data to provide more global coverage for many of these parameters. The Navy MEDEA effort has established a bridge between the scientific community and a number of classified Navy databases, and is providing the scientific community with access to a wide range of new information. Together, MEDEA and the Navy are working to extract environmental information from these databases to input into ocean circulation and transport models. An important point here is that data taken by national security systems can be combined with data from civil systems to provide a much better base for the application of models developed by the Navy, NOAA, EPA, and DOE.

An upcoming MEDEA investigation that will have direct impact on the use of national security systems for monitoring oceanic pollution is the Arctic climatology study, which will combine U.S. and Russian databases to provide an unparalleled global view of the Arctic. Russian hydrographic and ice information will provide a much finer view of Arctic processes than the U.S. currently has, and this will significantly improve existing circulation models. In addition, this study will specifically investigate the use of radionuclides as traces for oceanic circulation patterns, thus providing a necessary validation of the models.

In summary, MEDEA activities directly relate to the problem of ocean dumping of radioactive and toxic wastes in three ways. First, MEDEA and the Intelligence Community have demonstrated the capability of national security systems to detect and monitor pollutant spills, to characterize the local terrain near the spill, and to use this information to predict the impact of the spill outside of the immediate area. Second, a number of MEDEA activities are extracting oceanic information from national security systems and Navy databases that characterize the processes needed to model circulation and transport of pollution. This environmental information can be used to improve existing circulation models and thereby improve their prediction of toxic waste transport. Third the working interaction between the scientific community and the National Security Community has enabled a rapid response with more complete information to environmentally related policy questions and, as demonstrated by the Komi oil spill study, this may be a useful model for addressing future pollutant problems.

Mr. WELDON. Thank you very much, Dr. Gershwin.

I thank all four of you for appearing today and for your excellent statements. I just have a few questions, one that I will repeat from the second panel and that is, what is our total of dollar allocation that we are putting forth out of the Federal budget for Arctic work? I noticed that, Dr. Brass, I think you had your handle on that.

Dr. BRASS. Just let me point to it, Congressman. It is in the back. This, by the way, is the Arctic Research of the United States publication that I mentioned before. The total budget in fiscal year 1994 for research in the Arctic was $191 million, in fiscal 1995, $174.9, and in fiscal 1996, proposed, $169.6. Our research funds for the Arctic are steadily declining.

You might be interested in the DOD totals, which were $35 million in 1994, $33.6 million in 1995, and $23.2 million in 1996. That reflects the loss of the $10 million Nunn-Lugar threat reduction money.

Mr. WELDON. Dr. Brass, how much of that money goes through the Arctic Commission and how do you get your funding?

Dr. BRASS. The Arctic Commission does not fund research, Mr. Chairman.

Mr. WELDON. At all?

Dr. BRASS. It is our job to set policy and guide the interagency group in their formulation of the research plan.

Mr. WELDON. How are you funded?

Dr. BRASS. We are actually funded as an independent agency but through the appropriation for the National Science Foundation.

Mr. WELDON. Very good. The impact of the $10 million loss, I guess I should say, first of all, what is undone, and I applaud the job, Admiral Pelaez, that you have done here, and I agree that you have done great work. What is left to be done? What needs to be done, perhaps, as opposed to asking you what amount of money you want, which puts you on the spot. What needs to be done?

Admiral PELAEZ. My assessment would be the following. One, we took some 30,000-plus samples. While the procedures we used to gather some of those samples would not necessarily support the other toxin analysis, many of those samples would and they are preserved but, one, it has not been in our mandate and it has not been in our charter to go look at other pollution sources and their transport. Nevertheless, that is a very rich data base which could serve that, so there is some work to be done there.

I think that you will see in our assessment that we need to be able to monitor conditions throughout this region. I am particularly concerned about up the rivers and these containment facilities. Some of these rivers, just to put them in perspective, have watersheds that are the equivalent of half the U.S. mainland. The ability to monitor that, to really get in to more detail on the security of those potential pollutants I think would be an area that we should be looking at as a continuing evolution.

I believe that our assessment in 1997 will give us an accurate and good and, for the money that we have—we are pretty close to being able to finish that, I think, and if not, I have been supporting it myself. We will be able to give a good assessment of the impact of the existing dumped nuclear waste on the environment and the transport.

But as I said and as other witnesses have said, there are a number of other issues which we need to address, and there needs to be, and I think Ms. Goodman stated it as well, a sustaining program of monitoring. I think that we are well on the road with the tools that we have to be able to do that, understand when something happens what the impact might be, how much time we have to react, what the technical challenges might be in dealing with that. It is a complex problem and it does require sort of a continuing effort as we work also to control and prevent the release of further toxic wastes.

Mr. WELDON. Admiral and others on the panel, has part of your function been to monitor the Komsomolets and any problems there, or is that not within the jurisdiction and it has not been a part of what has happened in terms of our work?

Admiral PELAEZ. None of our direct measurements were on that site.

Dr. BRASS. I can comment briefly, Mr. Chairman, that my understanding is from the other international participants in these kinds of programs that for the moment, at least, there appears to be no significant release from Komsomolets, but, of course, all of these problems involve the fact that we do not know enough about the corruption of reactor vessels, fuel rod cladding. There are two nuclear torpedoes in Komsomolets, as we understand it. We do not know what their corrosion resistance is, how long they will last.

Admiral PELAEZ. Mr. Chairman, I think it is fair to say, though, that from the sites we have visited, even where there was breach of containment of some of the storage vessels, in some cases, in fact, they shot them full of holes to make them sink, even after they went through some precautions to contain the material, the release has been localized, very local in nature so far. So we are very fortunate in the nature of these types of materials, that they tend to be trapped into sediment and they do tend to stay in the near vicinity of the release.

Mr. WELDON. Did you want to add something, Dr. Gershwin?

Dr. GERSHWIN. Yes. Certainly, CIA analysis would agree. I mean, the worst thing you could do in a sense would be to try to raise this thing. Leave it where it is.

Mr. WELDON. There was some discussion. I have heard others who say you should raise it——

Dr. GERSHWIN. No.

Mr. WELDON [continuing]. But the bulk of the evidence I heard is that that should not occur. I assume we are doing even a more aggressive job in monitoring the *Thresher* and *Scorpion*.

Admiral PELAEZ. Yes. The U.S. Navy has a continuing program and has had since the *Thresher* and *Scorpion* went down.

Mr. WELDON. And no problems?

Admiral PELAEZ. No.

Dr. GERSHWIN. Could I add a point, though, which is a general problem we have in assessing all of this is that while we know the sites and we have information on measurements and so on of the situation in the ocean, what we really do not know is really what is there. We do not know the composition of what has been dumped. We do not know how much of it is leaking. I mean, there is just a basic lack of information on our part on what the Russian

nuclear dumping was. Knowing that would add significantly to our understanding of potential future risks.

Dr. BRASS. I might add something to that, as well, Mr. Chairman, and Bob Edson can give you even more information on this, but it turns out in pursuing the records of dumped material, not all of the things supposed to have been dumped are dumped where it says they were dumped. There has been considerable effort to find some and at least one large one has not yet been found. One, for example, that was listed as a barge full of radioactive material looks in sonar imaging to be the Liberty ship.

Mr. WELDON. Are we using the same modeling that you talked about to model and watch the dumping that occurred off the San Francisco coast a few years ago? Are any of you familiar with that? Is that part of this? You would not know that, I guess.

Admiral PELAEZ. I would have to take that for the record to answer that specifically. Of course, we run global ocean models. We have running global ocean models, but I do not know if it was used at all in any particular dumping there.

Mr. WELDON. Very good. And Dr. Gershwin, you mentioned the Bellona Foundation. As I mentioned earlier, we have been joined today by Frederick Hodge, who is the chief director of Bellona and we had a press conference before this hearing to state our concern for what occurred to Bellona in terms of the security apparatus in Russia.

I have one final question. The recommendation of Bellona today to us was that perhaps we should have an international commission established to monitor nuclear waste sites, and since there is currently no such operation, we have all these commissions looking at nuclear weapons but we do not have anything specific to nuclear waste sites. What is your response to that, if any, off the top?

Admiral PELAEZ. I would be a strong supporter.

Mr. WELDON. The others, the same?

Dr. GERSHWIN. I would certainly say that from the point of view of the U.S. intelligence community, we would understand a lot better what the risks are if we had access to information.

Mr. WELDON. And the Arctic Commission?

Dr. BRASS. I think, in addition to simply monitoring, to standing and watching these operations, it is probably worthwhile to conduct at least a basic research program in them. You heard Dr. Yablokov discuss the motion through the groundwater of the Myak radionuclides. This is a very serious problem and it takes more than just a few monitoring sites to keep track of what is going on and what processes are active in the system.

Mr. WELDON. Thank you.

Mr. Kennedy.

Mr. KENNEDY. Thank you, Mr. Chairman.

I have questions that I will follow up with the individual panel members later on. Thank you.

Mr. WELDON. Thank you, Mr. Kennedy.

Let me thank the panelists for their excellent testimony and their comments. This concludes the one part of our hearing.

We are going to move into our fourth and final panel picking up a different issue, but before we do, there are a number of publications that I would like to simply acknowledge for the record that

are out there. Some of them have been referred to here today, some outstanding publications put forth by the Bellona Foundation which are available. This is the one document that I would urge people to contact Bellona for, which I first came on 2 years ago, I guess, when it was first released.

OTA did an outstanding study which was just released this past fall and that also is available through the Office of Technology Assessment.

Several of the publications that you mentioned, we have already highlighted, but they also, I think, are worthwhile, and a publication by Murray Feshbock from Georgetown University also, I think, sums up the problem and is worth considering, as well as this document which I referred to earlier from the American Association for the Advancement of Science on "Ocean Pollution in the Arctic North", another publication available.

I think we have raised a lot of interesting points. We have a status report on what is happening, both within our Government and internationally. We have a real commitment here that we are making to follow through. In our second hearing, we will look at broader ways that we can perform dual use cooperation in understanding the ocean and working with the military, but I will continue to follow through as a personal priority of mine the support to keep this Arctic research program underway and to assist the Russians with this terrible problem of disposing of their nuclear wastes.

I thank all of you for coming in.

Mr. WELDON. With that I would invite our fourth panel to step up to the table, Dr. Philip Valent from the Naval Research Laboratory, Stennis Space Center; John Edmond, professor of geochemistry from the Massachusetts Institute of Technology; Dr. Fred Grassle, director, Institute of Marine and Coastal Sciences from Rutgers University; and Ms. Beth Millemann, executive director of the Coast Alliance.

Let me welcome you all to the subcommittees and apologize for making you sit through a rather long hearing. We try to combine the hearings to take advantage of the two subcommittees coming together, and also at the request of Chairman Jim Saxton, my good friend from New Jersey.

Unfortunately, Jim is tied up on the floor, at least temporarily, with the same issue that was raised by Congressman Frank Pallone, a very important issue on the floor right now relative to one of our appropriation bills. He will join us when that act has been completed, but I understand it is causing a great deal of controversy, as you might imagine, at the eleventh hour among the members.

We are extremely concerned about the abyssal waste plain disposal plan and the panel that we have assembled here today we think will give us some insights into where we are going. In 1992, the former Coast Guard Navigation Subcommittee held a hearing on the enforcement of the ocean dumping ban and on research and development of waste management technology that could place material on the abyssal plain. The Naval Research Laboratory has also undertaken work to assess the environmental feasibility of the isolation of dredged material, sewage sludge, and municipal incin-

erator ash on the abyssal plains of the deep ocean. I look forward to hearing from Dr. Valent about that study.

I also look forward to hearing from Drs. Edmond and Grassle about the status of knowledge about the deep ocean environment and Beth Millemann about the legal and policy implications of deep ocean placement.

Personally, I have grave concerns about deep ocean disposal. Removing our waste from plain sight is not the same as responsible management of those wastes, nor does it replace efforts to develop practical, cost effective ways to reduce the stream of waste that we produce. However, I am interested in hearing the testimony of our distinguished panelists today and perhaps this will be the beginning of additional dialog on this issue in the Congress.

Thank you all for coming. Your statements will be placed in the record. Feel free to make whatever comments you would like, either following your statement or without your notes. We will start with Dr. Valent. Thank you.

STATEMENT OF DR. PHILIP J. VALENT, NAVAL RESEARCH LABORATORY, STENNIS SPACE CENTER

Dr. VALENT. Thank you, Mr. Chairman.

My name is Philip Valent. I am the associate superintendent of the Marine Geosciences Division, Naval Research Laboratory, and a marine geoscientist and a registered civil engineer. I submit my written statement, which I will summarize orally.

The United States relies mostly on land-based waste management alternatives since the cessation of ocean disposal of wastes with the Ocean Dumping Ban Act of 1988. In fiscal year 1993, Congress tasked the Department of Defense to study the advantages, disadvantages, and economic viability of storing industrial waste in the abyssal plains of the ocean floor. Please note, the industrial waste is defined here as sewage sludge, fly ash from municipal incinerators, and dredged material and does not include radioactive waste, such as discussed in the previous panels.

DOD tasked the Naval Research Laboratory to perform the paper study to examine the abyssal waste isolation option. I am the principal investigator on that project.

Our first task was to conduct a technology assessment of the capabilities to transport and place wastes on the abyssal sea floor. Four concepts emerged as being technically feasible. The least risky and least costly concept is depicted in the first figure of a packet, which I hope you have. This figure depicts the barge transport of waste contained in geotextile bags. The waste-filled bags are released through trapdoors and free-fall to the abyssal sea floor without loss of material to the water column.

Our second task was to perform an environmental assessment where we sought first to identify areas of the abyssal sea floor within 1,000 nautical miles of the U.S. mainland where environmental isolation of waste would be maximized, where the environmental impact of placing the waste on the sea floor would be minimized, and where economic zones of other countries would be excluded. Favorable sites are shown on the second figure, with the darker squares marking those more favorable.

The results from the environmental predictive models are described in my written testimony.

The results of the study lead to the following conclusions. One, placement of subject wastes on the abyssal sea floor with no accompanying loss to the water column appears feasible with modest advancements in technology. Initial indications are that the abyssal waste isolation option will be cost competitive with present waste management methods for higher priced areas.

Two, model predictions suggest that for reasonable waste isolation scenarios, the placed waste would likely be contained locally within a defined site, would bury local fauna which would be replaced by different, more opportunistic abyssal communities, and would impact geochemical processes beneath the waste site for thousands to tens of thousands of years.

Three, the Atlantic offers the most favorable sites for waste isolation. The Pacific sites are less favorable. The Gulf of Mexico offers poor choices for isolation sites.

Four, overall impacts of placed waste are predicted to be localized.

Our recommendations are, one, an in situ experiment using uncontaminated, organic-rich, fine-grained dredged material would be needed to generate the data necessary for further development and validation of models to predict changes in physical, biological, and chemical environments of the abyssal sea floor if perturbed by large-volume deposits of contaminated dredged material.

Two, research must be undertaken to better predict the performance of waste-filled geotextile bags, especially hydrodynamic response and geotextile strains during release from a transport platform, descent through the water column, and impact on the sea floor.

Three, development of technologies necessary for the handling, bagging, and transport of contaminated dredged material would be needed to ensure technology availability when, and if, environmental acceptability of the abyssal sea floor waste isolation option is demonstrated.

In June 1995, NRL was funded by the Advanced Research Projects Agency [ARPA], to extend portions of this paper study, applying advanced simulation technologies to the waste isolation problem with focus on the end-to-end simulation and visualization of the relocation of contaminated dredged material to the abyssal sea floor and the potential environmental impact. The scope of this new project is summarized in my written testimony.

My colleagues and I thank the chairman and the committee for this opportunity to make the results of our work known to the subcommittees. I will be happy to answer any questions you may have on our work.

[The prepared statement of Dr. Valent follows:]

TESTIMONY OF
PHILIP J. VALENT
ASSOCIATE SUPERINTENDENT, MARINE GEOSCIENCES DIVISION, NAVAL RESEARCH LABORATORY, STENNIS SPACE CENTER, MS
before the
NATIONAL SECURITY SUBCOMMITTEE ON
MILITARY RESEARCH AND DEVELOPMENT
and the
RESOURCES SUBCOMMITTEE ON FISHERIES, WILDLIFE AND OCEANS

6 December 1995

Messrs. Chairmen and Members of the Subcommittees: My name is Philip Valent. I am Associate Superintendent of the Marine Geosciences Division, Naval Research Laboratory, Stennis Space Center, Mississippi. I submit this written statement, which I will summarize orally, for inclusion in the hearing record.

In addition to my administrative duties, I am also Project Manager and Principal Investigator for a project tasked to the Department of Defense (DoD) in the FY93 Appropriations Bill to "...study the advantages, disadvantages, and economic viability of storing industrial waste in the abyssal plains of the ocean floor" (see Figure 1). I thank you for this opportunity to report to you the results, conclusions, and recommendations of that project.

Background

The US has had to rely largely on land-based waste management alternatives since the cessation of ocean disposal of wastes with enactment of the Ocean Dumping Ban Act of 1988. Remediation of contaminated wastes, though technically feasible, is very costly; and, therefore, land disposal is experiencing increased use.

Implementing an environmentally sound and economically viable program for remediation of highly contaminated bottom sediments, and obtaining regulatory and public approval of such action, poses a particularly vexing problem. Inaction in remediation of these highly contaminated sediments from shipping berths, turning basins, and navigation channels, because of concern over the environmental impact of removing these sediments by present alternatives, is compelling maritime commerce to avoid affected US ports (Haggerty 1993).

In introducing our project report, let me acknowledge the recent prior work on the topic of waste isolation on the abyssal seafloor. Two workshops sponsored by the Sloan Foundation were conducted at Woods Hole Oceanographic Institution (WHOI), 7-10 January 1991, and Massachusetts Institute of Technology (MIT), 12-14 June 1991, to examine "the potential benefits and problems of an 'industrial scale' experiment extending over a period of 10 or so years..." involving "...the delivery of from one to a few million tons per year of waste to the deep

sea floor" (Spencer 1991, p 2). The waste stream considered in these WHOI/MIT workshops was sewage sludge, fly ash from municipal incinerators, and dredged material. The WHOI workshop developed the research program requirements for the experiment, and the MIT workshop reviewed potential systems for monitoring the waste deposit.

The recommended 10-year, industrial scale experiment was not pursued, in part, due to the environmentally controversial nature of such a full-scale experiment. Continuing waste disposal problems, particularly those of managing/disposing of contaminated dredged materials, as indicated by the conduct of a Congressional hearing (House Hearing 1992), have stimulated further interest in the abyssal seafloor disposal option.

Strategic Environmental Research and Development Program Project

The Naval Research Laboratory (NRL) responded to the FY93 Congressional tasking with a proposal to the Department of Defense Strategic Environmental Research and Development Program, titled "Technical and Economic Assessment of Storage of Industrial Waste on Abyssal Plains." Our proposal was funded in November 1993, all research and development work was completed in September 1994, and the last of six reports was submitted for printing in September 1995. The effort was limited to a paper study addressing the same materials as the WHOI/MIT workshops. During the course of our work we adopted a shortened version of the project title, "Abyssal Plains Waste Isolation (APWI) Project."

To carry out the APWI Project work, NRL augmented its in-house expertise in oceanography, geology, and geophysics with industrial expertise for most of the technical assessment (Oceaneering International, Inc.) and academic expertise for portions of the environmental assessment (geochemistry, Richard Jahnke, University of Georgia; benthic biology, Gilbert Rowe, Texas A&M; and physical oceanography, Curtis Collins, Naval Postgraduate School) and for the economics of waste handling (Di Jin and Hauke Kite-Powell, WHOI).

Technology Assessment - The technology assessment for transporting and placing wastes on the abyssal seafloor was approached by first conducting a patent search to identify all potential applicable concepts and then assessing the technical feasibility of each. Four concepts emerged from the 128 patents as being most technically feasible for lowering waste through 6,100 m to the abyssal seafloor. They are synopsized as:

1) Controlled lowering of the waste in a tethered bucket with a 250 metric ton payload;
2) Pumping the waste down twin 1.37-m (54-in.) diameter, 7600-m long pipes;
3) Containing a barge-load of wastes in 50 geotextile bags (380 m^3 per bag) and free-falling the waste-filled bags to the seafloor; and
4) Carrying 153 waste-filled bags (127 m^3 per bag) to near the seafloor in an unmanned submersible and free-falling the bags from 200 m above the seafloor.

Sewage sludge would not be readily moved to and maintained in a fixed position on the abyssal seafloor because of its relatively low bulk density (1.04 MN/m^3 (65 lb/ft^3)) which is slightly

heavier than seawater. Thus, geotextile bags filled only with sewage sludge would sink very slowly through the water column and drift laterally for long distances. Methane gas generated in the sludge would decrease the bulk density even further, and the bags could float! Therefore, sewage sludge would require blending with a fine-grained weighting material to facilitate transporting the sludge to a specified abyssal seafloor isolation site and then ensuring that the sludge remains in place. Fly ash and dredged material, while not completely free of handling and placement problems, did not pose significant problems in the technical assessment.
Concept 1 above was eliminated at an early stage from the technical assessment because it became clear that the rate of placing waste material on the abyssal seafloor would be one-tenth the rate estimated for the remaining concepts; therefore, the bucket concept was eliminated as not being cost competitive. Both risk and capital-operating cost analyses revealed Concept 3, that of free-falling the waste-filled bags from the ocean surface to the abyssal seafloor, to be the best option (see Figure 2) (Hightower et al. 1995a, b, c).

Environmental Assessment -

Site Selection - We sought first to identify areas of the abyssal seafloor within 1800 km (1000 nautical miles) of the US mainland where environmental isolation would be maximized, where the environmental impact of placing the wastes on the seafloor would be minimized, and where economic zones of other countries would be excluded. A site assessment model was developed to quantitatively compare the suitability for waste isolation within 10-degree (latitude-longitude) squares of the abyssal seafloor. Included in the analysis were environmental and anthropogenic factors. Areas in the Hatteras Abyssal Plain (Atlantic) and the abyssal hills province west of southern California (Pacific) were shown to be the most suitable for waste isolation because of low currents, low eddy kinetic energy, favorable sediment type, favorable weather, and low anthropogenic activity. Atlantic sites scored somewhat better because of lower seafloor slopes and less roughness. Even the best areas in the Gulf of Mexico were shown to be poorly suited due to the high near-seafloor currents and high eddy kinetic energy (see Figure 3).

Hydrodynamic Processes - Simulations were conducted using the NRL six-layer, basin scale, ocean circulation model. Model results show that, if any dissolved contaminants were to be released into the water column during waste placement, these contaminants would not be advected shallower than 1000 m water depth for a 10-year simulation period. Well within this period of time, we would expect that the contaminants will have been adsorbed on/scavenged by particulates in the water column and would have settled to the seafloor. Model results, validated with existing data, indicate that near-seafloor currents at the most suitable abyssal seafloor sites will not be strong enough to erode/suspend uncontained dredged material or fly ash (Valent and Young 1995).

Biological Processes - The overall response of abyssal animals to the placement of one or more million cubic meters of organic-rich material, containing varying degrees of adsorbed contaminants, on the abyssal seafloor is not known with any certainty. It is clear that all resident animals buried under the bags and the sediment apron resulting from the impact plumes

generated by bag impact on the bottom would be smothered. Deposits of material greater than several millimeters depth would probably bury many invertebrates, which have adapted to extremely low sedimentation rates characteristic of the abyssal seafloor. Analogies with benthic recovery rates from abyssal turbidites suggest that it may take hundreds to thousands of years to return to an equilibrium community of animals following episodic disposal of waste materials greater than several centimeters over large areas of the abyssal seafloor. Given this very long-duration response of the abyssal community to disturbances on the large scale of turbidity flows, it would be preferable to limit the size and number of waste placement sites to minimize overall environmental impact.

Direct transport of contaminants to surface waters by abyssal animals via bioaccumulation processes would not occur because they do not venture out of abyssal depths. There does exist one potential pathway, however, via transport in the yolks of eggs of certain fishes and invertebrates. These eggs are known to rise to shallow depths in the ocean and develop into larvae which, in turn, mature into juveniles, and the juveniles then return to the abyssal depths. While the eggs, larvae, and/or juveniles are at the shallow water depths, they could be consumed by other species closer to food chains utilized by man.

Ten-year numerical simulations of a simplified abyssal food chain were run to simulate impact of a one-year duration placement of sewage sludge and/or organic-rich dredged material on the abyssal seafloor. One model simulation predicts a significant perturbation of the reproductive and growth cycle, with the natural 1-year cycle altered to a 6-year cycle for the megafauna (fishes and large invertebrates); we note that the timing of these cycles may be an artifact of oversimplifications in the modeled food chain - or this timing may turn out to be real - at this point too little is known about the origin of this mathematical result to make any informed judgements about its origin (see Figure 4). To better understand the significance for eggs of megafauna as potential pathways for contaminant export from the abyssal seafloor, the export of polycyclic aromatic hydrocarbons (PAHs) via this pathway was estimated using data from the 106-mile site: the annual transport of PAHs from a 1-year placement of sewage sludge and/or dredged material (assuming 1×10^6 m^3) is estimated to be 1.7 grams, truly minuscule (Valent and Young 1995).

Geochemical Processes - Placement of million-plus cubic meters of sewage sludge and/or dredged material on the abyssal seafloor would significantly alter the local oxic/anoxic balance affecting geochemical processes at the seafloor surface and in the subseafloor (see Figure 5). We have conducted numerical model simulations of the impact of placement and remineralization of combined sewage sludge and dredged material on the abyssal subseafloor, predicting the impact of organic matter oxidation reactions on profiles of oxygen, nitrate, sulfate, sulfide, ammonium, total inorganic carbon, alkalinity, and particulate organic carbon. The model results show that the available oxygen in the water overlying and downcurrent of the isolation site would not be depleted to a level injurious to abyssal animals. However, to attain geochemical equilibrium (referenced to conditions prior to waste placement) would take thousands to tens-of-thousands of years. This result is not surprising because turbidite deposits at abyssal depths which occurred

over 12,000 years ago have not reached geochemical equilibrium (Valent and Young 1995).

Regarding the contaminants contained in the wastes, US Army Corps of Engineers experience with dredged material placed at shallow water depths indicate that the contaminants would remain adsorbed on the clay mineral particles with some of the organic contaminants adsorbing on organic particulates in the dredged material. Geochemical changes in the waste deposit could cause iron and manganese compounds to go into solution, but the iron and manganese would then precipitate as oxides when reaching the deposit interface with the oxygenated overlying water. The oxides would then serve as scavengers of other heavy metal contaminants that may leach to the deposit-seawater interface (Spencer 1991, p 78). Sewage sludge poses possibly a somewhat greater problem due to a potential deficit of appropriate clay minerals to provide adsorptive surfaces for scavenging heavy metal ions. This shortcoming could be corrected by blending clay mineral material into the sewage sludge during handling, which would increase overall volumes to be isolated and cost per unit volume. Fly ash poses the largest problem to the waste isolation option due to its easily leachable, high content of lead, cadmium, dioxins and furans. To isolate fly ash on the abyssal seafloor, the fly ash would probably have to be blended into a fine-grained, organic-rich dredged material to provide sufficient adsorptive surfaces for the contaminants. Developing an adequate approach to isolation of contaminants within a sewage sludge or fly ash deposit would require some laboratory experimentation which was beyond the scope of the DoD tasking for this study.

Conclusions -
(1) Placement of subject wastes on the abyssal seafloor with no accompanying loss to the water column appears feasible using technology that could be developed.
(2) Model predictions suggest that for reasonable waste isolation scenarios the placed wastes would (a) likely be contained locally within a defined site, (b) bury local fauna which will be replaced by a new abyssal community of animals, and (c) impact local geochemical processes for thousands to tens-of-thousands of years.
(3) Regarding potential abyssal sites for the isolation of wastes (a) the Atlantic offers the most favorable sites, (b) the Pacific sites are favorable but less so than those in the Atlantic, and (c) the Gulf of Mexico offers poor choices for isolation sites.
(4) Overall impacts of placed wastes are predicted to be localized in extent. However, very little is actually known about the environmental impacts of such emplacement.

Recommendations - Before deep ocean isolation of wastes could safely occur, significant additional research would be needed.

(1) The models upon which this study was based, and disposal activity would be based, need to be refined. Some additional models need to be developed. This is underway in the ARPA study, discussed below.
(2) In-situ research would be needed to learn more about the abyssal environment, including its processes and inhabitants, to accurately assess potential environmental impacts.
(3) Research must be undertaken to better predict the performance of waste-filled geotextile bags

especially (a) hydrodynamic response and geotextile strains during release from a transport platform, descent through the water column, and impact on the seafloor; and (b) responses of the geotextile bags to physical, chemical, and biological degradation caused by the combination of contained waste and abyssal environment.
(4) An in-situ experiment using uncontaminated, organic-rich, fine-grained dredged material would be needed to generate the data necessary for further development and validation of models to predict changes in physical, biological, and chemical environments of the abyssal seafloor when perturbed by large-volume deposits of contaminated dredged material. Tracers should be added to the material in the experiment to mimic potential contaminant bioaccumulation and transport if such were to occur with implementation of the abyssal waste isolation option.
(5) Development and refinement of techniques necessary for the safe handling, bagging, and release of contaminated dredged material would be needed when, and if, environmental acceptability of the abyssal isolation option is demonstrated.

Advanced Research Projects Agency Project

Scope and Approach - In June 1995, NRL was funded by the Advanced Research Projects Agency (ARPA) to apply, to the extent possible, the concept of Simulation-Based Design to the waste isolation problem, focusing entirely on the end-to-end concept of dredged material isolation on the abyssal seafloor and the environmental impact, with the goal of optimizing the dredging-to-isolation system. The project scope includes consideration of dredging techniques and dredged material handling necessary to facilitate containment for transport and lowering through the water column. Model improvements and developments programmed for simulating the dredging-to-placement segment of the process include (1) modeling of improved full-containment dredge design and transport ship loading system; (2) optimization of the surface transporter through application of linear and, if merited, non-linear ship design models; (3) optimization of the geotextile bag-hopper-release system design to reduce potential for bag tearing on release; and (4) modeling of the hydrodynamics of waste-filled bags in free-fall to understand and control the deviation from ideal free-fall path to the seafloor with the intent of maximizing the concentration of bags from each transporter payload drop. To facilitate improved understanding of the environmental impact of placing dredged material on the abyssal seafloor, model improvements and development underway include (1) modeling of the plume generated by filled bags impacting on the ocean bottom, and the subsequent advection, dispersion, and settlement of the plume materials; (2) modeling of the geochemical processes within individual dredged material-filled bags and sediments buried under bags; (3) modeling the formation of methane hydrate within the deposit and assessing potential impact on isolation; and (4) modeling the pathways for toxicant bioaccumulation.

Participants and Progress - We are now at an early stage of the ARPA project. We have brought all expected academic participants on board including one new participant, Robert Moorhead, Mississippi State University, who will develop a visualization of simulation products. We are in final contract negotiations with a contractor team of industrial and academic participants for developing the dredging-to-seafloor placement portion of the modeling and simulation. We

expect completion of the ARPA project in September 1996.

Synopsis

I believe that the technology for placing contaminated dredged material at a specified abyssal seafloor site is either in hand or within easy reach. It is the environmental impact of the proposed deposit of several million cubic meters of dredged material that is difficult to predict with certainty. An in-situ experiment, spanning 7 years (including 2 years for planning and set-up), involving the placement of several thousand cubic meters of uncontaminated, organic-rich dredged material, will be the most efficient way to generate data and understanding necessary for predictive model development and validation.

My colleagues and I thank the Chairmen for this opportunity to make the results of our work known to the Subcommittees.

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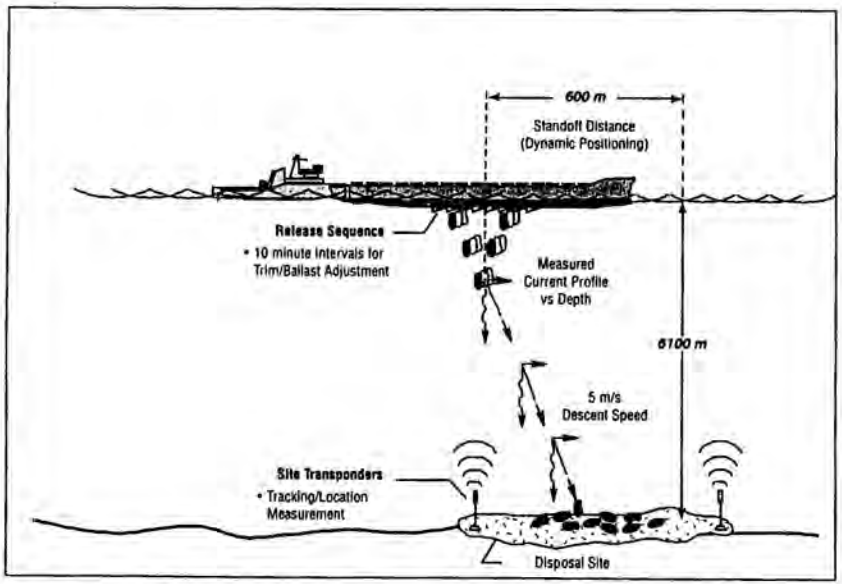
The Congress tasked the Department of Defense (DoD) in the 1993 Department of Defense Appropriations Bill, Senate Report 102–408, as part of DoD's Strategic Environmental Research and Development Program (SERDP), to:

> "...study the advantages, disadvantages, and economic viability of storing industrial waste in the abyssal plains of the ocean floor. Abyssal plains are areas of the ocean floor at depths of over 10,000 feet which are believed to be geologically stable and to experience only slight water currents. The Committee [i.e., Committee on Appropriations] understands that these characteristics may make abyssal plains viable regions for long-term storage of industrial waste. The Committee is aware of preliminary scientific discussions of this concept and feels additional study of the concept would be useful."

Figure 1

EMPLACEMENT CONCEPTS



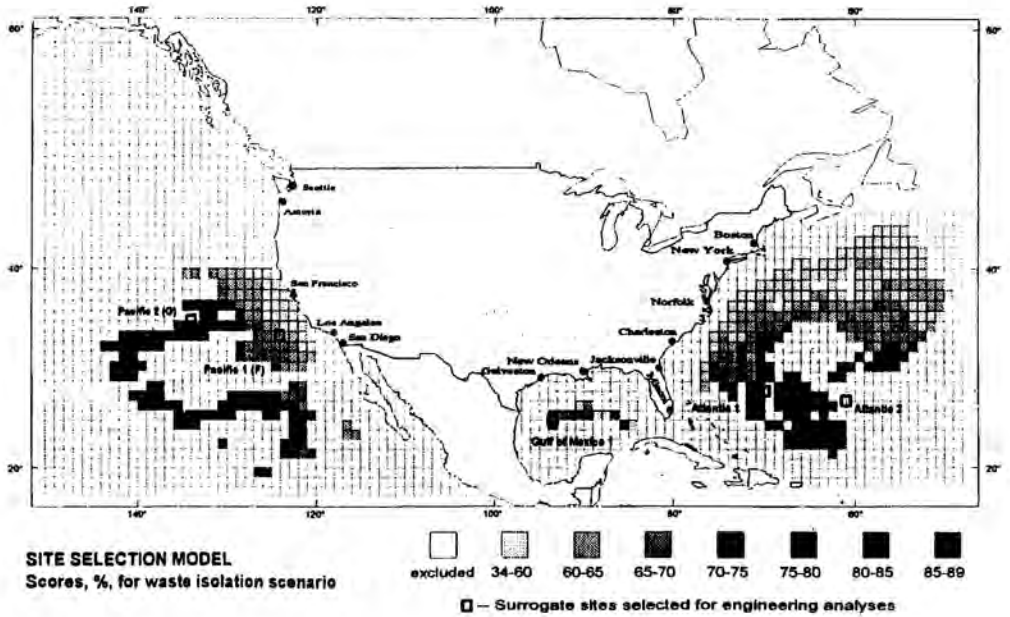
Surface Emplacement Concept uses 50 ea. 382 m^3 capacity geotextile bags for free-fall emplacement of 25,000 metric tons bulk waste per trip.

Figure 2

SERDP
Strategic Environmental Research and Development Program

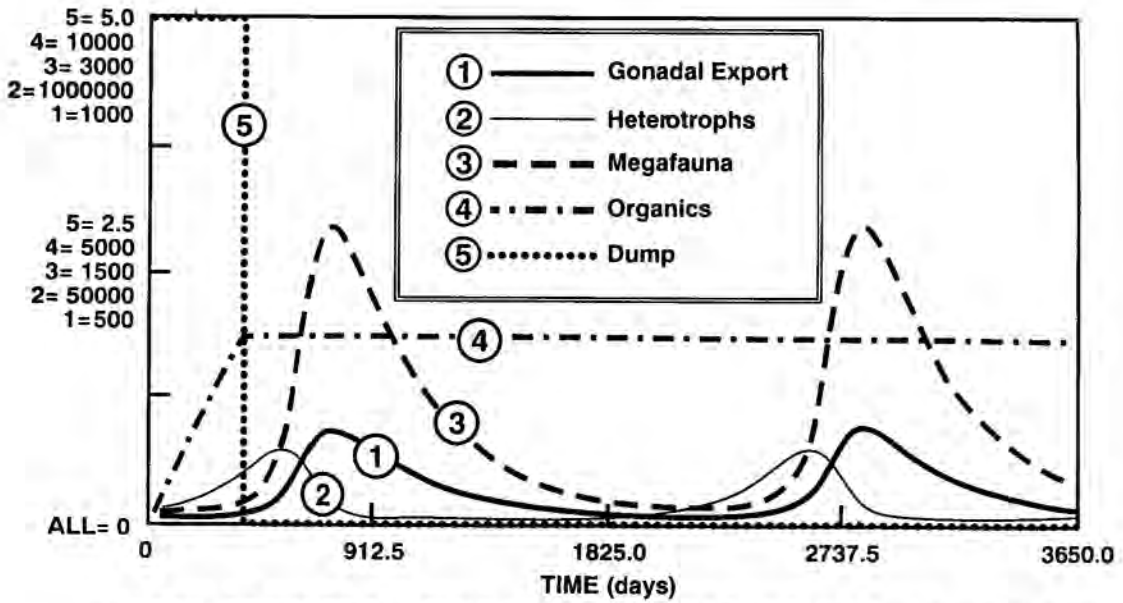
Abyssal Plains Waste Isolation Project
SITE SELECTION

8LC85-3



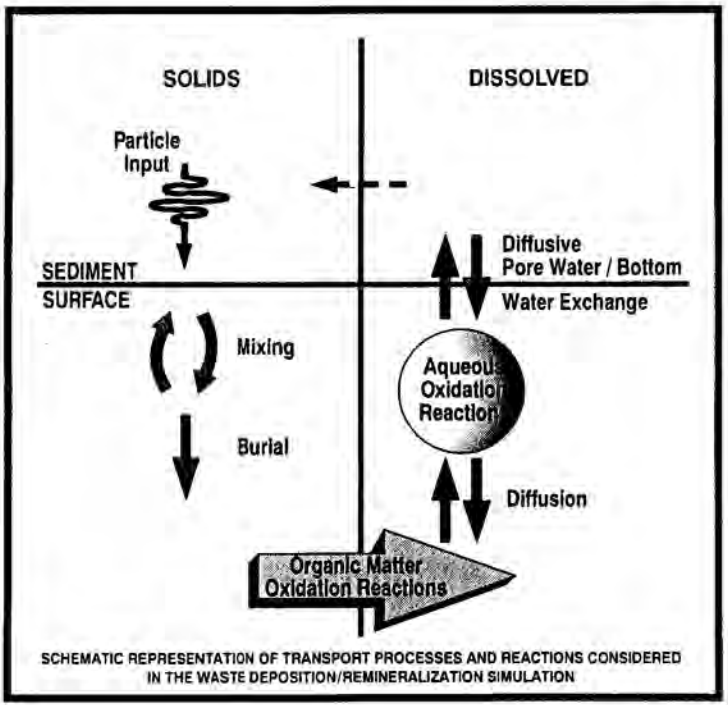
SITE SELECTION MODEL
Scores, %, for waste isolation scenario

Figure 3



OUTPUT OF NUMERICAL SIMULATION WITH SLUDGE INPUT OF 1000 mg C $m^{-2}d^{-1}$

Figure 4



SCHEMATIC REPRESENTATION OF TRANSPORT PROCESSES AND REACTIONS CONSIDERED IN THE WASTE DEPOSITION/REMINERALIZATION SIMULATION

Figure 5

Mr. WELDON. Thank you, Dr. Valent.

Dr. Edmond, I apologize for your name tag not appropriately including your title. We apologize, so Dr. Edmond, welcome.

STATEMENT OF DR. JOHN M. EDMOND, PROFESSOR OF GEOCHEMISTRY, DEPARTMENT OF EARTH, ATMOSPHERIC AND PLANETARY SCIENCES, MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Dr. EDMOND. It is a pleasure to be before your panel. I think from the research support you just heard about, there really is no question about the technical feasibility of disposing of these relatively benign materials on the sea floor. We can place them accurately and one of the bags in this room at 3 miles water depth, routinely. We could stack them up and fill the whole room for you, if you like. So technically, we are extremely capable in terms of operating in the deep sea, largely, as was pointed out earlier, because of the enormous investment the Federal Government has made over the last 50 years in oceanographic research and, of course, anti-submarine warfare.

The question is, should we, and if you ask that, then you want to look at a cost-benefit analysis. That is to say, we have a large inventory of waste. There is not anybody advocating that we just keep generating waste. Our problem is the inventory that we have right now is enormous, both in place in harbors and then also in essentially uncontrolled landfills.

The question is, how can we dispose of that in the most benign way in terms of ecological and environmental impact, and I would argue that the place to put it is in the deep sea floor, which is about a third of the area of the planet—there is a lot of room down there—in that it is the lowest energy environment on the planet, so the potential for dispersal of material is minimal, either physically in the water column or by contamination of ground water.

There is no ground water in the deep sea. It is a static system. There are no storms to speak of. There are no sea gulls to disperse things. There are no children to crawl into the dump site, and you will see, any dump site you go past, you see children. Plus, the standing crop of organisms is very low.

Now, I have to be careful here. My distinguished colleague and friend, Fred Grassle, has made extremely exciting discoveries about the enormous variety of species that live predominately in the deep sea floor, but you must distinguish between the number of species and the standing crop of live organisms.

The organic carbon content of the sediments that we are talking about impacting is about a tenth of a percent. Almost all of that carbon is the equivalent of humus in your garden. It is not live. The amount of live carbon in the abyssal sea floor is probably something like 0.05 to 0.01 percent by weight of the sediment. So we are talking about impacting a restricted area, a very restricted area, maybe a square mile of an enormous ecosystem that is relatively homogeneous laterally.

So in terms of environmental damage, I would argue that this is the minimum damage site of any that we could conceivably access economically, and from that point of view, I think we have a great opportunity to use the enormous investment that we made in un-

derstanding the deep sea to solve a very important societal problem, which I do not think is going to get easier to solve if we continue along the conventional routes that we are on right now. Thank you.

[The prepared statement of Dr. Edmond follows:]

29 November 1995

National Security Subcommittee on Military Research and Development
and
Resources Subcommittee on Fisheries, Wildlife and Oceans

House of Representatives

Congress of the United States

Witness Statement by Prof. John M. Edmond, Professor of Marine Geochemistry, MIT, for joint hearing, 6 December 1995

At the outset let me express my gratitude at being invited to testify before these two House Subcommittees today. As a foreign-born scientist who, over the last thirty years, has pursued a successful research career in the United States funded very largely by this Government through the National Science Foundation and the Office of Naval Research, I feel a strong obligation to be of service. It is also gratifying to be asked to help present the results of the enormous national investment made by this Government in oceanographic research over the last fifty years in support of your deliberations on a pressing societal problem, the disposal of waste streams.

Post-WWII, oceanography developed as a quintessential Cold War science. The fundamental driver was anti-submarine warfare. Of course, numerous spin-offs occurred in particular the thriving off-shore oil industry. Over the last decade or so oceanographic studies have become central to our understanding of the complexities of our environment and its response to natural and, increasingly, human perturbations. It must be recognized that this new orientation would have been impossible without the massive military-related investments mentioned above. Your Subcommittees have the opportunity to apply the insights, understanding and experience of the oceanographic sciences and engineering to the resolution of an increasingly critical problem in our society, and the world, the safe and

permanent disposal of the various streams of industrial solid waste.

The abyssal plains of the deep ocean are an attractive location for the disposal of solid wastes for a number of reasons;

1. They represent the minimum energy environment on this planet. There are no storms or flowing groundwater to disperse the emplaced waste.

2. The area available is vast, approximately one half of the surface of the Earth, as compared to that of the sites impacted. It is also quite homogeneous geologically and biologically. No site would be affecting a unique environment.

3. The abyssal plains are accessible to all the coastal conurbations of the U.S., a few days ship transit time at most, thus minimizing the cost of transport.

4. The technology exists today to completely by-pass the biologically productive upper water column and emplace waste on the floor of the deep sea with the accuracy of a good dump truck on a landfill, to permanently archive the positioning information and to relocate and monitor the site as need be. Development costs for this disposal option would be minimal.

5. Because the sites would be accurately located with the information in the public domain they would not be accidentally disturbed by, for example, deep sea mining ventures since these would be employing the same navigation techniques. Due to their remoteness at between two and three miles water depth, the possibility of deliberate disturbance can be ruled out.

6. The biota in the deep sea is sparse although diverse in species, mainly of microfauna. The abundance of living biomass is extremely low, close to desert-like. Thus the ecological impact would be very much smaller than at a similar site on land. Bio-dispersal of the waste material might occur for short distances laterally; however there is no significant possibility of vertical transport of the material and its re-introduction into the primary food chain in the upper waters.

7. We can be confident of these statements based on existing experience in the exploration for hot vents in the deep sea. These occur only in volcanically active areas remote from the abyssal plains. Although large volumes of hot water (600°F) laden with heavy metals are being expelled, significant effects are restricted to a few hundreds of feet laterally around the vent sites and perhaps a thousand feet in the water column above. There is absolutely no manifestation at the sea surface. In fact vent fields are quite difficult to find! The exploration, navigation and monitoring techniques discussed above for the waste sites are exactly those used to study vents.

Mr. WELDON. Thank you, Dr. Edmond, for your statement and for your comments. We look forward to a dialog among the witnesses as we get to questions.

Dr. Grassle, we welcome you from beautiful New Jersey, my neighboring State, my summer home State.

STATEMENT OF DR. FRED GRASSLE, DIRECTOR, INSTITUTE OF MARINE AND COASTAL SCIENCES, RUTGERS UNIVERSITY

Dr. GRASSLE. Thank you, Mr. Chairman. I thank you and the distinguished members of the subcommittees for the opportunity to discuss the potential use of the deep ocean environment as a repository for certain types of waste, particularly contaminated dredge material.

With support from the NOAA National Undersea Research Program, I have led several deep diving submersible expeditions to study the fate and effects of municipal sludge at the 106-mile deep water site, a depth of about 1.5 miles on the continental rise off of New York and New Jersey. Our institute at Rutgers has also played a role in issues associated with dredging and management of contaminated sediments in the New York-New Jersey Harbor Estuary and we have held three conferences for the port authority of New York and New Jersey on sediment remediation and dredging technologies.

Marine scientists have only recently appreciated the richness of life found in the deep ocean. Indeed, the dark, cold, and inhospitable environment of the deep sea has previously been thought of as a desert-like habitat that is largely devoid of any life. Very few individuals have had the opportunity to observe the diversity of deep sea life that Dr. Edmond referred to and even fewer have the knowledge to identify deep sea life forms so that they can be enumerated and compared from one part of the ocean to another. Recent estimates indicate a richness of species in the deep ocean as high as from any environment on earth.

The importance of our studies of deep ocean municipal sludge disposal at the 106-mile site is to predict the probable effects of the gradual buildup of pollutants that is occurring from other sources. Surface disposal of sludge over an approximately 75-nautical-square-mile area at the surface contaminated over 1,400 nautical square miles of deep sea floor.

A reexamination of the site in 1994 suggested that as a result of cessation of sludge dumping in 1992, measurable recovery of the environment has started. If the National Undersea Research Program continues to be able to support this research, we expect to study the site again this coming summer. Our objective is to measure the progress toward recovery of the site and ideally predict the time to complete recovery.

I also chaired an international working group on biological effects of deep ocean disposal in 1991 held at Woods Hole. We concluded that deep ocean marine disposal should only be considered where alternative disposal methods are inadequate, either now or in the foreseeable future. We further recommended that all risks needed to be assessed and an environmental cost-benefit audit be conducted before adopting new technology.

Because of the limited knowledge of the deep oceans, we recommended against ocean disposal of highly toxic wastes but in favor of an experiment on the mass disposal of relatively benign high-volume waste, such as sludge, and its impact on abyssal ecosystems. Such an experiment should include replicated experimental treatments and should be designed to maximize its usefulness in predicting future changes in oceanic ecosystems.

In calculating whether deep ocean disposal is practical, the cost of bringing the knowledge of deep ocean processes up to levels we take for granted in other environments should be factored into the cost of disposal. Alternative approaches that include beneficial use, source reduction, and alternatives available for waste isolation should be carefully evaluated.

A substantial portion of the cost associated with disposal alternatives are related to management and regulation, where obstacles have little to do with actual costs of containment or treatment. For purposes of comparison, costs associated with the most efficient management practices achievable should be used.

Some of the interest in using the abyssal plains as a dumping ground for contaminated sediments is a result of a crisis presently faced by the port authority of New York and New Jersey. In my previous testimony before the House Subcommittee on Merchant Marine and Fisheries in 1993, I recommended continuation of the use of the 6-mile mud dump site in the short term, pending development of another method for containment; determination of the sources of contamination and a study of the transport processes associated with deposition of contaminated sediments in the shipping channels and berths; use of specially designed pits for subseabed containment within the harbor; and initiation of a broad-based, long-term strategy to develop methods for remediation of Newark Bay sediments.

Some of the reasons there has been little progress in any of these areas include a complex and fragmented regulatory framework, lack of an adequate mechanism to evaluate new technology, an inadequately informed public, and our inability to manage the port as an entire system. I believe that the limited resources available to the port should be used to improve management of contaminated sediments rather than for development of techniques for isolation of sediment on the abyssal plain.

This conclusion perhaps begs the more general question about the feasibility of using the abyssal to isolate wastes. Considerable investment by the Department of Energy was made approximately a decade ago to evaluate the possibility of using the abyssal plain for placement of high-level radioactive waste. Uncertainties associated with an inability to control the placement and transport of the material have argued for disposal under more manageable circumstances.

Unfortunately, the deep sea is a habitat that is particularly difficult to access. Thus, once wastes have been planted there, future remediation is near impossible from a logistic or financial standpoint. It is possible that risks associated with land or near-shore disposal of some materials may be so great in the future that the equivalent of a landfill on the abyssal plain will eventually be needed. I believe this eventuality can be avoided.

In any case, because there are unmeasured effects of global increases in pollutant concentrations in deep sea sediments, it would be prudent to learn about life on the abyssal plain and to investigate the transport, fate, and effects of pollutants. I encourage you to continue to support research on deep ocean processes.

I thank Mr. Saxton, Mr. Weldon, Mr. Pallone, and other members of the subcommittees for their continuing efforts to improve the knowledge base for developing environmental policy and for their continuing and strong support of ocean programs.

I will be pleased to address any questions. Thank you.

[The prepared statement of Dr. Grassle follows:]

Testimony

Delivered by Frederick Grassle, Director
Institute of Marine and Coastal Sciences
Rutgers University

Subcommittee on Fisheries, Wildlife and Oceans
Subcommittee on Military Research and Development
Wednesday, December 6, 1995

Chairman Saxton, Chairman Weldon, and distinguished members of the Subcommittee on Fisheries, Wildlife and Oceans and Subcommittee on Military Research and Development, thank you for the opportunity to discuss the potential use of the deep-ocean environment as a repository for certain types of waste, particularly contaminated dredge material. For the last 30 years I have been among the relatively few scientists to study processes on the deep-ocean floor, and, especially, the living organisms on or in the deep-sea bed. Since coming to Rutgers University in 1989, I have led the development of the Institute of Marine and Coastal Sciences and have continued my interest in the deep ocean. In conjunction with scientists from the Woods Hole Oceanographic Institution, the U.S. Geological Survey, and two other universities, and with support from the NOAA National Undersea Research Program, I have led several deep-diving submersible expeditions to study the fate and effects of municipal sludge disposal at the 106-mile Deepwater Municipal Sludge Site at a depth of over 1.5 miles on the continental rise off New York and New Jersey. Our Institute has also played a role in issues associated with dredging and management of contaminated sediments in the NY/ NJ Harbor Estuary and we have held three conferences for the Port Authority of New York and New Jersey on sediment remediation and dredging technologies. I had the opportunity to give testimony before the House Merchant Marine and Fisheries Committee on these subjects in 1993.

Marine scientists have only recently appreciated the richness of life found in the deep ocean. Indeed, the dark, cold and inhospitable environment of the deep sea has previously been thought of as a desert-like habitat that is largely devoid of any life. Very few individuals have had the opportunity to observe the diversity of deep-sea life and even fewer have the knowledge to

identify deep-sea life forms, so that they can be enumerated and compared from one part of the ocean to another. Recent estimates indicate a richness of species in the deep sea as high as from any environment on earth. Although the deep ocean might be called a desert if only total numbers or weight per area of animals is considered, it cannot be considered a desert if we take into account the richness of species--a richness that has yet to be fully described. Most of the deep ocean has never been sampled properly, and it is therefore likely to reveal many more surprises in the future. The deep-sea fauna is a vast reservoir of biological innovation that can be tapped for use as pharmaceuticals or for the development of other useful compounds.

Since the lowest points on the planet are in the deep ocean, gravity dictates that the deep-sea floor is also a repository for the relatively small amount of waste that is transported large distances in the atmosphere, or through ocean circulation, great distances from land. Pollutants are detectable wherever they have been looked for in the deep sea, but so far the concentrations have not been shown to be a cause for immediate alarm.

The main importance of our studies of deep-ocean municipal sludge disposal is to predict the probable effects of the gradual build-up of pollutants that is occurring from other sources. The surface discharge of sludge from 1986 to 1992, at a rate of about 8-9 million tons per year, resulted in: 1. significant increases in bottom contamination by both metal and organic pollutants over background concentrations (despite predictions to the contrary), 2. changes in bacterial community composition, 3. transfer of sludge-derived carbon into the tissues of deep-sea animals, 4. a twofold increase in the oxygen uptake of deep-sea sediments, and 5. the appearance of species not normally common at the site. Surface disposal of sludge over an approximate 75 nautical square mile area affected and contaminated over 1,400 nautical square miles of deep-sea floor. A re-examination of the site in 1994 suggested that, as a result of cessation of sludge dumping in 1992, measurable recovery of the environment had started. These results are available in a number of reports and published articles that we can make available to you. If the National Undersea Research Program continues to be able to support this research, we expect to study the site again in the summer of 1996. Our objective is to measure the continued recovery of the site and to determine the time scales over which this sort of environmental disturbance might be expected

to completely abate.

In 1991, I participated in a workshop at the Woods Hole Oceanographic Institution sponsored by the Sloan Foundation on "The Abyssal Ocean Option for Future Waste Disposal." I chaired a working group of participants from France, Germany, Norway, the United Kingdom and the U.S.A., which considered the biological effects of deep-ocean disposal. We concluded that:

> "marine disposal should only be considered where alternative disposal methods are inadequate either now or in the forseeable future."

We recommended:

> "that all risks needed to be assessed and an environmental cost/benefit audit be conducted before adopting new technology."

Because of the limited knowledge of the deep oceans we recommended against ocean disposal of highly toxic wastes, but in favor of a large-scale experiment on the mass disposal of a relatively benign, high-volume waste, such as sludge, and its impact on abyssal ecosystems. Such an experiment should include replicated experimental treatments and should be designed to maximize its usefulness in predicting future changes in oceanic ecosystems.

Such a deep-sea, disposal experiment should have the following features:

- disposal should not proceed until a quantitative assessment of the species normally occurring in the environment has been conducted,
- in addition to direct effects on deep-sea life, attention must also be given to the possibility of contaminants reaching commercial fish species through food web transfer,
- analyses should not make assumptions about effects on the organisms living on or in the abyssal sea bed without direct measurements,
- the rate of lateral transport across the seafloor over decades should be studied, especially if the material is not capped or otherwise contained.

In calculating whether deep-ocean disposal is practical, the cost of bringing the knowledge of deep-ocean processes up to the levels we take for granted in other environments should be factored into the cost of disposal. The costs of prevention of short dumping, and the enforcement of protocols for emplacement on the seafloor should also be included. Alternative approaches that include beneficial use, source reduction, and alternatives available for waste isolation should be carefully evaluated. A substantial portion of the costs associated with disposal alternatives are related to management and regulation, where obstacles have little to do with the actual costs of containment or treatment. Rather than using the worst cases of management of contaminated sediments, costs associated with the most efficient management practices achievable should be used.

Some of the interest in using the abyssal plain as dumping ground for contaminated sediments is a result of a crisis presently faced by the Port of New York and New Jersey. In my previous testimony before the House Subcommittee on Merchant Marine and Fisheries in 1993, I recommended:

- continuation of the use of the 6-mile Mud Dump Site in the short term pending development of another method for containment,
- determination of the sources of contamination and a study of the transport processes associated with deposition of contaminated sediments in shipping channels and berths,
- use of specially-designed pits for sub-seabed containment within the Harbor, and
- initiation of a broad-based, long-term strategy to develop methods for remediation of Newark Bay sediments.

Some of the reasons there has been little progress in any of these areas include: a complex and fragmented regulatory framework, lack of an adequate mechanism to evaluate new technology, an inadequately informed public, and our inability to manage the Port as an entire system. I believe that the limited resources available to the Port should be used to improve management of contaminated sediments rather than for development of techniques for isolation of sediment on the abyssal plain.

This conclusion perhaps begs the more general question about the feasibility of using the abyssal plain to isolate wastes.

Considerable investment by the Department of Energy was made approximately a decade ago to evaluate the possibility of using the abyssal plain for emplacement of high-level radioactive waste. Uncertainties associated with an inability to control the placement and transport of the material have, thus far, argued for disposal under more manageable circumstances. Unfortunately, the deep sea is a habitat that is particularly difficult to access; thus, once wastes have been planted there, future remediation is near impossible from a logistic or financial standpoint. It is possible that risks associated with land or near-shore disposal of some materials may become so great that the equivalent of a landfill on the abyssal plain will eventually be needed. In any case, because there are unmeasured effects of global increases in pollutant concentrations in deep-sea sediments, it would be prudent to learn about life on the abyssal plain and to investigate the transport, fate and effects of pollutants. I encourage you to continue to support research on deep-ocean processes and congratulate Mr. Saxton and his Subcommittee on their continuing efforts to improve the knowledge base for developing environmental policy. I would also like to thank Mr. Saxton, Mr. Weldon, Mr. Pallone and other members of the subcommittees for their continuing and strong support of ocean programs. I will be pleased to address any questions you may have at this time. Thank you.

Mr. WELDON. Thank you, Dr. Grassle, for your excellent statement.

Ms. Beth Millemann, welcome. The floor is yours.

STATEMENT OF BETH MILLEMANN, EXECUTIVE DIRECTOR, COAST ALLIANCE

Ms. MILLEMANN. Thank you. I would like to thank you for staying for the very bitter end of this hearing. It has been many hours and very instructive for all of us who were here.

I must comment that there is a certain schizophrenia inherent in having the first three panels and then this panel. The information that was raised in the previous panels raised the most sobering and disturbing of conclusions about what a willy-nilly approach to disposing of wastes in the ocean can bring 10 years and 15 years later after the fact, and that we are having a panel talking about introducing new wastes into the deep ocean is personally very disturbing to me, particularly in light of the very sobering information that was presented earlier.

I am presenting testimony today on behalf of the Coast Alliance and also 35 other environmental groups and sports and commercial fishing organizations and water recreation groups. We are very pleased to be here.

I wanted to raise essentially five different issues that our groups have concerns over beginning deep ocean dumping. The first deals with the fact, as Dr. Grassle has raised before, that we are getting to learn more and more about the deep ocean and the fact that, as you stated, it is not a dead zone, that there is a variety of life.

Beginning a waste disposal practice in an area that we are just now learning about its variety and abundancy seems to me precisely the wrong direction to go, and certainly the direction of waste disposal policies in this country vis-a-vis the ocean has been precisely the opposite direction. It has been to get out of the ocean, not to go back to the ocean for additional disposal.

The passage of the Ocean Dumping Ban Act in 1988 and the recent changes to the London Convention in 1993 are only two examples of the fact that the public does not support ocean dumping of wastes. When the public becomes sufficiently concerned about the quality of ocean waters, it reacts very violently. The history of the ocean is not one of half-measures. When the public becomes sufficiently concerned, activities dumping in the ocean are banned. I think that any movement forward toward introducing a new deep ocean dumping regime will be met with the most hostile of public responses.

Regarding the ban, the materials that are discussed in the Naval Research Lab report of January this year contemplate the disposal of dredge materials but also incinerator ash and also sewage sludge in the ocean. The Ocean Dumping Ban Act banned the disposal of sewage sludge and industrial wastes in the oceans. It also banned the incineration of wastes at sea. It also banned the transportation of those wastes across U.S. waters for purposes of dumping.

The London Convention also bans the disposal of industrial wastes in the ocean, and there is certainly a good deal of conversation going on now about potentially expanding that ban to sewage sludge dumping. So the elements that are discussed in the Naval

Research Lab report discuss in part the disposal of materials that are illegal under current U.S. law and under international law. This is a profoundly disturbing point, that we are spending tax dollars into researching a proposal that is illegal under domestic and international regimes.

Also, if we talk about beginning a deep ocean dumping policy, what we are really doing is leaving a legacy of shame for our grandchildren. I remember the proponents of nuclear power talked about waste that would be too cheap to meter and we are talking about beginning a new, hugely expensive and hugely intrusive waste disposal practice that ultimately our grandchildren will be left to bear the brunt of.

Now, I say that because I have looked at some of the proposals that are included in the Naval Research Lab report. One of the proposals is this so-called tethered container proposal, which I was glad to see the report rejected as being unworkable. Unfortunately, that same proposal is what is in the Commerce Committee report that has come before you for a vote today.

I was very disturbed, however, to see what the first choice was that was described in the lab report and it is a so-called surface emplacement project. Essentially, what would happen under that proposal would be this. A barge would sail from a major metropolitan area; Philadelphia is listed as one of the cities. It would be loaded with 55 million tons of waste; 50 bags would be packed on this barge and the waste would be loaded in the 50 bags. The barge would sail anywhere from 200 to 2,300 miles offshore.

It would dump the 55 million pounds of waste through 3½ miles of water onto an ocean dump site that is almost as big as 100 football fields, and for the amount of wastes that are discussed in the lab report solely for dredged materials, we are talking about a universe of wastes that would be dumped every year in the deep ocean of 44 trillion pounds of dredged sediments. This is outrageous to even consider undertaking this kind of an activity in the deep ocean and we are very disturbed to see that time has been given to that.

I was also disturbed to read that in the Naval Research Lab report, it cast grave doubts about the bags into which the waste would be put. Those bags have only been tested in 295 feet of water as opposed to 20,000 feet of water, as proposed in the Naval Research Lab report, so they are not tested in deep water. They also have a propensity to rip, and it is not at all clear that they would be able to withstand on the ocean floor the effects of the deep ocean.

So we are talking about embarking on a waste management strategy with devices that may or may not work, have never been tested, for waste that we do not need to dump in the deep ocean, because, finally, my concluding remark is that we cannot legally dump industrial waste or sewage sludge in the oceans. That leaves dredged material. If the dredged material is clean, it should not be dumped in the ocean. It is a resource. It is fabulous for beach renourishment, for landfill cover, for nurseries, plant nurseries. It can all be used. We should not throw it away.

If it is contaminated, it should not go into the ocean no matter what the size or the type of the container is. Again, under the

Ocean Dumping Act of 1972, we are not to dump materials in the ocean that degrade the marine environment.

So there is not a waste crisis that is pushing this industry. What we can do is prevent the waste from being created in the first part and pursue a different Federal program that has been on the books since 1987, which is the development of technologies to clean up contaminated sediments, not to put them in bags and dump them in the ocean or put them in containers and dump them in the ocean but clean them up so they can be safely disposed of.

The groups that I work with around the country strongly support that program and that approach to waste management rather than opening up the oceans for a variety of wastes. Thank you for the opportunity to testify.

[The prepared statement of Ms. Millemann follows:]

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TESTIMONY

BEFORE THE NATIONAL SECURITY SUBCOMMITTEE ON MILITARY RESEARCH AND DEVELOPMENT AND THE RESOURCES SUBCOMMITTEE ON FISHERIES, WILDLIFE AND OCEANS

UNITED STATES HOUSE OF REPRESENTATIVES

Regarding the Potential Use of the Deep Ocean Environment as a Repository for Certain Types of Waste

by Beth Millemann, Executive Director
Coast Alliance
Washington, D.C.

On Behalf of:

American Littoral Society (Highlands, NJ)
Baykeeper, American Littoral Society (Highlands, NJ)
Cape Arago Audubon (North Bend, OR)
Center for Marine Conservation (Washington, D.C.)
Clean Ocean Action (Highlands, NJ)
Coast Alliance (Washington, D.C.)
Coastal Advocates (Los Gatos, CA)
Concerned Citizens of Montauk (Montauk, NY)
Conservation Law Foundation (Boston, MA)
Fisher's Island Civic Association (Fisher's Island, NY)
Fisher's Island Conservancy, Inc. (Fisher's Island, NY)
Friends of the Earth (Washington, D.C.)
Great Lakes United (Buffalo, NY)
Greenpeace International (Washington, D.C.)
Heal the Bay (Santa Monica, CA)
Jersey Coast Angler's Association (Toms River, NJ)
Lake Michigan Federation (Chicago, IL)
Lake Pontchartrain Basin Foundation (Metairie, LA)
League for Coastal Protection (Malibu, CA)
Louisiana Environmental Action Network (New Iberia, LA)
ManaSota-88 (Palmetto, FL)
Montauk Fishermen's Emergency Fund (Montauk, NY)

Narragansett Baykeeper (Narragansett, RI)
Natural Heritage Institute (San Francisco, CA)
Natural Resources Defense Council (Washington, D.C.)
North Carolina Coastal Federation (Newport, NC)
Northwest Environmental Advocates (Portland, OR)
Ocean Advocates (Dickerson, MD)
Pacific Coast Federation of Fishermen's Associations (Sausalito, CA)
People for Puget Sound (Seattle, WA)
Saratoga Springs Hazardous Waste Coalition (Saratoga Springs, NY)
Save The Bay (Providence, RI)
Save the Harbor/Save the Bay (Boston, MA)
Save Our Shores (Santa Cruz, CA)
Sierra Club, Northeast Regional Field Office (Saratoga Springs, NY)
Staten Island Sport Fishing Federation (Staten Island, NY)
Surfrider Foundation, Santa Cruz Chapter (Santa Cruz, CA)

December 6, 1995

My name is Beth Millemann, and I am Executive Director of the Coast Alliance, a national coalition of environmental leaders headquartered in Washington, D.C. The Coast Alliance works to educate the public about the value of ocean and coastal resources. I am presenting testimony today on behalf of the Coast Alliance and 35 other fishing, water recreation and environmental organizations. We appreciate the opportunity to express our grave concerns about, and opposition to, proposals to dump wastes in the deep ocean.

Follow-Up To The 1992 Hearing

In the letter inviting me to testify, Chairmen Weldon and Saxton described today's hearing as an investigation into potential use of the deep ocean environment as a repository for certain types of waste, particularly contaminated dredge material. Today's hearing was described as a follow-up to a 1992 hearing on using the deep ocean for contaminated dredge disposal.

Many extremely valid concerns were raised at that 1992 hearing, and they are as relevant today as they were then. For example, Chairman Saxton joined his colleagues from New Jersey -- former Representative William Hughes and Representative Frank Pallone -- in pointing out the potential for deep ocean dumping to degrade the marine environment. Mr. Hughes vowed to work against any experimental ocean disposal program. Mr. Pallone rightly described proposals to dump in the deep ocean as turning the ocean floor into a landfill. And Chairman Saxton cautioned that:

> "Until scientifically determined conclusions are made beyond our present state of ignorance, this government during a time of fiscal restraint would be hard-pressed to assist research efforts seeking to inject more waste into the ocean floor."

The Oceans Are Biologically Rich

Since Chairman Saxton's 1992 observations, our state of ignorance has greatly improved with regard to the deep ocean. In October 1995, the *New York Times* reported an astonishing breakthrough in knowledge about the deep ocean and sea floor (see attached). According to scientists interviewed by the *New York Times*, the deep ocean has now been discovered to "harbor a riotous diversity of life":

> * The diversity of species in the deep ocean is so high that it may rival that of tropical rain forests, often seen as the pinnacle of biological richness.
>
> * The estimates for the number of species on the deep-sea floor have now soared to 10 million or even 100 million, hundreds of times larger than old projections. According to Dr. Lambshead, a marine biologist at the Natural History Museum in London, "all sorts of ecologic theories that looked good suddenly fall apart. We're having to change all our ideas."
>
> * A huge variety of life occurs throughout the deep sea. Along with its ecological importance, there is the potential for significant commercial value.

The Oceans Are Rich But The Country Is Not

Our knowledge of the deep ocean environment has grown since 1992, as has the nation's debt. This Congress is focusing enormous attention on the budget and major financial problems facing the nation. A *Summary Engineering Report* prepared for the Naval Research Laboratory in January 1995 estimates that operating one barge for deep ocean dumping activities would cost $15 million per year, while another of the proposed ships would cost $32 million a year to operate. Presumably, several barges and ships will be needed to dispose of the 20 million metric tons of sediments discussed in the report, as 800 trips from port to dumpsite and back to port again will be needed to dump all that mud. The cost of retrofitting or building these barges and operating them could easily be in the hundreds of millions of dollars per year. In comparison, the program for developing technologies to decontaminate dredged sediments costs $5 million a year.

The government would be called on to be a major financial player in the development of the dumping industries, shouldering the costs of modelling, testing, designing, building prototypes, and finalizing the technologies for commercial development -- and for profit-making by the private companies once the government has paid to research and develop the machines. Instead of spending precious tax dollars on developing new ways to dump polluted waste in the ocean -- a practice which is illegal and strongly opposed by the public -- the Federal government should continue its extremely modest investment in technologies that can clean up toxic materials, not just get them "out of sight and out of mind."

The Naval Research Lab's *Report* was conducted over the strong objections of Senator Frank Lautenberg who urged in 1993 that the study be dropped because of "scarce federal resources." He also pointed to the improvement of fisheries and water quality with the end of sewage sludge dumping off the Jersey shore. Representative Gerry Studds also cautioned the Department of Defense to abide by the Ocean Dumping Ban Act, which makes it unlawful to dump, or transport for the purpose of dumping, sewage sludge or industrial waste.

The Summary Engineering Report

The *Summary Engineering Report for Abyssal Plains Waste Isolation Project* was completed in January 1995 for the Navy. It is one of the more recent documents proposing deep ocean dumping. It is useful to examine what this newest document proposes.

In a nutshell, the Report focusses on deep ocean dumping of industrial waste in the form of incinerator ash, sewage sludge and contaminated dredged sediments. These materials cannot be legally ocean dumped. In addition to being illegal, any new ocean dumping activities would be extremely unpopular. The public has spoken out forcefully and repeatedly against ocean dumping of pollutants, including shore tourism interests, water recreation businesses, fishermen and conservationists.

What does the Navy's Report Recommend?

The Report ranks different dumping concepts. It's number one choice is the "Surface Emplacement Concept." In this instance, a barge would sail out to one of 400 dumpsites. Off the Atlantic coast, the waste-loaded barge would have to sail from over 630 miles to over 1,250 miles to reach the dumpsite. For the Pacific, the barge would travel from 275 miles to nearly 2300 miles from port to dumpsite. For the Gulf of Mexico, the barge would have to sail from 250 to 712 miles from port to dumpsite. The dumpsites would be located off such heavily populated cities as Boston, New York, Philadelphia, Baltimore, Seattle, San Francisco, Los Angeles, San Diego, Tampa, and Galveston.

Each barge would carry 25,000 metric tons of wastes that are currently illegal to dump in the ocean. That translates into more than 55 million pounds of waste, per barge. The wastes would be put into 50 bags. So barges travelling hundreds if not thousands of miles out to sea -- subject to storms, hurricanes, and nor'easters -- would be loaded up with 55 million pounds of waste.

Once the dumpsite was reached, the barge would dump bags of incinerator ash, contaminated dredged sediments, or sewage sludge into the ocean. The bags would be dropped from the bottom of the barge to sink through roughly 20,000 feet of water. This is a depth of over three-and-a-half miles.

The 50 bags containing a total of 55 million pounds of waste would be dropped on a dumpsite measuring 500 meters by 500 meters. This translates into roughly 2.7 million square feet -- making the dumpsite an area the size of nearly 100 football fields. The bags would be dropped through water over three-and-a-half miles deep, from a sight far out in the high seas subject to storm conditions and currents, to cover an ocean area the size of nearly 100 football fields.

In the *Report*, an estimate of roughly 20 million metric tons of dredged material is listed as "suitable" for deep ocean disposal every year. This translates into 40 trillion pounds of dredged sediments annually.

The *Report* estimates that the per-port capacity is 2.5 million metric tons, which means that presumably eight ports would be ports-of-call for the dumping barges. To dump 20 million metric tons of waste in the ocean, 800 trips would have to be made at the rate of 25,000 metric tons per trip.

Therefore, the Report must envision the use of several barges to service the eight ports-of-call to make the 800 trips necessary to dump **40 trillion pounds of dredged sediments in the ocean.**

To summarize the Report's number one choice for deep ocean dumping:

A barge would sail from a major metropolitan area, loaded with 55 million tons of waste. It would sail anywhere from 276 to 2300 miles offshore. It would dump 50 bags containing a total of 55 million pounds of waste into the ocean. The bags would sink through more than 3 1/2 miles of water. The dumpsite area on the ocean floor would be the size of nearly 100 football fields. If only dredged sediments are dumped -- as opposed to sewage sludge and incinerator ash, as also proposed by the report – 44 trillion pounds of sediments would be dumped in the ocean annually.

The top ten reasons why this proposal is full of flaws are:

1. It would be illegal under U.S. and international law to dump the wastes proposed by the *Report*.
2. It would be illegal under U.S. law to transport the wastes through U.S. waters for the purposes of dumping. Therefore, you could neither transport nor dump the wastes discussed by the *Report*.
3. Transportation hazards would be enormous. Distances of hundreds or thousands of miles would be covered by a ship loaded with 55 million pounds of waste. What happens in the event of a storm, or leak, or spill?
4. The deep ocean is extraordinarily vibrant and filled with life, much of it with great commercial potential. In addition, the ocean is traversed by marine mammals, all of which are endangered or threatened species. Vitally important fisheries use the ocean and depend on clean water for survival. It would be extremely difficult to monitor the impact on migratory marine mammals and fisheries from exposure to the wastes. However, common sense dictates that dumping 44 trillion pounds of waste in the ocean would make an impact on its biological integrity.
5. A dumpsite on the ocean floor the size of 100 football fields is the equivalent of firebombing the ocean floor.
6. U.S. waste policy has developed more of an emphasis on monitoring disposal facilities to ensure that wastes are not moving offsite. Monitoring the movement of hundreds of bags on the ocean floor 3 1/2 miles below the water surface would be extremely difficult if not impossible.
7. Ocean floor dumping would make waste retrieval for treatment nearly impossible, dooming the ocean floor to be a landfill forever.
8. If the bags decayed or split open, cleaning up the resulting hazardous waste area would be impossible. In addition, the bags of waste would be dumped through extremely deep water. The only experience to date with dumping geotextile bags filled with waste has been in water less than 300 feet deep. This Report proposes dumping in water 20,000 feet deep.
9. There is no practical experience with the bags proposed to hold 1 million

pounds of waste each. They have never been tested in deep water; they have the potential to rip as they are dumped off the barge; there is no evidence showing they can withstand the forces of the deep ocean; and it is likely that their disposal in the ocean would be illegal under international and domestic law.

10. There is no need to embark on this proposal of herculean and completely unproven proportions. Contaminated sediments can be stored on site, in upland facilities or treated. It is illegal to dump any other wastes in the ocean, with the exception of clean dredged materials. If the dredged sediments are clean, there are many beneficial reuse options, beach renourishment or safe disposal alternatives available: they are a resource, not a waste.

The *Report* acknowledges some of these very fundamental problems in its next-to-the-last page. It acknowledges that the downside of the "Surface Emplacement" concept is that "the bags are expected to drift apart as they fall through the water column," which presumably would make it difficult to actually dump in the designated dumpsite. Earlier in the *Report*, it is noted that the only experience with dumping bags of waste in the ocean has come from the Army Corps of Engineers in water depths of less than 300 feet, which is less than 5 percent of the depth of water discussed for deep ocean dumping. The susceptibility of bags to drift is raised. Bag survivability on the ocean floor is also a complete unknown. The bags can also rip as they exit the barge. And there aren't enough of them: currently, 700 are made a year and the "Surface Emplacement" project would require seven times that.

This entire concept pivots on the notion that wastes will be kept out of the marine environment because they will be in bags. But almost nothing is known about these bags, whether they can survive on the seafloor, whether they will land in the targeted dumpsite, whether they will rip on their way out of the barge, even whether there will be enough of them to sustain this new mini-industry.

This concept also depends on current law being overturned. On the last page, the *Report* notes that the Ocean Dumping Ban Act made it illegal to dump sewage sludge at sea. Incinerator ash may contain contaminants that are prohibited from ocean dumping under the international treaty called the London Convention. And the synthetic bags themselves could well be illegal since the London Convention, the International Convention on the Prevention of Pollution from Ships (MARPOL) and the Marine Protection, Research and Sanctuaries Act (MPRSA) make it unlawful to dump persistent synthetics in the ocean.

Why is an activity that is illegal, potentially very damaging to the environment, extremely costly and entirely unproven being considered?

Decontamination Technologies Are Further Developed Than Deep Ocean Dumping Technologies

Instead of sinking Federal dollars into developing ocean dumping techniques, the Federal

government should continue developing techniques that don't shuffle wastes around: rather, they reduce or remove the contaminants that make the waste problematic. Since 1987, the Federal government has supported demonstration projects at five sites in the Great Lakes that are geared toward developing ways to make contaminated sediments safe for re-use or disposal. In 1992, a demonstration project was authorized in the New York-New Jersey Harbor.

These Great Lakes and New York-New Jersey decontamination projects show real promise for *de-contaminating* wastes, not just bagging them and dumping them. The Environmental Protection Agency, the Army Corps of Engineers and entrepreneurs have cooperated to further develop methods to make contaminated sediments clean enough for reuse as landfill cover, plant nursery application, or safe disposal.

Waste Dumping In The Deep Ocean Is Unwise and Unnecessary.

There are several reasons why embarking on a deep ocean dumping concept is unwise and unnecessary.

1. Ocean dumping of wastes other than clean dredged sediments is illegal under U.S. law, while the ocean dumping of most other wastes is illegal under international law.

A. Domestic Law. The Marine Protection, Research and Sanctuaries Act (MPRSA) was passed in 1972. It was later amended by the Ocean Dumping Ban Act of 1988 (ODBA). The 1988 law banned ocean dumping of sewage sludge and industrial waste, and prohibited ocean incineration of wastes. It also banned the transportation of wastes through U.S. waters for the purpose of ocean disposal.

The ODBA bans were in addition to prohibitions already included in the original 1972 law, the MPRSA. Under it, pollutants that cause cancer or genetic damage cannot be dumped in the ocean above "trace" amounts. Many of these pollutants are found in sediments dredged from harbors or rivers, including dioxin, PCBs, mercury and DDT. Therefore, under the MPRSA, dredged materials containing more than "trace" levels of carcinogens or mutagens cannot be legally dumped in the ocean. That leaves only one material that can be legally ocean dumped: dredged sediments that are clean or whose pollutant levels are below "trace."

In sum, the Navy's *Summary Engineering Report* proposes to dump materials in the ocean that are illegal under the MPRSA and the Ocean Dumping Ban Act.

B. International Law. The London Convention governs waste dumping activities in the ocean, and the United States -- along with dozens of other countries -- has been a part of the Convention since 1972. Like U. S. law, the London Convention has been steadily moving in the direction of *increased* ocean protection and *decreased* waste disposal at sea. In 1994, the London Convention voted to ban hazardous waste incineration at sea. It also banned the disposal of industrial waste at sea, and outlawed the disposal of high-level and low-level radioactive waste dumping at sea. Only two materials may be legally dumped: sewage sludge and dredged

sediments, and there is movement toward banning sewage sludge disposal soon.

The direction taken by the international community through the London Convention and the United States through passage of the Ocean Dumping Ban Act is clear: the eventual elimination of waste dumping at sea.

In addition to the London Convention's prohibitions, the MARPOL convention (International Convention on the Prevention of Pollution from Ships) regulates waste dumping at sea. As mentioned above, it, along with the London Convention and MPRSA, prohibits ocean dumping of persistent synthetics, which raises questions about the legal ability to dump synthetically bagged wastes in the sea.

Both U.S. and international law have moved away from the ocean as a waste repository. By and large, the wastes contemplated for a new deep ocean dumping regime cannot be legally dumped at sea. Starting a new ocean dumping industry would also run completely counter to U.S. and international waste disposal policies.

2. Embarking on a new at-sea waste dumping protocol is completely inconsistent with U.S. waste management policies.

Waste dumping in the deep ocean would run counter to established waste management policies for the following reasons:

A. deep ocean dumping would act as an enormous disincentive for waste prevention, recycling and reuse.
B. waste disposal on the seafloor hundreds or thousands of miles offshore in depths of water over three miles deep would make waste monitoring incredibly difficult, while making waste retrieval and site clean-up nearly impossible.
C. beginning a new deep ocean practice would divert limited Federal funds from the development of technologies that solve waste problems, not just move them around.
D. scattering bags of wastes across the ocean floor would leave a legacy of waste for our grandchildren and great-grandchildren to grapple with.

Waste Policy Has Shifted To Prevention, Recycling And Reuse

The first preferred action in the waste management hierarchy is prevention, followed by recycling and reusing wastes. Ocean dumping is a throw-back to an out-of-sight, out-of-mind outlook on waste management. As history has shown, as long as the oceans have been available for waste dumping, preferred activities such as waste prevention and reuse have languished. While the oceans received sewage sludge, little effort was made to determine environmentally safe ways of decontaminating and disposing of sludge. When the Ocean Dumping Ban Act passed in 1988, states and municipalities were forced to develop alternatives. As we've closed

the ocean as the ultimate garbage can, waste management has developed a more proactive and environmentally safe approach, which benefits everyone.

The only material that can be legally ocean dumped in U.S. waters is dredged sediment. Contaminants in the sediment pose a threat to the marine environment. Decontamination technologies developed in the Great Lakes, as well as techniques pioneered by mining companies, are succeeding in recycling useful minerals from sediments and removing harmful pollutants. If sediments were lumped into a bag and tossed overboard, the ability to mine them for useful elements or reduce their toxicity would be lost.

Waste Monitoring, Retrieval And Site Clean-Up Would Be Nearly Impossible With Deep Ocean Dumping.

In terms of waste disposal on land, the emphasis is on constructing facilities whose activities can be closely monitored to determine if harm to the environment or human health is occurring. For example, landfills are now required to have double liners to help reduce the possibility that wastes will filter through to underground water supplies. Monitoring systems are required to determine if wastes are moving offsite or leaking from the disposal area. Wastes are supposed to be confined so that, if possible, treatment can occur.

None of these criteria would be met with deep ocean dumping. Monitoring would be extremely difficult through 3 1/2 miles of water in an area subject to currents, underwater storms and wave action. Leakage or offsite movement would be difficult to determine and if found, remedies would be practically non-existent.

A New Deep-Ocean Dumping Practice Would Divert Federal Funds Away From Problem-Solving

In the Navy's *Report*, Federal funding would be required to develop and test the technologies that are in the five "concepts" discussed in the Report. As this Congress knows, Federal Funding budget for innovative technologies that benefit the environment is extremely limited. The entire budget for the Assessment and Remediation of Contaminated Sediments (ARCS) program in the Great Lakes is a modest $5 million per year. Since this program has been ongoing for eight years, and its New York-New Jersey counterpart has been in existence for a couple of years, it would make better fiscal sense for the Federal government to direct its limited resources into technologies that hold the promise of solving the waste problem, not just re-locating it.

Deep Ocean Dumping Would Leave A Legacy For Future Generations To Confront

This country has a history of embarking on waste disposal activities whose impacts are not realized for generations. For example, liquid hazardous wastes were dumped into unlined landfills, which led to toxics leaching out and poisoning drinking water. Tall stacks spewed air pollutants that resulted in acid rain and significant forest damage. Too often our response to a

perceived "waste crisis" has been to jump first and think later. Deep ocean dumping would leave another waste legacy to our grandchildren and great-grandchildren, who are already burdened with the problems created to date.

3. There is no need to begin waste dumping in the deep ocean as economically and environmentally preferable waste disposal, prevention and reuse options exist and are being further developed.

Clean-up technologies are being developed through the Great Lakes and New York-New Jersey programs. While they are not currently ready for commercial application, they are moving toward that goal. It is quite possible that launching a deep ocean dumping industry will take as long as getting the decontamination technologies to a position of commercial readiness.

Even in the absence of clean-up methods, new disposal and reuse options are reducing the volume of waste proposed for deep ocean dumping. For example, some ports are avoiding ocean dumping by using approaches such as creating new subaqueous pits for storage of contaminated sediments. The Port of New York-New Jersey is investigating this option for storage of polluted dredged materials. The Port of Boston has decided to avoid ocean dumping of problem sediments and is, instead, creating a disposal pit in one of its channels. On-site disposal options are also being pursued by the Port of Seattle and some of the Great Lakes ports. Some sediments are being treated to the point that they are suitable for landfill cover, thereby becoming an asset, not an encumbrance.

With everything banned for ocean disposal except dredged materials, the need for embarking on a massive new ocean dumping program is completely absent.

4. Waste dumping in the deep ocean could harm living marine resources and industries dependent on them.

The *New York Times* and other publications, including *Smithsonian* and *BioScience* magazines, have reported new scientific breakthroughs regarding the incredible diversity and richness of the deep ocean. As well as threatening the plants and animals that live in the abyssal plain and elsewhere in the deep ocean, waste dumping activities would threaten animals that live closer to shore. For example, ships hauling 55 million pounds of waste would sail for huge distances through areas used by endangered and threatened marine mammals. These areas are also rich commercial and recreational fisheries. If a spill or leak were to occur in transit, the impacts could be disastrous. In addition, the action of dumping hundreds of million-pound bags through miles of water onto the seafloor could have catastrophic impacts. At a bare minimum, life on the ocean floor would be smothered or crushed by the bags landing intact or breaking apart on impact. Waste bags tossed into ocean waters also threaten the delicate microlayer of the sea, which is a thin zone of water and air which supports foodchain basics like phytoplankton. The dumping activities -- transportation, water dumping and seabed landing --

are fraught with problems for the ocean and the resources it supports.

Conclusion

As proposed by the *January 1995 Report* done for the Navy, deep ocean dumping would involve wastes that cannot legally be disposed in the ocean or even transported over it for purposes of disposal. The *Report's* number one recommended proposal would go against long-standing public opposition to waste dumping in the ocean. It would involve long-distance transportation over storm-prone seas to a site where literally trillions of pounds of waste would be tossed into the ocean to sink through over three miles of water and despoil an area of the ocean floor the size of almost 100 football fields.

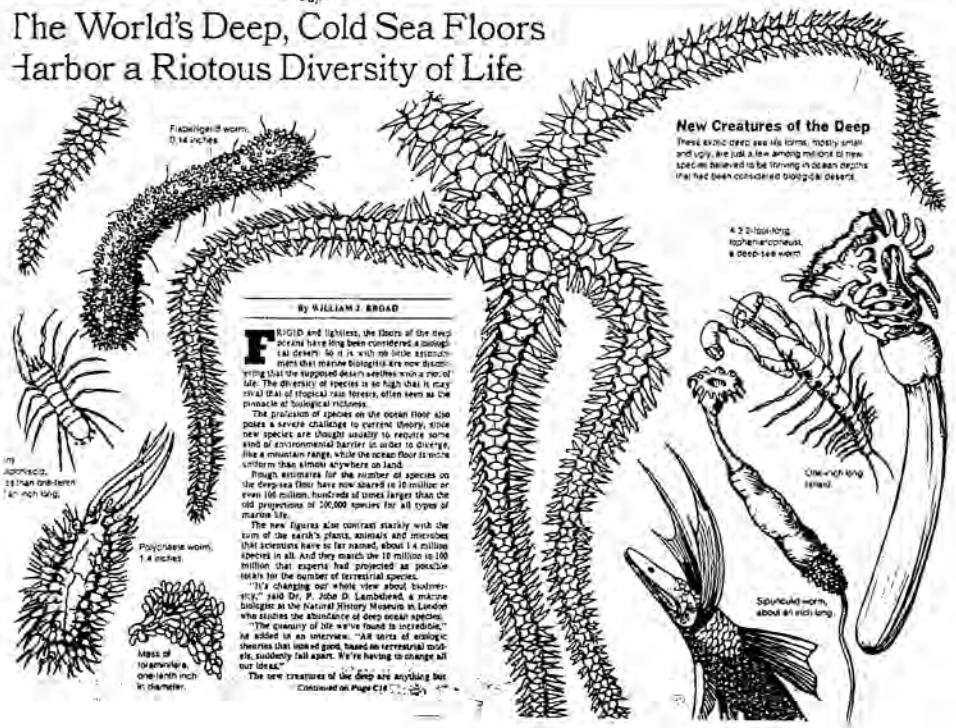
This proposal is unworkable. It is also unnecessary. Other more environmentally sensitive disposal, reuse, recycling and prevention options exist.

Any deep ocean dumping proposals would, by their nature, divert scarce Federal funds from supporting the development of technologies that would deal head-on with pollutants in waste, not just bundle them up and dump them at sea.

On behalf of the fishing, water recreation and conservation interests I represent today, I strongly urge the subcommittees to prevent deep ocean dumping activities from occurring.

Thank you for the opportunity to testify.

The World's Deep, Cold Sea Floors Harbor a Riotous Diversity of Life



By WILLIAM J. BROAD

FRIGID and lightless, the floors of the deep oceans have long been considered a biological desert. So it is with no little astonishment that marine biologists are now discovering that the supposed desert seethes with a riot of life. The diversity of species is so high that it may rival that of tropical rain forests, often seen as the pinnacle of biological richness.

The profusion of species on the ocean floor also poses a severe challenge to current theory, since new species are thought usually to require some kind of environmental barrier in order to diverge, like a mountain range, while the ocean floor is more uniform than almost anywhere on land.

Rough estimates for the number of species on the deep-sea floor have now soared to 10 million or even 100 million, hundreds of times larger than the old projections of 200,000 species for all types of marine life.

The new figures also contrast starkly with the sum of the earth's plants, animals and microbes that scientists have so far named, about 1.4 million species in all. And they match the 10 million to 100 million that experts had projected as possible totals for the number of terrestrial species.

"It's changing our whole view about biodiversity," said Dr. P. John D. Lambshead, a marine biologist at the Natural History Museum in London who studies the abundance of deep ocean species.

"The diversity of life we've found is incredible," he added in an interview. "All sorts of ecologic theories that looked good, based on terrestrial models, suddenly fall apart. We're having to change all our ideas."

The new creatures of the deep are anything but

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THE NEW YORK TIMES, TUESDAY, OCTOBER 17, 1995

Deep Sea Floors Teem With Diversity of Life

Continued From Page C1

cuddly or cute, menacing or sinister. Dwelling on or in seabed mud, and often smaller than an aspirin tablet, they include tiny slugs, snails, crabs, bristle worms, ribbon worms, lamp shells, tusk shells, sea anemones, brittle stars and sea cucumbers. The biggest are seldom longer than a banana.

Often miles deep, thriving in pitch darkness under enormous pressure, the mobs of marine invertebrates have now been found in hundreds of deep samples from the northeast and northwest Atlantic, the eastern and western Pacific, and other parts of the global sea.

The variety of life is so high that there is very little overlap among species from various sampling sites, even when they are relatively close together. It is almost as if the animals in any given sample were mostly endemic, that is, species that live nowhere else, as is often found on Pacific and Caribbean isles.

In this case, however, the endemicity is occurring in water — a medium famous for its lack of isolating barriers and its propensity to aid animal migration. Moreover, it is apparently occurring over much of the domain of the deep sea, a dark world that envelops nearly two-thirds of the earth.

Though small and ugly by human standards, the newly recognized creatures are considered important because of their possible commercial value, because of their role in maintaining the earth's ecological balance and because of the intellectual challenge of understanding their place in the planet's evolutionary history.

The potential commercial value of the new organisms lies in their great genetic diversity. In general, all kinds of creatures with strange metabolisms from odd places around the earth are starting to be aggressively investigated as possible sources of biological wealth. The hope is to use their exotic genes to develop new drugs, catalysts and agents that can break down toxic wastes.

The discovery seems to give some indirect credence to speculation about the existence of much larger sea creatures that remain to be discovered. If there are krakens, leviathans or other unknown monsters that prey at the top of the rich food chain of the deep ocean floor, they are certainly too big for the kind of small traps so far used in sampling programs.

Not surprisingly, the discovery of the sea floor's biodiversity has set off debates as scientists struggle to understand the unexpected opulence of a supposedly barren world.

"Nobody has explained this," said Dr. Robert R. Hessler, a pioneer of deep biodiversity who works at the Scripps Institution of Oceanography in La Jolla, Calif. "Everybody comes up with wonderfully plausible ideas. But nobody really knows why you get all these species. The issue is just hanging there."

Dr. J. Frederick Grassle, director of the Institute of Marine and Coastal Sciences at Rutgers University in New Brunswick, N.J., and a leading figure in the field, said the mystery had important implications for understanding the fate of the earth.

"Species diversity is one of the most sensitive indicators of change," Dr. Grassle said. "A lot of highly diverse areas need urgently to be studied because they're disappearing, the rain forests and coral reefs.

"We don't know how threatened the deep sea is," he added. "But in the long term there are going to be changes. So there is some urgency in knowing what's out there."

Scientific theories of life are often rooted in the ideas of Charles Darwin, whose "Origin of Species," published in 1859, said evolution was partly driven by reproductive isolation. Species often arise, he held, when barriers like mountains or deserts prevent the interbreeding of populations.

In time, groups that become isolated drift apart genetically and physically to form new species, meaning that they are so dissimilar that they cannot successfully procreate.

Land is full of such barriers, both geographic and climatic. But the sea has few — a fact Darwin and his scientific heirs often pointed to in explaining why the land appeared to be so much richer biologically than the sea. This logic seemed reinforced in considering the deep, which not only had few environmental barriers but lacked primary producers such as plants. For food, its inhabitants mainly had to rely on a rain of organic scraps falling from far above or to prey on one another.

Expeditions over the decades that dropped lines and dredges into the deep seemed to confirm the wasteland idea. The few glimmerings of life that were discovered tended to be monotonously similar. The sea cucumbers of the deep Atlantic were virtually indistinguishable from those of the deep Pacific, as many a weary researcher observed.

The first hint that things were radically different came in the late 1960's when Dr. Hessler and Dr. Howard L. Sanders, both then at the Woods Hole Oceanographic Institution on Cape Cod, developed new kinds of bottom-sampling sleds that revealed an astonishing richness in the depths of the north Atlantic.

Half-inch crustacean, Ischnomesus brunni, from sea floor.

Ecological theories based on the land are threatening to fall apart in the sea.

The breakthrough was simple. The sampling nets that had been regularly towed behind such sleds were replaced with ones in which the nylon meshes were much finer. The new nets caught smaller creatures, and caught them in prodigious numbers. One sampling run hauled up 365 species.

Though startling, the work was slow to be duplicated elsewhere because deep research was so difficult and costly. Moreover, collected specimens were often hard to identify because so few biologists were trained in deep-sea taxonomy. In short, the richness was debatable.

The work was slowly extended in the 1970's to many new sites in the Pacific and Atlantic, with similar startling results. Even so, skepticism continued in some circles because the sampling was imprecise. Sled runs for different times and speeds produced different results. And it was hard to know how far the sleds traveled across on the bottom, a fact that made the density of sampled life ambiguous.

So Dr. Hessler, after he moved to Scripps, worked with a colleague there to develop a device known as a box corer. Like a giant square cookie cutter 20 inches on a side, it was dropped on a line from a ship and cut into a precise volume of muddy sea floor. A seal drawn across the corer's bottom kept the sample from falling out during retrieval.

The box corer worked a revolution in the field, allowing a new level of precision. Now, for the first time, the distribution of deep fauna could be exactly mapped. Though individual samples were small, repeated ones over a region could give a clear reading of species density.

A half dozen sites were studied with such methods in the 1970's and 1980's, with tantalizing results. But the field really developed only after Dr. Grassle, then at Woods Hole, and several other scientists embarked on an extensive study off the east coast of the United States for the Interior Department's Minerals Management Service, which was considering oil and gas development in deep water.

Armed with a few million dollars, Dr. Grassle, Dr. Nancy J. Maciolek, Dr. James A. Blake and Dr. Brigitte Hilbig, among others, in the mid-1980's dropped box corers measuring one foot square into waters off Delaware, New Jersey, New England, and North and South Carolina. A total of 556 box core samples were taken at sites up to 2.2 miles deep. The feast of life extracted from the muck was so great that taxonomists spent several years identifying all the different types of animals.

"Our results, from the first extensive quantitative sampling of deep-sea communities, indicate a much greater diversity of species in the deep sea than previously thought," Dr. Grassle and Dr. Maciolek wrote in the February 1992 issue of The American Naturalist, a scientific journal.

From 272,000 individuals captured by the box corers, the scientists identified a total of 1,597 species. More important, the rate at which new species were added remained high throughout the sampling — in other words, the diversity of life was so great that newness was found wherever a box corer hit bottom. Every square foot of core disclosed another dozen or creatures that were unknown to science.

"The number of species continued to rise steadily as more samples and more individuals were collected," the scientists wrote.

Based on the rate of additions, the scientists estimated that the deep sea in general might hold 100 million species of small invertebrates. Assuming that abyssal regions far from continental shelves supported less life, they said, a more realistic number was 10 million species. "This estimate is probably conservative," they added.

It nonetheless provoked strong debate. Dr. Robert M. May, a zoologist at Oxford University, faulted the figures as unsupportable and said that the deep total was unlikely to exceed a half million species.

By contrast, Dr. Gary C. B. Poore and Dr. George D. F. Wilson, Australian biologists, said their own field studies in the Pacific suggested that global species richness was even greater than 10 million.

"We suspect new estimates could be much higher," they wrote in the Feb. 18, 1993, issue of the journal Nature.

Other experts, such as Dr. Lambshead of the Natural History Museum, formerly the British Museum, suggested that the estimates would easily rise into the range of 100 million species if the count included even smaller creatures such as thread worms, copepods and ostracods, uncounted hordes of tiny multicellular animals that flourish in the deep ooze.

Dr. Hessler of Scripps, the deep

New drugs may emerge from a vast pool of exotic genes in the depths.

biodiversity pioneer, said in an interview that marine biologists needed to redouble their research instead of their rough estimates. "What we don't know is the rate of species replacement" across the deep beyond the few areas that have been sampled, he said. "That's the big question."

Experts also want more investigations of the riddle behind the diversity — how the deep is able to support such richness, seemingly in defiance of Darwin. Dr. Grassle of Rutgers said the disparity is probably more apparent than real. His work suggests that extraordinarily fine but nonetheless formidable barriers arise in the deep as, for instance, food resources raining down from above collect on the seabed in transient patches.

Another conjecture is that the extra billion years or so that life has been evolving in the sea compared with land may be a factor in the unexpected biological richness of its deep recesses.

Given the vast dimensions of the emerging field, said Dr. Lambshead of the Natural History Museum, conservationists were wrong to focus so exclusively on land ecosystems. "You'll still read in textbooks that 80 percent of all species are in tropical rain forests," he said. "That's rubbish. It simply means that 80 percent of all biodiversity scientists work in rain forests."

He said deep taxonomists are so few, and the new population estimates so large, that just identifying the inhabitants of the abyss could take thousands of years.

"The kinds of numbers we're coming up with are frightening," he said. "If we're only halfway right, many species could be forced into extinction before they're ever described."

Mr. WELDON. Thank you for your statement. I thank each of you for your excellent statements and comments and your testimony.

It is very infrequently that we have a panel of witnesses appear before a committee of the House of Representatives at the very same time that the issue that they are here to testify about is on the House floor, so you have a unique opportunity here to directly impact at least four votes here in the Congress on this issue. I do not think we have voted on this yet.

We have heard the pro and con here and we have heard reservations about the capability. We have the capability, but perhaps the technology relative to the bags, and we are talking about from what I understand on the appropriations conference report the patented tethered technology delivery system that you mentioned, which I understand has been rejected by the Navy.

So the question that we have to decide for ourselves today I am going to put to each of you, and that is, should we be spending NOAA's money on this issue.

Frank, would you give us an update? Has there been a vote yet?

Mr. PALLONE. Do you want me to tell you?

Mr. WELDON. Has it been resolved yet? I will yield to the gentleman from New Jersey to give us the latest update. We are not putting you on the spot until we hear what he has to say, so you can think about your answer.

Mr. PALLONE. This really says a lot about the process, unfortunately, and the way things operate around here in terms of certain special interests, if you will, getting their way. But essentially, due to the work of Congressman Saxton and also Congressman Torkildsen from Massachusetts and myself, we had a dialogue on the House floor during the general debate on the conference report, which is occurring right now, with Mr. Livingston.

And Mr. Livingston, of course, said that this research project would not result in any ocean dumping actually taking place, which, of course, I contest. But leaving that aside, he agreed basically that no action would be taken with regard to the research project until our subcommittee, meaning the Fisheries, Wildlife and Ocean Subcommittee, reported a bill authorizing it.

As you know, Mr. Burton has introduced a bill that is essentially the same as what is in the conference report, so that is certainly a positive development because it would mean, at least in theory, that nothing would move forward until our subcommittee took action on the authorizing bill. That is at least the way I understood it, and maybe Mr. Saxton can confirm that when he comes back.

But I am still concerned, because the suggestion was being made, Mr. Chairman, by Mr. Livingston that this was not going to result in any ocean dumping. Of course, my position all along has been that the research project itself is essentially an open-ended opportunity to conduct various forms of ocean dumping and that is the reason why both the Commerce Department, when they did their study, and the Naval Research Lab, when they did their study, suggested that this not be done.

If I could just read this and then I will leave you all alone here, and I read this on the floor, in the letter that came to the chairman of our Resources Committee, Mr. Young, July 28 this year, the General Counsel of the Department of Commerce says that, "The

bill," the Burton bill, "is inconsistent with the spirit as well as the letter of the Ocean Dumping Act and the London Convention. It allows for large-scale open-ended dumping without limitation on the amount of material. It contains no guidance or requirements with regard to prior consideration of the impacts of the authorized waste on the marine environment, monitoring programs after disposal, or methods of packaging or containment of the materials. Therefore, the research program requirements fail to ensure that activities will be scientifically sound, appropriately limited, and undertaken only after consideration of potential adverse impacts."

So my point, Mr. Chairman, was that the research program itself is essentially an open-ended opportunity to do ocean dumping of dredged materials, you name it. There is no real definition. So I do not agree with Mr. Livingston that the research project, if it moved forward, would not result in ocean dumping. It would. But thankfully now, we have a commitment that it would not do this research project or this study until our subcommittee acts.

At least, that is the way I understood it. I think that past experience tells us we have to be vigilant in this regard and constantly make the case that this should not happen, but I think that we at least made some progress today.

Mr. WELDON. I thank the gentleman from New Jersey for his comments and for his work on the House floor, and I thank our colleague from New Jersey, who I know is alive and well someplace in this building or the building across the street. Hopefully, we will see him before we adjourn the session.

But with the comments that our good friend and colleague, Mr. Pallone, just made, we do have a distinguished panel of experts here, scientists, and as we know, in the scientific community there is always room for disagreement on a number of issues and that has been evident by the testimony today. So I would go down the line and ask each of you, if you had the chance to take action on this issue today and to allocate funds through NOAA, as I understand it would have been, to allow a research project to move forward, what would your position be? We will start with Dr. Valent and go right down the line.

Dr. VALENT. To perform this 15-year demonstration project? Absolutely no.

Mr. WELDON. Thank you. Dr. Edmond.

Dr. EDMOND. I think absolutely yes. If you are talking contaminated dredged soil, the volumes involved are enormous. The expense of cleaning it up chemically is enormous. It is in the ocean already. Unfortunately, it is in one of the most biologically productive parts of the ocean, estuaries. We are taking it to the least biologically productive part of the ocean and disposing of it in an organized, safe way, and we should not be misled by the bags breaking. Those are engineering questions. We can solve those. It is an option that should not be walked away from because the situation is getting progressively more serious, both in this country and internationally.

Mr. WELDON. Thank you. Dr. Grassle.

Dr. GRASSLE. In terms of our priorities, I do not think we should go forward with the proposal as stated. I think that for contaminated sediments, there are bigger issues to be solved, particularly

with respect to some of the things that I mentioned in my testimony. There are certainly alternative approaches. Beth Millemann mentioned beneficial use. Certainly, source reduction and taking a systems engineering approach to contaminated sediments in our harbors is what is needed, considering the problem in its entirety. I think isolating the problem as an engineering issue somewhat begs the question.

Mr. WELDON. And Ms. Millemann.

Ms. MILLEMANN. I would agree with that. I would also say that, as we know, this is a time of very scarce Federal funds and what I would suggest instead of this kind of a completely unproven and unnecessary project would be to continue congressional support for the program that was begun in 1987, which is seeking to find a solution to the problem of contaminated sediments to begin with, which is ways to render those sediments safe enough to be reused or to be disposed of safely. That project has been joined by a project that Mr. Pallone has long championed to test different technologies in the New York-New Jersey Harbor area to find ways to clean those sediments up.

I would also add that several of the ports, as Dr. Grassle pointed out also, including the Port of New York-New Jersey, are taking steps to create ways to deal with contaminated sediment issues that they face now. The Port of New York-New Jersey is talking about digging an underwater pit for storage of contaminated sediments. The Port of Boston is doing the same thing for its sediment contamination issue. The Ports of Seattle and Tacoma are doing upland disposal and on-site disposal. So the ports are trying to deal with this as well, too, and that is the prudent course.

Mr. WELDON. What agency is heading up that program?

Ms. MILLEMANN. The decontamination projects that were created in 1987 were amendments to the Clean Water Act that the EPA runs——

Mr. WELDON. So the EPA is running it?

Ms. MILLEMANN [continuing]. Through the Great Lakes National Program Office. The project that Mr. Pallone has championed is run jointly by the Army Corps of Engineers and the EPA and it was authorized through the Water Resources Development Act of 1990.

Mr. WELDON. Thank you.

Mr. Kennedy.

Mr. KENNEDY. Thank you, Mr. Chairman.

Mr. WELDON. Let me thank you for sticking through this marathon landmark hearing. You have been here from the beginning and we appreciate that. Thank you.

Mr. KENNEDY. Not at all. It has been a real education. I look forward to working with my new colleague, Congressman Pallone, and furthering his endeavors on the committee as a recent appointee of the Natural Resources Committee. I look forward to working with some of the panel members as we discuss this issue going forward.

I cannot help but just immediately be struck by the importance of this issue economically. I mean, you can just see all of our land-based dump sites are getting to be such problems, and the cost of transporting waste across State lines is another issue altogether. You can only begin to imagine why this is now being debated in

the conference report. There is no mystery to this. There are big dollars behind this and I am anxious to get more educated and aware of it because I am sure if my constituency really understood what we are talking about here, they would be very interested in learning more about it, so thank you.

Mr. WELDON. I would thank the gentleman and would say that when we have the field hearing up in your area, this is certainly an area that we could pick up on as it relates to Rhode Island and the coastal States in that area.

Mr. Pallone, do you have any other comments or questions?

Mr. PALLONE. I just wanted to say briefly, I know the day is long here, but——

Mr. WELDON. It is very long.

Mr. PALLONE [continuing]. I appreciate all the testimony. I did miss some of it, and I think maybe the most important thing, Mr. Saxton has come back now so I am sure he will comment on it, but——

Mr. WELDON. He will adjourn the hearing.

Mr. PALLONE. The most important thing, I think, is to continue to be vigilant. We know that this has come up before in the Merchant Marine and Fisheries Committee. As I said, there is no doubt in my mind that this was put in the conference because it was not to see the light of day. If it had come up in this authorizing committee or if it had come up in even the regular appropriations process, it never would have gotten through.

Now that this has been shifted back to our subcommittee, I think that we just have to make sure that we bring to light the problems with this bill and why it is essentially ocean dumping, albeit maybe on a limited scale or maybe not.

I just wanted to thank Mr. Saxton and also Mr. Torkildsen for bringing this up on the floor today because I think that we at least have thrown another roadblock in the way, but it is going to come back to bite us again and we have to be constantly vigilant. So thank you, Beth, and thank you Fred and thanks to the others for bringing it to our attention again today.

Thank you, Mr. Chairman.

Ms. MILLEMANN. We really thank both of you for your good work and very quick response time on this issue. It was really so important for you to raise your voice again for the ocean and we really appreciate your hard work on this.

Mr. SAXTON [presiding]. Thank you all. I apologize, but as you know, things do not usually happen in twins around here but they did today on the same subject, so I had to choose, as Mr. Pallone has just correctly stated, to be on the floor addressing this same issue. I think we have done so today successfully, and I thank Mr. Pallone, who was the vanguard of ferreting out some language in the appropriations bill that was objectionable to the New Jersey delegation, so I am very pleased.

I guess I would just ask that my statement be included in the record at the appropriate place.

Just let me ask a question for anyone who wishes to respond. As you know, I just mentioned the conference report on the Department of Commerce appropriations bill includes direction to study potential technology delivery system for deep ocean material place-

ment. Since apparently the Navy has at least indicated serious reservations about this technology or maybe even has rejected the technology do you think it is appropriate that we spend or direct NOAA to spend its funds relative to this topic. I am sorry if you may have already answered this question, but if you would like to address that issue, I would appreciate it.

Dr. VALENT. My approach will be to transfer my reports and our findings and what not to NOAA to a contact that I have been talking to there, Don Pryor, and offer them to him for his use in replying to that Congressional tasking. I do not think they are going to come up with any different findings than we did, and basically, that finding is that a tethered bucket under controlled lowering has about one-tenth the throughput, or in other words, it will cost 10 times as much to get the waste to the sea floor using a tethered bucket concept that is controlled on the way down.

As far as the issue of speeding it up by allowing that bucket to free-fall, that is technically not feasible, but we will be happy to provide all of our information.

Mr. SAXTON. I thank you, and if you would provide a full set of that information, if you have not already done so, to the subcommittee we would appreciate that, because we believe that the changes that were made to the intent of the bill language today reaffirms the authority of the subcommittee to deal exclusively with this matter, so it would be presumptuous on our part to ask you to send that to NOAA at this point. We would prefer that you send it to us.

Dr. VALENT. I see. Thank you.

Mr. SAXTON. We think we have a commitment from all parties now that this process will not proceed until this subcommittee authorizes it.

Dr. VALENT. I see. Thank you. We will do so.

Mr. SAXTON. We think that we have made that much progress. Does anybody else want to respond?

Ms. MILLEMANN. I would just like to respond and say that I think that since there has already been an analysis done of this process that outlined its inherent weaknesses, spending tax dollars to repeat that would be a silly use of money. We also believe that there is no need to start a deep ocean dumping regime. It is also illegal under the law that you and Mr. Pallone worked so hard to pass in 1988, the Ocean Dumping Ban Act.

So many of the materials that have been discussed for deep ocean dumping are illegal under U.S. law, international law, incredibly expensive, examined, and rejected. We would prefer to see a continuing commitment to developing the decontamination technologies that are under development in the New York-New Jersey region through the demonstration project and in the Great Lakes region through the ARCS program.

Mr. SAXTON. Thank you. Dr. Grassle.

Dr. GRASSLE. I would also like to add that we should not consider the problem narrowly as an engineering problem, that there are some issues about our understanding of deep ocean processes and life on the sea floor which need to be considered before we would contemplate putting waste on the abyssal plain.

The other side of the issue is that the question of the contaminated sediments in our ports needs to be addressed broadly. We need to take a systems approach to contaminated sediments in our ports, looking at the entire system. As has been mentioned, we need to consider remediation technologies, but in the short term, it is more important to look for better approaches to containment of the dredged materials. There are a number of innovative proposals to contain sediments in our ports at a reasonable cost.

Mr. SAXTON. Thank you. Mr. Edmond.

Dr. EDMOND. I will be in the minority. I think this is an option that is well worth looking into, certainly at the level of paper studies, as they are called, although I do not find them very valuable. I think if you look at the bag technology, it would work. It would be cheap. It would be accurate. I have almost as many Alvin dives as Fred, and when you get down in the submarine with about a couple hundred pounds, you go straight down. We could accurately emplace material on the sea floor using the bag technology.

We would be taking material from one of the most biologically productive areas in the ocean—remember, the dredged soil is already in the ocean—and putting it in the least biologically productive area, which seems to make sense, doing it at a cost that would be competitive certainly with remediation, and doing it with a system which could operate on a scale comparable to the problem, which is not only contaminated harbors in this country but worldwide.

There is an international problem associated with disposal of contaminated soil. Nobody has come up with a good way of doing it. The study that has been funded has been in existence now for what, 7 or 8 years without any real bullet in the hands. It seems to me that this is an option that should be looked at.

The law is the law and the law can be changed, so the law is not an argument. If it is in the national interest, legislation could be passed. And I think if you think of the problem seriously, as we all do, then there is at the moment no obvious way out that is not going to cost us an arm and a leg.

Mr. SAXTON. Yes, sir, and that is why we had originally scheduled this hearing today, to begin that process, and we want to do that.

I am not a scientist, but I come as other members of this panel do at this from a commonsense point of view and from some experience, I might add. Back several decades ago, we had a problem with sewer sludge and we decided that since the sea was such a vast area, that if we just transported it 12 miles off the tip of Mr. Pallone's district, that it would be out of sight and out of everyone's mind forever.

We finally decided that that did not work, so we moved it to a site 106 miles off the southern tip of my district and dumped it there for a time, and finally we collectively decided that that did not work, in spite of the fact that the sea is such a vast area.

So now we are considering the more vast reaches of the ocean because the first two did not work. So from an experience point of view as well as from a commonsense point of view, one of the things that many of us have concluded is that out of sight is not out of mind when it comes to these types of materials.

I do not claim to know what the answers are, but from some of our experiences in recent years and recent decades, it certainly appears that we need to move very cautiously on these issues.

In any event, I am sure that we have not heard the last of this matter, as Mr. Pallone correctly points out. We thank you for coming to share your visions and your perspectives of this issue with us. We will continue to search together for answers.

Thank you very much. The hearing is concluded.

[Whereupon, at 5:48 p.m., the subcommittees were adjourned.]

[The following information was submitted for the record:]

FACT SHEET
March 1995

PLAN OF ACTION FOR THE IMPLEMENTATION OF REPORT NO. 34 (1993-94) TO THE STORTING ON NUCLEAR ACTIVITIES AND CHEMICAL WEAPONS IN AREAS ADJACENT TO OUR NORTHERN BORDERS

The Government presented Report no. 34 (1993-1994) to the Storting on nuclear activities and chemical weapons in areas adjacent to our northern borders on 8 April 1994. The report was debated in the Storting on 16 June 1994.

The Government has now drawn up a Plan of Action for following up this report. High priority is given to measures to increase nuclear safety and prevent radioactive contamination.

Summary of the Plan of Action

Although Norwegian efforts in connection with nuclear issues will primarily be concentrated on northwest Russia, it may also prove appropriate to provide assistance for certain projects in the Baltic states and Central and Eastern European countries.

The Plan of Action includes projects designed to address the following major problems:

1. Unsatisfactory safety standards at nuclear facilities (power plants, nuclear-powered civilian vessels, nuclear-powered naval vessels and reprocessing plants).
2. Unsatisfactory management and storage of spent uranium fuel and radioactive waste.
3. Dumping of radioactive waste in the Barents and Kara Sea and input into the sea from Russian rivers.
4. Weapons-related environmental hazards.

Although the *responsibility* for solving these problems lies primarily with the Russian authorities, external support is necessary. Norway is seeking to initiate *broad international cooperation on the technical and financial aspects* of these problems.

Increasing international cooperation

In a short period of time, the attention focused on nuclear problems and on the cooperation necessary to solve them has increased considerably.

Norway participates actively in a large number of formal and informal bilateral, trilateral, regional and multilateral fora for cooperation and consultation. Cooperation has been initiated with Russia, the Nordic countries, France and the USA.

Furthermore, nuclear safety and radioactive contamination have been placed on the agenda in a large number of multilateral fora. The most important of these are:

* the International Atomic Energy Agency (IAEA),
* the OECD countries' G-24 group for nuclear safety,
* the OECD's Nuclear Energy Agency (NEA),
* the Nuclear Safety Fund of the European Bank for Reconstruction and Development (EBRD),
* the London Convention of 1972,
* NATO/the North Atlantic Cooperation Council (NACC),
* the Barents Cooperation,
* the Baltic Sea Council,
* the Nordic Council/Nordic Council of Ministers,
* the Rovaniemi Process,
* the UN and
* the EU.

Sound financial basis for increased Norwegian activity

The Plan of Action encompasses surveys and analyses, technical assistance (including training), equipment deliveries, work in connection with international agreements and conventions and political processes for obtaining as much information as possible and promoting the broadest possible international involvement in combating the threat of radioactive contamination in areas adjacent to our northern borders.

The Storting has provided a sound financial basis for increased Norwegian activity in this field. The Government has earmarked up to NOK 130 million for implementation of the Plan of Action in 1995.

In 1995 the Government's efforts to improve nuclear safety and prevent radioactive contamination will focus on the following:

1. *Unsatisfactory safety standards at nuclear facilities*

* Technical assistance including training and equipment deliveries to the nuclear power plant on the Kola Peninsula.

* Risk and impact assessments related to accidents at the nuclear power plant on the Kola Peninsula.

- Studies and measures related to the use of alternative energy sources, energy-saving and efforts to increase the efficiency of the energy sector in northwest Russia.

- Increased cooperation between Norwegian and Russian authorities which are responsible for safety and control measures at nuclear facilities.

- Contributions to the work of the Nuclear Safety Fund to improve safety standards at high-risk nuclear reactors in Russia and Eastern Europe pending their closure in the near future. Norway attaches great importance to ensuring the success of the Fund in implementing a project to improve safety standards at the nuclear power plant on the Kola Peninsula.

- Support for international cooperation on the closure of the Chernobyl nuclear power plant in Ukraine.

- Participation in the work of the IAEA and the OECD/NEA related to liability for nuclear damage.

2. *Unsatisfactory management and storage of spent uranium fuel and radioactive waste.*

- Financial and technical assistance for an international conference under the auspices of the IAEA on the management and storage of radioactive waste in Russia.

- Continuation of the Norwegian-Russian-US project aimed at expanding the capacity of the nuclear-powered icebreaker fleet's effluent treatment facility for low-level radioactive waste in Murmansk. Funds may be made available for the co-financing of the facility.

- Efforts to initiate international cooperation on measures for the safe handling of the vessel "Lepse", which is used by the nuclear-powered icebreaker fleet in Murmansk as a storage facility for radioactive waste, including high-level spent uranium fuel. Vis-a-vis countries and international organizations that have expressed an interest in this matter, Norway will propose the establishment of a steering group for international cooperation in connection with "Lepse". Funds have been reserved for specific measures in this connection.

- Continuation of the contacts between Norway, the USA and Russia with a view to preventing radioactive contamination from defence-related activities and installations. Funds have been reserved for specific measures in this connection.

- Continuation, under Norwegian leadership, of the NATO/NACC pilot study on cross-border environmental problems emanating from defence-related installations and activities, with special emphasis on obtaining information and developing methods for implementing risk assessments in connection with the decommissioning of nuclear-powered submarines and the handling and storage of waste resulting from this process.

- Participation in the efforts coordinated by the IAEA to draw up an international convention on the safety of radioactive waste management.

- Renewed initiatives vis-à-vis the G-7 countries concerning the preparation of an international programme of action and the establishment of an international fund for multilateral projects to promote the safe management and storage of radioactive waste and fissile material.

3. *Dumping of radioactive waste in the Barents and Kara Seas and input into the sea from Russian rivers*

- Completion of analyses and preparation of a scientific report on the 1994 expedition to the Kara Sea.

- Completion of the first phase of the survey on the risk of radioactive contamination from the Mayak reprocessing plant.

- Risk assessment of the hazards to humans and the environment posed by dumped radioactive waste.

- Development of a programme for monitoring radioactivity in the Northern seas in cooperation with Russia and the Arctic Monitoring and Assessment Programme (AMAP).

4. *Weapons-related environmental hazards*

- Proposals to the Russian authorities aimed at initiating a scientific survey on radioactive contamination resulting from nuclear tests.

- Participation in international cooperation to promote the adoption of a comprehensive test ban treaty. Contribution to a system of verification and control.

- Measures contributing to the environmentally sound destruction of Russian chemical weapons in areas adjacent to our borders.

- Promotion of an unconditional and indefinite extension of the Non-Proliferation Treaty (NPT). Norway considers it important that the treaty be further strengthened by universal adherence. Norway is also making efforts to ensure that the verification arrangements of the NPT - the IAEA's safeguard system - is strengthened with emphasis on greater transparency and with the right to inspect and monitor all nuclear facilities.

- Financial contributions to the International Science and Technology Center in Moscow.

- Participation in international cooperation to prevent illicit traffic in radioactive substances and nuclear material. Implementation of specific measures to improve border controls between Russia and Norway.

DEPARTMENT OF THE NAVY
OFFICE OF LEGISLATIVE AFFAIRS
1300 NAVY PENTAGON
WASHINGTON DC 20350-1300

IN REPLY REFER TO
LA-581-235
3 Oct 95

Mr. Bill Andahazy
Professional Staff Member
Committee on National Security
U.S. House of Representatives
Washington, D.C. 20515

Dear Mr. Andahazy,

In response to your request for information concerning the process the Navy uses to determine channel dredging requirements to support harbor and Naval base access, the attached information is provided.

Sincerely,

P.W. DUNNE
Captain, U.S. Navy
Director, Navy Programs

Enclosure

Response to Congressional Request for Information

Question: Based on projected Navy Force Structure, explain the process Navy uses to determine channel dredging requirements to support harbor and Naval Base Access. Provide a list of channel and harbors that will require dredging to support Naval operations in the next 15 years.

Answer: Dredging requirements are principally based on criteria from Navy Design Manual 26.1. Harbors and channels are dredged in accordance with maximum navigational draft and underkeel safety requirements (such as ship motion from waves, trim, list, squat, tides, salinity, diver clearance, etc.) of the vessels that will transit or be berthed in the area. Additional dredge depth may be required to account for siltation and/or aquatic plant growth.

Navy dredging is categorized as either Maintenance or Construction dredging. Maintenance dredging is dredging to offset the effects of siltation. Construction dredging is dredging in support of a new requirement or waterfront upgrade/replacement project.

Ports requiring dredging in the next 15 years include:

NAS North Island, CA
NAS Pensacola, FL
NAVSTA San Diego, CA
NAVSTA Pearl Harbor, HI
NAVSTA Mayport, FL
NAVSTA Norfolk, VA
NAVSTA Ingleside, TX
NAVSTA Pascagoula, MS
SUBASE Kings Bay, GA
SUBASE New London, CT
SUBASE Bangor, WA
Puget Sound Naval Shipyard, WA
Norfolk Naval Shipyard, VA
WPNSTA Earle, NJ
WPNSTA Yorktown, VA

QUESTION: Over the next 15 years, what is the Navy's estimate for the number of dredging operations that will be required? How much dredge material will result. How much of this material can be considered contaminated or hazardous and will require special disposal methods?

ANSWER: An estimated number of required dredging "operations" is not available. The number of construction dredging operations is predicated on how dredging requirements are packaged into contracts and the availability of military construction funds to support construction dredging requirements. The number of

Maintenance dredging operations is based on siltation rates/aquatic plant growth.

Estimated dredging quantities through 2010:

Construction Dredging:

14 Million CY. 30-40% potentially contaminated.

Maintenance Dredging:

30 Million CY, generally, less than 10% potentially contaminated.

QUESTION: How does the Navy currently dispose of dredge material, both contaminated and clean? Are environmental restrictions resulting in disposal problems that Navy will have to address in the future?

ANSWER: Non-contaminated dredge material is used as fill material, or for near-shore or on-shore beach replenishment. Non-contaminatd material not suitable for beach replenishment is disposed of at an off-shore disposal site.

Contaminated material is disposed of in upland disposal sites, capped (above water or below) by clean dredge material or may be chemically treated to remove or arrest the contaminants in the dredged material.

Off-shore disposal sites are now open to all users and are primarily controlled by the Army Corps of Engineers. These sites have limited capacity and are subject to increasing public scrutiny and environmental restrictions. Disposal of contaminated dredge material in upland disposal sites is extremely expensive. Disposing of contaminated dredge material will continue to be a challenge as enviromental regulations become more restrictive.

The following is a list of printed information retained in committee files:

- Goals and Priorities to Guide United States Arctic Research, Beinnial Statement, Arctic Research Commission, January 1995.
- Arctic Research of the United States, Interagency Arctic Research Policy Committee, Volume 9, Spring 1995.
- Ocean Pollution in the Arctic North and the Russian Far East, Edited by Elizabeth J. Kirk, American Association for the Advancement of Science, September 1, 1994.
- Facts and Problems Related to Radioactive Waste Disposal in Seas Adjacent to the Territory of the Russian Federation, Office of the President of the Russian Federation, Moscow, 1993.
- Arctic Contamination Research and Assessment Program, Interagency Arctic Research Policy Committee (IARPC).

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