REPORT BY THE U.S.

General Accounting Office

Hazards Of Past Low-Level Radioactive Waste Ocean Dumping Have Been Overemphasized

From 1946 to 1970, the United States disposed of low-level radioactive waste by dumping it into the ocean. Today, more than a decade after all dumping stopped, concerns over the potential environmental and public health consequences of past ocean dumping persist.

In an evaluation of the adequacy of Federal efforts to deal with this issue, GAO found that

--the Federal Government has no complete and accurate catalogue of information on how much, what kind, and where low-level nuclear waste was dumped because detailed records were not required;

--the overwhelming body of scientific research and opinion shows that concerns over the potential public health and environmental consequences posed by past ocean dumping activity are unwarranted and overemphasized; and

--although the Environmental Protection Agency has been slow in developing low-level radioactive waste ocean dumping regulations, its current approach is sound. Nonetheless, improvements are needed in developing specific dumpsite monitoring requirements.

Accordingly, GAO makes specific recommendations to improve the effectiveness of Federal efforts in the area.

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OCTOBER 21, 1981

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

B-204946

The Honorable William V. Roth, Jr.
United States Senate

Dear Senator Roth:

In response to your request of January 8, 1981, this report discusses the results of our evaluation of the environmental and public health consequences of past ocean dumping of low-level radioactive waste. Our report discusses Federal efforts to (1) identify the extent of past ocean dumping, (2) assure that it poses neither an environmental nor public health hazard, and (3) insure that any possible future dumping is conducted safely and in an environmentally acceptable manner.

As directed by your office, we did not obtain official agency comments on this report. As arranged with your office, we will not release this report to other interested parties for 30 days unless you publicly announce its contents before that time.

Sincerely yours,

Milton J. Socolar

for Comptroller General
of the United States

REPORT TO SENATOR
WILLIAM V. ROTH, JR.

HAZARDS OF PAST LOW-LEVEL RADIOACTIVE WASTE OCEAN DUMPING HAVE BEEN OVEREMPHASIZED

D I G E S T

WHY THIS REVIEW WAS DONE

From 1946 to 1970, the United States followed a practice of disposing of certain nuclear waste by packaging it in metal barrels and dumping it into the ocean. Although dumping nuclear waste in the ocean has been widely practiced over the years, it has recently been receiving an increased level of scrutiny by the Congress and the public. Behind this renewed concern are allegations about possible health and environmental hazards that may be posed by past ocean dumping activities. In view of this renewed interest, Senator William V. Roth, Jr. requested that GAO review the issues surrounding this Nation's past dumping activities and the adequacy of Federal efforts to deal with them. Specifically, he requested that GAO determine the adequacy of Federal efforts

--to identify the extent and locations of radioactive wastes dumped by the U.S. Government and private industry;

--to assure that nuclear waste already dumped into the ocean poses no undue hazard to the health of U.S. citizens or to the environment; and

--to assure that any future ocean dumping is done safely and in an environmentally acceptable way. (See p. 1.)

FINDINGS IN BRIEF

In response to this request, GAO found that the

--Federal Government has no complete and accurate catalogue of information on how much, what kind and where low-level nuclear waste was dumped because detailed records were not required (see p. 7),

--overwhelming body of scientific research and opinion shows that concerns over the potential public health and environmental consequences posed by past ocean dumping activity are unwarranted and overemphasized (see p. 11), and

--Environmental Protection Agency (EPA) has been slow in developing low-level radioactive waste ocean dumping regulations. Although its current approach is sound, improvements are needed in developing specific dumpsite monitoring requirements. (See p. 22.)

COMPLETE AND ACCURATE INFORMATION DOES NOT EXIST

In an effort to better assess the hazards posed by past U.S. ocean dumping activities, EPA is collecting data on past ocean dumping activities from all of the Federal agencies having responsibility for various kinds of nuclear activities. These agencies include several components of the Department of Defense (DOD) and both successors of the Atomic Energy Commission--the Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC). The objective of this exercise is to compile a consolidated source of data on the kinds, amounts, and locations of nuclear waste dumped into U.S. territorial waters. (See pp. 7 and 8.)

GAO reviewed EPA's efforts to identify the kinds, quantities, and locations of nuclear waste that has been dumped into the ocean, as well as the data collection efforts of DOD, DOE, and NRC to determine whether their efforts were adequate. GAO found that although reasonable avenues of inquiry are being pursued by EPA and the other agencies in compiling this data, the effectiveness of this effort has been significantly constrained by the lack of accurate and complete source data at the responsible Federal agencies--DOD, DOE, and NRC. Because detailed recordkeeping was not required during the period when low-level wastes were being dumped into the ocean, Government and commercial organizations maintained only sketchy records of the nature, volume, and location of the low-level wastes that were generated and disposed of. On the other hand, GAO found that the deficiencies in the

available data on past ocean dumping are not a key factor in determining the environmental or public health hazards that might exist largely because of the insignificant amounts of material that have been dumped. (See p. 7.)

EVIDENCE OVERWHELMINGLY SHOWS PAST OCEAN DUMPING POSES NEITHER AN ENVIRONMENTAL NOR PUBLIC HEALTH HAZARD

GAO contacted over 30 scientists during its review and found that, with the exception of a series of three reports by a university professor in California, no scientific basis has been established indicating that a public health or environmental hazard exists from the previous ocean disposal practices. Moreover, upon closer examination by members of the scientific community, these three reports were questioned by the scientists GAO contacted during its review. (See p. 11.) GAO also examined the major scientific research papers and studies on this subject and talked to several environmental and public interest groups. The results of this effort were that, other than the one account, all of the major research reports on the issue, all of the scientists GAO contacted, and the majority of environmental and public interest organizations GAO met with agreed that no environmental or public health hazard exists as a consequence of past ocean dumping activities. (See pp. 11 through 17.) Of the few organizations which asserted that past dumping activities present such hazards, none were able to provide GAO with specific scientific support for their beliefs. (See p. 16.)

EPA EFFORTS TO ASSURE THE SAFETY AND ENVIRONMENTAL ACCEPTABILITY OF FUTURE OCEAN DUMPING CAN BE IMPROVED

Since enactment of the Marine Protection, Research, and Sanctuaries Act of 1972 (Public Law 92-532), the EPA has had responsibility for assuring the environmental acceptability and safety of ocean disposal activities--including radioactive waste disposal. However, after 7 years of effort, the EPA has not yet developed regulatory criteria for permitting the ocean disposal of low-level radioactive wastes.

So far, EPA's delay in issuing ocean dumping criteria for radioactive waste has not been an obstacle to the use of this disposal medium because it has not been an economic alternative to land disposal. However, the ocean disposal option is now being considered by both the DOE and DOD. Consequently, it is becoming increasingly important that EPA be ready to assure that any potential future dumping is done safely and in an environmentally acceptable way. (See p. 18.)

Generally, GAO found that the emphasis of EPA's program for developing ocean dumping regulations for low-level radioactive waste has been misdirected. In this regard, EPA's approach was based primarily on monitoring prior dumpsites. GAO identified key problems with this approach. Specifically, GAO found that the effectiveness of EPA's program for meeting its regulatory responsibilities in this area could be improved if the agency

--recognized the limited benefits of monitoring prior dumpsites and

--fully utilized the results of extensive research and international experience with the ocean disposal of low-level radioactive waste instead of relying on the results of agency-funded research projects and studies. (See p. 18.)

Monitoring past ocean dumpsites to develop future regulations is of little benefit

There are some key factors that GAO believes severely undermine the utility of relying on monitoring prior dumpsites as a basis for developing future regulations. (See p. 19.) These factors are the

--lack of baseline data on the amounts of natural and fallout-related radioactivity in the oceans (see p. 19),

--small volume of low-level radioactive waste dumped at sea (see p. 20), and

--lack of information on the specific contents and locations of the waste that has already been dumped. (See p. 21.)

In view of these drawbacks, serious questions can be raised about the contribution that monitoring prior dumpsites makes in the development of future ocean dumping regulations. For example, without knowing how much and what type of radioactive material was disposed of at a particular dumpsite or how much natural or fallout-related radioactivity there was at a site to begin with, any benefits EPA might get from sampling data are very limited. In essence, EPA is attempting to determine the effects of low-level radioactive wastes on certain marine environments without knowing how much radioactivity was there in the first place or what the incremental contribution of fallout and past dumping activities has been. (See p. 21.)

EPA has been slow in relying on international guidance as a basis for developing future ocean dumping regulations

Until recently, EPA's approach to developing ocean dumping regulations involved contracting out for the research work it needed. It did not rely on prior research results and international regulatory guidance that was already available in the area which, GAO believes, could have saved EPA a lot of time and money if better utilized. Until this year, the EPA's plans called for spending an additional $7.2 million through fiscal year 1984 to develop criteria for permitting the ocean dumping of low-level radioactive wastes. However, during GAO's review, Congress cut back on the funding for EPA's ocean disposal program. As it is, EPA will receive no money for funding outside contractor studies for fiscal year 1982, nor will it receive funding for dumpsite monitoring work. Consequently, EPA has revised its approach to developing its regulations in this area. (See p. 22.)

Under the revised approach, EPA plans to determine the extent to which existing international ocean dumping guidance can be utilized. This approach will permit EPA to issue draft regulations in October 1981 and final regulations in 1982. Based on the results of GAO's work, GAO endorses this approach regardless of the cutback in 1982 funds. In fact, GAO believes EPA should have

adopted it years earlier. In view of the questionable value of EPA's past ocean dumpsite surveys and the lack of any demonstrated hazard from past ocean dumping practices, GAO believes that this is the best and most expeditious approach to developing regulations governing this particular disposal method. (See p. 22.)

The current international guidance, which was developed by the International Atomic Energy Agency, is based on three decades of European experience with dumping low-level radioactive wastes. Published in 1978, it contains both regulatory definitions and recommendations. These regulatory definitions and recommendations are an outgrowth of an international convention on the prevention of marine pollution. Significantly, the United States is a signatory to the convention. Further, although the provisions of the convention are broad and generic in nature, the implementing guidance subsequently developed by the International Atomic Energy Agency addresses all of the ocean dumping permit evaluation criteria suggested in the Marine Protection, Research, and Sanctuaries Act of 1972--the legislation establishing EPA's regulatory role in this area. Consequently, GAO views EPA's revised approach as a long overdue step in the right direction. (See p. 23.)

However, the international guidance that now exists does not include criteria on future dumpsite monitoring or periodic site monitoring requirements. In GAO's opinion, these are two considerations which EPA should include in its final regulations. GAO believes such regulatory requirements would better reflect what appears to be this country's generally heightened public interest in the ocean disposal of radioactive waste and provide assurances that any potential consequences to possible future ocean dumping will be considered before any actual dumping is conducted. (See p. 24.)

CONCLUSIONS

The weight of the evidence collected by GAO during its review indicates that

concern about this issue has been greatly overemphasized. In fact, GAO could identify only one university professor purporting to have data showing that past U.S. radioactive waste ocean disposal practices were linked to adverse health, safety, and environmental consequences. But, in this one instance, the methodology used in developing the data was questioned by the other scientists GAO interviewed. Other than this one account, GAO could find no other evidence suggesting that a hazard exists. (See p. 25.)

EPA's lack of progress in developing regulations governing future ocean disposal of low-level waste can be attributed to its preoccupation with monitoring past ocean dumpsites and its reluctance to adopt currently accepted international regulatory guidance as a basis for domestic ocean dumping regulations. GAO believes that, in view of the small volume of radioactive waste dumping that has occurred in this country, the lack of baseline data on the amount of natural and fallout-related radioactivity initially present at prior dumpsites, and the lack of specific information on what was actually dumped, the utility of monitoring past dumpsites as a basis for developing future regulations is minimal. While past dumpsites may offer some scientific research opportunities, monitoring them as a basis for developing future regulations controlling low-level waste ocean disposal appears far less promising. Consequently, GAO believes EPA's revised regulatory approach which embraces existing international guidance for ocean disposal of low-level waste is a sound foundation for developing future regulations. (See pp. 25 and 26.)

Moreover, GAO believes that in developing future regulations the EPA should include specific criteria for future dumpsite monitoring as well as periodic monitoring requirements which are not now included in the existing international guidance. In our opinion, such requirements would better reflect this country's heightened level of concern surrounding nuclear issues and provide better assurances that any potential consequences to possible future ocean dumping will be considered before any actual dumping is conducted. (See p. 26.)

RECOMMENDATIONS TO THE ADMINISTRATOR OF EPA

To ensure that EPA does not spend an inordinate amount of staff time attempting to inventory past ocean dumpsites for low-level radioactive waste, and to prevent an unnecessary search for what are apparently non-existing records, GAO recommends that the Administrator of EPA terminate the ongoing dumpsite inventory project now being done by EPA staff. This action would recognize the numerous limitations of the information contained in Federal records and avoid more elaborate searches for information which is inessential to determining the consequences of past ocean dumping activities. (See p. 26.)

GAO also recommends that in developing regulations governing the future use of the oceans as a low-level radioactive waste disposal medium, the Administrator of EPA, in addition to embracing the internationally-established guidance, develop specific criteria for dumpsite monitoring and for periodic monitoring requirements for all future dumpsites. Doing so would provide added assurances that any potential environmental and/or public health or safety effects will be considered before the actual dumping is conducted. (See p. 26.)

AGENCY COMMENTS

As requested by Senator Roth we did not obtain official agency comments.

Contents

ABBREVIATIONS

AEC	Atomic Energy Commission
DOE	Department of Energy
DOD	Department of Defense
EPA	Environmental Protection Agency
GAO	General Accounting Office
IAEA	International Atomic Energy Agency
NOAA	National Oceanic and Atmospheric Administration
NRC	Nuclear Regulatory Commission

CHAPTER 1

INTRODUCTION

Recent information has renewed national interest in the issue of past ocean dumping of low-level nuclear waste. This renewed interest has been spurred by contentions that (1) radioactivity may have entered the food chain in certain Pacific Ocean locations off the coast of California and (2) the military may have dumped large quantities of radioactive waste into the Atlantic Ocean shortly after World War II. As a result of such concerns, Senator William V. Roth, Jr. asked that we evaluate the following issues related to the ocean dumping of low-level radioactive wastes:

--The adequacy of Federal efforts to identify the extent of and locations where radioactive wastes have been dumped by the U.S. Government and private industry.

--The effectiveness of Federal efforts to assure that the nuclear waste which was dumped into the ocean poses no environmental or public safety hazard.

--The extent of Federal efforts to assure any future ocean dumping is done safely and in a way that is environmentally acceptable.

BACKGROUND

There are three major classes of radioactive wastes--high-level, transuranic, and low-level. High-level wastes include (1) spent or "used" reactor fuel which will be classified as waste if not reprocessed 1/ and (2) the by-products coming out of a reprocessing plant which contain highly toxic nuclear fission products. These wastes are now being considered for disposal in geologic repositories or by other technical options designed to provide long-term isolation from the biosphere.

Transuranic waste results predominantly from reprocessing spent fuel and fabricating plutonium to produce nuclear weapons. These are man-made radioactive elements that, like high-level

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1/Reprocessing is the process whereby the unused uranium and plutonium in spent reactor fuel can be removed for use again as nuclear reactor fuel. Since 1977, the United States has indefinitely deferred the reprocessing of commercial nuclear fuel.

waste, have half-lives 1/ of thousands of years. This waste-type is also quite toxic and would be disposed of in a manner similar to that used for high-level waste.

Low-level nuclear waste is generally considered to be any radioactive waste that is not high-level or transuranic waste. Other than this rather obscure definition of low-level waste, there is no other generally accepted description of this waste category. As it is, the range of waste regarded as low-level extends from materials suspected of being slightly contaminated with radiation to highly contaminated materials which remain radioactive for long periods of time.

From 1946 until 1970 the Federal Government, and to a lesser extent commercial disposal agents, dumped solid low-level radioactive wastes into the sea. Most of the actual dumping was done by the Navy for the former Atomic Energy Commission (AEC), whose non-regulatory functions are now performed by the Department of Energy (DOE). 2/ The waste came from commercial and medical sources as well as defense installations located, for the most part, along the Atlantic and Pacific coastlines. The wastes included such things as broken glassware, ashes, animal carcasses, and assorted laboratory paraphernalia used in experiments.

Most of the wastes were packaged in steel drums, weighted with concrete, and dumped in the ocean generally at depths over 1,000 fathoms--about 6,000 feet. At the time, the containers were not intended to permanently contain the waste. They were intended only to ensure that it descended to the ocean floor where ocean currents would dilute and disperse the radioactivity to insignificant concentrations.

U.S. ocean dumping activities dropped off sharply beginning in 1960 when the former AEC opened its land burial sites to all radioactive waste generators. The land burial sites offered a far less expensive waste disposal alternative to ocean dumping. AEC records show that by 1962 about 95 percent of all low-level waste was being disposed of at land burial sites. By 1970, U.S. ocean dumping practices stopped entirely. Although ocean dumping of low-level wastes is still permissible, it is still considered more expensive than land burial. As a result, there has

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1/The half-life of any particular radioactive material is the amount of time required for one-half the atoms to disintegrate and thus reduce the total amount of radioactivity by one-half.

2/The Atomic Energy Commission was the Federal agency then responsible for promoting and regulating the commercial uses of nuclear power and radioactive materials.

been little interest in resuming such practices by the commercial industry or by the Federal Government. However, according to EPA officials, the costs of each option are approaching parity--particularly for high-volume, low-activity wastes being disposed of in shallow land burial repositories--and there is increasing interest in the ocean disposal option by both the Government and some commercial organizations.

Renewed interest in the potential dangers of ocean dumping of low-level radioactive waste was apparently inspired by reports alleging public health and environmental dangers resulting from past dumping activities. The most serious one came from an analysis by a university professor on the West Coast who concluded that radioactivity from past ocean dumping activities had entered the human food chain. At about the same time, a former Navy test pilot announced publicly that he flew three ocean dumping missions in October 1947 where 3 or 4 drums of radioactive materials per mission were dumped beyond the continental shelf approximately 110 miles off the coast of Delaware. The possibility that low-level radioactive waste may have been dumped from Navy aircraft was information that had not been publicized previously. As a result, new questions were raised about the adequacy of Federal efforts in dealing with this apparently serious issue. Specifically, various public interest and environmental groups are raising concerns about the adequacy of this Nation's knowledge of the extent of past U.S. dumping activities and the locations of prior dumpsites.

FEDERAL AGENCIES INVOLVED IN CONTROLLING LOW-LEVEL NUCLEAR WASTE OCEAN DUMPING

Four Federal agencies have been primarily responsible for various aspects of this Nation's low-level nuclear waste ocean dumping activities. Historically, the military service organizations of the Department of Defense (DOD), the DOE, and the commercial nuclear industry--regulated by the Nuclear Regulatory Commission (NRC)--have been the sources of all of the low-level wastes that have been dumped at sea. The only other Federal agency involved in this activity to any significant degree is the Environmental Protection Agency (EPA).

DOD through the Navy disposed of low-level nuclear waste by dumping it into both the Atlantic and Pacific oceans between 1946 and 1970. In addition to DOD wastes, the Navy--under an interagency agreement with the former AEC--dumped wastes generated by AEC laboratories and other commercial sources. Except for 3 years when the Army dumped some of its radioactive wastes in the Atlantic Ocean, the Navy disposed of the large majority of the low-level nuclear wastes that have been dumped into the sea by this country. Consequently, to the extent any records of these

past activities have been maintained, these two services are the primary sources of the data.

The AEC laboratories--now part of DOE--were the Nation's largest generators of low-level waste and thus were the biggest contributors to the volume of material and amount of radioactivity that were dumped into the oceans between 1946 and 1970. Although no low-level wastes are currently being dumped in the ocean, DOE still does basic research on the effects of various sources of radioactivity from all stages of the nuclear fuel cycle. For example, DOE has done considerable research aimed at how the highly toxic transuranic elements persist in the environment and has attempted to quantify and appraise the degree to which these elements would be transported to humans through aquatic and terrestrial food chains and aerial pathways.

NRC is the principal successor to the regulatory arm of the former AEC. While the NRC does not now have statutory responsibility over ocean disposal of nuclear wastes, its predecessor did have such responsibility during the period when all of the ocean dumping occurred. Consequently, its files contain AEC historical records documenting an estimated 95 percent of the disposals made by the private sector under licenses issued by AEC.

EPA is responsible for issuing regulations and permits governing the disposal of low-level nuclear wastes into the ocean. This responsibility was taken from the regulatory arm of AEC and given to EPA as part of the Marine Protection, Research, and Sanctuaries Act of 1972 (Public Law 92-532). 1/ In this capacity, EPA is responsible for gathering or developing information needed to support the regulations it issues and in granting ocean dumping permits. As part of its responsibility, EPA is now attempting to gather an exhaustive list from a variety of public and private sources on the extent and location of past U.S. low-level waste ocean dumping activities.

OBJECTIVES, SCOPE, AND METHODOLOGY

The objective of this evaluation was to answer the three questions posed in Senator Roth's request.

--How adequate are Federal efforts to identify the extent and locations of past radioactive waste dumpsites?

--How effective are Federal efforts to assure past dumping poses neither an environmental nor public health hazard?

1/The ocean dumping provisions of the legislation did not become effective until early 1973.

--To what extent do Federal efforts assure any future ocean dumping is conducted safely and in a way that is environmentally harmless?

In responding to all three questions our basic approach was to obtain the most diverse set of views on each issue and evaluate the evidence supporting each view. Accordingly, we obtained the views of over 30 nationally and internationally prominent scientific authorities on nuclear and other hazardous waste disposal techniques. These experts were selected on the basis of their general knowledge of and involvement in nuclear or hazardous waste disposal issues. Most of them are still doing research on the effects of radioactivity in a marine environment or are involved in nuclear energy and hazardous waste management research in other ways. The experts, for the most part, were from Government agencies, national laboratories, oceanographic research organizations, universities, and nuclear industrial societies. In addition, we conducted interviews and meetings with various organizations knowledgeable about dumping any form of waste in the ocean. These organizations represent a wide range of views on the issue extending from outright opposition to ocean dumping to favoring such disposal. A complete list of the organizations we contacted is included as Appendix I.

In addition, we reviewed the records and reports of the former AEC, DOE, NRC, DOD and its service organizations, EPA, the National Academy of Sciences, and several government contractor organizations from as far back as 1954. We examined the "Federal Plan for Ocean Pollution Research, Development, and Monitoring, Fiscal years 1979-83" and the National Advisory Committee on Oceans and Atmosphere's special report to the President and the Congress on "The Role of the Ocean in a Waste Management Strategy." We also considered the regulatory definitions and recommendations contained in the International Atomic Energy Agency's (IAEA) guidance on ocean disposal of radioactive waste. Moreover, since the Europeans have been dumping low level wastes at sea for nearly 30 years, we also reviewed the oceanographic and radiological bases they developed in support of continued ocean dumping operations. The international documents and regulations were considered because (1) the United States is a signatory to an international convention on the prevention of marine pollution and as such has agreed with its provisions and the IAEA's implementing regulatory guidance, and (2) the European nuclear community has far more experience with conducting and regulating the practice of ocean dumping than does the United States.

At the Federal level, we interviewed officials in the headquarters offices of the EPA, the National Oceanographic and Atmospheric Administration, DOE, NRC, Department of State, the U.S. Coast Guard, and five DOD agencies. Each of these agencies

either has, or previously had, a role in the ocean dumping of low-level radioactive waste. We also contacted selected national laboratories and oceanographic institutions involved in conducting marine research and monitoring activities. These facilities house the bulk of U.S. marine radioecology expertise. We did not, however, specifically evaluate any current DOE nuclear waste management or decontamination programs which include ocean disposal of radioactive materials among their programmatic alternatives.

Further, in determining the adequacy of Federal efforts to identify the extent of and locations at which radioactive waste dumping occurred, we reviewed the data already collected by EPA and tracked it back to the records held by each of the three agencies providing it. We also examined the provisions of licenses awarded by AEC to commercial disposal agents to determine what kind of information might exist in the private sector.

Chapter 2 of this report addresses the first two issues posed by Senator Roth:

--the adequacy of Federal efforts to identify the extent and locations where low-level radioactive wastes were dumped and

--the effectiveness of Federal efforts to assure that past ocean dumping practices pose no environmental or public safety hazard.

Chapter 3 addresses the third issue raised in Senator Roth's letter--the extent of Federal efforts to assure that any future ocean dumping is done safely and in a way that is environmentally harmless.

Chapter 4 presents our conclusions and recommendations.

CHAPTER 2

PAST U.S. OCEAN DUMPING DOES NOT PRESENT PUBLIC HEALTH AND SAFETY CONCERNS

Federal efforts to identify the extent and locations of prior low-level radioactive waste dumpsites are being led by EPA. In this capacity, EPA is attempting to assemble and update data describing all past nuclear waste ocean dumping activities. Although we found the scope of EPA's work and the methods they employed to be adequate, the effectiveness of its effort has been significantly constrained by the lack of accurate and complete source data at the responsible Federal agencies--DOD, DOE, and NRC. Because detailed recordkeeping was not required during the period when low-level waste was being dumped into the ocean, Government and commercial organizations maintained only sketchy records of the nature, volume, and locations where low-level waste was dumped at sea.

On the other hand, we found that deficiencies in the available data have little impact on determining whether the wastes present potential environmental or public health consequences. Our review showed that, according to the scientific experts we contacted and the studies we reviewed, even if the amounts of radioactivity dumped in the ocean are significantly more than recorded, they would pose no health or safety hazard to humans or the environment. Thus it appears--and EPA ocean disposal program officials agree--that recent concerns about the dangers associated with past ocean dumping activities have been overemphasized.

COMPLETE AND ACCURATE INFORMATION DOES NOT EXIST

At the urging of the Congress and as part of its regulatory responsibilities, the EPA is now cataloguing all of the available information on past U.S. ocean dumping activities. It has requested all of the existing data on this subject from DOE, NRC, and DOD.

Although EPA's efforts to identify the extent and locations of radioactive waste dumped in the ocean appear to be adequate, we found that reliable and complete data needed to make a precise determination of the extent of past dumping activities does not exist.

From 1946 when the first material was dumped at sea to 1970 when the dumping stopped, AEC and DOD were responsible for

regulating these activities. 1/ Accordingly, to the extent that the Federal Government has kept any records, they are held by DOD and the AEC's successors--DOE and NRC. However, the reporting policies and practices governing low-level waste management from 1946 to 1970 did not call for a definitive accounting of the waste. Consequently, the historical records do not give a precise accounting of past U.S. low-level radioactive waste dumping activities. The information that was reported to the agencies varied widely and frequently did not even refer to the amounts of waste involved or specifically where it was dumped. Thus, it appears that the available data does little more than provide a general indication of the magnitude of the waste involved and approximations of where it was dumped.

For example, each commercial disposal agent was issued a license by the regulatory arm of AEC. We examined the specific licensing provisions and found that throughout the period when low-level radioactive waste was disposed of in the ocean, the AEC recordkeeping requirements permitted a great deal of discretion in what specific information had to be reported. Typically, a disposal agent's license prescribed an area of the ocean where the waste could be dumped, the basic types of waste that could be dumped, and the depth of the water at the dumpsite. 2/ They did not, however, require that the specific amounts or kinds of waste be reported. Consequently, the records for commercial dumping activities were no more than gross approximations of their extent and location.

The reporting policies and the vagueness of the data were similar for the low-level waste materials dumped by DOD. The Navy which dumped both DOD and AEC generated wastes at pre-designated sites in both the Atlantic and Pacific oceans, was responsible for roughly 95 percent of all the radioactivity dumped into the oceans. However, as with AEC, the quality of the recordkeeping

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1/Until the AEC was abolished in 1974, it had the dual responsibility of developing nuclear energy as well as regulating its commercial use. Accordingly, the AEC exercised control over all non-DOD ocean dumping activities.

2/The type of material was to be reported in one of the three broad categories--by-product, source, or special nuclear material. By-product materials include a wide variety of substances exposed to what EPA calls incidental radiation. Source materials consist of at least .05 percent of uranium or thorium, separately or combined. Special nuclear materials include plutonium 239, uranium 233, enriched uranium 233 or 235, and any material artificially enriched in any of these substances.

ranged from poor to nonexistent. In fact, the Navy had no detailed information on its Pacific Ocean dumping activities, and its information regarding the Atlantic Ocean was non-existent with the exception of a few years. Moreover, for the years in which records were available, they included only dates, locations, broad characterizations of the contents such as "atomic waste" or "radioactive waste" and the volume of material in the waste containers. There was no information about the specific kinds of materials or its radioactive level.

This lack of accurate and complete data in the records available at DOE, NRC, and DOD has made EPA's task a virtual impossibility. So far, based on the information it has obtained, EPA has developed a general understanding of the extent and location of low-level radioactive waste dumped at sea. The information was obtained from the available records of the Federal agencies involved and from two major studies that have been done on the subject--one in 1954 by AEC and one done in 1971 by the National Academy of Sciences. 1/

According to the records EPA has compiled to date, about 90,000 containers of low-level radioactive waste have been dumped into the Atlantic and Pacific oceans with less than 1 percent being dumped into the Gulf of Mexico. Based on the records, it appears that more than 80 percent of the waste was dumped off the eastern seaboard with roughly 95 percent of it at two sites about 120 and 220 miles southeast of Sandy Hook, New Jersey. Of the wastes dumped off the western seaboard, about 99 percent of the radioactivity was dumped at the Farallon Islands site about 25 to 60 miles west of San Franciso, California. The entire site covers an area of about 500 square miles. The map on the next page shows the approximate location of the three major dumpsites.

Despite its deficiencies, the data available to EPA, in our opinion, is adequate to characterize the magnitude of past ocean dumping activities. However, the usefulness of the data for any other purpose is questionable since EPA lacks specific information on the precise volume, contents, and locations of prior ocean dumpsites. As discussed below, the weaknesses in the data have little meaning because there is an overwhelming consensus among experts that even if the amounts of radioactive waste dumped in the past are significantly more than reported,

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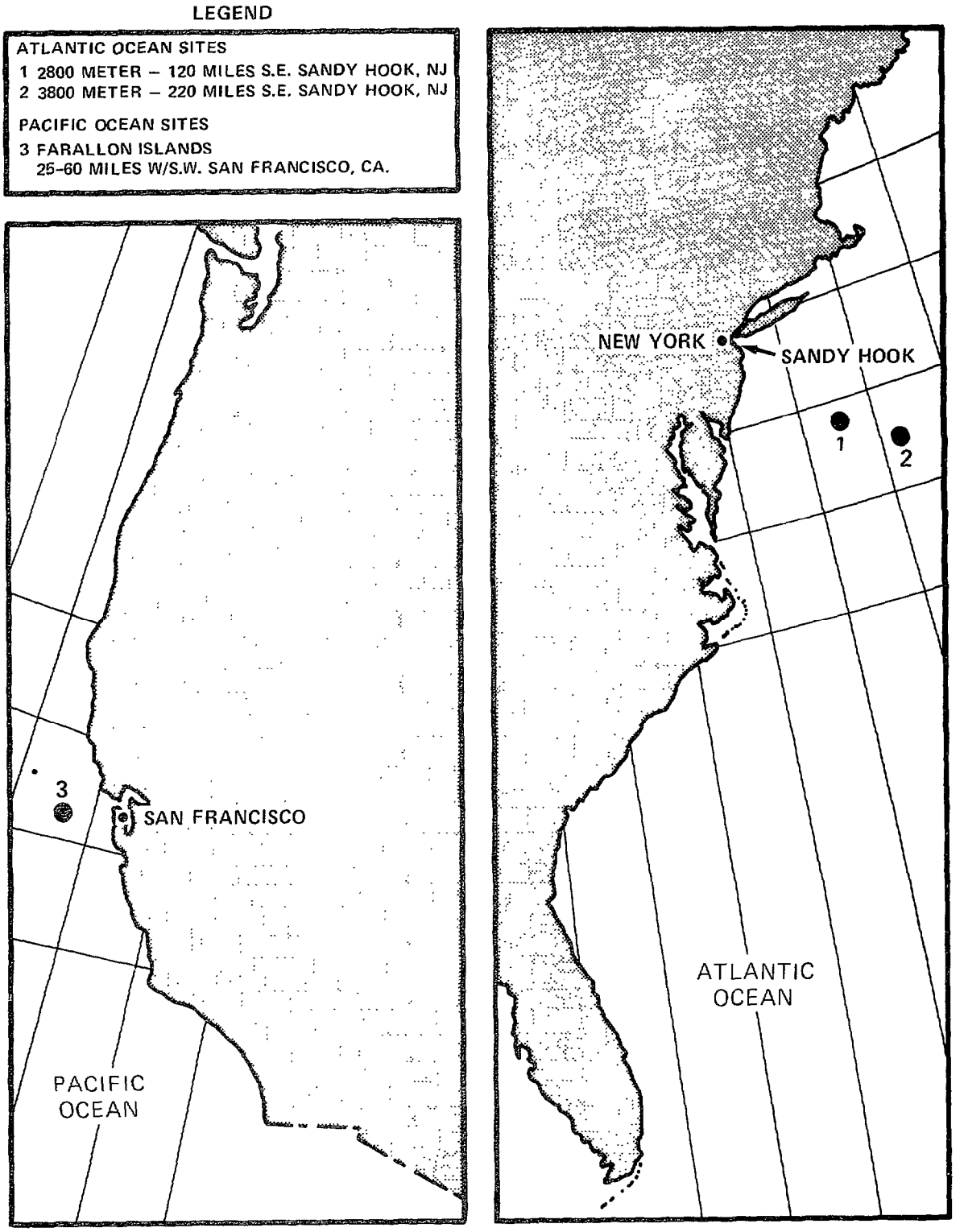
1/"Radioactivity in the Marine Environment," Committee on Oceanography, National Research Council, National Academy of Sciences, 1971.

MAJOR OCEAN DUMPSITES FOR LOW LEVEL RADIOACTIVE WASTE



they would not represent a hazard to people or to the environment.

EVIDENCE OVERWHELMINGLY SHOWS PAST U.S. OCEAN DUMPING POSES NEITHER AN ENVIRONMENTAL NOR A PUBLIC HEALTH HAZARD

There has been a substantial amount of research on radioactivty in marine environments. In the United States, some of this work has focused on the effects of past low-level waste ocean dumping, but for the most part the work has centered on understanding the behavior and effects of both natural and artificial radioactivity on marine life and the ocean environment.

To evaluate the effectiveness of EPA's program for assuring that past ocean dumping poses no threat to the environment, health, or safety, we first sought to understand the severity of the problem. After reviewing the major scientific studies, obtaining the views and comments of many national and international experts, and interviewing officials from a wide range of environmental and public interest organizations, we concluded that the potential hazards from past dumping activities have been overemphasized. Considering the overwhelming consensus among the scientific community, the need for a Federal program in this area is not apparent. In our view, any level of Federal involvement in assessing the environmental and/or health and safety hazard of past low-level radioactive waste ocean dumping is unwarranted. Consequently, we believe EPA's efforts to study this issue should be discontinued.

Scientific studies show no adverse effects from radioactive waste dumped in the ocean

The prevailing scientific thought guiding past ocean disposal activities was that the low-level waste should be placed on the ocean floor where the currents would disperse and dilute the radioactivity. The AEC's policies governing the siting and packaging of the material were predicated on that concept.

Prior to its reorganization, AEC funded several studies of the potential environmental and health effects of the ocean disposal of radioactive wastes; EPA has funded similar studies. In addition, the consequences of past ocean dumping activities were reviewed during a more recent scientific workshop sponsored by the National Oceanic and Atmospheric Administration (NOAA) in 1978. In all but one instance--a series of papers done in 1980 by a university professor in California--the conclusions

have been that the past dumping of low-level radioactive waste poses no threat to the environment, health or safety. Moreover, even in the instance where a different conclusion was reached, the supporting evidence has been questioned by the scientific community.

In 1971 the National Academy of Sciences, at the request of the AEC, did a comprehensive analysis of the effects of radioactivity on the marine environment which summarized the state of scientific understanding in the field. This study, according to many scientists we interviewed, is regarded as the single most definitive work examining marine radioecology issues, including ocean disposal of radioactive wastes. It concluded--about 1 year after all ocean dumping of radioactive waste had stopped--that there was no evidence indicating a hazard exists to people or any marine species or ecosystems.

In examining radiation effects on the marine environment, the Academy recognized the oceans' increasing radiation burden associated with the expansion of nuclear energy. The Academy's concerns were with the amounts and kinds of radiation individual marine organisms, populations, and ecosystems could tolerate without significantly changing the balance of nature. It reported that ocean field studies on the effects of radiation indicated that the best technologies and methods available at the time could not demonstrate any effects on marine ecosystems--at the then-prevailing radioactive dose rates--that were clearly and uniquely attributable to radiation.

In evaluating human radiation exposure, the Academy found the ocean disposal of low-level radioactive waste in packages to be a much less significant source of radioactive material than worldwide fallout and the discharge of low-level wastes from operating nuclear power reactors and nuclear fuel processing plants. Moreover, it found that, even in cases where low-level wastes were discharged into rivers and directly into the sea, the proposed discharge received careful study in advance of operations and prudent restrictions specified the kinds and amounts of radioactive materials that could be released. According to the Academy's report, subsequent surveys showed that the restrictions were entirely adequate to keep human exposure well within the guidelines specified by the International Commission on Radiological Protection and the U.S. Federal Radiation Council. Accordingly, it concluded that a continuation of the policies and practices concerning the control of low-level waste ocean disposal that were established during the formative years of the U.S. nuclear energy program should assure that radioactive contamination of the marine environment would not reach unacceptable levels.

Since assuming the responsibility for controlling the ocean disposal of radioactive wastes in 1972, EPA has also sponsored several studies looking at various aspects of radioactivity in marine environments. Although some work in this area is still continuing, EPA has made some key findings based on its work so far. Specifically, according to EPA officials, they have found

--concentrations of radioactive material in the fish it has collected from areas near ocean dumpsites are within the range of concentrations found in similar marine species where no dumping has occurred;

--the levels of radioactivity in the sampled fish are so low that their sources, either fallout from nuclear weapons testing or low-level waste ocean dumping, are indistinguishable;

--an annual human consumption rate of 45 pounds of the fish in EPA's sample would yield an annual dose which is approximately 1000 times lower than the dose from radionuclides occurring normally within the human body; and

--the water-soluble materials in the low-level waste EPA has studied are being dispersed and diluted to insignificant levels, while plutonium, which tends to behave as an insoluble particulate, settles rapidly to the ocean floor where it appears to be entrapped by sediments.

Consequently, the EPA findings parallel the earlier conclusions of the National Academy of Sciencies. These findings and conclusions are further corroborated by the National Oceanic and Atmospheric Administration (NOAA). In 1978, NOAA--the agency responsible for monitoring and conducting Federal oceanic research efforts--sponsored a workshop aimed at developing a comprehensive statement on the scientific problems of all kinds of ocean pollution as well as identifying programs to solve them. 1/ The workshop participants concluded that:

"* * * Soon after production of nuclear energy began, the question was asked: What amounts of artificial radionuclides can be accommodated in the marine system without danger to public health, marine ecosystems, or marine organisms? With the minimal information

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1/"Scientific Problems Relating To Ocean Pollution," Estes Park, Colorado, July 10-14, 1978, U.S. Department of Commerce, National Oceanographic and Atmospheric Administration.

available in the 1950's, guidelines for acceptable levels were formulated; they were modified as better and more complete data became available. Monitoring and surveillance programs provided descriptions and then predictions of the distribution of radionuclides in the oceans. To date, no impacts on human health have been documented; no effects harmful to marine organisms are known, even at the sites of large discharges, such as the (nuclear fuel) reprocessing plant in Windscale, England. * * * " 1/.

The only dissenting view among all of the scientific studies and reports that we were able to identify was expressed in three 1980 research papers done by a university professor in California: 2/ In these reports the author concluded that the scope and magnitude of radioactive contamination of U.S. coastal waters was substantially greater than previously recognized. He further concluded that

"* * * There is little question that radioactivity from the Farallon dumpsite has entered the oceanic food chain and is now present in commercial species of fish. There now exists a clear potential for significant adverse impact of the existing radioactive contamination on the economy and health of the people of the state of California, of states along the Eastern seaboard of the United States and all U.S. citizens who eat seafood. Moreover, as the waste containing canisters deteriorate further the extent of the radioactive contamination may be expected to increase.* * *" 3/

1/Proceedings from the Estes Park workshop, March 1979, U.S. Department of Commerce, National Oceanographic and Atmospheric Administration, pp. 5-6.

2/"Present Status of Oceanic Radioactive Waste Dumpsites," W. Jackson Davis, University of California at Santa Cruz, August 19, 1981.

"Radioactive Dumpsites in U.S. Coastal Waters," W. Jackson Davis, University of California at Santa Cruz, September 15, 1980.

"Response to the American Nuclear Society Critique of the two reports issued by the Honorable Quentin L. Kopp Regarding Oceanic Dumping of Radioactive Wastes," W. Jackson Davis, University of California at Santa Cruz, October 6, 1980.

3/"Radioactive Dumpsites in U.S. Coastal Waters," W. Jackson Davis, University of California at Santa Cruz, September 15, 1980, p. 45.

We found, however, that the methodology and conclusions of the report were widely questioned by other scientists familiar with this issue. In fact, all of the scientists we interviewed questioned the quality of these reports in one way or another. One of the more significant concerns was that the amounts of radioactivity in the sampled fish around the dumpsites were overstated by a factor of about 1,000. The most significant concern was that the professor incorrectly compared the radionuclide concentrations of different fish, from different oceans, using samples taken in different years. This approach, which is not scientifically correct, raised fundamental questions among the other technical experts we interviewed about the validity and usefulness of the reports.

Discussions with scientists confirmed study results

In addition to the results of the major studies that have been done in this area, we interviewed over 30 scientists having detailed technical knowledge of the problems associated with radioactive waste disposal. For the most part, the scientists were either doing research on the effects of radioactivity in a marine environment or were involved in related nuclear energy research. These experts were from government agencies, national laboratories, oceanographic research organizations, universities, and nuclear industrial societies. The scientists all supported the conclusions reached by the National Academy of Sciences, EPA, and NOAA. Although we sought opposing points of view within the scientific community, we were unable to find any except for the university professor mentioned earlier. The following examples characterize the basic thrust of the information we obtained.

One scientist noted that in the early 1960s the nuclear material production reactors at DOE's Hanford reservation in eastern Washington State released about 100,000 curies 1/ of radioactivity per month directly into the Columbia River. According to this researcher, measurements taken at the time indicated that about 25,000 curies per month reached the Pacific Ocean. The commercial marine life in the area of the disposal--salmon, clams, oysters, etc.--were monitored

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1/A curie is the basic unit to describe the intensity of radioactivity in a sample of material and/or a quantity of any nuclide having 1 curie of radioactivity.

by AEC and no problems were found. Thus, the Hanford reactors discharged more radioactivity into the Columbia River in one month than the United States is thought to have dumped into the ocean in 25 years without any measurable impact. This is particularly significant in view of the fact that an estimated 90 percent of the total radioactivity previously dumped in the oceans has since decayed to negligible levels.

One group of scientists compared the amounts of artificial radioactivity found at the dumpsites to the natural radioactivity contained in common garden products and foodstuffs. For example, a sediment sample taken from the ocean bottom immediately next to an imploded waste container was reported to contain up to 1 million picocuries of radioactivity per kilogram. 1/ In contrast, the scientists pointed out that the familiar garden fertilizer potash contains 591,000 picocuries of radioactivity per kilogram. Further, the potassium contained in the potash concentrates in vegetables like tomoatoes or cumcumbers. Marketed tomatoes contain an average of 28,200 picocuries of natural radioactivity per dry weight kilogram, a value far in excess of that in most samples taken from the dumpsites.

Discussions with environmentalists and public interest groups did not reveal evidence of potential hazards

In attempting to obtain information supporting dissenting views on this issue, we contacted a number of environmental and public interest groups. These included organizations such as the National Resource Defense Council, the Union of Concerned Scientists, Greenpeace, and several others. While some of their representatives had definite beliefs about the environmental and public health and safety hazards of past dumping activities, they were unable to provide us with any scientific data in support of their claims. Ironically, perhaps the most revealing piece of evidence we obtained during our review was from the Oceanic Society.

In response to public concerns about low-level waste dumping off the coast of California, the Oceanic Society, which is dedicated to maintaining the environmental integrity of the ocean, assembled a group of scientists to review implications for the environment, health, and safety surrounding the ocean disposal of radioactive wastes. The group of scientists, called the Ad Hoc Scientific Committee on Ocean Dumping of Radioactive Waste, was knowledgable in the areas of radiation, health, toxic wastes, and oceanography. According to a top official of the Society, members of the Ad Hoc Committee

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1/A picocurie is one-trillionth of a curie.

have been vigorously opposed to dumping radioactive wastes in the ocean and set out to prove that a problem existed but did not succeed. As a result, in its October 1980 report 1/ the Committee concluded that there is no evidence of a serious present or future threat to aquatic or human health either at Farallon Island or at the Atlantic sites where the largest proportion of the waste was dumped. In fact, they thought EPA should concentrate more on other non-nuclear waste materials that have been disposed of in the ocean, such as heavy metals and other toxic materials. Moreover, other groups we spoke to like the National Resources Defense Council and the Union of Concerned Scientists generally agreed with this assessment.

1/"Summary Report of the Ad Hoc Scientific Advisory Committee on Ocean Dumping of Radioactive Wastes," The Oceanic Society, Western Offices and Research and Policy Group, October 7, 1980, p. 1.

CHAPTER 3

EPA EFFORTS TO ASSURE THE SAFETY AND ENVIRONMENTAL ACCEPTABILITY OF FUTURE OCEAN DUMPING CAN BE IMPROVED

After 7 years of effort, EPA has not yet developed regulatory criteria for permitting the ocean disposal of low-level radioactive waste. In June 1981, EPA finally decided to begin developing criteria it hopes to publish in draft for public comment in October 1981. So far, EPA's delay in issuing radioactive waste ocean dumping criteria has not been an obstacle to the use of this disposal medium because it has not been an economic alternative to land disposal. However, the ocean disposal option is now being considered by both the DOE and DOD. Consequently, it is becoming increasingly important that EPA be ready to assure future dumping is done safely and in an environmentally acceptable way. Generally, we found that the emphasis of EPA's program for developing low-level ocean dumping regulations has been misdirected. In this regard, EPA's approach was based primarily on monitoring prior dumpsites which in some instances may contain only 1/1000 to 3/10000 of the internationally prescribed limits of radioactivity. Our review identified key problems with this approach. Specifically, we found that the effectiveness of EPA's program for meeting its regulatory responsibilities in this area could be improved if the agency

- --recognized the limited benefits of monitoring prior dumpsites and
- --fully used the results of extensive research and international experience with the ocean disposal of low-level radioactive wastes instead of relying on the results of agency-funded research projects and studies.

During the course of our review, EPA revised its approach to developing ocean dumping regulations as a result of Congressional funding cutbacks. Under its revised approach, EPA plans to determine the extent to which existing international ocean dumping guidance can be used as basis for developing future regulations. We believe this revised approach offers the best and most expeditious path for developing effective regulations governing this particular radioactive waste disposal method. However, we also believe EPA should add dumpsite monitoring and periodic site monitoring requirements to existing international criteria. Neither of these two considerations are currently included in the established international guidance.

MONITORING PAST OCEAN DUMPSITES TO DEVELOP FUTURE REGULATIONS IS OF LITTLE BENEFIT

So far, EPA has spent about $3 million on its ocean monitoring program, primarily on surveys of past ocean dumpsites. The surveys are a key element in EPA's efforts to develop future regulations governing the ocean disposal of low-level radioactive wastes. EPA officials believe that studies of oceanographic and biological conditions at prior dumpsites will provide insight into the effects of past ocean dumping and, thus, would provide a better basis for developing future dumping regulations. While this approach appears to be sound, we believe there are some key factors that severely undermine the utility of EPA's approach. These factors are the

- --lack of baseline data on the amounts of natural and fallout-related radioactivity in the oceans,
- --small amount of low-level radioactive waste dumped at sea, and
- --lack of information on the specific contents and locations of the waste that has already been dumped.

Baseline data on the amount of radioactivity in the oceans needs to be developed

To fully assess the health and environmental effects of past ocean dumping practices, according to the scientists we interviewed, EPA must determine the marginal contribution of past dumping to the radioactivity in the marine environment by comparing general areas where the waste has been dumped with areas where no dumping has occurred. Without such information, the presence of radioactivity in the water, sediments, and marine organisms cannot be ascribed to natural conditions, fallout, or ocean dumping.

According to NOAA officials, however, the radioactive fallout from past nuclear weapons testing complicates the problem of isolating the impact of past ocean dumping because of the uneven distribution of fallout in the oceans of the world. Although fallout occurs in predictable patterns related to bands of the earth's latitude, local atmospheric phenomena can modify the distribution of fallout reaching the ocean surface in any one particular area of the sea, such as the Farallon Islands dumpsite. Further, as radionuclides from fallout are incorporated into the marine environment, chemical and biological processes appear to separate them and produce concentrations different than that expected or found in the fallout itself. Therefore,

the actual distribution of radionuclides in biological samples, water, suspended particles, and bottom sediment may differ significantly from the expected distribution.

One consequence of this difficulty in distinguishing the contribution of fallout from that of ocean dumping is that it undermines the utility of monitoring prior dumpsites as a basis for developing future regulations.

Only small amounts of low-level waste have been dumped at sea by the U.S.

The comparatively small amount of radioactive waste dumped at sea also limits the usefulness of EPA's approach, as evidenced by examining the different sources of the radioactivity in sea water and their relative contribution to the total radioactivity of a given body of water. For instance, regarding the Farallon Islands dumpsite off the coast of San Francisco, California, which covers an area estimated to be as large as 500 square miles, one analysis of the amount of natural radioactivity in the dumpsite vicinity makes the amounts from low-level waste trivial in comparison. 1/ The scientists estimate that even if the amount of long-lived radioactivity already dumped into the ocean at the Farallon site was all plutonium-239--probably the most hazardous long-lived radioactive material--it would still constitute only a small hazard relative to the toxicity of the natural radioactivity in the seawater.

Comparing United States ocean dumping with international ocean dumping practices provides a good perspective on the small scale of ocean dumping conducted off U.S. coastlines. Over the 25 year history of ocean dumping in this country, the estimated total volume of waste that has been dumped is less than that dumped in one year at an international dumpsite in the Northeast Atlantic ocean. Further, if the international criteria governing the use of the Northeast Altantic site applied to past U.S. dumping, the U.S. activities would seem extremely small in comparison. For example, at the Farallon Islands dumpsite a total of about 47,500 containers of low-level waste were dumped. This includes about 14000 curies of beta-gamma radioactivity and 30 curies of

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1/Letter from American Nuclear Society, Northern California Section to Quentin L. Kopp. San Francisco Board of Supervisory, dated September 10, 1980, Re: Ocean Radioactive Waste Dumpsites, pp. 3 and 4.

alpha radioactivity. 1/ Applying the internationally prescribed standards for limitations of radioactive waste ocean disposal, the Farallon Islands dumpsite contains about 1/1000 of the allowable annual limit for beta gamma radioactivity and 3/10000 for the annual limit for alpha radioactivity. Scientists estimate that as much as 90 percent of the wastes dumped have already decayed to innocuous levels. With only 10 percent of the wastes still radioactive, the task of locating and measuring its presence and effect on the marine environment becomes increasingly difficult and, in this sense, is a factor limiting the utility of monitoring prior dumpsites.

Basic information on the contents and locations of past ocean dumping is lacking

Yet another problem limiting the contribution that monitoring prior ocean dumpsites makes to the development of future regulations is the lack of reliable information on the specific contents of waste containers and the exact locations of the dumpsites. As already pointed out in Chapter 2, the Federal reporting policies and practices governing the ocean disposal of low-level wastes did not call for accurate or complete data to be maintained by those organizations involved in dumping activities. The lack of complete and accurate information on specifically what was dumped and where compounds the difficulties facing EPA, because it increases the number of uncertainties facing the formulation of an effective and useful monitoring plan.

Without knowing how much and what type of radioactive material was disposed of at a particular dumpsite or how much natural or fallout radioactivity there was at a site to begin with, any benefits EPA might get from sampling data are very limited. In essence, EPA is attempting to determine the effects of low-level wastes on certain marine environments without knowing how much

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1/Alpha, beta, and gamma are three common types of radiation emitted by radioactive materials. Alpha is the least penetrating of the three and can be stopped by a sheet of paper. It is not considered dangerous to plants, animals, or man unless the alpha-emitting substance has entered the body. Beta radiation is easily stopped by a thin sheet of metal. Materials emitting it are harmful, if they enter the body, and beta radiation may cause skinburn. Gamma radiation is very penetrating and is best stopped by dense materials such as lead. Its rays are essentially similar to X-rays and are nuclear in origin. It frequently accompanies alpha and beta emissions.

radioactivity was there in the first place or what the incremental contribution of fallout and past dumping activities has been.

EPA HAS BEEN SLOW IN RELYING ON INTERNATIONAL GUIDANCE AS A BASIS FOR DEVELOPING FUTURE OCEAN DUMPING REGULATIONS

After 7 years and $3 million of research effort, EPA has yet to issue any regulations governing the ocean disposal of low-level wastes. Until this year, the EPA's plans in this area called for spending an additional $7.2 million through fiscal year 1984 to develop appropriate criteria. Most of the money was to have been spent on contracts for studies aimed at developing different regulatory criteria such as dumpsite selection or waste container design criteria. About $1.1 million was to be spent on monitoring prior dumpsites. The results of the contractor studies were to be used by EPA in formulating ocean dumping regulations. The dumpsite monitoring work was to be used in assessing the hazards posed by prior ocean dumping practices.

However, during our review Congress has cut back on the funding for EPA's ocean disposal program. As it is, EPA will receive no money for funding outside contractor studies for fiscal year 1982, nor will they be funded for monitoring dumpsites. Consequently, EPA has revised its approach to developing its regulations in this area.

Under this revised approach, EPA plans to rely on the existing international ocean dumping guidance which they believe will permit them to issue draft regulations in October 1981 and final regulations in 1982. Based on the results of our work, we endorse this approach regardless of the cutback in 1982 funds. In fact, we believe EPA should have adoped it years earlier. In view of the questionable value of EPA's past ocean dumpsite surveys and the lack of any demonstrated hazard from past ocean dumping practices, we believe that this is the best and most expeditious approach to developing regulations governing this particular disposal method. In our opinion, such an approach will serve to mitigate against the more lengthy "not-invented-here" approach EPA has previously taken.

Since the early 1950s, several European countries have been dumping low-level radioactive waste into the Atlantic Ocean. For about the past 15 years, they have been dumping at a site in the Northeast Atlantic Ocean. The site is under the auspices of the Nuclear Energy Agency, which is an arm of the Organization for Economic Cooperation and Development. The health, safety, and environmental standards now followed

at the site are essentially those growing out of an international convention on the prevention of marine pollution. 1/

Known as the London Dumping Convention, it addressed the prevention of marine pollution by dumping of all matter including radioactive waste. While the agreements reached at the Convention specifically prohibit ocean dumping of high-level radioactive waste, low-level waste dumping is permissible but requires a prior special permit. Any dumping, however, must take full account of the recommendations of the International Atomic Energy Agency (IAEA) which was designated as the competent technical body in the field. Significantly, the United States is a signatory to the convention.

Although the provisions of the London Dumping Convention are broad and generic in nature, the specific implementing guidance developed by the IAEA includes definitions of

--radioactive matter unsuitable for dumping at sea;

--radioactive waste packaging requirements; and

--the role of escorting officers in supervising dumping activities.

None of these have yet been defined by EPA. If the United States had such definitions in place during the time it dumped radioactive wastes in ocean waters, some of the concerns surrounding the potential public health and environmental hazards posed by the dumping would probably have been eliminated or allayed.

In addition, the international guidance addresses all of the ocean dumping permit evaluation criteria suggested in the Marine Protection, Research, and Sancutaries Act of 1972 (Public Law 92-532)--the legislation establishing EPA's regulatory role in this area. Consequently, we view EPA's revised approach as a long overdue step in the right direction.

However, over and beyond the definitions now being incorporated into EPA's programs, the international guidance that now exists does not include criteria on dumpsite monitorability or periodic site monitoring requirements. In our opinion, these are two considerations which EPA should include in its final regulations. We believe such regulatory requirements would

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1/"Prevention of Marine Pollution," Convention Between the United States of America and Other Governments, done at London, Mexico City, Moscow, and Washington, December 29, 1972. This entered into force for the United States on August 30, 1975.

better reflect what appears to be this country's generally heightened public interest in the ocean disposal of radioactive waste and better ensure that the potential consequences of any possible future ocean dumping are considered before the actual dumping is conducted.

To date, the European countries have not attempted to closely monitor the potential effects of the radioactive waste dumped at the international dumpsite in the Northeast Atlantic. Many scientists we spoke with believe it is because the amounts of radioactive waste dumped at the site, although seemingly large in comparison to the dumping off the U.S. coast, are quite small in terms of internationally defined limitations. According to an IAEA information circular, since 1967 annual amounts dumped into the Northeast Atlantic site generally have never exceeded 1 percent of the maximum radiation release rates. Hence, the Europeans have not seen the need for monitoring this site.

On the other hand, the monitorability of the international dumpsite has been questioned. Some scientists believe that the physical and oceanographic characteristics of the site make monitoring difficult and that this, in part, explains the limited monitoring activities to date. Consequently, in developing its site selection criteria for future dumpsites EPA should include specific criteria for assuring that site monitoring is possible as well as specific periodic monitoring requirements. These more stringent requirements would provide added regulatory assurances that the potential environmental and public health effects of radioactive wastes dumped in the future will be considered before the actual dumping is approved.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The weight of the evidence we collected during our review indicates that Congressional and public concern about this issue has been overemphasized. In fact, we could identify only one university professor purporting to have data showing that past U.S. radioactive waste ocean disposal practices were linked to adverse health, safety, and environmental consequences. But even in this one instance, the methodology used in developing the data was questioned by all of the scientists we spoke with who were familiar with it. Other than this one instance, we could find no other evidence suggesting that any kind of hazard exists.

Because detailed recordkeeping was not required during the period 1946 through 1970 when low-level waste was dumped into U.S. oceans, those organizations disposing of the waste maintained only sketchy records of the kinds, amounts, and locations of wastes dumped. On the other hand, we found that the deficiencies in the available data on past ocean dumping activities are not a key determinant of the potential health, safety, or environmental consequences that could result from this practice. Regardless of the accuracy and completeness of the historical data, there is no evidence supporting the contention that past ocean dumping of low-level radioactive waste poses any hazards. With the one exception cited above, the major research reports on the issue, the scientists we interviewed, and the majority of environmental and public interest organizations we met with during our review concurred in this assessment. Of those few individuals and groups asserting that a public health and safety and/or an environmental hazard has been caused by past ocean dumping activities, none were able to provide us with any specific support for their beliefs.

In 1973, after all domestic dumping of low-level nuclear waste had ceased, EPA became responsible for developing regulations governing any further low-level radioactive waste ocean disposals. EPA has yet to issue any regulations in this area. In our opinion, the EPA's lack of progress can be attributed to (1) its preoccupation with monitoring past ocean dumpsites and (2) its reluctance to adopt currently accepted international guidance as a basis for domestic ocean dumping regulations.

In view of the small volume of radioactive waste dumping that has occurred in this country, the lack of baseline data on the amount of natural and fallout-related radioactivity initially present at prior dumpsites, and the lack of specific information on what was actually dumped, the utility of monitoring past

dumpsites as a basis for developing future regulations is minimal. Although past dumpsites may offer some scientific research opportunities, monitoring them as a basis for developing future regulations controlling low-level waste ocean disposal appears far less promising. Consequently, we believe EPA's revised regulatory approach which embraces existing international guidance for ocean disposal of low-level waste is a sound foundation for future regulations, regardless of the funding cutbacks experienced by EPA. In fact, doing so will save EPA time and effort.

As a signatory to an international convention, the U.S. should have regulations considering and reflecting the international guidance which many of the world's scientific experts in the field of marine pollution have worked to develop. Although the international standards are generic in nature, they do address all of the ocean dumping permit evaluation criteria stipulated in the Marine Protection, Research, and Sanctuaries Act of 1972 and reflect the years of regulatory experience gained at the international dumpsite in the Northeast Atlantic ocean. However, we believe the EPA should build upon the international guidance by adding dumpsite monitoring criteria and periodic monitoring requirements in order to reflect this country's heightened level of concern surrounding nuclear issues and ensure that the potential consequences of any possible future ocean dumping are considered before the actual dumping is conducted.

RECOMMENDATIONS TO THE ADMINISTRATOR OF EPA

To ensure that EPA does not spend an inordinate amount of staff time attempting to inventory past ocean dumpsites, and to prevent an unnecessary search for what are apparently non-existing records, we recommend that the Administrator of EPA terminate the ongoing dumpsite inventory project now being done by EPA staff. This action would recognize the numerous limitations of the information contained in Federal records and avoid more elaborate searches for information which is unessential to determining the consequences of past ocean dumping activities.

In developing regulations governing the future use of the oceans as a low-level radioactive waste disposal medium, we recommend that the Administrator of EPA, in addition to embracing the internationally established guidance, develop specific criteria for dumpsite monitoring and periodic monitoring requirements for all future dumpsites. Doing so would provide added assurances that any potential environmental and/or public health or safety effects will be considered before the actual dumping is conducted.

Organizations Contacted During GAO's Evaluation Of Ocean Dumping Of Radioactive Wastes

Federal Agencies

Environmental Protection Agency
Department of Defense
Department of Energy
Nuclear Regulatory Commission
National Oceanic and Atmospheric Administration
Department of State
United States Coast Guard

National Academy of Sciences

National Laboratories (DOE)

Pacific Northwest Laboratory
Lawrence Livermore Laboratory
Oak Ridge National Laboratory
Environmental Measurements Laboratory

Oceanographic Institutions

Woods Hole Oceanographic Institution
Scripps Institution of Oceanography

Environmental and Public Interest Organizations

Oceanic Society
Greenpeace
Committee to Bridge the Gap
Center for Law and Social Policy
National Resources Defense Council
Union of Concerned Scientists
Scientists Institute for Public Information

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