
REPORT BY THE
Comptroller General
OF THE UNITED STATES

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RELEASED

The Nation's Nuclear Waste-- Proposals For Organization And Siting

The Federal Government's nuclear weapons program already has generated a vast amount of nuclear waste, and spent fuel from commercial reactors is accumulating at an increasing rate. These wastes have long, toxic lives and must be disposed of carefully.

Past efforts failed because the Federal Government has not developed a publicly acceptable disposal program. A recent Federal task force provided the President with policy recommendations to this end.

This report discusses past and present ways for disposing of nuclear waste and presents GAO's views on additional actions necessary to solve the waste problem soon rather than saddling future generations with the task. It also points out that existing Federal nuclear reservations should be considered for disposal sites before others are selected.



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

B-164052

The Honorable John Glenn
Chairman, Subcommittee on Energy,
Nuclear Proliferation, and
Federal Services
Committee on Governmental Affairs
United States Senate

Dear Mr. Chairman:

In response to your request of February 7, 1979, here are the results of our review of the Department of Energy's nuclear waste management policy and programs. Our report discusses alternative organizational structures for nuclear waste management planning, and also discusses waste repository site selection procedures.

We provided the Department of Energy an opportunity to review a draft of this report. Department officials' comments are reflected in the report where appropriate. As arranged with your office we will not release this report for 7 days unless you publicly announce its contents earlier.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Thomas A. Stents".

Comptroller General
of the United States

COMPTROLLER GENERAL'S REPORT
TO THE CHAIRMAN, SUBCOMMITTEE
ON ENERGY, NUCLEAR PROLIFERA-
TION AND FEDERAL SERVICES,
SENATE COMMITTEE ON GOVERN-
MENTAL AFFAIRS

THE NATION'S NUCLEAR
WASTE--PROPOSALS FOR
ORGANIZATION AND
SITING

D I G E S T

Over the last 30 years, the Federal Government has generated vast quantities of highly radioactive contaminated wastes. These exceed 20 million cubic feet--enough to cover a four-lane highway with 10 inches of waste for almost 100 miles. (See p. 1.)

Spent fuel from commercial reactors has also accumulated. Like the Government nuclear waste, it is characterized by high levels of radiation and a long toxic life. There are about 4,000 metric tons of commercial spent fuel presently stored in the United States. Based on an assumed high growth rate, the Department of Energy expects that by the year 2000 about 98,000 metric tons will be accumulated. (See p. 2.)

Three Federal agencies have major responsibilities for managing and disposing of these wastes.

--The Environmental Protection Agency is responsible for establishing general waste management criteria and environmental standards.

--The Nuclear Regulatory Commission is responsible for establishing specific waste storage and/or disposal criteria and regulations, consistent with the Environmental Protection Agency's criteria and general environmental standards. It is also responsible for licensing and regulating long term waste storage or disposal facilities for all high-level waste and commercially generated trans-uranic contaminated waste.

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--an organizational concept which will provide for widespread public participation in policy development, planning, and implementation of such a plan.

Development of a master plan addressing important planning elements, such as identifying additional research requirements, is critical to eventually gaining public acceptance of any specific nuclear waste repository projects. (See pp. 9 and 15.)

Equally important to a successful program is the proper organizational concept or structure. The President's task force believes the Department of Energy should develop and implement the overall plan. The plan must not only be technically feasible but also broadly accepted. Given this combination of technical and political implications, GAO favors placing responsibility for developing the plan in a committee structure.

Various legislative bills have been introduced that contain proposals for organizational structures to deal with the waste problem. A recently introduced Senate bill (Senate Bill 742) embodies most of those elements that would, in GAO's view, provide an appropriate committee structure. (See pp. 10 and 11.)

Because many States have indicated an unwillingness to permit nuclear waste disposal within their boundaries, it may be impossible to get the public and political acceptance necessary for a State to accept nuclear waste. Ultimately, if State approval for repository sites cannot be obtained within an established time the Federal Government might have to mandate selections. While such action will not be easy, it may be necessary if the waste problem is to be solved within a reasonable time. (See pp. 5 and 6.)

--public and political acceptance at these locations is likely to be higher than in other parts of the country. (See p. 21.)

If the Department of Energy's highly contaminated reservations are not acceptable for storing nuclear wastes that would be shipped there from other locations, then these sites should not be acceptable for the long-term storage of wastes already there.

RECOMMENDATION TO THE
SECRETARY OF ENERGY

The Secretary of Energy should determine-- unless and until its responsibility in this area is assigned to another organization-- how it is going to deal with the highly contaminated DOE reservations and whether they are acceptable as nuclear waste repositories before selecting any other sites.

AGENCY COMMENTS

Department of Energy officials provided verbal comments on this report. These officials agreed with the report except for the recommendation that Congress create a Federal and State committee responsible for developing a national waste plan. The officials believed that the committee approach would give the Department of Energy an insufficient voice in nuclear waste management planning, and would be subject to forced compromises and inevitable risk of delay.

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ABBREVIATIONS

DOE	Department of Energy
GAO	General Accounting Office
IRG	Interagency Review Group

CHAPTER 1

INTRODUCTION

Nearly all operations that produce or use nuclear materials generate radioactive wastes. These wastes vary widely in volume, composition, and intensity of radioactivity, depending upon the materials and the operations from which they originate. The most hazardous of these wastes are:

- High-level waste. When used or spent reactor fuel is dissolved in acid to recover unused uranium and plutonium for re-use (reprocessing), the chemical solution remaining, which contains over 99 percent of the fission products, are called high-level waste. This waste has high levels of penetrating radiation, high heat generation rates, and a long toxic life.
- Transuranic contaminated waste. Transuranic elements are man-made, long-lived, and extremely toxic. These elements--such as plutonium--are created during the normal nuclear reaction process. This waste contains much lower concentrations of radioactivity than high-level waste. It is generated by plutonium fuel fabrication and fuel reprocessing facilities and laboratories using transuranic elements.
- Spent reactor fuel. This contains all the fission and transuranic elements found in high-level waste as well as the uranium and plutonium not burned during the nuclear reaction process. Spent fuel, like high-level waste, involves high levels of penetrating radiation, high heat generation rates, and a long toxic life. Commercial reactor spent fuel is not now being reprocessed and may not be in the near future, if at all. Without reprocessing, spent fuel must be disposed of as high-level waste.

Over the last 30 years the Federal Government has generated a vast quantity of high-level and transuranic contaminated wastes from its military weapons and research and development programs. The volume of these wastes exceeds 20 million cubic feet--enough to cover four highway lanes with 10 inches of waste for almost 100 miles. These wastes are temporarily stored at the following federally owned, Department of Energy (DOE) managed, nuclear reservations:

powerplant sites, and--for Federal programs' spent fuel--at Federal reservations while it awaits reprocessing.

RESPONSIBILITIES FOR WASTE MANAGEMENT

Three Federal agencies have major responsibilities for managing and eventually disposing of high-level wastes (perhaps including spent fuel) and transuranic contaminated wastes:

- The Environmental Protection Agency. The Environmental Protection Agency is responsible for establishing waste management criteria and general environmental standards.
- The Nuclear Regulatory Commission. The Nuclear Regulatory Commission is responsible for establishing specific waste storage and/or disposal criteria and regulations, consistent with the Environmental Protection Agency general criteria and standards, and for licensing and regulating long-term high-level waste storage or disposal facilities.
- The Department of Energy. DOE is responsible for developing waste disposal methods and for building and operating facilities for long-term storage and/or disposal of both Federal program and commercial high-level wastes and Federal program transuranic contaminated waste.

PAST EFFORTS AND PROBLEMS IN DISPOSING OF NUCLEAR WASTES

In its first two decades, the Nation's nuclear weapons program concentrated on producing nuclear materials for weapons and other defense-related activities. Little budget or management attention was given to addressing permanent disposal of the resulting nuclear wastes. The Atomic Energy Commission ^{1/} believed the disposal problem was technically solvable and could be addressed at some future time. As a result, decisions on nuclear waste management were based on short-term expediency rather than long-term management. Beginning in the late 1950s, the expansion of the commercial nuclear power industry prompted the Atomic Energy Commission

^{1/}On Jan. 19, 1975, part of the Atomic Energy Commission became part of the Energy Research and Development Administration, which in turn became part of DOE on Oct. 1, 1977.

to adequately inform public and government officials about its programs. As a result, when the Energy Research and Development Administration announced it would conduct site screening studies in one Michigan county, government officials and the public believed a site had already been selected. Opposition to the repository program developed from this misunderstanding.

Later, in December 1976, the Energy Research and Development Administration undertook a 36-State search to identify suitable sites for geologic repositories for commercially generated high-level wastes. The search was designed to lead to the construction of six repositories, two each in salt, shale, and granite before the year 2000. That search, too, failed because of local political resistance to site exploration attempts and insufficient resources to do the planned work.

The project which has progressed the farthest is the Waste Isolation Pilot Plant--a proposed repository for disposing of Federal transuranic contaminated wastes. DOE has selected a site on Federal and State owned land in New Mexico. To secure the site, DOE had to purchase or condemn a number of oil and gas leases, and may have to acquire some potash mining leases at a total cost of about \$43 million.

Initially, New Mexicans welcomed the project, but recent public opposition to storing nuclear wastes in the State has developed. A project official told us that the project is still supported by elected local officials and, he believed, by many elected State officials. He added, however, that if New Mexicans voted against the project, he believed DOE would abandon it. DOE's schedule calls for construction to begin in 1981 and for the site to be ready to receive waste in April 1986.

URGENCY OF SOLVING THE NUCLEAR WASTE DISPOSAL PROBLEM

Unless safe nuclear waste disposal methods are decided on and effectively demonstrated and the public is convinced that there is a permanent solution to the problem, construction of additional nuclear powerplants may be prevented and existing reactors could be forced to close. DOE told us that as of February 1979, nine States--Colorado, Louisiana, Michigan, Maryland, Minnesota, Montana, Oregon, South Dakota, and Vermont--had enacted legislation that might prohibit waste repository siting. Nineteen other States had enacted or were considering legislation asserting lesser degrees of State control. Notwithstanding this State legislation, the Federal Government can mandate the location of nuclear waste

CHAPTER 2
PROGRESS AND PROBLEMS IN
DEVELOPING NUCLEAR WASTE POLICY

Past efforts to dispose of nuclear waste in geologic formations have not been successful because neither DOE nor its predecessors cultivated sufficient public and political acceptance during a time of growing concern for protecting the environment. The major obstacle to disposing of nuclear waste appears to be convincing the public and various political bodies that a particular nuclear waste disposal method is acceptably safe.

In an effort to address the nuclear waste management problem head-on, the President requested that several Federal agencies recommend to him policies which would provide a basis for a technically feasible and publicly acceptable program for long-term nuclear waste management. This was an important first step toward realistically addressing this critical national issue. The next step should be the development of a master plan for long-term management of both Federal and commercial nuclear waste. This plan should clearly lay out the dimensions of the nuclear waste problem, long-term management goals and objectives, steps necessary to achieve goals and objectives, responsibilities, and opportunities for early public participation.

To have a reasonable chance of acceptance, a plan for nuclear waste management must be technically feasible, have a realistic implementation timetable, and have a broad base of support. To achieve this support, opportunity for early and widespread public participation is needed in nuclear waste management program planning, policy formulation, and program implementation. Therefore, we believe that an organization similar in concept to the President's recent waste management policy group--expanded to include participation from outside the Federal Government--should be given broad planning and policymaking tasks relating to nuclear waste management. DOE should then be primarily responsible for implementing the plan and policies.

This chapter discusses the administration's recent efforts to develop comprehensive nuclear waste management policies and our views on the planning and organizational efforts needed to proceed with a long-term nuclear waste management program which would have the greatest chance of technical, public, and political acceptance.

NEED FOR A MASTER PLAN

The Federal Government has never articulated a firm policy on how it intends to manage, over the long term, either Federal or commercial nuclear waste. Because of this there has also never been a clearly defined, technically feasible long-term waste management plan. The IRG recognized this deficiency and concluded that an "interim strategic planning basis" is needed to insure that the long-term nuclear waste management option selected meets environmental and safety requirements in a socially acceptable, economically feasible manner, consistent with general nuclear policies. According to the IRG, the interim planning basis must:

- Address Federal agency responsibilities.
- Identify areas where additional planning, evaluation, assessment, or long lead time research must be done.
- Identify and complete major environmental review, standard setting, and licensing activities.
- Provide for State, local, and general public consultation.
- Identify the resources and develop schedules for completing the many separate tasks.
- Develop and submit legislative recommendations.

In our view, a master plan addressing these and any other important planning elements is critical now to eventually gaining public acceptance of any proposed nuclear waste repository projects. It is critical in order to show how and when any proposed project logically and technically fits into the Nation's long-term waste management program.

We also believe such a plan should address both Federal and commercially generated high-level waste (including spent fuel) and transuranic contaminated wastes. Traditionally, DOE and its predecessors have separately funded and managed these waste programs. While the exact composition of Federal and commercial wastes varies, the major radioactive materials which must be isolated from the environment over the long term are essentially the same.

The IRG recognized that both high level and transuranic contaminated wastes present problems of comparable magnitude for the long-term--greater than 1,000 years. In its final report the IRG also recognized that there is essentially no

proposed council--would best insure development and implementation of a viable nuclear waste management plan without disrupting and delaying ongoing programs.

A recent Senate bill (742) provides an alternative approach to that recommended by the IRG. The bill would create a State and Federal advisory council similar to that proposed by the IRG, but would place responsibility for developing a national waste management plan not in DOE but in a Federal interagency committee (with one representative from the proposed State and Federal advisory council). Under this proposal, overall planning would rest in a committee outside of DOE, but a DOE representative would chair the committee and the responsible agencies and departments would implement the national nuclear waste management plan.

Because of what we believe is the critical importance of developing a technically defensible, broadly acceptable long-term nuclear waste management plan, we favor placing responsibility for the plan with a committee concept or structure. Various legislative bills have been introduced that contain proposals for organizational structures to deal with the waste problem. The recently introduced Senate bill 742 embodies most of those elements that would, in GAO's view, provide for the needed committee structure.

While this may cause some near term program disruption and/or delay, such an approach could be more effective in the long term if it can better foster public acceptance of a long term nuclear waste plan and implementing programs.

CONCLUSION

We believe that solving the waste problem is important for two reasons. First, the waste problem should be solved soon rather than saddling future generations with the task. The vast quantities of Government-produced waste and the increasing amount of commercial spent fuel must be dealt with now. Second, if nuclear power is to continue to be a major energy source, the Nation must prove it can safely dispose of nuclear wastes.

Past efforts to solve the problem have failed because of the lack of a sound policy and plan which would provide public acceptance. Attempts thus far to permanently dispose of nuclear waste have been rejected by the public because, at least in part, it was not afforded an opportunity to participate in the early stages of the projects.

We believe the recent IRG effort is a good start toward establishing a viable Federal program for long term

for developing a national waste plan. The officials believed that the committee approach would give DOE an insufficient voice in nuclear waste management planning, and would be subject to forced compromises and inevitable risk of delay.

We recognize these possible disadvantages, but believe they are more than offset by the long-term advantage of fostering public acceptance of a nuclear waste plan and implementing programs offered by the committee concept.

political, and administrative constraints. DOE officials told us that neither existing radioactive contamination nor present Federal ownership of land is part of the evaluation criteria.

DOE's approach to geologic exploration is a screening process of comparing successively smaller geographical areas to its general specifications. Eventually, DOE plans to select a number of potential sites for very intensive studies that will result in identifying a small number of candidate waste repository sites.

In addition to this screening process, DOE is conducting studies at the Hanford Reservation and the Nevada Test Site. At Hanford, DOE is exploring an underlying basalt geology. As part of its program to find disposal sites for commercial waste, DOE is investigating its Nevada Test Site. This investigation is directed at identifying specific potential repository sites, suitable geologic media for a repository, in-place testing of spent fuel, and compatibility of a potential repository with continued nuclear weapons testing. To date, no public or political opposition has developed toward either of these programs.

SOME DOE RESERVATIONS ARE
PERMANENTLY CONTAMINATED
WITH RADIOACTIVITY

DOE officials told us that it is probably impossible to totally clean up parts of four of its reservations--Hanford, Idaho National Engineering Laboratory, Savannah River, and the Nevada Test Site. DOE has not decided what to do with these reservations in the long term, but is now preparing environmental impact statements for Hanford, Idaho Laboratory, and Savannah River which will identify alternatives for long term management.

According to DOE, the Nevada Test Site is the least likely site to be cleaned up. While only a small volume of high-level waste is stored there, unknown but suspected significant amounts (1) have been scattered over the land from early above-ground weapons tests and (2) remain trapped in the caverns and shafts associated with underground tests.

DOE officials said that the three remaining reservations could theoretically be cleaned up if costs were no consideration. One official, however, said the cost to totally clean up the Hanford Reservation would be prohibitively expensive. In addition, DOE officials pointed out that moving the great quantities of waste to another location for permanent disposal is questionable from a safety

Other factors favor these sites. Specifically, each reservation is

- large enough for an adequate buffer zone;
- now owned by the Federal Government, eliminating the need to condemn and purchase land; and
- remote from major population centers.

Furthermore, communities adjacent to these reservations are familiar with, and for the most part accept, nuclear activities. Indeed, many residents earn their livelihood directly or indirectly from the reservations. Therefore, these communities may be more receptive to nuclear waste repositories than other communities.

CONCLUSIONS

DOE is using a screening process to identify potential waste repository sites. This process is a conservative and logical approach, has the support of the scientific community and should continue to be pursued. But before DOE or any other entity which may assume responsibility for site selection selects any other repository sites, it should give first consideration to determining if any of the existing, highly contaminated DOE reservations are acceptable. Locating repositories on these reservations offers some very definite advantages. It would

- avoid contaminating any more areas of the United States with radioactivity;
- simplify disposal of existing defense wastes now stored on the reservations if that is required because transportation risks would be minimized; and
- gain public and political acceptance better than privately owned sites because the reservations are already federally owned, are in relatively remote locations, and are a major contributor to the local economy.

More importantly, locating a repository on a DOE reservation offers a solution to the dilemma that these reservations present to DOE. These reservations, according to DOE, are so contaminated that it would not be feasible to clean them up. Moreover, they now contain about 95 percent of the high-level and transuranic waste that exists in this country, and moving this waste to other locations would be very expensive and would present significant safety risks.

CHAPTER 4

SCOPE OF REVIEW

We obtained the information contained in this report by reviewing documents, studies, reports, and other records. We also interviewed officials at the

- DOE headquarters, Washington, D.C., and Germantown, Maryland;
- DOE's Richland Operations Office, Richland, Washington;
- DOE's Savannah River Operations Office, Aiken, South Carolina;
- DOE's Albuquerque Operations Office, Albuquerque, New Mexico;
- U.S. Geological Survey, Denver, Colorado;
- Battelle, Columbus, Ohio.

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If DOE were to find that the geology at these reservations was unacceptable for a permanent repository, it would face very disturbing questions about permanent solutions regarding what to do with the wastes at these sites that cannot be moved to another location. Looking at the problem from another angle, if the DOE reservations are not acceptable for storing wastes that would be shipped there from other locations, then they should not be acceptable for the long-term storage of wastes already there. Clearly, these contaminated sites present a set of very perplexing problems to DOE.

RECOMMENDATION TO THE
SECRETARY OF ENERGY

We recommend that the Secretary of Energy determine-- unless and until its responsibility in this area is assigned to another organization--how DOE is going to deal with the highly-contaminated DOE reservations and whether they are acceptable as nuclear waste repositories before selecting any other sites.

standpoint. In these officials' opinions, the risks of removing the waste and transporting it from the site is far greater than leaving it where it is.

DOE officials told us the waste at the Idaho Laboratory could be removed relatively easily compared to the other sites. However, because of the large quantity of transuranic material buried there, with no plans to retrieve it, and the large number of research reactors (51) at the site, total decontamination would be very costly and risky.

At Savannah River, the large volume of waste and the massive reactors and supporting facilities which were built to withstand nuclear attacks would be very difficult and costly to remove.

In conclusion, DOE officials told us that the prior nuclear activities have resulted in a de facto commitment of these four reservations to long-term nuclear uses. They also said that it "offends logic" to spend sums of money and take risks to remove the wastes from these reservations and bury them elsewhere, thus contaminating another location. U.S. Geological Survey officials agreed, provided the DOE reservations are geologically acceptable for permanent disposal of nuclear wastes. The Nuclear Regulatory Commission has stated that defense-related high-level wastes will likely be disposed of in the same or similar repositories as commercial wastes. Given this, DOE and Geological Survey officials would prefer to dispose of commercial high-level waste in repositories at the existing DOE reservations if geological and other technical considerations permit. Geological Survey officials pointed out that because of the large defense waste volumes in comparison to the limited commercial waste volumes, it would make much more sense to ship commercial wastes to a repository located on a DOE reservation than to ship the defense wastes to another repository location.

DOE CONTAMINATED RESERVATIONS
HAVE CHARACTERISTICS FAVORABLE
FOR WASTE REPOSITORIES

The underlying geology of three of the four DOE permanently contaminated reservations--Hanford, Nevada Test Site, and Savannah River--have been and are being investigated as part of DOE's Federal and commercial long-term waste management programs. Additional intensive investigations are needed to confirm or reject the geology underlying these reservations and to identify and confirm the suitability of any specific potential repository sites.

CHAPTER 3

FIRST CONSIDERATION SHOULD BE GIVEN

TO EXISTING DOE RESERVATIONS FOR

WASTE DISPOSAL SITES

DOE is searching the United States for potential high-level waste repository sites. Efforts to date have focused on identifying those sites with geologic environments that provide the best physical integrity and waste containment characteristics. This approach is both conservative and logical and should continue to be pursued.

We believe, however, that before DOE--or any other entity which may assume responsibility for site selection--selects any other repository sites, it should first accept or reject its highly contaminated reservations for repository sites. Locating repositories on one or more of these reservations, if technically feasible, is desirable because:

- It would avoid contaminating any more areas of the United States with radioactivity.
- Disposal of the existing Federal program wastes in geologic repositories would be simplified.
- The sites are already federally owned, are in remote locations, and some areas are so badly contaminated that they can never be returned to unrestricted uses.
- Public and political acceptance at these locations is likely to be higher than in other parts of the country.

DOE'S APPROACH TO SELECTING HIGH-LEVEL WASTE REPOSITORY SITES

The Environmental Protection Agency has the ultimate responsibility to develop waste repository environmental standards which will, in turn, form the basis for site selection and suitability criteria to be issued by the Nuclear Regulatory Commission. As of May 1979 these standards and criteria had not been developed. In advance of the standards and criteria, DOE developed specifications which it is using to evaluate candidate regions, and eventually specific potential sites. These criteria include the physical integrity and waste containment characteristics of the geology, accessibility to transportation facilities, socioeconomic impacts on nearby communities, and legal,

nuclear waste management. However, the effectiveness of the program depends on future policy, planning, implementation, and the proper organizational structure to carry it out.

The IRG's report is the first dedicated effort to establish a workable program. We believe most of the IRG's recommendations are on target. They point to public acceptance, transportation, State and local government acceptance, and the lack of standards and criteria as problems remaining to be solved. While it appears that technical problems can be solved, political and public acceptance are major obstacles that will be difficult to overcome.

We believe it is very unlikely that making DOE the responsible lead agency to plan and coordinate the program will establish public confidence and trust. A more diverse organizational concept made up of Federal and non-Federal representatives should develop the policy and plan, while DOE maintains responsibility for implementation. Only through this broader involvement can there be any chance that the public can be convinced that an acceptably safe disposal method exists.

But because nuclear problems are such highly emotional issues and becoming even more so, as evidenced by the States that have indicated an unwillingness to permit nuclear waste disposal within their boundaries, it may be impossible to get the public and political support necessary for a State to accept nuclear waste. Ultimately, if State approval for waste repository sites cannot be obtained within an established time, the Federal Government might have to mandate selections. While such action would not be easy it may be necessary if the waste problem is to be solved in a reasonable time.

RECOMMENDATION TO THE CONGRESS

We recommend that the Congress enact legislation which will create a Federal and State committee and place responsibility for developing a national waste management plan in that committee. While Senate bill 742 would establish such a committee, we believe that it or any other bill considered must recognize that if this concept does not lead to the selection of waste repository sites within an established time, the Federal Government would exercise its right to mandate selections.

AGENCY COMMENT

DOE officials disagreed with our views and recommendation that Congress create a Federal and State committee responsible

difference between Federal and commercial transuranic waste; therefore, wastes from the two programs should be disposed of in the same manner. The IRG report is not clear on whether both Federal and commercial high-level waste should be managed the same. In our opinion, they should be, because the ultimate objective is the safe isolation of essentially the same long-lived radioactive materials from man's environment.

ORGANIZATIONAL STRUCTURE

The IRG report clearly set out the need for a nuclear waste management program structure which would provide the greatest chance for public acceptance. The IRG recommended that DOE continue to have responsibility for developing and implementing the overall plan but identified a number of oversight mechanisms and external reviews which it believed would insure the proper development and implementation of the DOE program. These include

- legislative direction and congressional review,
- participation of State and local governments,
- increased broad scientific and public participation,
- Executive Office program review, and
- NRC licensing review.

Public comment on the IRG report was divided as to whether DOE should retain lead responsibility. Some commentators feared that DOE would be more committed to disposing of nuclear wastes quickly than carefully. An alternative preferred by many commentators was to assign primary responsibility for planning and managing the waste management program to a new Government authority. The IRG concluded that this option would provide a focal agency for managing necessary programs but would also delay necessary immediate action while the agency was organized.

A key element of the IRG's organizational recommendation is the creation of a planning council composed of Governors, selected Indian nation representatives, officials of national organizations of State and local governments, and representatives of DOE and other Federal agencies. The planning council would provide State perspectives and advice on nuclear waste management activities.

The IRG believed that this strategy--continued DOE lead waste management program responsibility with input from the

RECENT EFFORT TO ADDRESS LONG-TERM
NUCLEAR WASTE MANAGEMENT

On March 13, 1978, the President sent a memorandum to 10 Federal agencies establishing an interagency nuclear waste management task force chaired by the Secretary of DOE. The President requested that the task force formulate recommendations for a long-term waste management policy and for programs to implement it. The task force deliberations were to include participation by the public, industry, States, and the Congress. Another 4 Federal agencies in addition to the 10 were enlisted because of their expertise and interest in the area. The task force, known as the Interagency Review Group (IRG), submitted its final report to the President in March 1979. Major IRG recommendations were:

- Build the first nuclear waste disposal facility in a mined geological formation. Examine several types of geology (salt, basalt, granite, etc.) before selecting a type and specific site.
- At the same time, continue to explore other technological options (such as disposal in deep ocean sediments) as candidates for future disposal options.
- Assign DOE the primary responsibility for planning and managing nonregulatory programs and interfacing with regulatory programs.
- Establish an executive planning council of Federal, State, and local government and Indian nation representatives to foster consultation and concurrence
--as opposed to State veto or Federal supremacy--in proposed repository sites.

The IRG recommendations are with the President for his review. Generally speaking, we believe the IRG effort and the thrust of its recommendations represent a step in the right direction. We believe that what are needed now for an effective and acceptable nuclear waste management program are

- a technically feasible master plan for managing Federal and commercial nuclear waste, with a realistic implementation timetable, which could convince the public that disposal is acceptably safe; and
- an organizational concept which would provide for widespread public participation in policy development, planning, and implementation of a waste management plan.

repositories through the right of eminent domain. It is however, certainly desirable to obtain State cooperation in site selections.

None of the public and political opposition to past waste disposal efforts has centered on either the need for repositories or the concept of geologic disposal. Instead, it has centered on specific proposed locations. That is, no one wants a nuclear waste repository in his or her backyard because of the fear that the wastes can escape to the environment. This fear cannot be overcome until the risk of specific repository proposals can be assessed and found acceptably safe. Such assurance cannot be given, of course, until a repository is built and tested.

Electric utilities have reported that the unresolved nuclear waste disposal problem is influencing their decisions not to build nuclear powerplants. They have stated that they cannot afford to put themselves in a position in which their operation of powerplants depends on schedules and projects for nuclear waste disposal over which they have no control. The problem faced by the utilities is becoming acute. Present projections show that unless additional storage for spent fuel is provided at reactor sites or centralized facilities, some reactors may be forced to shut down by 1985. GAO plans to issue a comprehensive report on the subject soon.

While the Nation could conceivably turn away from expansion or continued long-term reliance on nuclear power, this action would not eliminate the critical need to dispose of nuclear waste. Over 20 million cubic feet of Federal high-level waste and about 4,000 metric tons of commercial nuclear powerplant spent fuel already exist. This existing waste is presently stored in several forms and locations, and must continue to be "stored" in some fashion for many thousands of years.

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Chapter 2 of this report presents our views on the approach the Nation should take to plan and implement a long-term waste management strategy which, recognizing the dimension of the nuclear waste disposal issue, may have the greatest chance of gaining both public and technical acceptance of nuclear waste disposal. Chapter 3 points out what we believe should be the major priority or consideration in selecting a repository site.

to begin research programs to develop safe, long-term storage or permanent disposal methods.

Methods investigated included (1) emplacement in geologic formations, deep ocean sediments, or deep drill holes, (2) transmutation into shorter-lived radioactive isotopes and subsequent disposal in a geologic formation, and (3) ejection into space. Of these, only disposal in deep underground repositories mined in sound geologic formations appears to be attainable in the near future. According to DOE, research on emplacement in deep drill holes or ocean sediments is probably 10 to 15 years away from being able to begin implementation. Transmutation and space disposal are even more distant because of scientific and engineering problems.

Disposal of high level wastes in underground geologic formations was first suggested by the National Academy of Sciences in 1957. Since then, attempts to identify and develop geologic disposal sites have been unsuccessfully attempted on three occasions. In all cases, the attempts failed or problems have surfaced primarily because of public and political opposition, rather than technical reasons.

In the 1960s and until 1972 the Atomic Energy Commission investigated bedrock formations underlying its Savannah River Reservation as a potential repository for the liquid high-level waste temporarily stored in steel tanks on the reservation. In 1972, however, this investigation was discontinued because of political opposition from the State of Georgia and an Atomic Energy Commission decision to reorient the military nuclear waste management program to investigating retrievable surface storage of solidified waste.

In 1965 the Atomic Energy Commission placed spent fuel in an abandoned salt mine near Lyons, Kansas, to examine the effects of radiation and heat on salt. In June 1970 the Atomic Energy Commission announced that it would build a Federal waste repository at the Lyons mine if further studies confirmed the site's suitability. Later investigations revealed a possibility that water could enter the Lyons mine from numerous nearby old oil and gas exploration holes and salt mines. These two technical issues had not been resolved, however, when the project was canceled in 1972 because of adverse public and political reaction.

A later attempt to screen possible disposal sites in Michigan failed in 1976 when voters in three Michigan counties voted overwhelmingly against any waste repository in their counties. This action was largely a result of the Energy Research and Development Administration's failure

<u>Location</u>	High-level waste (millions of cu. ft.)	Transuranic contaminated waste (millions of cu. ft.)
Hanford Reservation, Washington	6.3	5.3
Savannah River Reserva- tion, South Carolina	3.0	1.2
Idaho National Engineer- ing Laboratory, Idaho	.4	3.5
Los Alamos Scientific Laboratory, New Mexico	-	(a)
Oak Ridge National Labora- tory, Tennessee	-	(a)
Nevada Test Site, Nevada	-	(a)
Total	<u>9.7</u>	<u>10.9</u>

a/These three sites combined add up to .9 which is reflected in the total.

There are also about 4,000 metric tons of commercial nuclear powerplant spent fuel presently stored. Based on an assumed high growth rate, DOE expects that by the year 2000 about 98,000 metric tons will be accumulated. In addition, over 80,000 cubic feet of liquid high-level waste generated from past reprocessing of both Federal and commercial spent fuel is now temporarily stored in tanks at the Nuclear Fuel Services, Inc., commercial reprocessing plant at West Valley, New York. This plant is presently shut down.

Up to now, radioactive wastes have been stored as follows:

- Federal and commercial high-level wastes have been stored in steel tanks pending an ultimate disposal solution.
- Federal and commercial transuranic contaminated wastes have been disposed of in the ground and, more recently, stored in retrievable storage facilities.
- Spent fuel has been stored in special pools at power-plant sites, at facilities constructed away from

RECOMMENDATION TO THE
CONGRESS

The Congress should enact legislation which will create a Federal and State committee and place responsibility for developing a national waste management plan in that committee. While Senate bill 742 would establish such a committee, GAO believes that it or any other bill considered must recognize that if this concept does not lead to the selection of waste repository sites within an established time, the Federal Government would exercise its right to mandate selections.

NEED TO CONSIDER EXISTING
DEPARTMENT OF ENERGY SITES
FOR WASTE DISPOSAL

The Department of Energy is searching for potential nuclear waste repository sites. Its approach is to identify sites with geological environments which provide the best physical integrity and waste containment characteristics. The Department is also evaluating some of its existing nuclear reservations as possible repository sites. This dual approach is both conservative and logical and should be pursued. (See pp. 14 and 15.)

Before the Department of Energy or any other entity which may assume responsibility for site selection selects any other repository site, it should give first consideration to determining if any of the existing, highly contaminated reservations are acceptable because

- using them would avoid contaminating any more areas of the United States with radioactivity;
- disposal of the Department of Energy generated waste would be simplified;
- the sites are already federally owned, are in remote locations, and are in some cases so badly contaminated that they can never be returned to unrestricted uses; and

--The Department of Energy is responsible for developing waste disposal methods and for building and operating facilities for long-term storage and/or disposal of both Federal and commercial high-level wastes and Federal transuranic contaminated waste.

PAST EFFORTS TO SOLVE THE WASTE PROBLEM

The Department of Energy and its predecessor agencies have made several unsuccessful attempts to permanently dispose of nuclear waste in deep underground repositories. These attempts have failed because of public and political opposition, rather than technical reasons. (See pp. 3 to 5.)

The Federal Government has never articulated a firm policy on how it intends to manage over the long-term either Federal or commercial nuclear waste. Consequently there has never been a clearly defined, technically feasible long-term waste management plan. (See p. 9.)

PRESENT EFFORTS TO SOLVE THE WASTE PROBLEM

On March 13, 1978, the President established a task force to formulate recommendations for a long-term nuclear waste management policy and for programs to implement it. The recommendations have been reported to the President, and they highlight the significant problems and are a step in the right direction. (See p. 8.)

What are needed now to provide an effective and acceptable nuclear waste management program are

--a defensible master plan for developing and implementing long-term management of both Federal and commercial nuclear waste and

