BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

The Nuclear Waste Policy Act: 1984 Implementation Status, Progress, And Problems

The Nuclear Waste Policy Act of 1982 established federal responsibility and policy for the permanent disposal of highly radioactive materials. The Department of Energy's (DOE's) Office of Civilian Radioactive Waste Management has responsibility for implementing the act.

During 1984 DOE made progress in completing important actions required by the act. However, actions are generally taking longer than envisioned by the Congress or planned by DOE. GAO recommends that the Secretary of Energy improve the program's planning. In addition, to avoid unnecessary program costs, delays, and potential litigation, DOE will need (1) congressional direction on how many sites should be found suitable for a final repository and (2) continued authority to compensate victims of a nuclear waste accident.

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

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To the President of the Senate and the
Speaker of the House of Representatives

This report presents the results of our second audit of the Department of Energy's (DOE's) efforts to implement the Nuclear Waste Policy Act of 1982 (42 U.S.C. 10101). The act requires us to report to the Congress the results of an annual audit of DOE's Office of Civilian Radioactive Waste Management. Our second audit covers selected activities of this office during calendar year 1984.

We are sending copies of this report to congressional committees with oversight of DOE's activities, the Secretary of Energy, the Chairman of the Nuclear Regulatory Commission, and other interested parties.

Charles A. Bowsher
Comptroller General
of the United States

The Nuclear Waste Policy Act of 1982 established a federal program estimated to cost between $21 billion and $35 billion for the safe and permanent disposal of highly radioactive nuclear waste.

This report, GAO's second annual audit as required by the act, discusses the Department of Energy's (DOE's) progress and problems during 1984 in implementing the act's requirements. GAO also examines several issues--key to the program's long-term success--concerning DOE's

--approach to selecting a waste disposal site,

--negotiations of agreements with states, and

--planning for monitored retrievable spent fuel storage.

BACKGROUND

The act established numerous requirements for DOE decisions and reports leading to the (1) selection of sites for the permanent burial of highly radioactive materials in deep underground rock formations (repositories), (2) construction and operation of these repositories, and (3) provision of federal short-term (interim) or long-term waste storage that can be monitored and retrieved if permanent disposal is delayed. DOE is committed to accept waste for disposal beginning in 1998. The program is financed by the owners and generators of waste through the Nuclear Waste Fund. In fiscal years 1984 and 1985, a total of $647 million was provided through this funding.

Another law, the Price-Anderson Act, provides financial protection against accidents to nuclear power plant owners and others and currently guarantees compensation to victims of a nuclear waste accident. The government's authority to provide financial protection expires in 1987.

RESULTS IN BRIEF

Although 1984 marked the achievement of several important program objectives, such as issuance of final siting guidelines and initiation of spent fuel demonstration projects, many actions required by the act have been delayed. Such

delays have generally been caused by DOE's unrealistic scheduling and inadequate planning for contingencies. These delays have implications for DOE's ability to operate a repository by 1998.

GAO also found that DOE's approach to siting the first repository may not ensure its timely completion. DOE has been unable to conclude an agreement with the state of Washington because of the state's concerns about liability for a nuclear waste accident. Moreover, DOE's plans for monitored retrievable storage could hinder the repository program's progress.

PRINCIPAL FINDINGS

Siting Approach

DOE spent most of 1984 preparing for the Secretary's recommendation of three sites for detailed testing. In December 1984 DOE published siting guidelines, which the act required by July 1983, and draft environmental assessments, which the act did not require although the act did assume these assessments would be final by January 1985. Although these documents are the foundation for DOE's site selection decisions, they had been delayed during numerous internal DOE reviews. DOE's planning has been overly optimistic. For example, DOE did not anticipate that drafts of these documents would require as many revisions as they did.

Currently, DOE plans to recommend sites in Nevada, Texas, and Washington for detailed site testing. Although DOE expects that all three sites will ultimately be suitable for a repository, DOE has interpreted the act as requiring that only one suitable site must be found after this testing. The Nuclear Regulatory Commission, states, and others have questioned DOE's interpretation of the act. Most of these parties believe that three sites must be found suitable from which one is to be recommended for a repository. GAO believes that DOE's approach jeopardizes the program's success because if backup sites are not available, successful legal challenges or a state or Indian tribe's disapproval of the recommended site could cause a major setback to the program. The

	Congress could override this disapproval, but DOE considers an override unlikely.
Consultation and Cooperation Agreements	The act requires DOE to negotiate formal agreements with states and affected Indian tribes to resolve their concerns. Although no agreements have yet been made final, one draft agreement with the state of Washington has been negotiated and is currently being reviewed by the state. DOE has also begun negotiations with the Umatilla Indians. Other states and tribes have decided to wait until further siting decisions are made before entering into negotiations with DOE. An issue that could affect acceptance of such agreements is whether DOE can meet states' demands that the government provide unlimited compensation to victims of a nuclear waste accident. Because the Price-Anderson Act limits liability for DOE contractor activities to $500 million per accident, DOE cannot provide this desired assurance.
Monitored Retrievable Storage Plans	The act requires that DOE submit a proposal to the Congress by June 1985 on the need for monitored retrievable storage facilities. The act calls for the repository program to proceed regardless of whether these storage facilities are built. Developing both the monitored retrievable storage program, if authorized by the Congress, and repositories in a timely manner will be difficult for DOE because both programs will be competing for limited federal personnel and financial resources from the Nuclear Waste Fund. Using limited staff resources on concurrent activities has already caused delays in the waste program. In addition, DOE has shifted some funding from the repository program to monitored retrievable storage to complete the proposal to the Congress by January 1986.
MATTERS FOR CONGRESSIONAL CONSIDERATION	The Congress should consider whether DOE's approach to siting the first repository is appropriate or whether DOE needs to adopt a different approach to provide backup sites. GAO presents several alternatives.

RECOMMENDATIONS

If the Price-Anderson Act is extended, the Congress should increase the act's liability and compensation provisions for nuclear incidents involving high-level radioactive waste. GAO has made similar recommendations in past reports to increase the protection for DOE contractor activities to a level equivalent to the protection afforded nuclear power plant owners.

GAO also recommends that the Secretary of Energy

--develop contingency plans for detailed testing of at least one additional repository site, and

--determine how DOE will ensure that the monitored retrievable storage program would operate so as not to impede the repository program.

GAO makes other recommendations to the Secretary in chapter 4.

AGENCY COMMENTS

DOE disagreed with the principal findings of the report and the specifics of GAO's recommendations. DOE questioned GAO's position on (1) the risks in DOE's siting approach for the first repository and (2) the potential for monitored retrievable storage to compete with the repository program. DOE believes that its siting approach is conservative and prudent and plans for its monitored retrievable storage proposal to include a complete budget to ensure adequate resources for the program. GAO believes that the risks of DOE's current siting approach are of serious concern and that contingency plans are needed so that the public will know in advance how DOE would test additional sites. In addition, DOE has not yet provided any specifics on how a monitored retrievable storage program would be administered to ensure that each program can operate without interfering with the other.

The Nuclear Regulatory Commission, five states, one Indian tribe, and four DOE contractors also formally commented on the report. GAO evaluated all these comments and incorporated them where appropriate in the report. Because of the length of these comments, they have not been reproduced in this report but are available upon request from GAO.

Contents

ILLUSTRATIONS

ABBREVIATIONS

CBO	Congressional Budget Office
CP&L	Carolina Power and Light
DOE	Department of Energy
EA	environmental assessment

EPA	Environmental Protection Agency
GAO	General Accounting Office
MRS	monitored retrievable storage
NRC	Nuclear Regulatory Commission
NWPA	Nuclear Waste Policy Act
OCRWM	Office of Civilian Radioactive Waste Management
OMB	Office of Management and Budget
OTA	Office of Technology Assessment
USGS	U.S. Geological Survey

GLOSSARY

Basalt	A fine-grained igneous rock, usually formed by lava flows.
Cost-plus-award fee contract	A cost-reimbursement contract that provides for a base fee and for an additional fee amount that may be awarded, in whole or in part, on the basis of periodic government evaluations of ongoing contractor performance.
Cost-plus-fixed fee contract	A cost-reimbursement contract in which the government agrees to pay the contractor a fixed number of dollars above reimbursable costs as a fee for doing the work.
Crystalline rock	A general term for designating an igneous or metamorphic rock, e.g., granite, as opposed to a sedimentary rock.
Dry storage	A storage technique that involves removing the spent fuel from pools and placing it in sealed containers. Systems for dry storage include casks, drywells, silos, and vaults. These systems are modular, are low in maintenance, and require no mechanical equipment for cooling.
Field drywells	A steel- and concrete-lined hole in the ground that will hold one or several spent fuel elements.
High-level radioactive waste	Highly radioactive material resulting from chemical processing of spent fuel to recover usable uranium and plutonium.
Integrated contractor	Major support contractors to DOE who serve as an interface between DOE and other contractors. As defined by DOE, integrated management and operating contractors are specifically authorized to use DOE's work package authorization system. In general, such contractors must accomplish their work in or on a government-owned facility, over at least 5 years, and at least 80 percent of the work at the facility must be DOE-funded.

Rod consolidation	Involves the dismantling of fuel assemblies and rearranging the spent fuel rods into a more compact configuration. It is a method to (1) increase the capacity of storage pools that have sufficient structural strength to safely support the added weight and (2) reduce the number of shipments to disposal or storage facilities. This technique, when licensed, could increase the maximum pool storage capacity at some plants by 1.5 to 2 times above that attainable using currently licensed methods, according to DOE.
Site characterization	Refers to activities undertaken in either the laboratory or the field to study the geologic condition of a potential repository site. Such testing includes borings, surface excavations, exploratory underground shafts, and in-situ testing to evaluate the suitability of a site for location of a repository.
Sealed concrete cask	Method for spent fuel storage involving a sealed concrete cyclinder sitting vertically on the ground. Inside the cask is a steel canister containing the spent fuel.
Siting guidelines	Guidelines that specify factors that qualify or disqualify any site from development as a repository, including factors pertaining to the location of valuable resources, hydrology, geophysics, seismic activity, proximity to water supplies and populations, and environmental quality.
Spent nuclear fuel	Nuclear reactor fuel that has been used to the extent that it can no longer be used in a nuclear power plant without reprocessing.
System guidelines	Part of DOE's siting guidelines that establish the requirements that an entire repository system--the site, the waste package, and the repositories--must meet to protect public health and safety and the environment.

Tuff	A rock formed of compacted volcanic ash and dust; it is usually porous and often soft.
Waste form acceptance requirements	The requirements that are the criteria for the performance of high-level radioactive wastes to be placed in a repository. These requirements would establish the technical specifications that the waste must meet prior to final disposal, such as physical dimensions, chemical composition, and weight.
Waste packages	The waste form and any shielding, packing, or other materials immediately surrounding the primary containers or canisters.
Waste packaging and handling	Involves packing the waste form in a container, loading this package into a cask for shipment, transferring the cask to a truck or rail carrier, etc.

CHAPTER 1

INTRODUCTION

Spent nuclear fuel and other high-level radioactive wastes are rapidly accumulating at commercial nuclear power plants and other storage areas throughout the United States. The Department of Energy (DOE) anticipates a shortage of existing storage capacity at some reactors to accommodate this waste[1] by the late 1980's. These radioactive materials are extremely difficult to dispose of because of their high toxicity, heat production, and long-lived nature. Currently, commercial spent fuel is stored in water-filled pools at the sites of nuclear power reactors; high-level wastes are stored in a variety of physical forms (including liquid and sludge) in containers at three federal sites (Hanford Reservation, Washington; Idaho National Engineering Laboratory in Idaho; and Savannah River Plant in South Carolina) and one state-owned site (Western New York Nuclear Service Center in West Valley, New York). Because spent fuel and high-level wastes can remain hazardous for hundreds to thousands of years, they must be isolated from the environment until their radioactivity declines to levels that will pose no significant threat to people or the environment. The safe disposal of this waste has been a national concern for almost 3 decades.

To ensure the safe disposal of these materials, the Congress enacted the Nuclear Waste Policy Act of 1982 (Public Law 97-425), which established a comprehensive national program directed toward (1) siting, constructing, and operating geologic repositories for the permanent disposal of this waste and (2) developing means to safely store such waste until its ultimate disposal. DOE estimates that the cost of this program is expected to range from $21 billion to $35 billion (1984 dollars). The act established the Office of Civilian Radioactive Waste Management (OCRWM) within DOE to carry out this program. Section 304(d) of the act requires the Comptroller General to audit this office annually. This report presents the results of our second annual audit of OCRWM[2] and covers program activities during calendar year 1984.

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[1]For brevity, the term "waste" is used throughout this report to mean "high-level radioactive waste and spent nuclear fuel."

[2]See Department of Energy's Initial Efforts to Implement the Nuclear Waste Policy Act of 1982 (GAO/RCED-85-27, Jan. 10, 1985) for the results of our first annual audit.

THE NUCLEAR WASTE POLICY ACT OF 1982

The Nuclear Waste Policy Act (hereafter referred to as "the act"), among other things, provides for the siting and testing of two geologic repositories; the licensing, construction, and operation of one of these repositories; financial assistance to states and Indian tribes affected by these facilities; research and development of short-term storage technologies; research on alternatives for permanent disposal of the waste; and technical assistance to foreign countries in the area of spent fuel storage and disposal. (See app. I for a more detailed listing of specific actions required of DOE under the act.) Our second annual audit has focused on DOE's efforts to meet the following six requirements of the act, which we believe are key to the long-term success of DOE's program.

A comprehensive program plan for the waste management program (sec. 301)--The act requires DOE to develop, by June 1984, a comprehensive "mission plan" providing an informational base sufficient to allow informed decisions on carrying out the program. According to the act's legislative history, the Mission Plan is intended to be a "planning blueprint" for the entire waste management program that will provide DOE guidance in developing and implementing an efficient program for the safe management and disposal of radioactive waste.

Guidelines for siting two geologic repositories (sec. 112)--The act requires DOE to develop general guidelines for assessing the suitability of potential repository sites by July 1983. DOE's recommendation of sites for further detailed investigation for both the first and second repositories will be based on these siting guidelines.

Environmental assessments (EAs) of nominated repository sites (sec. 112)--In addition to the siting guidelines, the act requires DOE to prepare environmental assessments for each site nominated for more detailed testing as a repository candidate. These EAs are to include an explanation of (1) the basis for DOE's recommendation and (2) the probable impacts of activities at each site on the public health and safety and the environment.

"Consultation and cooperation" agreements with affected states and Indian tribes (sec. 117)--As the siting activities proceed, DOE must provide information to and consult with states and local governments, as well as other potentially affected groups, in the evolving process. To ensure the participation of potentially affected states and Indian tribes in the siting process, the act requires DOE to begin negotiating written agreements for consultation and cooperation with these groups. These agreements are intended as a means to resolve the groups' concerns regarding public health and safety, and the environmental and economic impacts of a repository in their area.

A proposal for the construction of one or more monitored, retrievable storage (MRS) facilities (sec. 141)--The act also contains provisions governing both long-term and interim, or short-term, storage of spent nuclear fuel and/or high-level wastes. The act states that long-term storage of radioactive waste in an MRS facility is an option for providing safe and reliable management of the materials. In keeping with this finding, DOE is required to conduct a study of the need for and feasibility of MRS facilities, and prepare a proposal for their construction by June 1985. This proposal is intended to serve as the basis for Congress' decision on whether or not to authorize such facilities.

Demonstrations of alternative spent fuel storage technologies in cooperation with utilities (sec. 218)--Interim storage of spent fuel, until its ultimate disposal or placement in an MRS facility, is the primary responsibility of commercial owners of that fuel. However, the act authorizes DOE to assist these owners with their storage problems. To do so, DOE is required to undertake cooperative activities with selected utilities to demonstrate new spent fuel storage technologies that are not yet licensed for commercial use in the United States. These demonstrations are designed to facilitate and expedite the licensing and, therefore, the commercial availability of these technologies for use at power plant sites that will soon exhaust their existing storage capacity.

ROLE OF FEDERAL AGENCIES IN THE NUCLEAR WASTE MANAGEMENT PROGRAM

Organization and responsibilities of the Office of Civilian Radioactive Waste Management

DOE's OCRWM is directly responsible to the Secretary of Energy for implementation of the act. The Office was established with passage of the act; however, it was not officially set up as a functioning part of DOE until October 1983. (Prior to that time, the immediate responsibility of the agency for carrying out the act fell to an interim Nuclear Waste Policy Act Project Office.) A director of OCRWM was nominated by the President and approved by the Senate in May 1984.

OCRWM consists of four suboffices: Geologic Repositories; Storage and Transportation Systems; Policy, Integration, and Outreach; and Resource Management. Responsibilities are divided between each of these suboffices for the key activities discussed in this report. (See fig. 1.1.)

The Siting Division of the Office of Geologic Repositories is primarily responsible for repository siting activities. This division manages the development and application of the site-screening guidelines and interacts with states, local governments,

and Indian tribes in the siting process. The Siting Division coordinated development of the guidelines for selecting and recommending sites for two geologic repositories, and is responsible for headquarters' oversight of negotiations on "consultation and cooperation" agreements with affected groups. In addition, the Siting Division has responsibility for coordinating the preparation and review of the required documents in support of repository site nominations and recommendations, such as the environmental assessments.

The Storage Division of the Office of Storage and Transportation Systems plans and manages all activities related to MRS and spent fuel storage research and development. Specifically, the Storage Division is responsible for developing the overall mission and role of the MRS, selecting and developing technical concepts and designs for MRS, and preparing the MRS construction proposal for the Congress. In addition, the Storage Division plans and directs all spent fuel research and development activities, and assists utilities with licensing of various alternative at-reactor storage technologies through cooperative demonstration projects and generic research.

The Policy Division within the Office of Policy, Integration, and Outreach is responsible for program policy formulation and policy guidance at headquarters and field project offices. This division is also responsible for the coordination, preparation, and submission of the Mission Plan, as well as other special reports.

OCRWM is supported in its activities by DOE's field operations offices. Project offices in Las Vegas, Nevada; Columbus, Ohio; and Richland, Washington, are responsible for the work on the nine "potentially acceptable" first repository sites[3] under investigation in six states as shown in table 1.1. In addition, the Richland office has primary responsibility for carrying out the MRS and spent fuel storage research and development activities. These field offices oversee the work of contractors and DOE's national laboratories, which carry out the bulk of the technical work. To assist Richland, DOE has also established an office in Oak Ridge, Tennessee, to provide information to the state and local communities on DOE's plans for MRS.

DOE's efforts to site a second repository in the Eastern United States are being led by the Crystalline Rock Project Office

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[3]In accordance with section 116(a) of the act, in February 1983 DOE officially notified the six states where these sites are located that the Department was considering their state for a waste repository site.

at DOE's Chicago Operations Office. This project office is studying crystalline rock formations in 17 states for potential repository sites.

Table 1.1

Potentially Acceptable First Repository Sites

DOE project office	Host rock[a]	Potentially acceptable repository sites
Richland, Washington	Basalt	Hanford, Washington
Las Vegas, Nevada	Tuff	Yucca Mountain, Nevada
Columbus, Ohio	Salt	Vacherie Dome, Louisiana Cypress Creek, Mississippi Richton Dome, Mississippi Deaf Smith County, Texas Swisher County, Texas Davis Canyon, Utah Lavender Canyon, Utah

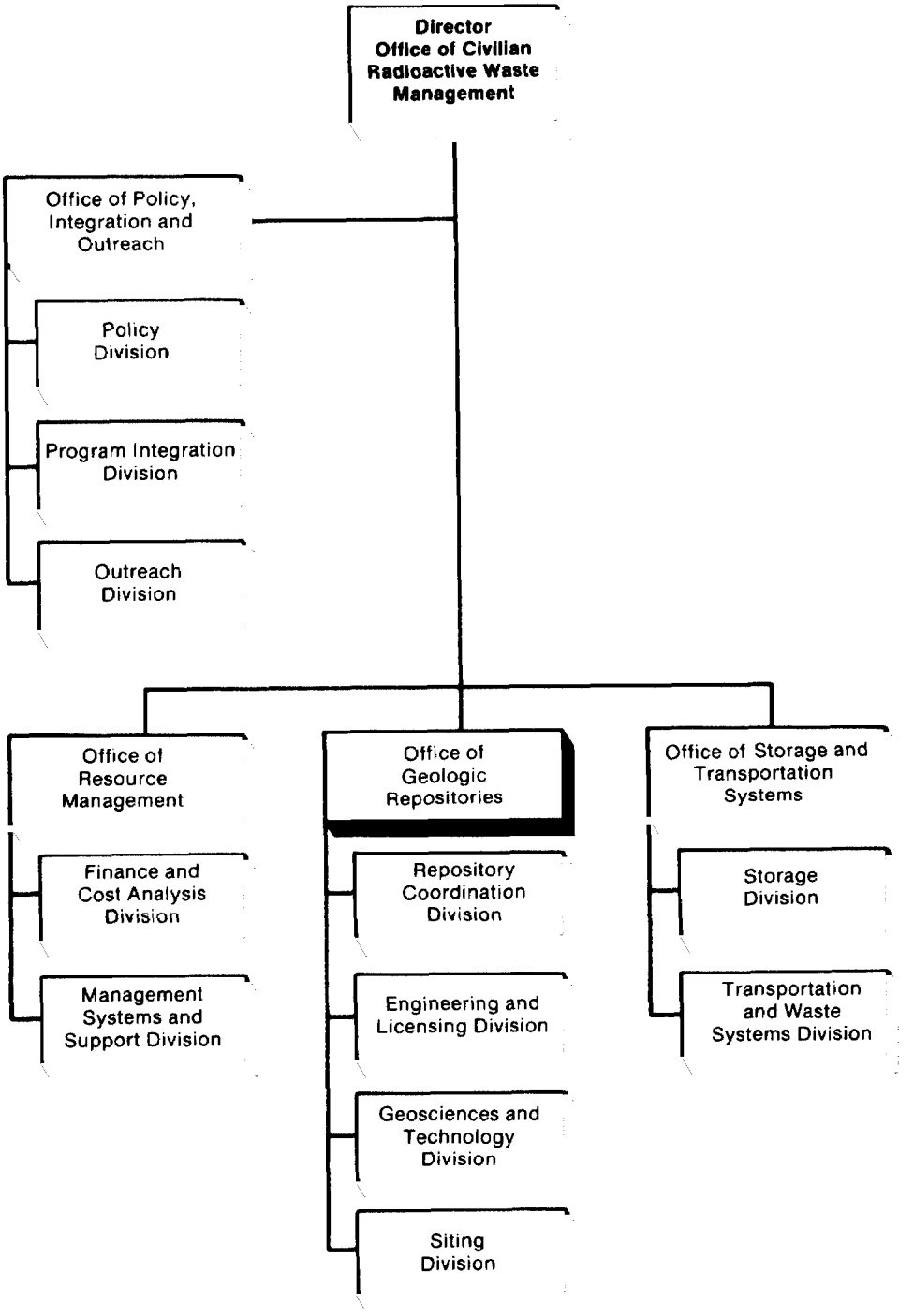
[a]The rock formations now being considered are basalt, a material formed from molten rock from volcanoes or fissures; tuff, a hard, compacted ash from volcanoes; and rock salt, a sedimentary rock formed by the evaporation of water from a saline solution.

Other federal agencies' roles in the DOE nuclear waste program

Although DOE is primarily responsible for implementing the act, other federal agencies also play prominent roles in carrying out the nuclear waste management program. The activities of other agencies with regard to the program range from consultation with OCRWM and document review to major actions such as promulgation of standards, technical requirements, and criteria with which DOE must comply.

The other federal agencies that are most actively involved in implementing the program activities discussed in this report are the Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC), and the U.S. Geological Survey (USGS). EPA is primarily concerned with ensuring that the nuclear waste program and the waste facilities being developed pose no health or safety hazards to the environment or man. In keeping with this mission, the act assigns EPA the responsibility for promulgating standards for the protection of the environment from any releases of radioactive materials from a repository. The act also requires DOE to submit certain key program documents--such as the draft Mission Plan and the MRS proposal--for EPA's review and comments. Further, DOE must consult with EPA in the preparation of the guidelines for the siting of geologic repositories.

Figure 1.1: Department of Energy Office of Civilian Radioactive Waste Management (Effective October 1984)



NRC is concerned with ensuring that the waste facilities and equipment developed under the act meet certain technical requirements and criteria, contained in federal regulations (10 C.F.R. 60), that it will apply in reviewing DOE applications for authorization to (1) construct repositories, (2) receive and emplace spent nuclear fuel and high-level waste in repositories, and (3) close and decommission these repositories. In addition, NRC must license an MRS facility and the use of alternative spent fuel storage technologies at civilian nuclear power plants. DOE must also obtain NRC's (1) concurrence with its repository siting guidelines, (2) consultation in preparation of the MRS proposal; and (3) comments on the draft Mission Plan and MRS proposal. In commenting on our report, Utah discussed NRC's role in the preparation of site characterization plans and provided additional views on NRC's activities.

Federal agencies, such as the USGS, have a somewhat less extensive role in DOE's nuclear waste program. The USGS has a consultative role in the repository-siting guidelines' preparation. In addition, USGS has been providing technical support to the DOE field offices in evaluating the geologic properties of the potential sites. The state of Nevada believes that at Yucca Mountain, USGS has been the lead investigator of geologic and hydrologic properties of the site. Under the terms of a memorandum of understanding between USGS and the Nevada Operations Office, USGS conducts investigations and interprets data for DOE.

In some sections of the act (e.g., section 301(b)), DOE is required to obtain the comments of "other government agencies as the Secretary deems appropriate" on program documents. Agencies then review the documents and provide DOE with comments from the perspective of their specific expertise to ensure that specific concerns on matters under their individual jurisdictions are accommodated in DOE's final document. For example, the Department of Transportation, which has responsibility for regulating waste transportation, has been active in commenting on program documents. DOE plans to enter into a memorandum of understanding with Transportation.

FISCAL YEAR 1984 AND 1985 BUDGETS FOR NUCLEAR WASTE ACTIVITIES

DOE's nuclear waste activities discussed in this report are currently funded under two budget categories: the Nuclear Waste

Fund,[4] and Civilian Radioactive Waste Research and Development. The Nuclear Waste Fund (section 302 of the act) finances the repository development activities, including preparation of the siting guidelines and environmental assessments, and interaction with states and Indian tribes. The Fund also finances current MRS activities, namely the preparation of the required proposal for the Congress. Under the act, the Nuclear Waste Fund consists of fees paid by utilities,[5] although DOE cannot expend these funds without specific congressional approval through the appropriations process. DOE received appropriations from the Nuclear Waste Fund of $319.6 million in fiscal year 1984 and $327.7 million in fiscal year 1985.

The Civilian Radioactive Waste Research and Development budget is funded under Energy Supply Research and Development Activities from DOE's general appropriations. These funds cover DOE's spent fuel storage research and development activities, including the cooperative alternative storage technology demonstrations with utilities. DOE received $5 million in fiscal year 1984 and $12.6 million in fiscal year 1985 in spent fuel storage activities appropriations.

OBJECTIVES, SCOPE, AND METHODOLOGY

Section 304(d) of the Nuclear Waste Policy Act requires the Comptroller General to report to the Congress the results of an annual audit of OCRWM. Our report focuses on DOE's progress in implementing six requirements of the act:

Specifically, in this report we identify

--the status of these activities as of December 31, 1984 (ch. 2);

--any problems DOE is encountering in meeting the requirements of the act governing these activities (ch. 3); and

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[4]The act provides for the establishment of a second separate fund composed of fees from utilities requiring federal interim storage of their spent fuel (section 136(c)). This Interim Storage Fund has not been activated since no utilities have yet requested federal assistance.

[5]Since 1983 DOE has been collecting a fee from utilities of 1 mil per kilowatt hour of electricity generated from their nuclear power plants. Utilities, in turn, pass these costs on to their ratepayers. DOE collected about $329.5 million in fees during fiscal year 1984.

--issues deserving consideration by the Congress or DOE (ch. 4).

In addition, we present information on DOE's oversight of five major contractors supporting the nuclear waste program (ch. 5).

In examining these issues we reviewed DOE, NRC, USGS, and contractor documents (such as the siting guidelines, position papers, internal directives on the environmental assessment process, and cooperative agreements with utilities); DOE correspondence with and from members of Congress, states, utilities, and other groups; and the legislative history of the act. We interviewed DOE, NRC, and USGS officials involved with DOE's program, as well as directors of the nuclear waste offices established in the six first repository states, the three utilities participating in research and development of spent fuel storage technologies,[6] and the five field contractors we reviewed.

Our methodology, in general, was to compare the provisions of the act with DOE's activities to determine the progress of the program. Where the act did not provide deadlines for DOE actions, we used internal target dates, especially those agreed to by OCRWM and the Secretary in the Secretary's management-by-objectives schedules, to measure DOE's progress. We reviewed the written comments of other federal agencies, states, utilities, and other groups on various DOE documents to obtain insights on where others believe the program is experiencing problems. We also observed DOE's January 1985 briefings to the six states being considered for the first repository to identify concerns with the draft EAs.

Our analyses have been based in part on our previous reports and a 1984 Congressional Budget Office (CBO) report. In examining DOE's negotiation of consultation and cooperation agreements, we reviewed the issue of liability for a nuclear waste accident and the protection afforded by the Price-Anderson Act (legislation that provides financial protection for nuclear power plant owners and others) by relying on our past work on this act.[7] We did not reexamine all of the issues surrounding extension of this act beyond its expiration in 1987, but rather focused on its significance to the transportation and disposal of high-level waste. Our analysis of the funding for any long-term storage

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[6]Carolina Power and Light, Northeast Utilities Services Company, and the Virginia Electric and Power Company.

[7]Analysis of the Price-Anderson Act (EMD-80-80, Aug. 18, 1980) and Congress Should Increase Financial Protection to the Public From Accidents at DOE Nuclear Operations (EMD-81-111, Sept. 14, 1981).

facilities discusses information presented in an August 1984 CBO report, Nuclear Waste Disposal: Achieving Adequate Financing.

In addition, we reflect in our report the conclusions of a March 1985 Office of Technology Assessment (OTA) report, Managing the Nation's Commercial High-Level Radioactive Waste. The OTA report focuses on three major documents that DOE will be submitting to the 99th Congress: (1) the Mission Plan, (2) the MRS proposal, and (3) a report on alternative mechanisms for financing and managing the waste program.

To gain an understanding of DOE contracting activities, we selected a judgmental sample of 5 of the over 200 contractors supporting DOE's nuclear waste activities. As we have reported in the past,[8] DOE relies heavily on contractor support to implement the Nuclear Waste Policy Act. We selected these five sample contractors because all had estimated total obligations for waste activities of $10 million or more in fiscal year 1984. In addition, they included the prime contractors for each of the three repository project offices. From contracting data DOE supplied to the Subcommittee on Energy Conservation and Power, House Committee on Energy and Commerce, on February 21, 1984, we identified the following five contractors as meeting these criteria:

Repository project	Contractor
Richland (Basalt)	Rockwell Hanford Operations Pacific Northwest Laboratory[9]
Nevada (Tuff)	Sandia National Laboratories Los Alamos National Laboratory
Columbus (Salt)	Battelle Memorial Institute

Fiscal year 1984 obligations to these contractors for Nuclear Waste Policy Act work totaled approximately $219 million. Since the 1984 appropriation for the Nuclear Waste Fund was $319.6 million, these five contractors accounted for approximately 69 percent of this fiscal year 1984 appropriation. Our analysis, however, was limited to describing the process DOE uses to conduct oversight of these contractors' activities.

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[8]See GAO/RCED-85-27, Jan. 10, 1985.

[9]Also provides substantial support to other OCRWM activities including the Salt project; MRS program; transportation, and the spent fuel research, development, and demonstration program.

This report does not represent a comprehensive evaluation of all of DOE's efforts to implement the act. For example, we did not review DOE's management of the Nuclear Waste Fund during 1984 since this issue was discussed in our January 1985 report. However, we are providing quarterly reports to the Senate Energy and Natural Resources Committee that discuss the status of this fund and other DOE activities.[10]

Except where noted, our review reflects the status of DOE activities as of December 31, 1984, updated through July 1985. Our work was performed in accordance with generally accepted government auditing standards.

Comments by DOE, NRC, states, and others

This report was distributed for comment to DOE, NRC, the six first repository states, and three affected Indian tribes. The five contractors discussed in our report were asked to comment on chapter 5 of the report. In addition, we discussed the report's information on cooperative spent fuel storage research and development demonstrations with the three utilities participating in these projects. Comments were submitted by DOE and NRC (see apps. IV and V); the states of Louisiana, Mississippi, Nevada, Texas, and Utah; the Yakima Indian Nation; and four contractors: Battelle Memorial Institute, Battelle Pacific Northwest Laboratories, Rockwell Hanford Operations, and Sandia National Laboratories. Comments were also submitted by Mississippi's Attorney General's Office.

These comments contain a variety of diverse views on our evaluation of DOE's implementation of the act. For example, DOE believed the report did not fully recognize the program's substantial accomplishments during 1984, while Mississippi, on the other hand, believed our report was disappointing because it "soft-pedals program failures." Generally, DOE disagreed with the findings and specific recommendations of our report, although it concurred with their intent, and believed it did not represent a balanced picture of the program. The states agreed with many points in our report, which they felt was well-researched, but took exception to some of our recommendations. The contractors

[10]See Status of the Department of Energy's Implementation of the Nuclear Waste Policy Act of 1982 As of September 30, 1984 (GAO/RCED-85-42, Oct. 19, 1984); Status of the Department of Energy's Implementation of the Nuclear Waste Policy Act of 1982 As of December 31, 1984 (GAO/RCED-85-65, Jan. 31, 1985); Status of the Department of Energy's Implementation of the Nuclear Waste Policy Act of 1982 As of March 30, 1985 (GAO/RCED-85-116, Apr. 30, 1985); and Status of the Department of Energy's Implementation of the Nuclear Waste Policy Act of 1982 As of June 30, 1985 (GAO/RCED-85-156, July 31, 1985).

provided additional information on their oversight activities, which they believed would provide a better understanding of their role in the program.

These groups' specific comments are summarized and addressed at the end of each report chapter. In addition, technical or editorial comments submitted by NRC, DOE, and others have been incorporated in the text where appropriate. Because of the length of these comments in relation to our report, we have not reproduced them in full. However, copies are available on request from GAO.

CHAPTER 2

STATUS OF IMPLEMENTATION OF SELECTED AREAS OF THE ACT

During calendar year 1984 DOE had difficulty accomplishing many of the nuclear waste activities it anticipated for this period. Delays in completing activities DOE had scheduled for 1983 contributed to pushing back milestones for the waste management program during 1984. In spite of these difficulties, DOE issued draft environmental assessments in December 1984, which was a significant program accomplishment. Of the 13 activities DOE had expected to accomplish during fiscal year 1984, 5 were completed by September 30, 1984, and 4 others were completed by July 30, 1985. Several of the delayed activities were significant--DOE's program did not have an approved program plan during this period and the repository siting program is encountering delays, which have implications for DOE's ability to have a repository in operation by 1998. This chapter begins with a brief overview of the status of these 13 activities followed by a more detailed discussion of 6 activities, which are especially important to the act's successful implementation. These six activities are:

--the Mission Plan, which was issued in July 1985;

--the siting guidelines, which were issued in December 1984;

--environmental assessments (EAs), which were released in draft for public comment in December 1984;

--consultation and cooperation agreements, which have not yet been finally negotiated;

--a proposal for monitored retrievable storage (MRS), which is expected to be submitted to the Congress in January 1986; and

--three cooperative agreements for spent fuel storage research and development in which DOE has been participating.

In chapter 3 we expand our analysis of five specific areas where DOE has experienced problems in meeting the act's requirements.

PROGRAM DID NOT ACHIEVE MANY OF ITS FISCAL YEAR 1984 EXPECTED ACCOMPLISHMENTS

The Nuclear Waste Policy Act specifies numerous actions with which DOE must comply. From the beginning of the civilian radioactive waste program, DOE has had difficulty in meeting many

of the schedules established by the act.[1] Rather than measure OCRWM solely against these deadlines, we identified two other possible sets of criteria--the Mission Plan (which DOE had not completed during 1984 and, therefore, we could not use) and the program's budget. We used DOE's budget for fiscal year 1985 as the best available basis to measure OCRWM's accomplishments because it (1) was the first such document formulated by OCRWM since passage of the act, (2) was submitted to the Congress and appropriations were provided early in 1984, and (3) contained a list of the program's actual accomplishments during fiscal year 1983 and expected accomplishments during fiscal years 1984 and 1985. To determine OCRWM's initial target dates for the siting guidelines, nomination of sites, second repository, and Mission Plan activities discussed below, we used the dates shown in the former Secretary's management-by-objectives schedules.

DOE identified 13 activities in its 1985 budget request to the Congress that it expected to have completed or initiated during fiscal year 1984. As shown in table 2.1, only 5 of 13 activities were accomplished as projected.

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[1]See GAO/RCED-85-27, Jan. 10, 1985; GAO/RCED-85-42, Oct. 19, 1984; GAO/RCED-85-65, Jan. 31, 1985; GAO/RCED-85-116, April 30, 1985; and GAO/RCED-85-156, July 31, 1985.

Table 2.1

Status of OCRWM's Accomplishments Expected by 9/30/84

Activity[a]	Status: Completed prior to 9/30/84	Status: Completed late—after 9/30/84	Status: In progress/ estimated completion
Issue final repository siting guidelines	-	12/84	-
Nominate at least five sites for the first repository	-	-	12/85
Submit report to Congress on test and evaluation facility location	4/84	-	-
Issue project decision schedule	-	-	11/85
Issue preliminary high-level waste form acceptance requirements	-	-	mid-85
Publish Mission Plan report to Congress	-	7/85	-
Publish first annual report to Congress	2/84	-	-
Develop and implement Cash Management Plan	-	11/84	-
Initiate advanced conceptual waste package design in salt and basalt; complete conceptual design for a waste package in tuff unsaturated zone	-	-	1985/86
Issue final regional-to-area screening methodology for crystalline rock program	-	4/85	-
Initiate monitored retrievable storage facility designs	4/84	-	-
Conduct independent financial audit of the Nuclear Waste Fund	9/84	-	-
Initiate system studies on waste packaging and handling	9/84	-	-

[a]Source: DOE, Congressional Budget Request FY 1985, Vol. 2, Feb. 1984.

The following briefly lists the status of each of these activities:

--Final repository-siting guidelines, originally targeted for May 15, 1984, were issued on December 6, 1984.

--Nomination of five sites for the first repository anticipated on December 15, 1984, has been postponed until December of 1985.

--Report to the Congress on a test and evaluation facility's[2] location, required by January 7, 1984, was submitted on April 19, 1984. The report states that although a decision on the need for such a facility will not be made until late 1987, if such a facility were needed, it would be located with the repository.

--Project decision schedule, originally anticipated to be completed in mid-September 1984, is expected to be issued in November 1985. Two drafts have been circulated for agency comments in January and July 1985.

--Preliminary high-level waste form acceptance requirements targeted for publication in September 1984 are now expected by mid-1985. OCRWM officials have requested that an earlier version of this document, prepared by Weston, OCRWM's support contractor, be revised.

--The Mission Plan, originally planned to be submitted to the Congress on August 20, 1984, was completed in July 1985.

--The first annual OCRWM report to the Congress was submitted in February 1984. The report included a discussion of the Office's organization, activities, and accomplishments and the program's costs and receipts. (OCRWM submitted its second annual report to the Congress in May 1985.)

--The cash management plan was published in November 1984 and is being implemented. These procedures govern billings, receipts, timing of disbursements, and an investment strategy for the Nuclear Waste Fund.

--Advanced conceptual designs for waste packages in tuff and basalt will be initiated in 1985, and a design for salt will be initiated in 1986. Pre-design work has been

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[2]Sections 211-217 of the act authorize the Secretary to construct an underground test and evaluation facility to carry out research and demonstrate the technology for deep geologic disposal of waste.

initiated on the criteria for these designs. A report on the conceptual design for a waste package in tuff was completed in November 1984.

--The crystalline rock program (second repository) screening methodology report for regional-to-area phase screening, targeted for July 31, 1984, was finalized in April 1985.

--MRS facility design work was initiated by architect-engineering contractors in April 1984.

--An independent financial audit of the Nuclear Waste Fund was contracted in September 1984; the final report was due in January 1985. Financial statements were submitted in March 1985, and the final report was completed in June 1985.

--Six contracts for system studies on waste packaging and handling were awarded in September 1984.

In commenting on our report, DOE stated that our discussion did not recognize the program's substantial accomplishments during this period. Although DOE did not provide examples of what it considers substantial accomplishments, OCRWM's May 1985 Annual Report to the Congress mentions the following additional program accomplishments:

--the July 1984 second annual report on the adequacy of the fee charged utilities to finance the program;

--a management plan for the Nuclear Waste Fund issued in August 1984, which outlines OCRWM's objectives, policies, and procedures for cost control and financial activities;

--site investigation activities and exploratory shaft design activities for the first repository;

--testing of experimental components of the subseabed disposal project;

--release for comment of a strategy options document for waste transportation; and

--initiation of a comprehensive quality assurance management program.

DOE'S MISSION PLAN FINALIZED

The Mission Plan contains DOE's overall strategy and plans for implementing the Nuclear Waste Policy Act. Despite the act's requirement that the Secretary submit the final Mission Plan to the Congress by June 7, 1984, it was not issued until July 1985.

According to the Director, Policy Division, the delay was due to (1) OCRWM's efforts to respond to comments on the latest draft plan from about 100 parties and (2) the diversion of key office personnel to work on other required assignments. This diversion of staff indicates that OCRWM assigned a higher priority to completing siting documents than to finalizing its program strategy. With the Mission Plan, the Congress and the public should now have a ready source of information needed to ensure that program decisions are being made on a reasonable basis and to relate these decisions to the act and the program's objectives.

The act required that the Mission Plan address 11 specific areas and that the public, federal agencies, and states be provided an opportunity to comment. OCRWM worked throughout 1983 and 1984 preparing the plan. The Office released two versions of the Mission Plan for comment in an effort to meet its responsibilities under the act and to ensure input from interested and affected parties.

In December 1983 OCRWM released a one-volume "working draft" of the Mission Plan. This draft contained a preliminary discussion of DOE's objectives, strategy, and plan for conducting the radioactive waste management program. OCRWM considers its release of the working draft for comment to be beyond the requirements of the act. The act required that by April 7, 1984, OCRWM release a draft Mission Plan for comment. The working draft, however, was distributed for comment about 4 months before the date specified by the act. In a January 1984 letter, the Acting Director of OCRWM's Operations Division explained that release of the working draft, in advance of the formal review, was an "extra step" that DOE put into the process ". . . in an attempt to surface major issues and coordinate with those individuals and organizations closely associated with the program, in advance of the legally mandated formal draft." Texas criticized DOE's release of an early draft without the consultation with states and Indian tribes that had been promised by OCRWM's Acting Director. In commenting on our report, Texas stated that the preliminary draft Mission Plan should have been viewed as a necessary component of consultation and not as a gratuitous DOE action.

According to OCRWM's Policy Division, DOE considered all comments received on the working draft; revised volume I of the plan, accordingly; completed volume II; and issued the formal draft Mission Plan on May 9, 1984--approximately 1 month after the deadline designated by the act. About 3,000 copies of the formal draft were distributed for comment.

DOE did comply with the two requirements of the act dealing with public comments: (1) DOE published a notice in the Federal Register on May 9, 1984, announcing the availability of the formal draft Mission Plan for review and comment and (2) DOE published a

Federal Register notice on September 5, 1984, announcing the receipt of comments from about 100 organizations and individuals, and the availability of these comments for public inspection.

OCRWM spent several months revising the Mission Plan in response to the numerous comments received. However, program staff responsible for making revisions had been diverted for several months to complete the draft EAs for the first repository sites and, therefore, the revision process was delayed. (See ch. 3.) OCRWM completed this process and submitted the final plan to the Congress in July 1985. The Mission Plan was accompanied by two supporting documents: (1) a comment response document summarizing and responding to comments received on the draft plan and (2) a document containing copies of all the comments.

FINAL SITING GUIDELINES DELAYED DURING DOE INTERNAL REVIEW

The act requires DOE to issue by July 7, 1983, siting guidelines approved by NRC. The guidelines are to serve as a basis for (1) nominating at least five sites from the nine identified as potentially acceptable at the beginning of the program and (2) recommending three sites for detailed characterization studies.

The siting guidelines were a major program effort during calendar year 1983. Their development underwent several cycles prior to final drafting and concurrences. DOE obtained NRC's concurrence, as required by the act, on the siting guidelines on June 22, 1984. DOE then finalized a preamble to the guidelines to explain their structure and development and hoped to issue the guidelines immediately. However, after receiving OMB's approval on September 14, 1984, DOE decided to conduct an internal review of the document, including the preamble. OCRWM's Office of Geologic Repositories staff said that DOE spent this additional time reviewing the guidelines because of their relevance to future site selection decisions and because it would allow OCRWM's Director to become more familiar with them. This additional internal review lasted until November 6, 1984. The Deputy Associate Director of OCRWM's Office of Geologic Repositories also told us that once DOE obtained NRC's concurrence, OCRWM's priority shifted from the guidelines to the EAs. Because the EAs were delayed, OCRWM questioned whether the guidelines needed to be issued quickly and postponed their publication until December 1984, when the draft EAs were scheduled for release.

After incorporating final changes to the preamble, DOE issued the siting guidelines on December 6, 1984. The siting guidelines' preamble was revised during the internal DOE review in response to concerns raised by the Office of Assistant Secretary for Policy, Safety, and Environment. According to staff of this office, language was deleted from the preamble to allow for future weighting of some of the technical factors in the guidelines. The

Assistant Secretary's office believed it was not credible to give equal importance to events that have little probability of affecting radioactive releases, such as erosion, and events that are more likely to cause releases, such as drilling or human intrusion. In addition, language was added to the preamble to reflect the possibility that the siting guidelines may have to be changed to be consistent with EPA's standards.[3]

ENVIRONMENTAL ASSESSMENTS RELEASED IN DRAFT BUT NOT YET FINALIZED

In order to complete the site-screening process, the act requires DOE to prepare EAs to accompany the nomination of sites for site characterization. Although the act does not contain a specific deadline for the EAs' completion, the sequence for siting would require that these documents be completed by January 1, 1985, to allow DOE to meet that deadline for recommending sites for detailed testing. In this respect, completion of the EAs will represent a major program accomplishment because only when these documents are completed will DOE be allowed to proceed to the next step in the site-screening process.

The EAs, as described in the act, represent more than an environmental analysis of the planned site characterization activities at a site. Under the act, the EAs must include

- --DOE's justification for nominating a site for site characterization, including the site recommendation decision process;
- --the probable impacts of planned site characterization activities on the public health and safety and the environment; and
- --a comparative evaluation of the site with all other sites and locations under consideration.

Thus, one of the practical results of the act's requirement for EAs was a consolidation of the analysis of the environmental and geologic suitability of a site for site characterization and development of a repository. In addition, the EAs serve as the document for comparisons between sites.

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[3]EPA is required by the act (section 121(a)) to establish standards for protection of the general environment from radioactive releases from the radioactive material in the repository. These standards would apply to airborne, waterborne, and groundwater releases of radiation at repositories. These standards have been under development since 1982 and were finalized in August 1985.

Completion of the EAs has been delayed, however. OCRWM initially estimated in October 1983 that the final EAs would be issued on September 19, 1984. In January 1984 OCRWM revised its schedule to delay issuing the final EAs until December 1984. In September 1984 OCRWM decided to publish the EAs in draft on December 20, 1984, allow 90 days for public comment (which the act did not require), and issue the final EAs in June 1985. This final publication date has again been revised to late 1985.

As discussed further in chapter 3, the delays in publishing the draft EAs for comment were due to the time needed to

--improve the quality of drafts received from the project offices and

--ensure consistency among the nine EAs.

DOE released the nine draft EAs for public comment on December 20, 1984. The Department proposed in the draft EAs to nominate five sites for site characterization: Richton Dome, Mississippi; Yucca Mountain, Nevada; Deaf Smith County, Texas; Davis Canyon, Utah; and Hanford, Washington. These EAs further identify DOE's tentative recommendation of three sites for detailed testing: Yucca Mountain, Nevada; Deaf Smith County, Texas; and Hanford, Washington. (See fig. 2.1.)

In January 1985 DOE held a series of briefings on the EAs for state and local officials, affected Indian tribes, and the public near all nine sites. Numerous concerns were raised by participants at these sessions concerning DOE's evaluation of

--environmental impacts, including the effect of a repository on groundwater and aquifers;

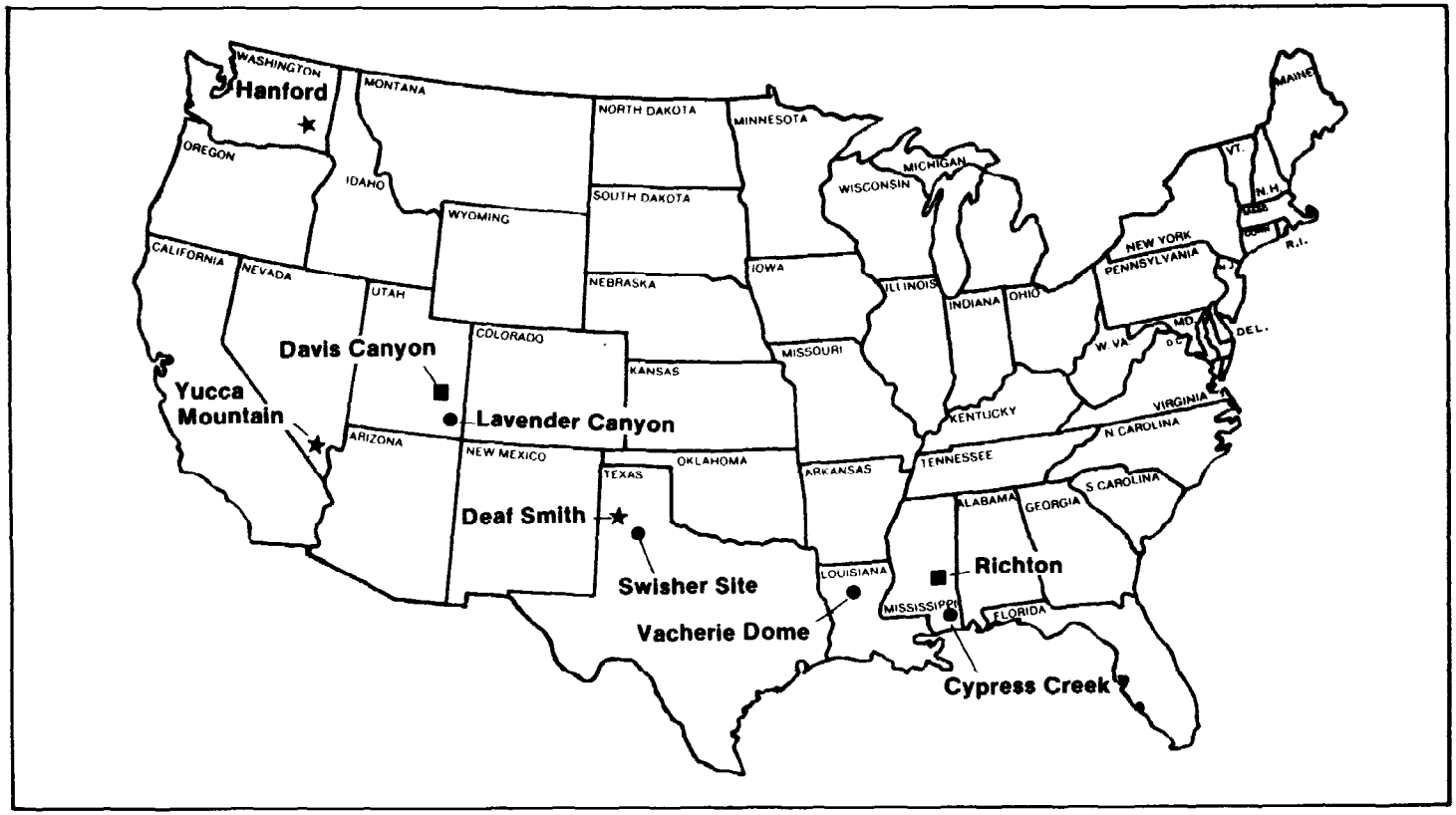
--socioeconomic impacts of a repository and site characterization activities;

--waste transportation; and

--how the nine sites were ranked.

In addition, since DOE's presentations in several states emphasized the act's provision for a state or Indian tribe on whose reservation the site is located to disapprove the President's final site recommendation (expected in 1991), questions were raised concerning whether the Congress would override this disapproval by passing a resolution of approval, as also provided in the act. DOE officials maintained at these briefings that a congressional override was unlikely. Participants were also concerned about whether additional sites would have to be tested if a problem developed at one of DOE's three recommended sites. In its comments on our report, Mississippi criticized how DOE conducted these briefings.

Figure 2.1: Proposed Site Nominations and Recommendations for First Repository



★ Proposed Recommended Sites

■ Proposed Nominated Sites

● Potentially Acceptable Sites

CONSULTATION AND COOPERATION AGREEMENTS WITH STATES HAVE NOT BEEN FINALIZED

DOE is required by the act to seek to enter into and begin negotiations of consultation and cooperation agreements with affected states and Indian tribes to establish procedures to resolve their concerns with the planning and development of any nuclear waste repository. Specifically, DOE is required to begin negotiations on these agreements within 60 days after (1) a candidate site has been approved for characterization by the President[4] or (2) receipt of a written request by a state or affected Indian tribe notified under section 116(a). Currently, there are six states (Louisiana, Mississippi, Nevada, Texas, Utah, and Washington) and three Indian tribes (Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, and the Yakima Indian Nation) eligible for the negotiations process.

Responsibility for carrying out DOE's negotiation process is divided between two groups--OCRWM and DOE's field operations offices. DOE issued guidelines in June 1983 to aid field organizations in carrying out the agreement negotiations and to establish "guiding principles" for the agreements. The operations offices have the responsibility to negotiate and sign any agreements.

Formal negotiations for consultation and cooperation agreements were initiated in July 1983 in response to requests by the state of Washington and the Yakima Indian Nation, and in August 1985 in response to a request from the Umatilla Indians. Although negotiations continue between DOE and Washington, negotiations with the Yakimas have been postponed at the request of a Yakima Indian Nation representative, pending completion of an agreement between DOE and Washington. Negotiations with the Umatillas are in the initial stages. According to representatives from the five other states and one Indian tribe, they have chosen to wait to negotiate an agreement until the Secretary recommends sites for site characterization.

Washington is currently reviewing a negotiated draft agreement. The state's Nuclear Waste Board, which is responsible for leading the state's negotiations, approved the agreement for public hearings in November 1984. After the hearings, the Board will determine whether to send this agreement to the legislature for approval. However, unresolved issues have emerged that could prevent finalizing the agreement. As discussed in chapter 3, these issues involve (1) liability and indemnification for any

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[4]DOE estimates that this would occur in early 1986, provided that the President accepts the Secretary's recommendation and does not require a 6-month delay in the decision as allowed under the act.

incident that may occur as a consequence of transportation and disposal of radioactive waste within the state and (2) handling of defense wastes.

DOE was late in notifying the Congress of problems with negotiations

The act (section 117(c)) requires the Secretary to submit a report to the Congress if a consultation and cooperation agreement cannot be completed within 6 months of a state or Indian tribe's request to enter into an agreement. The Secretary's report is to be submitted within 30 days of this date (i.e., 7 months from the original request) and is to include comments from the state or Indian tribe. Furthermore, section 112(f) of the act states that the Secretary shall comply with these requirements, with respect to the state of Washington, within 1 year of enactment or by January 7, 1984.

The Secretary submitted DOE's report to the Congress on Washington state's negotiations on September 26, 1984--about 9 months after the January 1984 requirement date in section 112(f) and 15 months after the state of Washington had originally requested to enter into negotiations. The report explained that

> "The negotiating teams have been able to reach essential agreement on all but two articles of the draft Agreement . . . (1) liability; and (2) defense waste."

In addition, the report notes that under a bill enacted in March 1984, the Washington state legislature must approve the agreement before it can be considered final. In his comments on the report, the Governor of Washington stated that although the negotiating teams had made significant progress,

> ". . . we still may well have additional items for discussion and negotiation with the Department of Energy that have been identified during the public review period, as well as issues arising during current legislative review. It is the state negotiating team's position that all issues will have to be looked at in the context of final negotiations."

At the same time, DOE also submitted a second report on its negotiations with the Yakima Indian Nation--16 months after the tribe's May 23, 1983, request to enter into an agreement.

The Secretary did not submit either of these reports to the Congress within the act's required time limit. According to responsible staff of OCRWM's Siting Division, DOE could not do this because comments on DOE's proposed report from Washington and the Yakimas were late and DOE needed these comments as part of the Secretary's report. However, we found that the Secretary did not request comments from Washington and the Yakimas until after the

act's required date for congressional notification; therefore, DOE could not have met the time frame required by the act. Washington submitted its comments in March 1984 and the Yakimas responded in late May 1984 because, according to OCRWM, they had lost the original copy of DOE's report. This delay in notifying the Congress of problems encountered in implementing the act is an example of DOE's inconsistency in keeping the Congress fully informed of the program's progress. (See ch. 4.)

MRS PROPOSAL IS IN PROCESS BUT WILL BE DELAYED

Since the Nuclear Waste Policy Act was enacted in January 1983, DOE's efforts in the area of long-term storage have concentrated on preparation of conceptual designs, completing a detailed study of the need for and feasibility of constructing MRS facilities, and preparing a proposal for facility construction. Upon receipt and consideration of this proposal, the Congress will determine whether one or more long-term retrievable storage facilities should be constructed. DOE estimates that MRS facilities could cost from $800 million to $1.2 billion and could require 8 to 11 years to complete following congressional authorization.

Requirement of the act

The act requires DOE to prepare, by June 1, 1985, a detailed study of the need for and feasibility of the construction of one or more MRS facilities. The MRS proposal must include

- --a federal program for the siting, development, construction, and operation of long-term storage facilities;
- --a plan for funding their construction and operations;
- --a plan for integrating these facilities with other storage and disposal facilities;
- --site-specific design, specifications, and cost estimates; and
- --an EA, including a full analysis of the advantages and disadvantages of five alternative site and facility designs.

In addition to these requirements, section 220 required DOE to submit to the Congress by July 1983 a report describing the research and development activities necessary to develop the MRS proposal.

MRS proposal activities completed to date

DOE has completed three key preliminary activities for the required MRS proposal: (1) preparation of the MRS research and development report, (2) selection of primary and secondary technologies to be used in MRS facility designs, and (3) selection of three "reference" site types to be used in facility designs. In addition to these activities, OCRWM conducted a reassessment of the role of MRS in late 1984.

MRS research and development report

In June 1983 DOE submitted to the Congress a report[5] describing the research and development activities necessary to develop the MRS facility construction proposal. DOE's report stated that it conducted an extensive review of prior design and research and development activities related to long-term retrievable storage of spent fuel and high-level nuclear waste. On the basis of an analysis of past experience and accumulated data, DOE concluded that no further research and development activities are necessary to develop the proposal required by the act. However, the report noted that, as the engineering designs for the MRS proposal are developed, specific research and development activities may be identified that could contribute to a more efficient design, improve safety, or facilitate licensing.

Selection of technologies

After determining that no further research and development activities were needed to prepare the proposal, DOE's next step was to select one preferred and one alternate technology that would best meet the long-term storage requirement. From the available design concepts, in November 1983 DOE selected two dry storage technologies--a sealed concrete storage cask as the preferred storage mode, and the field drywell as the alternate mode. As the preferred concept, the sealed cask design will be developed to a greater level of detail than the field drywell design. (See fig. 2.2.)

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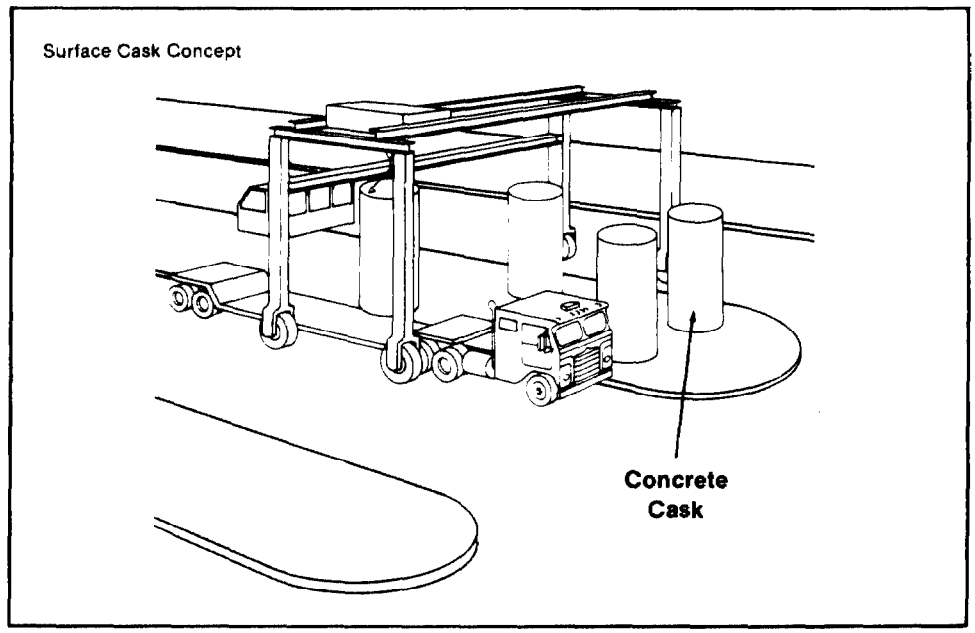
[5]DOE, Monitored Retrievable Storage Proposal Research and Development Report, DOE/S-0021, June 1983.

Figure 2.2: Preferred Technology Designs for Monitored Retrievable Storage



Source: DOE

To select these primary and secondary concepts, Pacific Northwest Laboratory, a DOE contractor, analyzed eight candidate storage concepts and compared them on the basis of their relative performance in seven areas: safety and ease of licensing, siting requirements, concept maturity or level of development, socioeconomic impacts, environmental impacts, cost, and flexibility in operational requirements. The contractor recommended the sealed cask and field drywell concepts for further design with the field drywell as its preferred concept. The report was reviewed by OCRWM management and staff and several independent peer reviewers. They concluded that the field drywell and sealed concrete cask concepts were the best designs, but that the concrete cask was preferred because it fit the MRS mission better as defined by DOE at that time.

Selection of "reference sites" for designs

The act requires that DOE's proposal include "site-specific designs" for an MRS facility using at least three alternative sites. Rather than select specific geographic locations, in March 1984 DOE adopted a siting approach that used "reference site" data for facility design purposes. These reference sites included three climatic or meteorological site conditions: hot and humid, cold and humid, and arid. The three reference sites used meteorological conditions as the distinguishing factor so DOE could design facilities suitable for deployment throughout the country.

DOE changed its approach to siting an MRS in late 1984 as a result of a reassessment of MRS' role. Beginning in the summer of 1984, OCRWM's Director asked staff to reassess different roles for an MRS beyond that of a backup to a repository. DOE has indicated that MRS will be an integral part of the repository system by incorporating most of the waste handling, packaging, and treatment facilities that otherwise would have had to be located at the repository. In April 1985 DOE identified three sites in Tennessee as its preferred locations for an MRS. On May 31, 1985, DOE notified the Congress of the status of the MRS proposal required by the act and reaffirmed its intent to submit this proposal in January 1986.

COOPERATIVE DEMONSTRATIONS TO ASSIST UTILITIES WITH SPENT FUEL STORAGE ARE UNDERWAY

The act contains several provisions authorizing DOE to assist utilities in meeting their own storage requirements until the federal government takes title to the spent fuel for disposal in a repository. Although owners and operators of nuclear reactors have the primary responsibility for providing interim spent fuel storage, DOE is required to "encourage and expedite" the effective use of existing storage facilities and the addition of any needed

capacity. To do so, DOE is undertaking certain activities, mandated under the act, designed to accelerate the licensing of new storage techniques. Specifically, in 1984 DOE entered into two agreements with utilities to assist in demonstration projects at power plants and negotiated, but had not finalized, a third agreement.

Requirements of the act

The act directs DOE to establish demonstration programs, in cooperation with the private sector, to encourage technology development for the dry storage of spent nuclear fuel at reactor sites and for spent nuclear fuel rod consolidation in existing reactor water storage pools. The objective of the dry storage demonstration programs is to establish one or more technologies that NRC can license for use at the sites of reactors without the need for additional site-specific approvals.

The act stipulates that by January 1984 DOE must select one to three reactor sites for the demonstration programs. Under the cooperative agreements with DOE, the participating utilities are to: select the alternate storage technique to be used; submit and provide site-specific documentation for and obtain a license from NRC; and pay all costs of construction, operation, and maintenance of the facility. DOE, on the other hand, is to provide "consultative and technical assistance" on a cost-sharing basis to assist the utilities in obtaining the license from NRC. In addition, DOE is to provide "generic" research and development of alternative spent fuel storage techniques to enhance utility at-reactor storage capabilities. The DOE assistance can include establishing a research and development program for dry storage of up to 300 metric tons of spent fuel at federal facilities intended to collect data necessary for the licensing process.

DOE's total contribution from federal funds and use of federal facilities or services is not to exceed 25 percent of the total costs of the demonstration programs. As shown in appendix II, although the percentage of costs contributed by DOE to these projects will vary each year, the total contribution is not planned to exceed 25 percent.

Dry storage demonstrations to assist utilities

In May 1983 DOE invited proposals from utilities interested in participating in licensed dry storage and at-reactor rod consolidation demonstration programs. Dry storage proposals were submitted by Virginia Electric and Power Company (Virginia Power) and Carolina Power and Light Company (CP&L). Cooperative agreements were negotiated with these utilities and signed in March 1984.

Virginia Power demonstration

The Virginia Power agreement provides for the licensed testing of spent fuel in up to five metal dry storage casks at the Surry Power Station (Gravel Neck, Virginia). NRC has informed Virginia Power that it may receive its license for dry storage in the summer of 1985. Subsequently, the actual cask and spent fuel storage demonstration would begin.[6]

Also included in Virginia Power's cooperative agreement is a research and development program for the dry storage of spent nuclear fuel at federal facilities, as provided by the act. The agreement provides for the shipment of spent fuel from the Surry Power Station to a federal site--DOE's Idaho National Engineering Laboratory--for an unlicensed test[7] in up to four metal dry storage casks supplied by Virginia Power. The first cask was delivered to the site in December 1984; fuel is to be shipped in September 1985. At that time, tests are scheduled to begin and the demonstration is to be completed in 1988.

Carolina Power and Light Company demonstration

The agreement negotiated with CP&L provides for licensed testing of spent fuel dry storage at the H. B. Robinson nuclear plant (Hartsville, South Carolina). The demonstration will involve three horizontal concrete modules to be constructed in 1986. Each of these modules will store seven spent fuel assemblies in a separate sealed canister, which is cooled by natural air flow through the module.

CP&L submitted a license application in early 1985, leading to a fuel-loading date at the Robinson plant of January 1987. DOE expects the demonstration to be completed in 1988.

Rod consolidation demonstration agreement not yet finalized

A proposal for participation with DOE in a spent fuel rod consolidation demonstration was submitted by Northeast Utilities Services Company (Northeast Utilities) in response to DOE's request for proposals. However, as of July 1985, no cooperative agreement had been finalized on this demonstration project.

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[6]The dry storage demonstration at the Surry plant is intended to develop a licensing base for the technology for both intact and consolidated spent fuel.

[7]The tests at the federal site are intended to demonstrate dry storage of spent fuel at higher than normal temperatures stored in different gases, including air and helium.

Northeast Utilities proposed DOE's participation in a rod consolidation project underway at its Millstone 2 plant (Waterford, Connecticut).[8] Currently, the project is supported by the Electric Power Research Institute, Baltimore Gas and Electric Company, and Combustion Engineering, Inc. DOE's Richland Operations Office began negotiating with Northeast Utilities in early 1984 to reach an agreement on DOE's participation in this ongoing demonstration project. According to a Northeast Utilities representative, negotiations have proceeded intermittently since then. Completion of the agreement has been delayed, however, because of questions about (1) the scope and nature of DOE's role in the project and (2) the patent rights to the equipment and process involved in the rod consolidation effort.

According to the Northeast Utilities representative, an early obstacle in the negotiations was that DOE's participation in those portions of the rod consolidation project of most interest to DOE--generic, analytical activities or those activities that would provide the most benefit to other utilities--would require Northeast Utilities to renegotiate existing contracts with its private industry supporters. Other aspects of the project--such as development of the rod consolidation equipment--were beyond the scope of DOE's planned activities. In addition, an issue arose concerning DOE's retention of certain patent rights to the technology because of its assistance in bringing the process to "first practice," or commercial viability. The private industry group wants to retain full patent rights since it has designed and developed the technology.

Both the Richland Operations Office and Northeast Utilities feel that an understanding was reached in October 1984 whereby DOE could participate in the project and Northeast Utilities and its supporters would retain all patent rights to the rod consolidation equipment and process. Northeast Utilities has submitted cost estimates for DOE's review and incorporation into a final agreement.

The schedule for completion of the demonstration will depend on when the agreement is finalized and the negotiated scope of work. Thus, the extent to which the delays in finalizing this agreement could hinder achievement of the act's spent fuel storage objectives is difficult to determine at this time.

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[8]The Northeast Utilities demonstration is intended to demonstrate the process of amending an NRC license to permit wet storage of consolidated fuel. The demonstration is designed to (1) establish the technology as a licensable alternative for expansion of spent fuel storage capacity and (2) provide utilities a basis for evaluating the economic benefits this technology may have in allowing more space in existing storage pools.

CONCLUSIONS

In spite of unexpected obstacles in implementing major program activities, 5 of the 13 activities DOE reported to the Congress in early 1984 that it expected to accomplish during the fiscal year were actually accomplished, and 4 others have been completed since the end of the fiscal year. DOE's most significant accomplishment was the issuance of draft EAs on December 20, 1984. These draft EAs contain the basis for DOE's preliminary decision to recommend to the President three candidate repository sites for intensive tests. Another important accomplishment was the issuance of final repository-siting guidelines on December 6--about 5 months after receiving NRC's concurrence although OCRWM had originally anticipated issuing them immediately following this concurrence. Finalization of the program's Mission Plan is also a noteworthy achievement.

Although not completed by the end of 1984, progress was also made in negotiation of a consultation and cooperation agreement with the state of Washington, development of the MRS proposal, and initiation of cooperative demonstration programs with utilities. In some cases delays in these activities were beyond DOE's control--such as negotiation problems with the state of Washington and Northeast Utilities. Several of the delayed activities were significant--DOE's program did not have an approved program plan during this period and the repository siting program is encountering delays, which have implications for DOE's ability to have a repository in operation in 1998.

AGENCY AND OTHER COMMENTS

DOE, Mississippi, the Mississippi Office of Attorney General, Texas, and Utah commented on a draft of this chapter. DOE believed that our report did not provide a balanced or accurate view of the program's status or progress in implementing the act during 1984 because we focused "on a few early deadlines missed" and did not recognize the conflicts in the act between milestones and processes. DOE believed trade-off decisions between scheduling, consultation, and quality considerations have been required to ensure the quality of final products. DOE believed the quality of its products is as important as or more important than meeting deadlines. We believe that in discussing activities DOE accomplished--even if late--as well as those not achieved, we have presented a balanced and accurate view of the program. Moreover, more than a few early deadlines have been missed and, as stated in our report, these delays have implications for DOE's goal to have a repository in operation in 1998. In addition, states, in their comments on this report and other DOE documents, have repeatedly voiced their dissatisfaction with DOE's consultation process, which DOE believes has been a primary reason for program delays.

DOE also stated that we did not note that the fiscal year 1985 budget was the first budget submitted for the Nuclear Waste Fund during a period when the program was being organized. This is incorrect. Our report states that one reason we selected this budget as a criterion to measure the program's progress was that it was the first budget prepared by OCRWM. In hearings on this budget, OCRWM's Acting Director expressed great pride in both the budget and in the program's accomplishments during the 13 months following passage of the act, a time when OCRWM was being staffed and organized.

In its comments on our report, Texas identified several dates for siting actions that DOE has again revised, and commented that Texas expects the repository site nomination date of fall 1985 to be postponed again. Texas stated that although DOE may not consistently inform the Congress of program delays, DOE has notified the Congress when the cause of these delays is being attributed to consultation with affected states and tribes.

Mississippi and Utah disagreed with our conclusion that issuance of draft EAs and siting guidelines were significant program accomplishments. Mississippi cited the over 20,000 comments on the EAs as indications of deficiencies in the quality of these documents, including, as cited by the Attorney General's office, inaccurate information, nonexistent references, and numerous upside down and backward pages. Mississippi further stated that DOE has repeatedly issued documents, including the EAs and siting guidelines, as "trial balloons" to see what reactions they will generate from states and others. Utah believed that the 20,000 comments DOE received on the draft EAs indicate the absence of effective consultation between DOE and affected states and tribes. Furthermore, according to Utah, the outcome of pending lawsuits against the siting guidelines will determine whether DOE has fully complied with the act. Utah believes compliance has not been achieved.

In recognizing both the issuance of draft EAs and siting guidelines as important accomplishments, we are not judging the merits of these documents. However, we believe that, given the level of effort DOE put into their development and their importance to repository siting decisions, they represent significant program achievements.

Mississippi provided additional views on the impact that shifts in program directors has had on the program to date.

CHAPTER 3

PROBLEMS WITH MEETING THE ACT'S REQUIREMENTS

In chapter 2 we identified several difficulties DOE has had in complying with the Nuclear Waste Policy Act. While some implementation obstacles are attributable to DOE's execution of its responsibilities under the act, others relate to the deadlines and requirements of the act itself. This chapter describes five areas where full compliance with the act has not been achieved. Specifically discussed are DOE's efforts to

--resolve comments on the Mission Plan,

--implement the act's site-screening process for the first repository,

--prepare EAs,

--negotiate a consultation and cooperation agreement with Washington State, and

--prepare an MRS proposal.

Completion of the Mission Plan, EAs, and MRS proposal has been delayed by planning and scheduling problems. The concerns of states and other parties are affecting DOE's implementation of the act's site-screening process and finalization of a consultation and cooperation agreement with Washington State. To the extent that DOE's implementation of the act has not foreseen or planned for scheduling delays and the concerns of affected parties, we believe the credibility of DOE's program with states and the public has been weakened.

DOE HAD TO RESOLVE NUMEROUS CONCERNS WITH CONTENT OF THE MISSION PLAN

The 100 organizations and individuals that commented on the draft Mission Plan expressed concerns regarding the strategy of the nuclear waste management program and the adequacy of the information presented in the draft plan. Although most of the concerns raised center around the overall program strategy presented in volume I, there was also some criticism regarding the contents of volume II, which directly addressed the act's specific information requirements.

OCRWM spent several months evaluating the comments received and accommodating comments it determined valid in the final plan. In formulating the final Mission Plan, OCRWM had to attempt to balance the sometimes competing interests and diverse concerns of

varied groups while trying to serve the overall national interest and meet statutory requirements in developing a viable waste management program.

Summary of the Mission Plan's content

Volume I of the May 1984 draft Mission Plan contained the waste management program's major objectives, a discussion of the overall program strategy, program plans, and program management, and presented schedules for geologic repositories, MRS, waste transportation, and Federal Interim Storage. Volume II of the draft Mission Plan responded directly to the informational requirements specified in section 301 of the act and dealt primarily with the repository program. This volume contained 11 chapters, each corresponding to a separate informational requirement of the act.

After months of evaluating comments and revising the plan, DOE submitted the final Mission Plan to the Congress on July 9, 1985. The final plan is divided into two parts corresponding to the two volumes of the draft plan. In addition to a revised and expanded discussion of the waste program's objectives, strategy, plans, and management system, part I includes a description of OCRWM's institutional plans and activities. See appendix III for a description of the act's requirements and our analysis of DOE's response showing that in some areas--discussions of site characterization, a test and evaluation facility, program costs--the information DOE provided is incomplete.

Major concerns with the draft Mission Plan noted in reviewers' comments

As noted previously, the act requires DOE to submit its draft Mission Plan to NRC, other federal agencies, states, and affected Indian tribes for their review and comments.[1] These reviewers pointed out several major areas of concern with DOE's strategy and specific plans for carrying out the civilian radioactive waste management program. These concerns ranged from criticism of the basic objective of the program--to begin accepting nuclear waste in 1998--to criticism of the general lack of detailed information in the draft. In summary, the comments reflected a general dissatisfaction with the sufficiency of information throughout the

[1]DOE received comments not only from these organizations but also from utility and nuclear industry organizations, environmental groups, and private citizens. Our analysis reflects only comments from the organizations to which the act required that DOE submit the plan.

draft Mission Plan as well as some of the basic assumptions, strategies, and plans, which form the basis for DOE's program.

DOE made numerous changes to the final Mission Plan to accommodate the concerns raised by the various reviewers. However, there were also areas where DOE disagreed with specific comments and made no modifications to the plan. DOE's responses to many of the principal concerns raised are discussed below.

Nuclear Regulatory Commission

NRC divided its responses into two categories: "objections"[2] and "comments." NRC stated that the formal draft Mission Plan is a substantial improvement over the preliminary draft issued in December 1983 and that none of the comments are meant to imply that the plan is fundamentally flawed. However, NRC noted major objections, which the staff believed, if accommodated, would improve the Mission Plan. Specifically, NRC noted that the plan

--needs to demonstrate that all aspects of the program that might be referenced in the licensing process are covered by an acceptable quality assurance program;

--does not assure that adequate information will be available to support each stage of the repository development and licensing process;

--should specifically recognize the need to include a conceptual design in the repository site characterization plans that meets the act's requirements and applicable NRC regulations;

--does not describe how the performance goals for the various repository system components will be identified and controlled to ensure that necessary information will be available to meet the DOE schedule for submittal of a license application;

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[2]This characterization of the comments responds directly to the provision of the act that states that the commenting agencies ". . . shall specify with precision any objections that they may have." In the event that DOE fails to revise the Mission Plan to meet these objections, DOE must ". . . publish in the Federal Register a detailed statement for not so revising the Mission Plan." DOE published such a notice on July 12, 1985, explaining why it did not revise the plan in response to all of NRC's objections.

--should be revised to reflect the June 22, 1984, agreement with the Commission that DOE will make its preliminary determination of site suitability after site characterization;

--should provide additional information on the second exploratory shaft; and

--does not sufficiently discuss the information necessary to permit decisions concerning the primary scientific, engineering, and technical information needed to support a license application for a repository.

In addition to these major objections, NRC also provided specific comments on the draft plan, which primarily dealt with their concerns with the waste program's ability to comply with NRC's regulations.

DOE made several modifications in the final Mission Plan in response to NRC's objections. For example, DOE revised the plan to include additional information on the dimensions of the exploratory shaft. However, in two instances DOE disagreed with NRC's objections:

1. DOE did not concur with NRC's view that the preliminary determination of site suitability be made after site characterization. DOE stated that this would either require the Department to characterize more than three sites, which DOE believes the act does not require, or accept the risk of large schedule and cost uncertainties if one site is found unsuitable.

2. DOE did not agree with NRC's objection that the plan does not sufficiently discuss the information necessary to permit decisions concerning the primary scientific, engineering, and technical information needed to support a license application. DOE stated that the plan includes the required level of detail and that more information on needed data can be found in the EAs.

Other federal agencies

DOE received responses to the draft Mission Plan from four other federal agencies: the Departments of the Interior, Treasury, and Transportation, and EPA. The Treasury Department offered no specific comments. EPA and the Interior and Transportation Departments responded with concerns generally consistent with their individual areas of responsibility, although these concerns were not described as objections to the plan.

In its comments, EPA stated that it believes the Mission Plan to be "reasonable." However, EPA noted some areas of concern with its contents:

--The final Mission Plan should identify possible radioactive material release mechanisms in the waste system, define what constitutes a "significant" quantity of radioactive material release, and analyze protective measures against such significant releases.

--Emergency preparedness in the event of radiation release from the waste system is an important consideration and should be discussed in the Mission Plan.

--If an MRS facility were built, the system should depend on geologic rather than engineered features for safety.

Interior's concerns with the Mission Plan related to the role of federal land managers in the program, and the program implementation schedule. Interior urged DOE to recognize in the Mission Plan that consultation and coordination with affected federal land management agencies are critical parts of the waste management program. It recommended that DOE require early consultation with any land manager responsible for federal lands that may be affected by the repository program or other waste management activities.

The Department of Transportation limited its comments to those sections of the draft plan relating to waste transportation issues and recommended specific language changes to the plan. In addition, it recommended that Transportation and DOE formulate an agreement between them to address issues relevant to waste transportation under the act. Transportation also recommended that a mechanism be established to keep it informed of DOE's assessments of the private sector's ability to provide transportation services.

DOE agreed with many of the comments and suggestions made by these agencies. For example, DOE agreed with EPA's suggestion that the draft plan should include additional information concerning both the release of radioactive materials from the waste system and emergency preparedness. DOE also acknowledged the importance of close cooperation and interaction with other federal agencies affected by the waste program. DOE did not, however, accept EPA's suggestion that an MRS facility should rely on geologic rather than engineered features for safety because, unlike a repository, which relies on geologic features to ensure waste isolation, DOE believes an MRS facility relies on engineered barriers.

States

Representatives of 29 states[3] submitted comments on the draft Mission Plan. Thirteen states[4] made extensive comments on the plan while the remaining states raised only a few concerns.[5] In general, the states believed the draft Mission Plan contained insufficient information and analysis in numerous areas.

Some of the states commenting on the draft plan criticized its discussion of how states would be involved in the decision-making process for the waste management program. In general, the states indicated dissatisfaction with: DOE's performance to date in "consulting and cooperating" with them; restrictions on state involvement, especially inadequate time for reviewing key program documents; inadequate provisions for payments to mitigate any adverse social, economic, environmental, or safety impacts from waste facilities; the absence of mechanisms for resolving problems between DOE and the states; and insufficient definition of DOE's responsibilities for informal as well as formal consultation and cooperation.

Several states' comments were also critical of the repository reference schedule[6] for the first repository, included in the draft, calling it "overly optimistic" or "unrealistic." The

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[3]Alaska, California, Delaware, Hawaii, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New York, North Carolina, North Dakota, Ohio, Rhode Island, South Carolina, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

[4]Maine, Michigan, Minnesota, Mississippi, Nebraska, Nevada, Ohio, South Carolina, Texas, Utah, Virginia, Washington, and Wisconsin.

[5]Given the diverse group of states responding and the range of their interests--from states under consideration for a repository to states that believe they have no role in the program--it is difficult for us to generalize about their concerns. In the following discussion of what we believe were states' major concerns, no concern was raised by more than eight states.

[6]DOE's reference schedule was a composite of various alternative dates for the likely completion of program activities. It assumed that, among other things, the siting guidelines would be issued in June 1984, the final environmental assessments in December 1984, and the recommendation of sites for characterization by January 1, 1985. None of these actions occurred as scheduled.

states generally believed that the siting, construction, and licensing of the first repository will take longer than the time allotted in the reference schedule. Some states also were concerned that DOE may try to compress some of the activities into a shorter time frame, take short-cuts, or otherwise attempt to meet the schedule at all costs.

The states expressed concerns about DOE's plans for waste transportation. They believed that this area was inadequately addressed in the plan. The states raised safety concerns regarding the transport of radioactive waste into or through their states. They noted that the Mission Plan should clarify DOE's proposed procedures and policy to ensure safe shipments, such as emergency response training for state and local emergency personnel, and advance state notification of waste shipments for all states along nuclear waste transportation routes. Some states also criticized the draft plan for not specifying what DOE will do to minimize transportation of waste as required by the act and how it will resolve the institutional problems (such as restrictions placed on waste shipments by local governments) relating to transportation of nuclear waste.

Some states believed that the Mission Plan should better describe the MRS alternative and the decision process related to it, in view of the "unrealistic" repository reference schedule. They noted that no quantification or clear indication is given of the repository time delay that would trigger MRS construction. Further, the states were concerned that the draft plan did not specify rights and responsibilities with regard to reviewing documents and decisions concerning an MRS, nor clearly define the mechanism for consultation and cooperation and for resolving conflicts regarding MRS and other program activities.

States believed the draft Mission Plan also fell short in its treatment of socioeconomic concerns. The draft plan did not consider socioeconomics as a key issue and it was given little attention, according to some states. Although it discussed potential impacts, the states believed that the plan's discussion was incomplete without an analysis of how the federal government intends to mitigate these impacts.

The states also criticized the discussion of the site screening methodology. The states generally believed that the draft Mission Plan did not adequately explain the site recommendation process. The states further noted that the draft Mission Plan should specify the rights of and mechanism for the states to review and comment on the repository site recommendation.

As a result of comments received from the states, DOE revised the final plan in several areas including institutional relations, socioeconomic impacts, and transportation issues. For example, in

response to a general dissatisfaction among the states with DOE's consultation and cooperation process, DOE added a new chapter to the plan that deals exclusively with institutional issues. According to the plan, DOE is developing an institutional program that will ensure full public participation in the waste program. This program will have three elements: outreach and participation to ensure accurate and understandable communication of program information; consultation and cooperation to establish the procedure for interaction with states and affected Indian tribes, including formal agreements; and socioeconomic analysis and impact mitigation to ensure that affected parties are included in efforts to assess and mitigate impacts of program activities. DOE states that the ". . . program envisions a comprehensive system of collaboration, consultation, and cooperation" with all affected parties.

There were instances, however, where DOE disagreed with states' comments. For example, in response to states' concerns that the repository reference schedule is "overly optimistic," DOE affirmed its commitment to the schedule, which it considers aggressive but achievable. DOE also asserted that it would meet the schedule requirements without compromising technical or institutional considerations. DOE also did not change the plan to include more discussion of the site-screening methodology. According to DOE, this information is presented sufficiently in the siting guidelines and the draft EAs.

In response to comments that the plan should better describe the MRS alternative, DOE noted that since issuing the draft Mission Plan, DOE has reevaluated the role of and strategy for developing an MRS facility. DOE's final Mission Plan includes a discussion of the new integrated MRS concept.

Indian tribes

DOE received responses from representatives of four Indian tribes: the Navajo, the Yakima, and the Chippewa Nations, and the Confederated Tribes of the Umatilla Indian Reservation.[7] In general, the Indian tribes were critical of the draft's treatment of the waste program's socioeconomic impacts on the tribes, and their rights, responsibilities, and obligations within the program. For example, they noted that the consideration of socioeconomic impacts in the draft plan does not address the potential effects on Indian cultures and contains

[7]The Navajo Nation (headquartered in Arizona) is primarily concerned about the potential repository sites in Utah; the Yakima and Umatilla Tribes (Washington and Oregon, respectively) are concerned with the Washington site; and the Chippewas (Wisconsin) expressed general concerns.

generalizations. The tribes' comments indicated their concern that the draft plan did not clearly define the overall role of the tribes in all phases of the program, and the precise mechanism for coordination and consultation with the tribes. As with other groups, the tribal organizations expressed concern over the insufficiency of information throughout the draft. In addition, the Yakimas criticized the repository reference schedule as being unrealistic and inflexible.

In response to tribes' concerns that socioeconomic impacts did not address the potential effects of a repository on Indian cultures, DOE determined that such information was beyond the scope of the Mission Plan but was already addressed in the Hanford Washington draft EA. DOE also indicated that although a new section concerning the consultation and cooperation process has been added to the plan, specific concerns of each tribe will be addressed with them during the actual consultation process.

Completion of plan delayed by higher priority work

Although the act required that the plan be submitted to the Congress by June 7, 1984, DOE originally estimated that the final Mission Plan would be issued in August 1984. This target had to be revised when (1) the receipt of comments extended until September 1984 and (2) program staff responsible for areas criticized in comments, such as the first repository schedule and socioeconomic impacts, remained involved with revising the EAs. Since the EAs were not published as anticipated in August 1984, staff were not available to resolve how the Mission Plan comments should be addressed. DOE's original schedules for the Mission Plan and the EAs did not anticipate this overlap. Moreover, as milestones for the siting program slipped, the Mission Plan was given less priority. According to the Deputy Associate Director, Office of Geologic Repositories, once the siting guidelines received NRC's concurrence in June 1984, the EAs became OCRWM's highest priority.

Moreover, we believe that DOE's schedule for finalizing the Mission Plan assumed that the comments could be handled quickly and may not have anticipated that they would be extensive. Although we recognize that the act's allowance of 2 months for public comment and finalization of the Mission Plan was not feasible, OCRWM did not set a new target date that realistically provided for revisions to the draft.

PASSAGE OF THE NUCLEAR WASTE POLICY ACT INTERRUPTED DOE'S SITE-SCREENING PROGRAM AT DIFFERENT STAGES

The Nuclear Waste Policy Act requires that in recommending sites for site characterization--detailed testing--the Secretary

must do ". . . a reasonable comparative evaluation . . ." of all sites under consideration. When the act was passed, however, DOE's site-screening program was in different stages of investigation. Specifically, DOE's testing and data for the salt sites were not as extensive as for basalt or tuff. The act also interrupted DOE's planned testing program at the basalt (Washington) and tuff (Nevada) sites.

In addition, the act required that EAs be prepared to accompany the nomination of five sites for characterization. DOE decided to prepare draft EAs for public comment for all nine sites under consideration. Although the act did not require that draft EAs be released, DOE wanted to benefit from public review and comment before final site nominations were made. This decision, as well as delays in completing the drafts, increased program costs by approximately $16 million.

DOE's approach to site selection prior to the act

Prior to the act the federal government had been developing a program to permanently dispose of high-level waste in geologic repositories. For about 3 decades DOE and its predecessor agencies[8] had primary responsibility for this program. DOE's approach prior to the act was to seek a repository site that on balance exhibited characteristics favorable to waste isolation.[9] This approach to siting was based on the assumption that perfect sites do not exist in nature and attempting to find them would be prohibitively expensive. Thus, to balance limited federal financial resources with the many factors that must be examined to identify a suitable site, DOE adopted a screening procedure in which broad land areas are narrowed in a step-by-step process to identify site-sized land areas.

Generally, DOE's plan was to proceed from a national survey to identify regions (parts of one or more states), areas (hundreds to thousands of square miles), and locations (tens to hundreds of square miles) to identify sites (less than 10 square miles). After this process, DOE was planning to prepare either an environmental impact statement or an EA for each of three sites to

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[8]On January 19, 1975, that part of the Atomic Energy Commission responsible for radioactive waste became part of the Energy Research and Development Administration, which became DOE on October 1, 1977.

[9]DOE, National Plan For Siting High-Level Radioactive Waste Repositories and Environmental Assessment, Draft, (DOE/NWTS-4, DOE/EA-151, Feb. 1982).

be selected for site characterization.[10] In selecting sites for detailed testing, DOE's approach since 1980 had emphasized different rock types and geohydrologic (groundwater) settings to increase the probability that at least one of the sites would be found suitable.[11] Following about 3 years of detailed testing, DOE planned to select at least one of the sites for development of a repository by issuing a site recommendation report and an environmental impact statement.

In addition to a screening process based on geologic considerations, DOE also used a land-use approach whereby DOE searched for suitable repository sites on federal lands where radioactive materials were already present. The screening of the basalt site on DOE's Hanford Reservation and the tuff site at the Nevada Test Site began under this approach.

Impact of the act on the siting process

The act formalized the repository siting process by integrating DOE's siting program into its requirements and procedures, while at the same time modifying DOE's approach by specifying steps to be completed in a specific sequence and time frame. The act required that DOE select repository sites in the following sequence:

1. Identify potentially acceptable sites.
2. Nominate at least five sites.
3. Recommend three sites for site characterization.
4. Ultimately select one site for recommendation to the President.

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[10]Prior to the act, environmental analyses of these actions were covered by the National Environmental Policy Act of 1969. Under environmental regulations, DOE could prepare an environmental assessment if there was no anticipated major impact from the action. Conversely, a more in-depth analysis or an environmental impact statement is required if an agency determines that the action is expected to have a major impact.

[11]The basis for this policy was to eliminate the possibility that all sites tested would be disqualified because of a generic deficiency in the rock type or geohydrologic setting (the groundwater system of a particular geologic setting or region).

In addition, the act introduced deadlines for achieving these requirements. In particular, identification of the potentially acceptable sites had to be completed within 90 days of enactment or by April 7, 1983. Although no specific date is specified for nomination of five sites for the first repository, the act required DOE to recommend three sites for characterization by January 1, 1985.

Status of activities at sites prior to the act

When the act was passed, DOE was trying to finalize its selection of sites for the first repository and had begun regional surveys for the second repository. For the first repository, DOE was attempting to narrow land areas into sites involving tuff, basalt, and salt. Since DOE's policy stressed diverse rock types, the basalt and tuff sites automatically qualified for site characterization because they were the only sites in these rock types under investigation.[12] Accordingly, at these two sites, DOE had begun preparing for site characterization. For example, at the basalt site, DOE had finished drilling the principal borehole and was preparing to drill an exploratory shaft. Similarly, at the tuff site, DOE had begun to drill the principal borehole and was designing the exploratory shaft, which was scheduled for drilling in October 1983.

DOE's work at the salt sites trailed the work on basalt and tuff. As of December 1982, DOE had identified two bedded-salt sites in Utah, two salt dome sites in Mississippi, and one salt dome site in Louisiana from area phase studies. Farther behind this work, DOE was also screening lands in Texas. However, DOE had not reached the point where site-sized land areas were identified. Instead, DOE's Salt Repository Project Office had

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[12]In commenting on our report, Nevada asserted that DOE had not properly applied the land use or geologic-screening approach in selecting the tuff site and that other sites on the Nevada Test Site may be as good or better than the Yucca Mountain site.

identified from area studies two units of 190 and 300 square miles each in Northwest Texas for further screening.[13]

DOE planned to identify one salt site for characterization by mid-1983 from these seven sites and planned to issue a site characterization report on the site selected. This was to be followed by the drilling of an exploratory shaft in 1984.

DOE's overall objective for the first repository, prior to the act, was to have three sites characterized by surface technologies in 1983 and to have three exploratory shafts in some phase of construction.

Impact of the act on activities at sites

The act's impact on field activities was to (1) postpone DOE's plans for exploratory shafts at the basalt and tuff sites until DOE was sure these sites would meet the new criteria and (2) make DOE's screening approach to narrow the salt sites unnecessary. Although DOE had selected tuff and basalt for detailed testing on the basis of their rock type and geohydrologic setting prior to the act, it needed to justify the selection of these sites using the new criteria specified in the siting guidelines. Moreover, the act no longer guaranteed that both of these sites would be selected.[14] Consequently, site characterization activities at both of these sites were postponed pending the issuance of the siting guidelines, environmental assessments, and the formal nomination and recommendation of sites.

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[13]According to Salt Repository Project officials, DOE was able to identify sites directly from area studies in Utah because the local topography had naturally concealed places to locate a repository. Similarly, DOE was able to identify sites from areas in Louisiana and Mississippi because the salt domes represented natural sites of appropriate size. On the other hand, DOE was not able to identify sites from area studies in Texas because distinguishing surface characteristics were lacking. Accordingly, DOE had to proceed to location studies, after the passage of the act, to identify sites. Texas criticized these subsequent studies for not being on-the-ground location studies and for using an "invented" screening methodology to accommodate data deficiencies.

[14]Under section 112(a) the Secretary must consider ". . . to the extent practicable . . ." recommending sites in different geologic media.

For salt, DOE had identified land units in several states but was not prepared immediately to identify one preferred salt site when the act was passed. Since states had to be notified of potentially acceptable sites within 180 days, the Secretary notified all of the salt states that they had suitable locations. Rather than continue to screen for one site, DOE proceeded to compare sites within geohydrologic settings, as would be required by the siting guidelines. At the same time, DOE had to complete its analysis of data on the Texas land areas to narrow them to site-sized locations. This work was completed in November 1984. The state of Texas has questioned DOE's selection of the state as "without factual support" and ". . . incomplete relative to DOE's established procedures and process for site screening and selection." In December 1984 Texas sued DOE, asking the court (1) to review the basis for the Texas sites' selection and (2) to determine whether the Secretary had yet designated potentially acceptable sites in Texas, as the act required. The court dismissed Texas' suit in a June 1985 ruling that litigation was not appropriate until a final site selection decision is made.

DOE believes that the process followed in selecting the Texas sites is in full accord with the requirements of the act. According to the Salt Repository Project's Program Manager, DOE's work in Texas trailed investigations of the other salt sites because, prior to 1980, DOE and its contractors perceived that the Gulf Coast salt sites in Mississippi had the best potential, and DOE had concentrated its efforts there. In response to criticism from the 1979 Interagency Review Group, DOE put greater emphasis on alternate sites and other geological basins.

Postponement of drilling and preparation of additional assessments have increased early program costs

Postponements of drilling an exploratory shaft at the basalt and tuff sites in order to meet the requirements of the act have been costly to the early phase of the program. For example, at the basalt site where DOE was preparing to construct an exploratory shaft, the delay has cost the program $2,600 per day to maintain the drilling rig in a standby mode or, according to DOE's estimates, $2.4 million from February 1983 to December 22, 1984. Since December 22, DOE has been considering purchasing the drilling rig, and its maintenance contract has not been extended.

DOE's approach to the act's requirement to prepare EAs to accompany the nomination of sites has also been costly. At the same time, release of these draft EAs has provided additional opportunities for state and public input to DOE's decisions. OCRWM first decided that draft EAs would be prepared for each of the five sites nominated, as the act indicates, and then later decided to prepare draft EAs for all nine sites under consideration. According to the Director, Siting Division, DOE

prepared nine draft EAs to allow the states the opportunity to critique DOE's siting decisions. DOE believed it was necessary to fully evaluate all nine sites in order to nominate five and recommend three for characterization. This decision to prepare nine documents, along with delays in finalizing them, has contributed to an increase in the overall cost of this early phase of the program. For example, at the Salt Repository Project Office, DOE estimates that the total cost for finalization of the EAs has increased from $7.7 million (October 1983) for three EAs, to over $23.2 million for seven EAs. Likewise, the cost of the contractor (Weston) assisting headquarters in reviewing the EAs has increased, according to Weston, from $350,000 (October 1983) for five EAs to $875,000 for the nine drafts. According to DOE, these increased costs also reflect a larger job to finalize the EAs than was originally estimated. Mississippi's Attorney General's office noted that the $2.4 million for rental of the drilling rig and the $16 million increase in EA costs are extravagances that should be limited.

DOE project offices had funds available to cover these additional expenses because site characterization activities budgeted for fiscal year 1984 have been delayed, particularly the start of the site characterization plan and a decision to write one rather than three salt site plans. DOE also had funds available because some field work that would have provided more site-specific data was cancelled. For example, the Salt Repository Project Office had planned to drill two boreholes in Utah that would have provided data on whether drilling in Canyonlands National Park would be necessary during site characterization. According to the Salt Repository Project Manager, since these boreholes were not absolutely necessary to complete the EAs, the decision not to drill them now did not have a major effect on the program.

DOE'S APPROACH TO PREPARATION OF ENVIRONMENTAL ASSESSMENTS CONTRIBUTED TO THEIR DELAY

As noted in chapter 2, issuance of final EAs has been postponed from a target date of September 1984 to November 1985. Accordingly, final site-screening decisions for the first repository will be delayed until then. OCRWM has attributed the greater-than-anticipated length of time for preparing the EAs to "unanticipated complexities." OCRWM officials said that the EAs are unique documents that have not been attempted previously.

Although the uniqueness of DOE's efforts may be partially responsible for delays in the EAs, we noted that some of the delay can also be attributed to DOE's approach to their preparation. Specifically, OCRWM (1) provided little direction or guidance to the field in the initial phases of the effort, which

resulted in inconsistencies in data presentation and interpretation of the siting guidelines and (2) scheduled completion of the draft EAs unrealistically, given the complexities of their preparation. Publication of the draft EAs became an especially intense, highest priority effort during the last quarter of 1984.

Limited guidance provided to field caused inconsistencies in EAs

OCRWM used a "trial and error" approach to prepare the EAs because it had no previous experience in drafting the type of document required by the act. Under this approach, OCRWM permitted the project offices to start writing the EAs in October 1983 with only very general guidance, including a tentative outline, a description of the purpose of the EAs and the information they must contain, and the basic assumption that the EAs were to be based on available information. If necessary data or information was inadequate, OCRWM instructed the project offices to make conservative assumptions to compensate for the deficiencies in the data. OCRWM provided additional guidance on an as-needed basis as headquarters identified problem areas from reviewing the drafts. Project offices prepared and revised the EAs on the basis of headquarters' review comments until an acceptable product was written. Six drafts of these documents were written prior to issuance of the EAs for public comment.

DOE disagreed with our characterization of the EA process as "trial and error." DOE believed that the issuance of draft EA guidance was an incremental and integral part of their preparation. Given that project offices had responsibility for the site-specific portions of the EAs, OCRWM's initial guidance was designed to give the field flexibility to prepare these documents. OCRWM believed this flexibility encouraged competition between offices so that the best ideas and analyses could be incorporated in later guidance. DOE believed the preparation of successive internal draft EAs was a learning experience

> ". . . during which inconsistencies were rectified, conservative assumptions were used to compensate for sparse data, and general comparability was sought in presenting technical analyses."

OCRWM established working groups comprised of OCRWM headquarters and project office personnel, including key contractors, to meet periodically to resolve technical problems and coordinate the EA preparation effort. To provide headquarters review and to resolve matters that could not be resolved within the work groups, OCRWM established a steering committee representing OCRWM, the project offices, and representatives from various offices within DOE, including the Office of the General Counsel and the Assistant Secretary for Policy, Safety, and Environment.

Throughout the process the steering committee and OCRWM staff provided comments to each individual project office and followed up with visits. In mid-September all the EA authors were brought together at headquarters to try to resolve differences in presentation. Some substantive issues--such as how the EAs should address the commingling of defense waste with commercial spent fuel--could not be resolved at the staff level. Thus, in late September 1984, OCRWM's Director acted to resolve them and move toward publication of the draft EAs in December.

Inconsistent presentation of data

Preparation of the EAs involved not only OCRWM headquarters and the three DOE project offices but also numerous contractors. Because they had different authors, inconsistencies arose in the EA drafts ranging from rounding errors (e.g., whether 101.2 miles was shown as 101, about 100, or 101.2) to whether an entire issue--such as defense waste--had been discussed or omitted in the text. Some project offices did not comply with the guidance OCRWM did provide. The Salt Repository Project Office, for example, did not initially draft chapter 6 in the format that headquarters guidance had indicated it should use. In other examples, the projects did not use OCRWM's May 9, 1984, guidance on assumptions on the age of waste and the repository-operating period in the June 1984 drafts as headquarters had requested. According to DOE's comments on our report, this guidance was too late for incorporation into the June draft, so OCRWM agreed to incorporate this guidance and other comments later.

Inconsistent interpretation of the siting guidelines

Project offices and OCRWM used the siting guidelines to determine whether or not a site was qualified for a repository location. However, project offices were sometimes confused by or made different interpretations of particular guidelines in determining whether a favorable or adverse condition existed at a site. These inconsistent interpretations were largely due to the general language in the guidelines. For example, one guideline specified that DOE evaluate a site on the basis of its "proximity" to highways and railroads. Project offices made independent judgments of these criteria to determine how close "proximate" was. For example, the Nevada Project Office believed the Yucca Mountain site met these criteria even though it was 85 miles from a railroad; the Salt Repository Project Office did not believe the Richton Dome site qualified although it was only 26 miles from a railroad. These independent interpretations were finally resolved in the mid-September 1984 meeting when additional quantitative guidance to allow the basis for a consistent evaluation among sites was developed. Specifically, the projects agreed to

interpret "proximate" as 10 miles to local highways and railroads and 30 miles to interstate highways or mainline railroads.

In another example of language that was difficult to define, project offices had to determine whether a site's ". . . geohydrologic system could be readily characterized and modeled with reasonable certainty." Headquarters and the project offices disagreed on definitions of "readily characterized" and "reasonable certainty." The project offices believed their sites could be characterized and modeled within the program's time frame and budget. Headquarters believed this assertion was not conservative enough and could draw criticism from the technical community. OCRWM's Director decided in late September 1984 to use a more conservative approach whereby none of the sites met the criterion for this favorable condition and all the draft EAs reflect this.

Because inconsistent interpretations resulted in project offices' having to revise their drafts, we believe that the EAs could have been prepared in a more timely fashion if OCRWM had provided more specific interpretations in advance, thus eliminating some difficulties the project offices experienced in interpreting the guidelines. OCRWM could have minimized these problems by (1) providing the project offices with scales to assist in evaluating factors such as the proximity to highways and railroads or (2) writing more specific guidelines. The illustration we have developed below is one example of the type of additional guidance that we believe OCRWM could have provided in advance to help the project offices write the EAs.

Table 3.1

Illustration of Scales to Quantify Interpretation of Siting Guideline--Proximity to Transportation

Distance from end of access road to public highway/rail			
0-2 miles	2-4 miles	4-6 miles	>6 miles
Most favorable condition	Favorable condition	Potentially adverse condition	Adverse condition

Moreover, had the guidelines been more specific, inconsistent interpretations might have been avoided. Throughout the development of the siting guidelines, DOE argued that its approach was to use general qualitative guidelines as a basis for comparing sites. Many parties, especially states, had commented that the guidelines were too vague to be useful in the decision process on sites. These parties felt that the guidelines should be more specific in wording or quantifying values. DOE's experience shows

that there were indeed difficulties in consistently interpreting the general language of the guidelines. According to the Director, Siting Division, this problem could not have been anticipated since it was impossible to predict the relevance of the guidelines until after the project offices had attempted to draft the EAs.

OCRWM schedule for EAs overly optimistic

OCRWM's initial schedule for publication of the draft EAs assumed that the siting guidelines would be issued in mid-May 1984 and that the June 1984 draft EAs submitted to headquarters would be final drafts and published in August. By June 1984, however, OCRWM officials realized that the EAs contained "critical deficiencies" and believed specifically that the salt EAs required the most improvements in quality. They targeted August as the deadline for revising the EAs, but this date, too, was postponed to November 1984.

OCRWM officials were overly optimistic in estimating completion of the EAs, we believe, because they assumed most revisions would be "quick fixes." OCRWM management did not appreciate the complexity of the effort the act required. OCRWM pressured the project offices to complete their work by assuming that the act's January 1, 1985, deadline for site recommendations would somehow be met even though headquarters staff, who had reviewed the June draft EAs, believed this was not possible. In its comments on our report, Texas noted that considerable time was also required by headquarters to develop a methodology to rank the sites and that headquarters- as well as field-prepared portions of the draft EAs required improvements.

Another factor that OCRWM did not take into account was that changes would be made to the draft EAs because the Mission Plan and siting guidelines were not final. The act called for both of these documents to be published prior to the nomination of sites in January 1985. Until early December 1984, neither of these requirements had been met by OCRWM.[15] As a consequence, OCRWM had to concurrently draft the EAs while these planning documents were in the process of being developed. As changes were made to the Mission Plan and the siting guidelines, the EAs also had to be revised to reflect a consistent program position on various technical matters.

In response to our report, DOE commented that the complexities encountered in completing the draft EAs would have

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[15]The siting guidelines were published in final on December 6, 1984--14 days prior to release of the draft EAs.

been difficult to predict. At each stage of the process, DOE believed its schedule reflected the best estimates of the time needed to complete the EAs. Moreover, DOE headquarters intentionally set aggressive deadlines for itself and the field because it believed this would minimize or eliminate unnecessary delays.

Current schedule questionable

We believe OCRWM's current schedule for finalization of the EAs is again overly optimistic and is unlikely to provide for adequate consideration of all comments. The public comment period on the EAs closed March 20, 1985. DOE now plans to review and respond to over 20,000 comments, consult with states, issue the final EAs in December 1985, and nominate the five sites. This schedule assumes that (1) the Department's tentative recommendations will not change and (2) major revisions to the EAs will not be required. DOE has no plans to do additional field work prior to finalization of the EAs. In comments on our report, Mississippi's Attorney General noted that the comment period allowed by DOE did not provide for the 10-day Christmas-New Year's holidays and that DOE refused to grant extensions of the comment period.

Given the over 20,000 comments DOE had received and DOE's past experiences in dealing with less voluminous, yet substantive comments on the draft siting guidelines and Mission Plan, we believe DOE can expect further delays in finalizing the EAs since these documents form the basis for site selection. In the past OCRWM has needed additional time to address comments, and we anticipate that this is likely to occur with the EAs. Moreover, OCRWM will have to ensure that the project offices consistently address concerns pertaining to more than one site. Since the act provides that the final EAs can be subject to judicial review, DOE's finalization of these documents will need to give substantial consideration to the concerns of states, Indian tribes, and the public.

DRAFT ENVIRONMENTAL ASSESSMENTS ILLUSTRATE DATA COMPARABILITY PROBLEM RESULTING FROM THE ACT'S SITE-SCREENING PROCESS

Because, as discussed earlier, more testing has been done at some sites than at others, DOE faced the problem of comparing sites for which the data are not directly comparable or equivalent. To account for these differences, the draft EAs contain discussions of "assumptions and data uncertainties" when DOE's conclusions have been based on preliminary or limited information. This data comparability problem created difficulties for OCRWM in ensuring consistency and conservatism among the site evaluations. For example, DOE stated that it could not compare or

rank sites for the "system guidelines" because sufficient information is not available at this stage in the siting process.

In addition, although the act itself created some changes in DOE's site-testing program, two states have delayed or restricted DOE's efforts to acquire data on sites in their states because of their concerns over DOE's conduct of the program.

Uncertainties identified in draft EAs and efforts to deal with optimistic analyses

Each EA notes DOE's belief that where data were insufficient for a conclusive evaluation of a siting guideline ". . . a generally conservative position was taken." Since DOE's site recommendations are not entirely based on site-specific data, whether DOE's analysis has been conservative enough is an issue that could have major repercussions for the program in the future.

According to OCRWM staff, the draft EAs attempt to recognize where sites are evaluated on the basis of regional or generic rather than site-specific data. In comparing the five nominated sites--Davis Canyon, Deaf Smith, Hanford, Richton, and Yucca Mountain--DOE attempted to account for how well or poorly a particular site seemed to meet a guideline and to some extent the relevance of that guideline to a particular site (e.g., if groundwater flow is of less concern because of the particular geologic properties of a site). However, DOE did not consistently recognize in its site comparison analysis that preliminary or regional data were used to support the ranking of sites. For example, the Yucca Mountain, Nevada, EA, which OCRWM headquarters considers the best analysis, is supported by approximately 502 references. This EA identified major assumptions or data uncertainties in evaluating the site for 17 of the 21 siting guidelines. These uncertainties are not repeated in the text when DOE later ranks the sites.

One problem common to all the initial drafts of the EAs was general optimism in the site evaluations. If data did not exist indicating a problem with the site, the project offices sometimes assumed conditions were favorable on the basis of this absence of data. For example, the basalt project office decided that the Hanford site met the guidelines' favorable condition for sufficient rock thickness to allow flexibility in repository design on the basis of "observations" elsewhere in the geologic basin, but that more data from the specific site were needed to be certain. When these drafts were reviewed, OCRWM headquarters requested many changes to more conservative positions. In this example, headquarters did not believe the data in the Hanford EA supported the project office's favorable conclusion, and the final draft EA was revised to show that this favorable condition had not

been met. As a result, according to the Director, Siting Division, the EAs have evolved from assuming favorable conditions existed to recognizing the possibility that a potentially adverse condition exists at a site. Those who commented on the EAs are questioning how well OCRWM has addressed the problem of optimism, and DOE will need to consider this in finalizing them.

In our opinion, on the basis of our observations and discussions with DOE officials, some of the inconsistencies and optimism in the project offices' evaluations could have resulted from the independence each project office exercised in the site nomination process and the interest each has in its outcome. As previously mentioned, the act caused DOE to change its plans on which sites would undergo detailed testing. Prior to the act, each of the project offices would have had a site undergoing characterization, but the continued involvement of each project office and its supporting contractors was no longer assured under the act and would be determined when the Secretary selected sites for characterization on the basis of the EAs. At the same time, the project offices have had sole responsibility for drafting sections and revisions to the EAs specific to their sites. OCRWM headquarters maintained the responsibility for sections common to all sites, such as the introduction and comparison of sites.

In its comments on our report, Mississippi noted that although three project offices will characterize sites, only one of these offices will be funded to construct and operate a repository. Mississippi believed that this will heighten future competition among project offices.

Some states have delayed DOE's efforts to acquire data on sites

Because of the concerns of Mississippi and Utah with DOE's compliance with procedures outlined in the act (and prior to the act with federal environmental and land-planning statutes), DOE has done limited on-site testing in these states.

In March 1980 the Governor of Mississippi requested that DOE defer any further site investigation activities until the state had an opportunity to review and comment on all DOE's pertinent data, evaluations, and conclusions on the Mississippi site. DOE agreed to this request and provided data to the state. Since that time DOE has been negotiating with the state as to whether all pertinent data have been provided and reviewed, since Mississippi contends that all documents have not been provided. The Governor's "moratorium" on field work has continued, so DOE has had to rely on data acquired from private parties, such as oil companies. In addition, the state enacted legislation in April 1983 requiring that the Mississippi Energy and Transportation Board enter into written agreement with DOE prior to the initiation of any site characterization activities. As discussed

earlier, Mississippi is not currently negotiating a written agreement with DOE.

Mississippi commented that our presentation of Mississippi's deferral of DOE testing in the state implies some fault on the state's part. The Mississippi Attorney General's office agreed with this view and also commented that the state filed two Freedom of Information Act requests in order to obtain data from DOE, which the state believes should have been readily provided. According to the Attorney General's Office, DOE's response to these requests took 1-1/2 years, each, and DOE denied certain portions of these requests. The Attorney General's Office believes that if DOE's program has been delayed in Mississippi, it is because state officials are trying to protect the state's citizens and perform their duties.

In July 1982 the Governor of Utah directed state agencies to deny permits for any new DOE studies that would use state facilities or resources. The state subsequently withheld permits for trucks traveling to the Utah sites until DOE could clarify that the trucks were needed for ongoing area testing. In December 1983 the Governor again directed state agencies ". . . to terminate any cooperative activities with the Department of Energy . . ." except for honoring requests to gather data for the EAs. The Governor expressed concern that DOE was circumventing the act's process for extensive public and state involvement in site selection decisions. Utah has agreed to consider new DOE permit requests on a case-by-case basis. However, in accordance with OCRWM's direction, the EAs have relied on existing data rather than pursuing new test results. In a November 1984 letter to the President, Utah's Governor-elect further criticized the Department's handling of the repository siting process and stated that he ". . . will oppose any further consideration of the placement of a high-level nuclear waste repository in this state unless . . . problems can be resolved."

In commenting on our report, Utah emphasized that it believed its objections to DOE's data collection efforts were justified because the state objected to (1) the amount of data being used to make site selection decisions and (2) the lack of effective consultation and cooperation in site screening. In addition, Utah stated that it was not satisfied with the procedures DOE was following for planning and data collection, believed that additional surface testing would be needed to resolve environmental concerns, and was concerned that DOE had overestimated the technical adequacy of the two Utah sites by omitting the region-to-area phase of site selection.

ISSUES IMPEDING FINALIZATION OF AGREEMENT WITH WASHINGTON STATE

As discussed in chapter 2, the state of Washington has been negotiating but has not yet finalized a consultation and cooperation agreement with DOE. By July 1984 DOE and the state of Washington negotiating teams were able to reach agreement on all but two principal issues:

--what role the state may play in the federal decision-making process if a decision is made to commingle defense and civilian wastes at a Hanford repository and

--federal government liability for accidents at the repository site or while transporting waste to or from a repository.

To resolve the first issue, in October 1984 DOE agreed to negotiate a separate defense waste agreement with the state of Washington. The state established a working group to initiate these negotiations with DOE. In December 1984 the first meeting of these negotiators occurred. The Governor of Washington requested financial assistance from DOE to support the state's involvement in defense waste issues, which the Secretary of Energy initially denied on December 31, 1984. The Governor believes that it will ". . . be difficult even to negotiate an agreement . . ." without this funding. In April 1985 DOE advised Washington that it would consider funding certain types of defense-waste analyses related to the repository program.

The liability issue also continues to be an unresolved matter. Washington has requested that DOE commit to strict liability and full indemnification (reimbursement) for any damage caused by a nuclear incident at a repository within the state or associated with the transport of radioactive material to or from such a repository. DOE has insisted that it cannot accept liability for such accidents beyond authority conferred by statute, namely the Price-Anderson Act.

In 1957 the Price-Anderson Act amended the Atomic Energy Act of 1954 to provide a system of financial protection for utilities operating nuclear power plants, for private companies operating government-owned nuclear facilities or otherwise providing services or materials to the government, for any other person who may be liable for a nuclear accident, and for potential claimants. It did this by (1) requiring each utility that NRC licenses to purchase liability insurance from private sources (In 1975 the act was amended to also require utilities to contribute $5 million per nuclear reactor in the event of a nuclear accident.), (2) providing for government indemnification of any person found liable for a nuclear accident, and (3) establishing a ceiling on the liability of indemnified persons for

any one accident. Although the authority to enter into indemnity agreements was supposed to expire after 10 years, it has been renewed twice and will expire in August 1987 unless the Congress approves another extension. Under this act the liability of government contractors who would construct or operate DOE's nuclear waste facilities is limited to $500 million[16] for any single nuclear waste accident. The act authorizes DOE to indemnify its contractors up to this amount. According to February 1984 testimony by the chairman of DOE's negotiating team, "In the absence of congressional action, we are without authority to offer additional liability protection."

Washington State's Nuclear Waste Board had considered postponing its review of the agreement until the differences with DOE on the issue of liability could be resolved. However, in November 1984, the Board agreed to seek public comment on a draft agreement that recognizes the state's position and provides for Washington to disapprove any final recommendation of a repository site at Hanford if the Price-Anderson issue has not been resolved by that time. The state legislature, following public hearings, must next consider the agreement. In chapter 4 we discuss the implications that the liability issue has for the successful completion of negotiations with other states and the need for the Congress to address this issue.

REEVALUATION OF MRS DELAYED COMPLETION OF THE PROPOSAL

Although DOE is making progress toward completing its MRS proposal, it has determined that a complete proposal cannot be submitted to the Congress until January 1986. A reevaluation of the appropriate role for MRS has resulted in delays in preparing the required proposal. OCRWM also reassessed its use of reference sites for MRS designs. The MRS proposal will recommend the construction of an MRS facility that will serve primarily as a waste handling and packaging facility, and will be an essential part of an integrated nuclear waste management system. The 1986 proposal will include designs for the three specific geographic sites in Tennessee, which OCRWM identified as preferred MRS sites in April 1985.

Requirements of the act

The act requires the Secretary to

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[16]This $500 million in protection to government contractors would apply to the nuclear weapons and testing facilities currently operating at DOE's Hanford Reservation.

". . . complete a detailed study of the need for and feasibility of, and shall submit to the Congress a proposal for, the construction of one or more monitored retrievable storage facilities. . . ."

The proposal is to include

"Site-specific designs, specifications and cost estimates sufficient to (i) solicit bids for the construction of the first such [MRS] facility; (ii) support congressional authorization of the construction of such facility; and (iii) enable completion and operation of such facility as soon as practicable following congressional authorization of such facility."

DOE's original approach to the MRS proposal

The April 1984 draft Mission Plan defined MRS' role as a backup facility if the first repository's opening is delayed. According to the Director, Storage Division, OCRWM selected the repository backup role for the MRS primarily because the act allowed DOE a relatively short time frame--2-1/2 years--to prepare both a needs and feasibility study and a proposal that was to include very detailed facility designs. Because of this time constraint, OCRWM had to make "conservative assumptions" regarding the MRS role and its location pending the outcome of the needs and feasibility study.

According to DOE's draft Mission Plan, DOE had based its original approach on what it termed an "inconsistency" in the act. The draft noted that section 141(h) states explicitly that any MRS facility authorized will also be subject to state review of the site selection, and participation of and consultation with states and Indian tribes. According to DOE's interpretation,

". . . although the phrase 'site-specific designs' suggests that site selection with state and Indian Tribe participation must take place prior to the submission of the proposal in 1985, section 141(h) would require such participation only after the facility is authorized."

The draft further stated that, to identify and select specific geographic sites before submitting the proposal to the Congress, DOE would have to propose sites "without prior meaningful involvement" of potentially affected states, tribes, and local governments in the siting process. OCRWM believed that precluding public participation by affected groups would not be consistent with the overall spirit of the act and its orientation toward providing for state and Indian tribe participation in waste facility siting decisions. The limited time that OCRWM had to

prepare the proposal did not permit such participation, according to the Chief of the MRS Branch. Consequently, OCRWM adopted a siting approach using reference site data in preparing the proposal.

The new approach: MRS as an integral part of the program

Shortly after the release of the draft Mission Plan, OCRWM's Director, at his confirmation hearings, questioned the use of MRS solely as a repository backup. He stated that he would review the potential advantages of an integrated waste system, which would include both repositories and an MRS, in preparing both the final Mission Plan and the final MRS proposal to the Congress. On July 12, 1984, OCRWM's Director directed an internal team to evaluate potential MRS roles in a fully integrated waste program. This team was requested to present options, advantages and disadvantages, technical and economic impacts, and issues supporting an MRS role recommendation.

During the next several months, DOE's Richland office and contractors prepared various analyses of different MRS role options. One option evaluated was MRS as an integral part of a disposal system, whereby one or more MRS facilities would be constructed to perform several essential functions: receive the spent fuel from most or possibly all reactors, consolidate and package the spent fuel for disposal, and store the waste temporarily until it can be shipped to a repository. Such an MRS facility would be centrally located in relation to the greatest concentration of commercial reactors (i.e., in the Eastern United States).

By November 30, 1984, OCRWM's Office of Storage and Transportation Systems concluded that having an MRS facility as an integral part of the waste management system would enhance the safe, reliable, and timely operation of the system, and its overall goals. Further, OCRWM decided to identify candidate sites and develop site-specific designs for an integral MRS rather than using reference site types for a backup MRS as previously planned. In December 1984 OCRWM directed DOE's Richland Office to (1) identify reprogramming actions needed to develop the MRS proposal consistent with this new approach and (2) discontinue activities that will not contribute to an integrated MRS proposal. Richland modified its architect-engineering contract to accommodate the revised MRS approach and requested that the contractor prepare modified site-specific designs by October 1985. In January 1985 Richland requested over $8.9 million to prepare new site-specific facility designs for a larger facility, expedite environmental analyses of sites, accelerate a public information program, and initiate cooperative agreements with states. Richland noted that the funding requested for siting activities quite possibly ". . . will be inadequate if large public opposition is encountered."

On March 1, 1985, DOE notified the Congress of its intent to reprogram $8.9 million from the repository program to MRS to complete the congressional proposal. Two congressional committees initially objected to the proposed transfer of funds. However, after reassurances by OCRWM that the MRS study would be carefully conducted and consider a full range of scenarios and MRS options, these committees withdrew their objections to DOE's reprogramming in April 1985.

On April 25, 1985, OCRWM announced that it had identified three preferred MRS sites from 11 sites evaluated in the Eastern United States. These three sites--Clinch River Breeder Reactor site, DOE's Oak Ridge Reservation, and Hartsville Nuclear Plant site--are all federally owned sites in Tennessee. OCRWM considers Clinch River to be its preferred MRS site because this site has good access to interstate highway and rail and a technical community in the area for MRS facility support, and because DOE has a current data base on the characteristics of this site and had received preliminary NRC approval for siting another nuclear facility there (the cancelled Clinch River Breeder Reactor). To assist DOE in its evaluation of MRS, Richland has hired MRS peer reviewers--representatives of utilities, state organizations, and others--to review DOE's plans.

Potential problem areas with revised MRS approach

Several issues arise from OCRWM's revised MRS approach that may be potential sources of problems for the program and that DOE will need to address in its consideration of a final MRS proposal.

--If an MRS is sited in the Eastern United States, DOE must deal with the issue of whether spent fuel from western reactors will be shipped to an MRS in the East and then back to a repository in the West or directly to a repository. Shipment to the East would increase the costs and risks associated with waste transportation from these reactors.

--Overall costs of the MRS concept will not be defined until designs have been finalized in October 1985. Some utilities and others can be expected to challenge OCRWM's belief that an MRS integrated with a repository can realize cost savings over a system without an MRS. OTA, in its March 1985 report, stated that an approach whereby DOE would provide other storage facilities directly at reactor sites for post-1998 storage would be preferable to an MRS ". . . unless there are substantial safety and cost benefits to centralized storage." In addition, OTA believed that continued spent fuel storage at reactors

would avoid the potential complications of siting and licensing an MRS.

--Payment for an MRS, according to the act, is to be provided by those whose waste is stored in such facilities. DOE must determine how to allocate the costs of such facilities if it does not require either defense waste or spent fuel from reactors in the Western United States to be shipped to an MRS.

--State acceptance of an MRS is important since the act provides the same opportunity for state disapproval of a final site as it does for the repository program, with one important difference. The MRS proposal including a preferred site must initially be congressionally authorized. (Under the act no further congressional action is necessary to authorize a repository unless a state or tribe submits a notice of disapproval.) Thus the political confrontation on the siting of an MRS will occur during the initial congressional consideration of DOE's January 1986 proposal. Although the state of Tennessee could disapprove the selection of a site, the act provides for congressional override of this disapproval. Moreover, Tennessee would be disapproving a site the Congress as well as DOE had selected.

CONCLUSIONS

DOE's problems in complying with the act generally fall into two categories: (1) those that DOE is in the process of resolving or has the capability to resolve (e.g., ensuring consistency among the EAs and considering comments on the EAs) and (2) those that DOE cannot resolve or that will likely require congressional assistance (finalizing a consultation and cooperation agreement with Washington State and providing comparable data to evaluate sites for the first repository). In the next chapter we discuss action the Congress could take to assist DOE in finalizing consultation and cooperation agreements with states and to ensure that DOE's site selection program is not proceeding at risk.

Our review of the difficulties DOE has had in implementing the act indicate that there are underlying reasons for DOE's inability to accomplish its actions in a timely manner. We believe the problems discussed in this chapter have arisen because of the following:

--The act contains some unachievable milestones; for example, 2 months for public comment and finalization of the Mission Plan was not enough time for these tasks.

--OCRWM took additional steps not required by the act to enhance the quality of their products; for example, releasing draft EAs for public review and comment.

--OCRWM has set unrealistic schedules for task completion even when it recognized that the act's deadlines could not be met; for example, initially scheduling the publication of draft EAs for August 1984, and defining the first repository's reference schedule in the draft Mission Plan.

--OCRWM has not planned for contingencies and anticipated potential problems, for example, inconsistent interpretations of the siting guidelines, and delays in completing the Mission Plan and siting guidelines.

--The program operated without an approved strategy or set of priorities so that attention shifted to the most delayed activity; for example, the initial 1984 emphasis on finalizing the siting guidelines subsided in July 1984 because of a shift in emphasis to publishing draft EAs, the new high-priority activity.

--Three key activities--the Mission Plan, the siting guidelines, and EAs--were attempted concurrently with limited staff.

--A new OCRWM director has revised the program's strategy about how parts of the waste management system will be integrated.

--DOE has been unable to reconcile the concerns of states about the conduct of the program; for example, state delays to field testing and negotiation of a consultation and cooperation agreement with Washington state.

We anticipate that as the commercial waste program evolves, OCRWM's priorities will become better established. However, we believe that OCRWM needs to be more conservative in its estimates of what is achievable and when, given the Office's current resources. The learning process OCRWM experienced in drafting the EAs should assist DOE's planning for future assessments of second repository sites.

AGENCY AND OTHER COMMENTS

DOE, Louisiana, Mississippi, Nevada, Texas, and Utah commented on this chapter of our draft report. This section reflects their major concerns and our response, if appropriate.

Mission Plan

Utah concurred with our assessments of the importance of the Mission Plan for program accountability and oversight, and the need for DOE to resolve deficiencies noted by those who commented on the draft plan. Moreover, Utah believed the Mission Plan should be issued before key site selection decisions are

made. Utah shared the NRC's concern that the plan assure that adequate levels of information be available at each phase of repository development.

EAs

DOE disagreed with our findings concerning the reasons for delay in issuing the EAs. DOE did not believe that its scheduling has been unrealistic; rather, that setting optimistic deadlines had been intentional to expedite completion of tasks. DOE believed its effort to obtain public review and comment on the draft EAs, which the act did not require, demonstrated its commitment to quality and the consultation process, which, in the long run, will enhance the act's successful implementation. DOE stated that it could have met the act's deadlines for nomination and recommendation of sites for characterization if only final EAs were published.

Our report attributes part of the delay in issuing the draft EAs to (1) the limited guidance that OCRWM gave to the field, which caused inconsistencies in the EAs, and (2) unrealistic scheduling for such a complex effort. We do not believe that DOE's intentionally aggressive scheduling has expedited tasks; rather, that extensive comment review and revisions have been required when third parties provide critical comments on the quality of DOE's products. The comments provided by states on our report, as well as many of the over 20,000 comments DOE received on the draft EAs, indicate a high level of dissatisfaction with the supporting data and findings in the draft EAs. We believe a more conservative and better planned approach to their preparation could have reduced the drafts' inconsistencies and increased the public's confidence in DOE's decision on the sites.

Moreover, by repeatedly missing program target dates for finalization of documents such as the EAs and the Mission Plan, DOE weakens the program's credibility with the public. When DOE states that an action is expected within a certain time frame, an expectation is created with affected states, tribes, and the public. Falling short of these expectations does not create confidence in DOE's ability to carry out the nuclear waste program.

DOE also commented on our observation that some inconsistencies and optimism in the EAs could have resulted from the independence exercised by the project offices. DOE stated that this implied a "conflict of interest," and that although potential conflicts of interest may be a legitimate concern, none existed in preparing the EAs. Independent headquarters review and concurrence, according to DOE, separated the site selection decisions from possible regional or other special interests. Although this separation may have afforded some protection, in our opinion, headquarters' siting decisions were largely limited to reviewing and concurring in the five sites the field had

determined to be preferred for a repository location. Thus, the effectiveness of headquarters' review was dependent upon the data and appraisals of site suitability developed by the project offices and their contractors.

States' comments

Both Nevada and Utah believed that DOE did not successfully follow its own guidance to take a conservative approach to the EAs. Nevada stated that its review of the Yucca Mountain draft EA found that DOE did not use conservative assumptions in evaluating the site against the siting guidelines. Utah stated that DOE's decision not to drill boreholes to determine whether drilling in Canyonlands National Park would be necessary during site characterization was a costly and nonconservative decision. Verifying the need for drilling later, according to Utah, would, at a minimum, greatly delay DOE's site characterization activities and could require loss of a large investment in exploratory shafts if the Utah sites were subsequently disqualified. Texas commented that this DOE decision not to drill on the Utah sites and others regarding data collection have resulted in the EAs' primary flaw--an inability to compare sites objectively against geotechnical factors.

Utah raised a specific concern about DOE's conclusions on the safety and economy of waste transportation in the draft EAs. Because the waste transportation program will affect many states, Utah said that DOE will have to respond to a greater number of affected parties. Utah believed this increased public scrutiny of the transportation program is causing changes to DOE's assessments of transportation data. Utah also commented that the competition between project offices, as indicated by optimistic assessments of the sites, could be a serious problem later in the program since it could affect the program's integrity and public acceptance of the sites.

Louisiana agreed with our conclusion that DOE has established unrealistic program deadlines. Louisiana noted that DOE has not provided adequate time for comments on major program documents and has overestimated the program's ability to analyze and respond to comments.

Siting guidelines

DOE commented that drafting the EAs was necessary to verify the contents and specific meaning of the siting guidelines. DOE believed that we are being unfair in expecting DOE to have been able to anticipate inconsistent interpretations of the guidelines. Given the wording of specific guidelines, their role in DOE's siting process, and the comments raised by outside reviewers concerning their lack of specificity, we believe OCRWM (1) could have anticipated that their application in the EA

process would be difficult and (2) could have taken steps, as we have suggested, to minimize problems with their interpretation.

Nevada, Texas, and Utah commented on our discussion of problems with interpretations of the siting guidelines. Nevada believed that even with an agreed-upon definition of proximity to highways and railroads, DOE's Nevada project office did not correctly interpret this guideline because no current 85-mile railroad spur exists to the Yucca Mountain site as DOE assumes in the draft EA. Utah also believed that the Salt Repository Project Office used a different definition of proximate in its analysis of the Davis Canyon site so that our example of inconsistent interpretations of this siting guideline on transportation has not been resolved.

In its comments Texas said that it fully agreed with our analysis of what DOE could have done to minimize problems in interpreting the guidelines. Texas believed DOE's guideline process was highly unsatisfactory and severely flawed, particularly because the lack of specificity in the guidelines allowed DOE to make interpretations of the guidelines without consulting with affected parties. Texas believed that DOE tried to make the guidelines fit the information known about the sites rather than develop an objective set of screening standards.

Consultation and cooperation agreements

Utah agreed with our analysis of problems with consultation and cooperation between DOE and affected states and Indian tribes. Utah added that it foresees an increased risk of state disapproval of a repository site recommendation if affected parties do not have early substantive involvement in repository program decisions. Even more important to Utah than a formal consultation and cooperation agreement would be agreement on what consultation and cooperation means in the absence of an agreement. Utah also believes that the liability issue would not be the sole impediment to a formal agreement with Washington and that, although a formal agreement would clearly expedite the program, achieving the objectives of consultation and cooperation would be more important to the program's long-term success.

Nevada stated that our report did not address the adequacy of DOE's involvement with states and tribes. Mississippi stated that our report implied that states and tribes are inhibiting the program's progress. Many concerns of states and other parties have been caused by DOE's failure to define the term "consultation and cooperation," according to Mississippi. In addition to consultation and cooperation agreements, Mississippi believed the requirements of section 117 of the act for DOE to provide information to states and affected Indian tribes are important and that DOE has not complied with these requirements.

MRS

Texas noted that DOE changed its entire approach to MRS without any consultation with affected states and tribes. Texas did not believe DOE has made a convincing case that all MRS sites for congressional consideration should be in Tennessee.

CHAPTER 4

GAO OBSERVATIONS ON AREAS FOR FUTURE CONGRESSIONAL OR AGENCY CONSIDERATION

The Nuclear Waste Policy Act represents the culmination of years of national debate and congressional deliberation on the problems of civilian radioactive waste disposal. It also is generally recognized as "compromise" legislation and contains language that has led to different interpretations of the act's requirements. The act also makes certain assumptions about how activities are to be timed or sequenced. Our evaluation of the issues addressed in this report indicates that in some areas, DOE will probably require congressional direction before it will take steps we believe are necessary to avoid additional program costs, delays, and potential litigation. This chapter highlights three areas where congressional direction or DOE action may be warranted:

--To provide more information to the Congress for its oversight of the program when schedules established in the Mission Plan are missed--We believe the Congress should have as much information as possible on the reasons for deviations from program schedules.

--To consider increasing the liability and indemnification limits in the Price-Anderson Act for a nuclear waste accident--We believe adequate protection should be provided to alleviate states' concerns if the Congress decides to extend certain provisions of this act.

--To determine whether DOE's approach to siting the first repository is likely to result in alternative suitable sites for final consideration--We believe that it may be appropriate to consider alternative siting approaches, which could provide greater assurance that alternative sites would be available, in the event DOE's final recommended site is not acceptable to states.

In addition, this chapter discusses the trade-offs involved in DOE's current siting approach for the first repository. It also addresses a factor that we believe should be incorporated into DOE's plans for an MRS: planning for how an MRS program would operate within OCRWM so as not to impede progress with the repository.

DOE SHOULD KEEP THE CONGRESS BETTER INFORMED OF DEVIATIONS FROM PROGRAM SCHEDULES

DOE's waste management program is experiencing delays and, as a result, DOE has missed several key statutory deadlines contained

in the act. However, the Department has not consistently informed the Congress of these delays. DOE believes that its efforts to brief committees or congressional staff informally on program schedules have provided adequate notification of delays. We believe the Mission Plan would provide an appropriate vehicle for DOE to begin accounting for changes to its schedules.

DOE has not consistently given the Congress a full accounting of program delays

Since the establishment of the nuclear waste management program, DOE has not consistently provided the Congress with what we consider to be a full and detailed accounting of actual or expected delays in meeting statutory requirements by means of formal, written statements. In most cases, DOE has eventually provided some formal notification of program delays, but for the most part, this notification has not supplied a full, detailed explanation of the causes and consequences of these delays, and has been provided only after the statutory deadline was missed or a considerable time after DOE had acknowledged in its program planning process that the milestone would be missed. For example, late or incomplete notification was given to the Congress when statutory deadlines were missed for

--issuing the final Mission Plan (The final plan was due June 7, 1984; the Congress was formally notified of the missed deadline on July 20, 1984.);

--issuing final repository siting guidelines (Final guidelines were due July 7, 1983; the Congress was notified of delay on June 30, 1983. Although the final guidelines were not issued until December 1984, no other formal explanations were provided to the Congress.);

--reporting on delays in completion of a consultation and cooperation agreement with Washington State (The act required congressional notification by January 30, 1984; the Congress was notified on September 26, 1984.); and

--reporting on alternative management and financing mechanisms for the program. (A report was due January 7, 1984; the Congress was notified February 27, 1984, that the deadline had been missed.)

In the Mission Plan, DOE acknowledges the potential for further schedule delays. It states that DOE will continue to examine its program plans and assumptions and will revise the Mission Plan's reference repository schedule as necessary. The following table indicates some specific future statutory requirements that DOE has noted will not be on time:

Table 4.1

Comparison of Activities Required by Nuclear Waste Policy Act and DOE Plans

Statutory requirement	NWPA date required	Date projected in April 1984 draft Mission Plan	Date projected in final Mission Plan
President submits to the Congress a site recommendation for construction of first repository	3/31/87	6/90	3/91
President submits to the Congress a site recommendation for construction of a second repository	3/31/90	10/95	3/98

Thus, DOE may miss future program deadlines and periodically revise its repository schedules as new obstacles arise. In order for the Congress to effectively conduct its oversight activities, we believe DOE must provide a full accounting of schedule delays to the Congress.

The act already requires OCRWM to submit an annual report to the Congress. This report may not provide the opportunity for timely notification of schedule delays, but it would provide a vehicle for DOE to address any substantial changes that occur in the program, such as a change in policy or strategy for a key program area. To inform the Congress of schedule delays, a report similar to that required of other federal agencies under the act would seem more appropriate. The act contains a provision that clearly indicates both the Congress' concern with meeting program milestones and the desire to be kept informed of deviations from program schedules. Section 114(e) requires DOE to prepare a "project decision schedule" that will demonstrate the optimum way to attain operation of a repository within the time periods the act specifies. The project decision schedule is to include a description of objectives and a sequence of deadlines for all federal agencies involved. The schedule would also identify activities that, if delayed, will cause a delay in the beginning of repository operation. The act further states that any federal agency that determines that it cannot comply or fails to comply with any deadline in the schedule must submit a written report to DOE and to the Congress explaining

--the reason for failure or expected failure to meet the deadline,

--the estimated time for completion of the activity involved,

--the associated effect on other deadlines in the project decision schedule, and

--any recommendations for actions to mitigate delays.

Although this provision requires other agencies to report delays to DOE and the Congress, DOE has no plans to make similar reports of its own delays.

We believe such formal notification would (1) ensure that the Congress is aware of any deviations from the schedule that may threaten achievement of the program's goals and (2) give the Congress the opportunity and the necessary information to effectively fulfill its responsibilities for oversight of DOE's waste management activities. We believe DOE should be no less accountable for its waste management activities than other federal agencies are and, therefore, should be bound by at least comparable reporting requirements.

THE CONGRESS SHOULD CONSIDER INCREASING THE LIABILITY LIMITS OF THE PRICE-ANDERSON ACT

States' negotiations of consultation and cooperation agreements with DOE could be facilitated if DOE could assure them that the federal government would ensure payment for damages from any incident involving the highly radioactive waste. Currently, DOE can only provide assurances of up to $500 million as provided in the Price-Anderson Act. This limitation has already impeded finalization of an agreement with Washington State and is likely to affect other negotiations. Officials from the five states that have yet to begin negotiating these agreements (Louisiana, Mississippi, Nevada, Texas, and Utah) have stated that they agree with the state of Washington's position on this issue. Their concern is that a waste accident might result in damages greater than $500 million. Consequently, the issue must be resolved before these states will negotiate consultation and cooperation agreements with DOE. Moreover, Texas officials have told us that DOE will not be allowed to perform any site characterization work in the state until a consultation and cooperation agreement is finalized. Thus, the liability issue could potentially delay initiation of DOE's site-testing program for the first repository.

The Secretary of Energy has supported amendment of the Price-Anderson Act to extend his authorities under the act beyond 1987 and raise the dollar limits on liability and indemnification for DOE's contractors. In addition to these changes in the Price-Anderson Act's basic liability provisions, the Secretary has recommended that the Congress include high-level radioactive waste

facilities in the act's special provision for an "extraordinary nuclear occurrence," which would afford special benefits to claimants, including consolidation of all litigation into one lawsuit and no requirement that a party prove negligence on the part of the government. The Congress is currently considering proposed legislation to modify the Price-Anderson Act.

Although we did not fully examine the merits of extending DOE's authorities under the Price-Anderson Act beyond 1987, we believe that the issue of liability and indemnification for an incident involving nuclear waste cannot be resolved administratively by DOE. The Congress will need to address this issue. Moreover, since the Price-Anderson Act is subject to reauthorization in the next congressional session, modifying it rather than the Nuclear Waste Policy Act (which is not subject to reauthorization) could provide more timely and direct resolution of the issue. In addition, we believe amendment of the Price-Anderson Act would provide more timely resolution than would consideration of new legislation to deal with the liability issue.

We believe that the Congress needs to consider an increase in the amount of liability and indemnification, if the act is extended, on the basis of (1) our previous reports on this issue, (2) the origin of the liability provision, (3) DOE's and NRC's experience with claims since 1957, and (4) the inequity in protection for waste activities currently available under the Price-Anderson Act.

Provisions of the Price-Anderson Act and our previous reports

The Price-Anderson Act, as amended, provides financial protection for both commercial licensees (such as nuclear power plant operators) and government contractors. However, this act established separate financial limits on the liability for nuclear accidents involving these parties. The aggregate liability for a single nuclear accident involving commercial activities, licensed by NRC, is limited to an amount equal to the total funds available through the insurance pools established under the act ($635 million as of July 31, 1985).[1] Commercial licensees found liable for an accident are indemnified first from a $160 million pool, which consists of commitments from insurance companies, and then from the remaining pool of $5 million premium per reactor to be paid by each licensed nuclear utility if claims exceed $160 million. The act's liability limitation for DOE's contractors who operate or construct DOE nuclear facilities is less under Price-Anderson--$500 million. The act provides that DOE, using appropriated funds, will indemnify its contractors.

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[1]This limit will continue to increase in increments of $5 million for each new nuclear reactor licensed to operate. The addition of reactors currently under construction could raise the $635 million ceiling to about $850 million by 1990.

We have issued several previous reports on the Price-Anderson Act, two of which specifically address the liability provisions of the act. In a 1980 report[2] we examined the basis for the limitation the act places on liability of commercial licensees and concluded that the act should be retained in its basic form but that its liability provisions should be revised. Our report found that the Price-Anderson Act was intended to encourage the commercial development of nuclear power and to compensate the victims of nuclear accidents, and that the act was fulfilling these two objectives. Although the act provided a reasonable mechanism for compensating victims of a nuclear accident, we found that the limit on liability was an arbitrary figure, may not cover most contingencies, and should be realistically defined.

In 1981[3] we examined how Price-Anderson governs DOE's contractors. We found that the Price-Anderson Act protected about 75 DOE prime contractors and many thousands of subcontractors working at DOE facilities, as well as others who might cause a nuclear accident. The report concluded that alternative methods of insuring the public against the hazards of a nuclear accident would not provide as much financial protection as the Price-Anderson Act. We believed that the protection provided by this act should be continued, but that certain provisions in the act should be changed to provide better public protection from catastrophic nuclear accidents. We recommended that the Congress provide consistent financial protection for DOE contractors and commercial licensees by amending the Price-Anderson Act and increasing the protection for DOE contractor activities. We also recommended that the Congress reexamine the act's liability limit to determine whether a new limit or a periodic readjustment to the limit is needed.

History of and experience with Price-Anderson Act supports revising the limit on liability

In our 1980 report we found that when the Congress enacted the Price-Anderson Act in 1957, it established what was then the $560 million limit on liability on the basis of the funds to be made available from the federal government and nuclear insurance companies. The Congress was willing to commit itself to making $500 million available because this amount would not significantly disturb the federal budget. (It was 0.65 percent of the 1957 budget.) Nuclear insurance companies as a group agreed to provide $60 million in liability coverage. The act's liability limit was set at $560 million; however, estimates of the cost of a catastrophic nuclear accident were up to $7 billion. Thus, the

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[2]EMD-80-80, Aug. 18, 1980.

[3]EMD-81-111, Sept. 14, 1981.

limit on liability was not developed on the basis of estimates of the costs of a nuclear accident, but rather was an arbitrary figure based on budgetary considerations.

In 1975 the Congress extended the Price-Anderson Act through August 1, 1987, and amended it so that the government's share of protection for commercial licensees ($500 million) would be phased out as more nuclear reactors are licensed to operate. In November 1982 the available protection from utility premiums and the insurance companies' group reached the act's limit of $560 million and the government's (NRC's) indemnity ended. (Certain guarantees such as waiver of defenses are still available.) The liability limitation of DOE contractors remains as it was originally set ($500 million). However, the act, as amended, states that the Congress will consider the need to provide additional assistance in the event an accident results in damages that exceed the funds otherwise available.[4]

To date, claims for incidents involving nuclear material have not approached the limit on liability. DOE estimates that the government has paid only $270,000 in claims against DOE's contractors and subcontractors. According to NRC, up until June 30, 1984, losses paid by the insurance industry totaled approximately $34 million, with 90 percent of this total resulting from the Three Mile Island accident.[5] According to a DOE fact sheet on this issue provided to states, ". . . no evidence to date has shown that the total amount of claims in a nuclear accident will exceed the monetary liability ceiling for payments." Nevertheless, both the Secretary and NRC have supported increasing their respective liability limits. DOE believes, however, that ". . . in light of the excellent experience with the operation of DOE's nuclear facilities to date, . . ." expanding the Price-Anderson Act's coverage by removing the liability ceiling altogether, as some pending legislation has proposed, is unwarranted.[6]

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[4]42 U.S.C. 2210(e).

[5]The Three Mile Island accident occurred in March 1979 at a nuclear power plant near Middletown, Pennsylvania, when radioactive gases were released from the plant. Claims were paid for the living expenses and lost wages of those who evacuated the area of the accident, business losses, and attorneys' fees and expenses. Since June 1984 one additional settlement has been reached; however, the courts have not disclosed the total amount of this award.

[6]Testimony on Extension of the Price-Anderson Act by Shelby T. Brewer, Assistant Secretary for Nuclear Energy, DOE, Before the House Subcommittee on Energy and the Environment, Committee on Interior and Insular Affairs, June 11, 1984.

Current protection for a waste accident differs for transportation to and activities at a DOE waste facility

As discussed earlier, the Price-Anderson Act, as amended, established different liability and indemnification limits for incidents occurring at NRC-licensed commercial facilities and DOE facilities. This same disparity extends to the transportation of nuclear waste. The amount of compensation available to the public in states and local communities is greater if an accident occurs while waste is being transported through an area than if it occurs during storage at a DOE interim or permanent facility. This inequity occurs because, as shown in figure 4.1, under the terms of DOE's waste contracts with the utilities, waste shipped from a licensed reactor site to the initial DOE waste facility would be NRC-indemnified at the $635-million-plus limit, but waste handled or stored at a DOE facility or transported between DOE facilities would be indemnified at the $500-million-plus limit.[7] The current Price-Anderson liability provisions, therefore, offer a a greater dollar value of potential compensation to a state or community through which waste is initially shipped than a community where an MRS facility or repository might be constructed. As we noted in our 1981 report on the Price-Anderson Act,

> "In our opinion, it is difficult to justify two different levels of public financial protection from catastrophic nuclear accidents depending upon such an artificial distinction as whether a nuclear accident occurs at a licensed commercial activity or a government-contractor [DOE] operation."

Effect of expiration of the Price-Anderson Act on liability for a waste accident

If the Price-Anderson Act's indemnification authority is not extended beyond 1987 and some other legislative protection is not afforded by the Congress, many state or local communities would no longer be assured of substantial protection in the event of certain waste accidents. Others would, however, have this protection because even if the government's indemnification authority under the act expires, nuclear power plants would continue to be eligible for indemnification from the insurance pools. These plants would be protected for the life of their respective operating licenses. However, DOE's authority to

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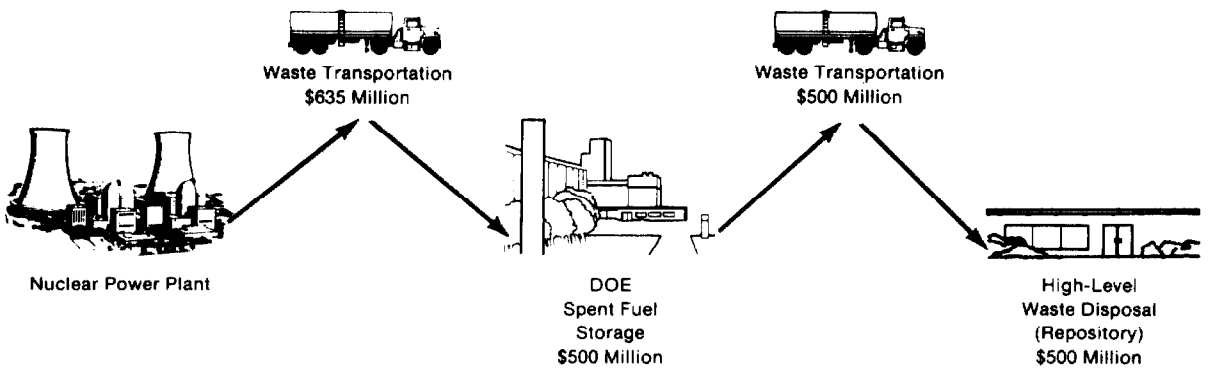
[7]Our analysis assumes that NRC would not exercise the discretion provided under the Price-Anderson Act to indemnify an MRS facility or repository at the higher limit. To date, NRC has not extended this protection to other long-term storage facilities.

indemnify its new contractors, including those contractors who would build and/or operate DOE waste facilities, would expire. Without DOE's indemnification, persons (including contractors) found liable for accidents at DOE waste facilities might be forced to pay damages using their own financial resources. This might subject these companies to potentially bankrupting liability in the event of a catastrophic accident. Thus, expiration of the authorities in the Price-Anderson Act could create a scenario where an accident at or during waste transportation from a nuclear power plant would remain indemnified at more than $635 million, but accidents associated with storage activities, including transportation from an MRS facility, would not be indemnified. (See fig. 4.2.)

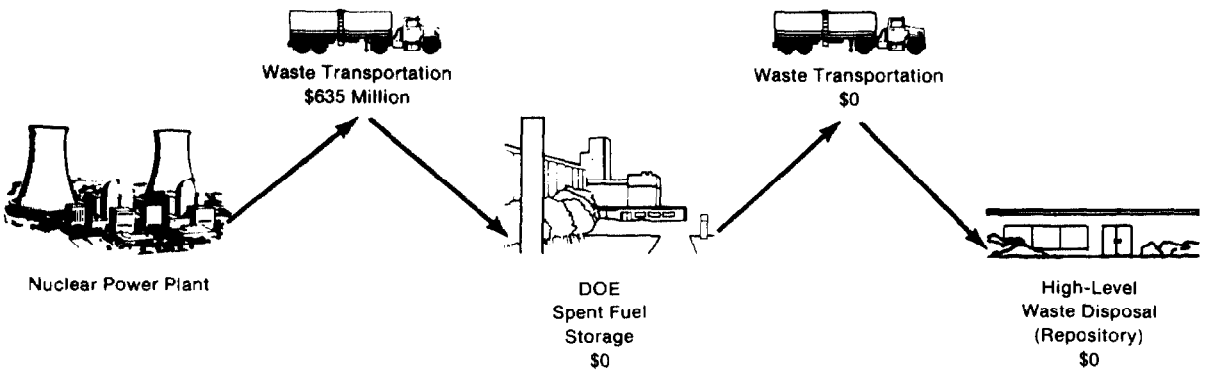
Figure 4.1
Protection Currently Afforded Public in the Event of a Nuclear Waste Accident Under the Price-Anderson Act



Without the Price-Anderson Act or some other congressional action, according to DOE's Office of General Counsel, the Department's options are limited: (1) DOE may be able to obtain appropriated funds to reimburse contractors or (2) DOE could require the repository operator to purchase private insurance, which DOE would pay for as a cost of the program. At a minimum the Department expects the Congress to continue the Price-Anderson Act's protection for its contractors. According to DOE this protection is

". . . indispensable to the conduct of DOE's nuclear weapons, production, and research and development programs . . . . If this statutory authority were permitted to expire, the Department could well be faced with a sharp programmatic crisis unless an equivalent protective system of coverage was available to replace it."[8]

Figure 4.2
Compensation That Would Be Available to the Public in the Event of a Nuclear Waste Accident Without the Price-Anderson Act



Waste facilities were not part of Congress' 1957 consideration in determining the need for the Price-Anderson legislation. However, we believe government indemnification is now critical to public acceptance of high-level radioactive waste disposal, since it affords congressional assurances that victims of a waste accident will be compensated. In addition, since without Price-Anderson DOE could have to pay the costs of liability insurance as a program cost, the program's funding from utilities might have to be increased to cover this expense. Thus, the absence of Price-Anderson protection could have implications for the adequacy of the nuclear waste program's funding.

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[8]DOE, The Price-Anderson Act, Report to the Congress as required by Section 170p. of the Atomic Energy Act of 1954, as amended, Aug. 1, 1983.

In our past work we have supported revising the Price-Anderson Act's limit of liability by reassessing the government's indemnity. In 1980 we recommended that NRC define a more realistic limit on liability. We have not attempted to identify here either the appropriate type or level of limits for the Price-Anderson Act, if extended. However, in a December 1983 report[9] NRC outlined three alternative proposals for increasing the present liability limit:

--adjusting the original $560 million for inflation (or about $2.1 billion in 1985),

--applying the 1957 percentage share (0.65 percent) to the current federal budget ($6 billion in 1985); or

--establishing an annual limit on the insurance funds that would have to be collected and expended, but no absolute limit for any one accident.

NRC concluded that an annual limitation was the best approach in order to minimize both uncompensated losses to victims of an accident and additional federal contributions. DOE has not taken a position on NRC's recommendation, but favors continuing the current system of contractor indemnification with some ceiling on liability.

DOE SHOULD CONSIDER ALTERNATIVE APPROACHES TO SITING THE FIRST REPOSITORY TO ENSURE ITS TIMELY COMPLETION

A major issue that may affect DOE's plans for site characterization, following its planned recommendation of sites in late 1985, is how many alternative suitable sites the Secretary should consider in recommending a first repository site. DOE believes that after detailed geologic testing (site characterization) of three sites, the Secretary may recommend a site for the repository even if the site is the only one found suitable for a repository. However, this position has been questioned by some NRC commissioners, the states, and the Yakima Indians. If DOE's position is not correct, the first repository program could face major delays in its completion. For example, in its March 1985 report,[10] OTA estimated that the program could be delayed by 4 or more years if DOE's interpretation is not upheld by the courts and additional sites must be characterized.

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[9]NRC, The Price-Anderson Act--The Third Decade, Report to the Congress, Dec. 1983.

[10]OTA, Managing the Nation's Commercial High-Level Radioactive Waste, Mar. 17, 1985.

OCRWM believes that a delay of more than 5 years would occur in this situation.

We believe there are practical and technical reasons why DOE should try to maximize the number of suitable sites. DOE is counting on its final recommended site's being acceptable to a state or Indian tribe. This acceptance is critical to DOE's program since the act also provides authority for a state or affected Indian tribe to disapprove the final recommended site. DOE officials have stated that they do not believe the Congress would override a state's (or tribe's) disapproval. If the Congress does not override this disapproval, it would become binding. If this occurs, DOE could be faced with starting the selection process over again if more than one suitable site is not found after detailed site testing. In addition, DOE could encounter technical problems before completing characterization and selecting a final repository site, which would also cause delays.

We have identified three alternative approaches to siting the first repository. DOE would have to weigh the expense and additional delays of these alternatives against the risks of potential litigation and delays under its current approach if the final recommended site is disapproved by a state or affected Indian tribe.

DOE's present site characterization approach

DOE plans to nominate five sites in the fall of 1985 and shortly thereafter recommend three sites for site characterization. Because of the almost simultaneous timing of the nomination and recommendation decision, DOE will rely on the same information in both nominating the five sites and then recommending three for site characterization. Thus, until detailed site testing is completed in about 1990, DOE will place heavy reliance on preliminary indicators of a site's suitability as provided in the EAs.

DOE has issued several formal statements on its interpretation of section 114(f)[11] and its requirements for characterization. These statements show that DOE (1) plans to

[11]Section 114(f) requires the Secretary to prepare an environmental impact statement to accompany any final recommendation of a site for a repository. In the environmental impact statement ". . . the Secretary shall consider as alternate sites for the first repository to be developed under this subtitle 3 candidate sites with respect to which (1) site characterization has been completed under section 113 and (2) the Secretary has made a preliminary determination that such sites are suitable for development as repositories consistent with the guidelines promulgated under section 112(a)."

make its preliminary determination of suitability before any detailed testing is done at the sites and (2) believes only one suitable site must result from characterization. In both its April 1984 draft and the final Mission Plan, DOE stated that the Secretary would make preliminary findings of the suitability of three sites for a repository at the time a site is nominated and recommended for site characterization.[12] If a site was later found unsuitable, DOE believed it could proceed with a recommendation of one of the two remaining sites. Likewise, in an April 1984 letter to the Chairman, Subcommittee on Energy Conservation and Power, House Committee on Energy and Commerce, the Acting Director, OCRWM, generally repeated this interpretation of the act (section 114(f)).

Some NRC commissioners, OTA, the states of Mississippi, Texas, and Washington, and the Yakima Indians have questioned DOE's interpretation of section 114(f) of the act, which addresses what the final environmental impact statement accompanying the site recommendation must contain. Most of these parties believe that under section 114(f) the Secretary may recommend a site for the repository only if the recommended site is one of three sites found suitable on the basis of site characterization activities.

DOE's approach puts the program at some risk by relying on one suitable site to be recommended by the President and accepted by a state or affected Indian tribe for a repository. It very likely will be subjected to litigation by those who believe the act requires DOE to have three suitable sites from which the President could choose in recommending a repository location (i.e., no "unsuitable" sites could be included in the three).

Planned testing program could result in no backup sites

DOE's site selection approach has risks since during site characterization, OCRWM plans to collect the detailed site-specific geologic and hydrologic data pertinent to the performance of a site. A major part of the activities planned include drilling or mining two exploratory shafts to conduct tests and collect data underground at the repository depths of 1,000 to 4,000 feet. Concurrent with the tests in the exploratory shafts, OCRWM plans to conduct surface tests, which will include the drilling of boreholes for geohydrologic investigations, surveying groundwater conditions, and measuring seismic activity. At the same time DOE will also be collecting nongeohydrologic data on

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[12] In June 1984 the Director of OCRWM agreed with NRC to change the timing of this finding of suitability to after site characterization. However, OCRWM now plans to make this finding in the fall of 1985, following the recommendation of three sites to the President but prior to actual characterization.

environmental, archaeological, cultural and historical resources, population density and distribution, transportation, and the economic conditions in the area to be affected by the repository.

Because most of the surface and underground site-specific information for three recommended sites (the President's recommendation is expected in early 1986) will not be gathered until site characterization--expected to begin in 1986 and end in 1990--DOE risks finding a problem late in the program that would disqualify a site from further consideration. This would leave the Department with fewer suitable sites to fall back on if the recommended site is not approved. The types of problems DOE could encounter include the following:

--Sites that are thought to be favorable may turn out to be unsuitable on closer, site-specific, surface examination.

--A site or design may be judged to be unacceptable on the basis of information obtained after a shaft has been sunk, underground passage-ways excavated, and the detailed geology at repository depth examined.

--Sites that are thought to be suitable on the basis of detailed testing may turn out to be unacceptable to state and local authorities or unlicensable by NRC because of a different evaluation of the technical information and DOE's modeling. DOE has estimated in its Mission Plan that if NRC requires additional information or rejects the site, the program's schedule could be delayed up to 7 years.

Consequently, an alternative approach to site selection may be necessary to minimize the potential for future disqualification of a site and to provide backup sites for the President's final recommendation.

We believe there are some very practical reasons why DOE should maximize the number of suitable sites. Without any backup sites DOE places the whole program at risk should the President or a state or Indian tribe refuse to accept the DOE-recommended site. Section 114(a)(3) requires the President to recommend a second site for the first repository within 1 year of a state or tribal disapproval of the first recommended location. It would be practically impossible to do this without a backup site available.

We believe it would be prudent for DOE to have backup sites available. The act does not limit the Secretary's site characterization authority to only three sites. In fact, section 112(d) specifically authorizes the Secretary to continue to screen candidate sites after the President's recommendation of three sites for characterization.

Alternative testing and site characterization approaches

Although DOE's planned procedures may be adequate to identify one suitable site for a repository, a more conservative approach might be necessary to have more than one site available. We have identified three such alternatives available to DOE to maximize the number of suitable repository sites. Each has its advantages and disadvantages in terms of cost, time, and providing additional assurances that more than one site would be available at the end of site characterization. However, we believe DOE may not be willing to consider other siting approaches at this stage of the program without congressional direction to do so. These alternatives are as follows:

1. Perform additional surface testing on three or more sites prior to selecting three sites for site characterization.

2. Proceed with testing as planned but characterize more than three sites.

3. Perform surface testing before selecting sites for site characterization, and characterize more than three sites.

A comparison of the pros and cons of these alternatives and DOE's plan is contained in table 4.2.

In the first alternative, DOE would attempt to determine the suitability of a site prior to drilling the exploratory shaft but after more testing than is currently planned. Such a determination would be based primarily on completing biological, physical, and socioeconomic baseline surveys, and testing from additional boreholes at the site to judge subsurface conditions. After the selection of three sites, DOE would drill the exploratory shaft and perform underground testing to confirm the results of the surface testing and resolve questions on any areas that could not be completely characterized from surface studies. Prior to the act, a similar alternative was described in DOE's EA accompanying the draft siting plan.[13]

The primary advantage of this alternative is that it provides better information for site-screening decisions. Thus, it allows DOE to maximize the number of suitable sites in the event a site has to be eliminated later for technical or other reasons. This alternative also avoids the risk of DOE's spending millions of dollars on an exploratory shaft and later finding such a site to

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[13]DOE, Environmental Assessment of Implementing the National Plan for Siting High-Level Radioactive Waste Repositories, Draft, (DOE/EA-151, Feb. 1982).

be unsuitable, if surface testing could reveal the problems. The major disadvantage of this alternative is the additional cost and time, since the additional surface testing could be required on more sites prior to, rather than concurrent with, tests in the exploratory shafts. DOE's Mission Plan, in a similar example, estimated that acquiring additional data to support its site recommendations could delay the program by 1 year. Another disadvantage DOE raised in its earlier consideration of this alternative is that testing itself would have more environmental effects such as air quality and noise disturbance, since more sites would initially be involved.

The second alternative to DOE's approach would help to maximize the number of suitable sites the Secretary has to choose from following site characterization by increasing the number of sites characterized. It would be a costly alternative since DOE estimates that site characterization activities will cost from $500 million to $1 billion per site, depending on the geologic media. Because additional permits would be required for testing at more sites, some work could be delayed. DOE has estimated that permitting delays could add 9 months to the repository schedule. Since site characterization activities would be done concurrently at all sites, however, it is unlikely that the program's overall schedule would be seriously affected once initial plans for testing additional sites are completed.

The third alternative is the most conservative approach and the most costly in terms of time and expenditures. It would involve (1) additional surface testing at three or more sites, prior to the selection of more than three sites for characterization and (2) the costs mentioned in both prior alternatives. Since the decision on these sites would be delayed, this alternative has the same potential to delay the program as both of the other alternatives.

Although we did not attempt to measure the additional cost or time required to perform the surface testing discussed in alternatives one and three, the following is an indication of the potential magnitude of such costs and delays. In December 1983 NRC issued its technical position on the type of surface testing DOE must perform to characterize groundwater flow at the basalt site. According to NRC's estimates, the cost of the surface testing and drilling 10 new boreholes at Hanford would be between $3 million and $10 million, exclusive of administrative overhead. NRC also roughly estimated that the additional time for performing the necessary tests would be between 1 and 2 years. DOE's experience, on the other hand, has been that 3 to 4 years is required to conduct necessary planning, engineering, data collections, and evaluation, and that the costs of such a program are about $1 million per borehole.

If DOE takes the more conservative approaches (alternatives two and three) and characterizes more than the planned three

sites, costs become dramatically higher. For example, the cost of site characterization, including drilling the exploratory shafts and the subsurface testing, is about $870 million for the Texas salt site. Thus, on the basis of the estimated costs for the Texas site, if more salt sites are characterized, the program's costs could increase by about $870 million per additional site.

In its March 1985 report, OTA proposed a plan for implementing the act that emphasizes the importance of minimizing the risk of major programmatic delays. OTA believes a siting program that (1) characterizes four sites for each repository, rather than three, and (2) recommends two sites for a construction authorization, rather than one, ". . . significantly increases the likelihood of meeting the 1998 deadline for initial [repository] operation." OTA considers the higher initial costs of such an approach as ". . . insurance for a program that cannot afford any major failures or delays."[14] OTA believes that the increased cost of characterizing four sites while increasing program costs by up to several percent over the next 4 years could reduce total costs in the long run by reducing or avoiding costly delays.

Our assessment of the alternatives

Although we recognize that any of these alternatives would involve more costs to the program and more time, they also would provide greater assurance that alternative sites would be found after site characterization. Moreover, the additional costs and time may be beneficial to the second repository program because if more than one suitable site is identified, the additional sites can be considered for the second repository.[15] In this way, they could reduce the costs and the time needed to develop the second repository. On the other hand, the alternatives may be unnecessary if DOE's present approach, while entailing greater risk, identifies more than one suitable site. At a minimum, we believe DOE should have contingency plans to characterize an additional site or sites if a problem develops at one of its three recommended sites.

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[14]OTA, Summary, Mar. 17, 1985, p. 22.

[15]There is one condition that could limit the benefits of additional testing for the second repository. Section 112(b)(1)(C) of the act provides that a site that is nominated for site characterization, but not recommended, cannot be nominated for the second repository. Thus, a site characterized could be considered, but one where surface testing indicates the site to be less desirable so that the site is not recommended for characterization, could not.

Table 4.2

Alternative Approaches to Site Characterization

DOE Siting Approach	Alternative 1	Alternative 2	Alternative 3
Nominate by fall 1985-characterize three sites	Additional testing prior to recommendation	Characterize more than three sites	Additional testing and characterize more than three sites
Pros			
Originally keyed to statutory date 1/1/85 More economical approach	Provides more site-specific data to make comparison between sites, which could provide greater confidence site would be suitable after characterization Possibly less risk of successful judicial challenges	Could provide alternative site(s) in event of veto	Most conservative approach Provides hard data to make comparisons Could provide alternative sites in event of veto
Cons			
Already missed 1/1/85 date Risk disqualifying sites during characterization Increased probability of legal challenges on DOE's interpretation of section 114(f) Decisions based on little site specific data in some instances May not be prepared for backup site resulting in delays and increased costs if original recommendation vetoed Under criticism from some NRC commissioners, states, and tribes	Could delay act's dates for siting decisions by up to 2 years Costs increase May be unnecessary if suitable site(s) likely from characterization May require additional permits from states	Costs increase significantly (although second repository site could benefit from results) Would require additional planning, permits, and delays of more than 2 years Criticized by Utah and Mississippi	Lengthens program Greatest additional costs Would require additional permits from states Characterization of additional sites criticized by Utah and Mississippi

According to the Deputy Associate Director, OCRWM's Office of Geologic Repositories, DOE has not formally considered any different approaches to testing or site characterization. Policy discussions have been limited to consideration of (1) how many EAs to publish in draft, (2) whether the site recommendations should be made separate from the EAs, and (3) whether more than three sites should be recommended to ensure that three are suitable after characterization. He said that DOE is not laying out its program to ensure that more than one suitable site is found for a repository. However, DOE expects that all three of the sites it proposes to recommend--Nevada, Texas, and Washington--will be found suitable. DOE's Office of General Counsel believes that even if DOE characterizes 10 sites, there is no guarantee that three would be found suitable. Moreover, the Deputy Associate Director, OCRWM, believes that there are enough data available to support nomination and recommendation now, so additional testing is not needed. OCRWM believes that by laying its strategy out in the Mission Plan, the Congress will have an opportunity to change the program's plan if it disagrees.

Given the implications of DOE's current approach to site characterization, namely the possibility that a selected state or affected Indian tribe would (1) sue the Department over its interpretation of section 114(f) if alternative sites are not available or (2) ultimately disapprove its selection, we believe DOE should give greater consideration to planning its program so that alternative sites are available. Proceeding without contingency plans risks having to restart the selection process in 1991 in the event of a state veto that is not overridden by the Congress. OTA has estimated that a delay of as much as 10 years could occur if the recommended site is rejected and characterization of backup sites has not begun.

PLANNING FOR MRS SHOULD CONSIDER ADDITIONAL FACTORS

The MRS proposal OCRWM is preparing for the Congress will be used as the basis for any congressional authorization to construct these facilities. To provide a complete and workable option to the Congress, we believe DOE's plans for an MRS should consider how an MRS project would operate within OCRWM so as not to impede progress of the repository program. Because segments of DOE's MRS proposal are still evolving, OCRWM has been unable to assure us that its planning is adequately considering these factors.

MRS should be planned so as not to impede progress of the repository program

Our review of the legislative history of the act, particularly congressional committees' reports on bills that preceded the act, indicates that there was some concern that the construction of an MRS facility might divert financial, program

staff, and technical resources from the completion of a repository, and thereby result in its delay. The act itself states

> ". . . disposal of high-level radioactive waste and spent nuclear fuel in a repository developed under this Act should proceed regardless of any construction of a monitored retrievable storage facility . . . ."

To help ensure that such diversions do not occur, we believe that if DOE proceeds with an MRS, DOE should plan the MRS program to operate within OCRWM so as not to impede progress of the repository program.

The construction of both repositories and MRS facilities clearly will require greater financial resources than would the construction of only repositories. The act envisions that the funding for both repositories and MRS facilities would be provided from the Nuclear Waste Fund (sec. 302(d)). Currently, however, the Department's estimates of costs of over $21 billion for the program do not include construction of integrated MRS facilities. DOE estimates that an integrated MRS could add $500 million to $700 million to total program costs.

An August 1984 study by the Congressional Budget Office (CBO)[16] noted that construction of an MRS facility to provide backup storage for spent nuclear fuel would result in higher overall program costs. CBO estimated total MRS costs in a range from about $710 million to nearly $6 billion (in 1983 dollars) at a time when DOE's estimated costs for a backup MRS facility were $600 million to $1 billion. The actual increase in program costs would depend on many factors (i.e., the extent of the delay in repository operation, the capacity of the MRS, the MRS storage method used, the length of MRS operation, and the overall growth rate of the nuclear industry).

Both DOE's and CBO's estimates indicate that construction of both repositories and MRS facilities will require additional financial resources. DOE's February 1985 analysis of the adequacy of the fee for financing the program concluded that although no increase is required at this time, with very gradual real cost increases or continuing inflation, the fee will have to be increased. Without some increase in the fee, the potential exists for inadequate funding to adversely affect one or both programs. However, the act provides for the Secretary to propose an

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[16]CBO, Nuclear Waste Disposal: Achieving Adequate Financing, Aug. 1984.

adjustment to the fee to ensure full cost recovery in the program.[17]

Even with sufficient funding to cover construction of both repositories and MRS facilities, there is potential for diversion of program staff and technical resources from the repository program to support MRS activities on the basis of (1) past program practices and (2) similarities between the two projects. Our review of OCRWM's waste management activities has shown that, to date, the program's limited staff resources have, on a number of occasions and for extended periods, been diverted from one project to another, with a resulting delay in one or both activities. A recent example of such a diversion was the detail of program staff to assist in completing the draft EAs, which delayed finalization of the Mission Plan. DOE's planning did not anticipate the magnitude of effort required to complete either of these activities. In the field, work on the EAs diverted staff from other duties, including regular administrative duties, reporting, and field activities. In the future, integrating the MRS with plans for repositories could cause more reassignments. Staff from the Office of Geologic Repositories are already assigned to an MRS/repository coordinating group planning the integration of an MRS with the repository. In commenting on this report, DOE stated that this assignment will only involve a few days annually. In another example, under the act an MRS facility must be sited with the participation of states and affected Indian tribes and licensed by NRC. Staff in OCRWM's Office of Geologic Repositories may well have technical expertise and experience in these areas from development of the first repository, which could benefit the MRS program. However, detailing these personnel because of the timing or urgency of the MRS program could delay the repository program. DOE has already reprogrammed almost $9 million in funds from the first repository program to MRS in order to complete the proposal to the Congress. DOE believes that this reprogramming of $9 million was not significant given the repository program's $300 million budget.

OCRWM's Director stated in January 1985 that DOE is committed to having a repository in operation in 1998 and that an MRS will not affect meeting that objective. However, OCRWM has not yet finalized its plan for integrating MRS facilities with the repository as required by the act. In addition to the technical issues surrounding the operation of both types of facilities, we believe DOE should address the management and administrative considerations of carrying out these interrelated projects in its plan.

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[17]Under the act a DOE-proposed fee adjustment would become effective within 90 days unless either house of the Congress disapproves the adjustment. In Immigration and Naturalization Service v. Chadha, 462 U.S. 919, 103 S. Ct. 2764 (1983), the Supreme Court ruled that a similar one-house legislative veto was not constitutional.

CONCLUSIONS

Given that the act established a timetable leading to the timely opening of a repository, Congress' desire to be kept informed of federal agency delays, and DOE's past performance in missing program milestones, we believe DOE should promptly inform the Congress of deviations from its program schedules. DOE has an obligation to keep the Congress fully and promptly informed of such deviations so that the Congress can effectively conduct its oversight of the program. The act provides a mechanism that DOE can use to formally notify the Congress of changes in the program: OCRWM's annual report (required under section 304 (c)). However, reports similar to those required of other agencies (section 114(e)(2)) would provide more timely explanation of DOE's failure or expected failure to meet a specific deadline in the Mission Plan.

Although we have not examined in this report the implications of extending DOE's authority under the Price-Anderson Act beyond 1987, in the past we have supported continuation of this act and revision of its liability limits. We believe that if the Congress decides to extend the Price-Anderson Act, it should increase the limit on liability and the amount of indemnification for a nuclear waste incident. At a minimum, the limits on liability and indemnification of DOE contractors should be increased to assure states and the public that they would be equally protected and compensated in the event of any nuclear waste accident. We recognize, however, that even a higher ceiling under the Price-Anderson Act may not satisfy Washington State's desire for unlimited liability and indemnification.

DOE's approach to siting the first geologic repository may not provide the Secretary with alternative suitable sites from which to choose in recommending a final repository site. This places the program at risk in the event of litigation that delays the program or a state veto of the President's recommendation. From a program planning and management standpoint, this issue needs to be clarified as soon as possible since it affects OCRWM's basic implementation of the act. We have identified three alternative siting approaches that could provide more confidence that the three sites initially recommended would be found suitable, although each would involve additional time and money to the program. We believe that the Congress may wish to consider whether (1) DOE's present approach to site characterization is consistent with the act's goal to have an operating repository in a timely manner or (2) greater conservatism is needed to ensure that alternative sites are available for selection of the first repository.

Finally, DOE's plans for an MRS should give consideration to how such a program would operate within OCRWM. Our review indicates that there is continued potential for concurrent OCRWM activities to (1) cause shifts in staffing from one critical area

to another and (2) result in delays to both programs. We believe that DOE should demonstrate how an MRS program would operate within OCRWM so as not to distract from or delay the repository program before the Congress authorizes construction of MRS facilities.

RECOMMENDATION TO THE CONGRESS

If the Price-Anderson Act is extended, the Congress should increase the act's limits on liability and indemnification for nuclear incidents involving high-level radioactive waste activities. In our past reports we have recommended that the Congress reexamine the act's limits on liability and provide equivalent financial protection for DOE contractors and NRC's licensees.

RECOMMENDATIONS TO THE SECRETARY OF ENERGY

To keep the Congress currently and fully informed of DOE's progress in implementing the nuclear waste management program, we recommend that the Secretary of Energy

- --submit to the Congress written reports, similar to those required of other federal agencies under section 114(e)(2) of the Nuclear Waste Policy Act, giving a separate and full accounting of the reasons for and implications of each actual and expected delay in meeting program deadlines and

- --address any changes to the program's overall policies or strategies, which may deviate from the Mission Plan, in each Annual Report of the Office of Civilian Radioactive Waste Management.

To reduce the risks to the waste management program of delays if a selected site cannot be successfully characterized, we recommend that the Secretary of Energy prepare contingency plans identifying which site or sites would be considered as backup site(s) to the three recommended for testing, and how and under what circumstances that site or sites would be tested.

To assist the Congress in its deliberations on whether to authorize construction of MRS facilities, we recommend that the Secretary of Energy explain to the Congress in the January 1986 MRS proposal how DOE will ensure that an MRS project would operate within OCRWM so as not to impede progress of the repository program.

MATTERS FOR CONSIDERATION BY THE CONGRESS

Congressional action is likely to be required before DOE will consider alternative approaches to site selection, which might

provide greater assurance of alternative sites for a final recommendation, but would further delay the program. DOE's current approach has some risks; therefore, it is important for the Congress to address this issue before the program is more advanced. The Congress could indicate that it concurs with DOE's site characterization strategy as planned. If the Congress decides greater conservatism in siting the first repository is needed to provide backup sites, several options are available. They are briefly restated below:

--Confirm the need for alternative sites to be available after site characterization but approve DOE's testing plans to minimize further program delays.

--Require additional testing prior to DOE's recommendation of three sites for characterization to build more certainty into the selection process.

--Direct DOE to characterize more than three sites.

--Direct DOE to modify its site characterization approach by first testing and then characterizing more than three sites to provide greater assurance that alternative sites are available for final selection.

AGENCY AND OTHER COMMENTS

DOE, Louisiana, Mississippi, Nevada, Texas, and Utah commented on this chapter of our draft report. This section reflects their major concerns and our response, if appropriate.

Mission Plan

DOE believed that it is currently keeping the Congress fully informed through various reports submitted to the Congress, testimony, and responses to individual congressional inquiries. Although DOE agreed with the intent of our recommendations to keep the Congress informed of changes to the program's planning, it disagreed with the specific reports that we recommend be provided.

Mississippi and Texas also disagreed with our recommendation that changes to the program's planning be addressed in OCRWM's Annual Report to the Congress. Mississippi stated that since DOE has described the Mission Plan as a "living document," it would be a more appropriate vehicle for changes. Texas believed that the Mission Plan and its updates are the appropriate vehicle to address program changes, particularly because such changes would be reviewable in draft form by all interested parties, including the Congress. Texas concurs, however, that the Mission Plan is an appropriate vehicle to begin accountability for schedule changes.

Although the Mission Plan as envisioned by the Congress would be perhaps the most suitable document to report changes in program

strategy, we believe, as Texas stated in its comments, that DOE has not yet established a process for updating the plan. Because DOE has not yet established an updating process and there is no requirement in the act for updates, we looked to existing program-reporting requirements for an opportunity for DOE to outline program changes without introducing new reporting burdens. The annual report, which the act requires DOE to submit to the Congress, seems to be the best existing reporting requirement for this purpose. Moreover, as stated in this chapter, we do not believe that DOE has provided timely and complete explanations to the Congress on the causes and consequences of schedule delays.

Siting approach

DOE disagreed with (1) our finding that its approach to siting the first repository has risks and (2) our recommendations on siting. DOE believed its approach has been conservative and prudent and that legal challenges were likely, regardless of the siting approach DOE uses. DOE remained confident that all three recommended sites would be successfully characterized and that backup sites would therefore be available if DOE's preferred site was disapproved. DOE believed its consultation and cooperation process lessened the likelihood of a site disapproval. According to DOE, sufficient data will be available from past testing and from public comments on the EAs to enable DOE to select sites with confidence and without additional testing, as one of our alternatives suggests. Finally, DOE believed that our table listing pros and cons for four siting approaches should include as a point against our alternatives that they would also be under criticism from some NRC commissioners and states.

We recognize that given the nature of the siting issue, legal challenges could arise under other siting approaches. We believe, however, that if legal challenges are successful against DOE's approach and backup sites are not available, the program could face a major setback. Given the program's early stage--for example, no exploratory shafts have been sunk--we do not share DOE's confidence that its three recommended sites will be found suitable after characterization. Additional testing, as suggested by one of our alternatives, could increase this confidence. Moreover, on the basis of comments on our report from NRC, states, and Indian tribes, the alternatives we suggest are not under criticism from most of these parties. As discussed in the following section on states' comments, only alternatives involving characterization of more than three sites were criticized by the two states most likely to contain the fourth characterized site--Mississippi and Utah. We have noted this in our final table.

We believe the risks of DOE's current siting approach are of serious concern and are troubled by DOE's apparent unwillingness to develop contingency plans as we recommend. In its response to our report, DOE stated that if only one site is suitable after characterization, and that site is vetoed,

". . . other sites could be characterized for the first repository from the remainder of the potentially acceptable sites previously identified."

OTA's March 1985 report estimated that this approach could delay the program 10 years. We believe contingency plans are needed so that these remaining states and the public would have a clear idea of why, when, and how sites in their state might be characterized.

States' comments

Utah commented on the alternative siting approaches in our report. Utah believed that the collection of more data, even with the costs and delays of additional testing at sites (alternative 1), could enhance the credibility of DOE's site decisions. Characterizing four sites is not supported by Utah and is seen as more costly in terms of expenditures, with the benefit of keeping closer to DOE's schedule. However, Utah believes that DOE's target date of 1998 for a repository is not the key purpose of the act and that haste to meet this date has been a major problem with the program. Rather, disposing of waste in a manner and at a time that can provide adequate protection of the public and the environment is the act's intent. In addition, Utah believes that OCRWM is trying to produce a defensibly sound site and may no longer be as confident that congressional override of a state disapproval is unlikely. Louisiana also noted that DOE's insistence on meeting the 1998 date is inconsistent with public safety and environmental considerations. Louisiana believes DOE will shorten the time frames for institutional activities and research and development as the program's milestones continue to slip.

Our use of the 1998 date throughout the report is to reflect DOE's goal for repository operation and is not meant to infer that we concur with this target date. For example, our discussion of alternative siting approaches is based on the need for timely completion of a repository with no date specified. In our opinion, a timely repository could be operated later than 1998. Utah has also suggested that our discussion of alternatives should include a more detailed evaluation of schedule impacts. We have included in this chapter excerpts from DOE's Mission Plan that identify DOE's estimates of what impact additional testing could have on the program's schedule.

Mississippi's Attorney General's Office disagreed with our report, which it believed recommends that DOE characterize a fourth site, likely to be in Mississippi. Our report does not recommend this. We are recommending that the Secretary of Energy develop contingency plans for characterization of at least one additional site. Such planning would not involve a large expenditure of additional funds, as these comments allege. Rather, it would provide notice and detailed information to

citizens of the state that is ultimately determined to have DOE's fourth preferred site.

The Attorney General's concern is that actual characterization activities would disrupt the lives of many Mississippians. Our report leaves the decision to require additional sites to be characterized at this time to the Congress. We believe the Congress should consider the repercussions of DOE's current strategy, in the event backup sites are not available and DOE's recommended site is unacceptable to NRC or the affected state or Indian tribe. We further believe that our recommendation for contingency planning is responsive to the concerns expressed by Mississippi's Governor at January 1985 DOE briefings on the draft EAs. The Governor repeatedly asked DOE to identify when the Richton, Mississippi, site would be called up to replace one of DOE's top three sites. He also was concerned that there would not be an opportunity for public comment and response to such a decision. By preparing detailed contingency plans for testing additional sites, DOE should be able to provide states with advance notice of the circumstances under which sites would be tested and with the opportunity to comment on and respond to these plans.

Both Mississippi and the Mississippi Attorney General's Office stated that the state has not officially taken a position on DOE's interpretation of section 114(f) of the act as our report states. On July 9, 1984, in Mississippi's comments on the draft Mission Plan, the Executive Director, Mississippi Energy and Transportation Board, wrote to DOE about an issue "with which we are in disagreement with the Department." This comment letter then cites DOE's discussion of the requirements of section 114(f) and requests that DOE clarify its intent as to how many qualified sites must result from characterization.

Louisiana, Nevada, and Texas agreed that congressional direction will be needed to have DOE rethink its current siting strategy. Louisiana agreed with our analysis of the risks of DOE's strategy and stated that surface testing prior to characterization could identify potential flaws in sites and make costly characterization unnecessary. Louisiana believed that under DOE's current approach, the possibility exists that, because the program will have progressed so far in terms of deadlines and expenditures, DOE may be pressured to recommend one of its three characterized sites regardless of its actual suitability. Nevada endorsed our recommendations because the state believed additional investigation and testing is needed before a reasonable comparison can be made between sites. Texas proposed that the Congress request a feasibility study on the impacts of initiating a new screening process and stopping DOE's current program. Texas believed the time and money spent to restart the program with a credible information base could mean the difference between success or failure of the act's program.

MRS

DOE disagreed with our conclusion that an MRS could impede progress of the repository program. DOE believed that its past record, initial studies, and current plans do not support such a finding. Since both the repository and MRS are integral parts of the waste management system, DOE believed there is no conflict between them. DOE planned to submit a complete budget as part of the MRS proposal to provide adequate resources to accomplish the program's goals without competition with the repository program. If properly integrated, DOE believed MRS would help the first repository's completion. DOE views its diversion of program staff from the Mission Plan to the EAs as an example of OCRWM's commitment to keep the repository project on schedule.

Our report states that there is potential for diversion of program staff and resources from the repository program to MRS activities because of past reassignments of staff and similarities in the technical backgrounds needed to successfully site and license both types of facilities. DOE has not yet provided any specifics to demonstrate that such diversions are unlikely. Although we welcome DOE's assertions that adequate resources will be available to accomplish the program's goals, we cannot be assured that the MRS program will be managed without interference to the repository program unless DOE specifically addresses the management and administrative considerations of carrying out these projects in its MRS proposal. Notwithstanding assurances DOE may provide in the proposal, we also believe that as the repository program's milestones are delayed, OCRWM will increase pressure on its staff to have an MRS facility, if authorized, available to accept spent fuel. Moreover, we are currently evaluating DOE's MRS plans for the House Committee on Interior and Insular Affairs and the Subcommittee on Energy Conservation and Power, House Committee on Energy and Commerce. This ongoing work will examine DOE's position that MRS will enhance the first repository program.

CHAPTER 5

OVERVIEW OF CONTRACTOR ACTIVITIES SUPPORTING DOE'S WASTE PROGRAM

DOE's commercial nuclear waste program depends on the expertise and work of over 200 contractors. These contractors and subcontractors primarily support the work of DOE field staff in implementing the Nuclear Waste Policy Act. Because contractor personnel outnumber by 20 to 1 DOE's civil servants administering the program, contractor performance is critical to the overall completion of the program's objectives.

Because a complete review of contractor performance is beyond this report's scope, we focus here on DOE's activities in overseeing its five largest field contractors--Rockwell Hanford Operations, Battelle Memorial Institute, Battelle Pacific Northwest Laboratory, Sandia National Laboratories, and Los Alamos National Laboratory. Although the responsibilities and activities of DOE's basalt, tuff, and salt project offices are similar, we found that their supporting contracts differ in type. Moreover, only the salt project office has a prime contract (Battelle Memorial Institute) that deals solely with waste activities. The waste activities conducted by the other four contractors are included as part of DOE contracts that cover a broad range of nonwaste-related activities. This complicates DOE's process of overseeing its contractors.

The five contractors we reviewed were responsible for over $200 million--or about 69 percent--of the 1984 Nuclear Waste Fund budget. Audits of contractor waste activities over the past 2 fiscal years have been limited in scope and frequency. DOE has recognized that audit coverage of its major support contractors has been a problem and DOE's Inspector General plans to increase financial audits of DOE's major contractors. However, it is uncertain to what extent these audits will specifically address waste activities.

PROFILE OF CONTRACT OPERATIONS

Under DOE's decentralized management approach whereby field offices are responsible for implementing the program, DOE relies heavily on the systems of key contractors for its project planning and control. Although OCRWM is responsible for establishing the overall technical objectives for the nuclear waste program, it has no direct contractor oversight role. This role is performed by DOE's field offices as they (1) provide guidance to contractors on work to be done, (2) administer the contracts themselves and any changes to their terms or conditions, and (3) evaluate contractor performance. The five contracts we reviewed were the responsibility of the three first repository project offices, namely the basalt project (Richland, Washington), the tuff project

(Las Vegas, Nevada), and the salt project (Columbus, Ohio). Two of the contractors are private companies (Rockwell Hanford Operations and Battelle Memorial Institute) and three are DOE laboratories (Pacific Northwest Laboratory, Sandia National Laboratories, and Los Alamos National Laboratory).

Organization for DOE's contractor, administrative, and technical oversight functions differs for each project, in some cases because the contractor's headquarters is located closer to a different DOE field organization. Three DOE field operations offices and one field project office have these responsibilities. Specifically,

--The Richland Operations Office has responsibility for both administering the Rockwell Hanford Operations (Rockwell) contract and overseeing the technical aspects of the basalt project. Richland also has responsibility for administering the Pacific Northwest Laboratory (Pacific) contract and overseeing the technical aspects of their work in support of MRS and the basalt project.

--DOE's Nevada Operations Office is responsible for overseeing only the technical aspects of the Sandia National Laboratories (Sandia) and Los Alamos National Laboratory (Los Alamos) contracts that support the tuff project. DOE's Albuquerque Operations Office is responsible for the administration of both contracts. (For the Los Alamos contract, DOE's Los Alamos Area Office has been delegated some administrative responsibilities from the Albuquerque Office.)

--DOE's Salt Repository Project Office, Columbus, Ohio--as a part of the Chicago Operations Office[1]--has responsibility for both the technical and administrative management of the Battelle contract.

Besides different DOE organizational responsibilities for prime contract management, the contractors themselves have the direct responsibility for the administration and technical performance of 246 subcontractors. Both Rockwell and Battelle,

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[1]The Columbus, Ohio, project office was reassigned to the Chicago Operations Office from headquarters in April 1981. Columbus has remained responsible for day-to-day management of the Battelle contract.

for example, are integrated contractors[2] who have overall responsibility for the entire basalt and salt projects, respectively. Most subcontractors for waste work (over 85 percent) at these project offices report through them. At the Nevada Project Office, on the other hand, Sandia and Los Alamos are two of six prime contractors, all of which report to DOE. While this approach, in principle, would appear to give DOE more direct oversight over the contractors' and subcontractors' waste work, the Nevada Project Office has begun to use the services of another prime contractor, Science Applications, Inc.,[3] to assume some of the responsibility for integrating the work of the other five prime contractors. (See fig. 5.1.)

Mix of contract types resulting from use of existing project support contractors

All five of the contracts included in our sample are cost-reimbursable contracts. Under this type of contract the contractor promises only its "best efforts" in completing the contract's requirements since both delivery and performance are considered uncertain. DOE in turn commits to reimburse the contractor for his allowable costs and, in some cases, to pay an additional fee to the contractor. This payment can be advanced to the contractors under letter-of-credit arrangements. For our contract sample, two contracts were cost (no fee), two were cost-plus-fixed fee, and one was cost-plus-award fee.[4] Thus, the types of contracts vary as to whether a fee to the contractor is involved, indicating that the risks of successfully completing the work have been assessed differently by DOE's field organizations.

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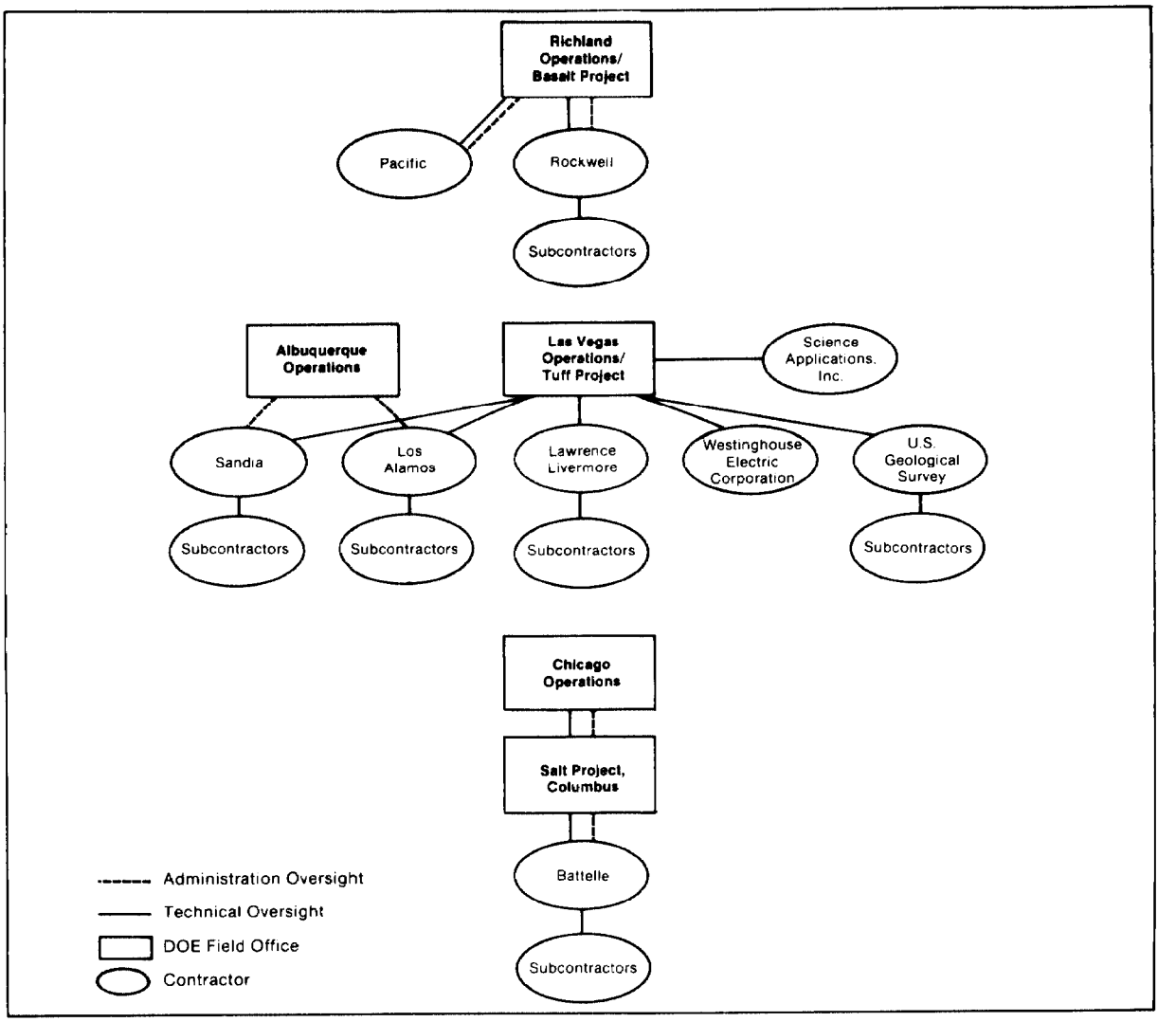
[2]As defined here, integrated contractors are major support contractors to DOE who serve as an interface between DOE and other contractors. Under DOE's definition, Battelle, which is not a government-owned operation, would not be an integrated contractor.

[3]Because the Science Applications, Inc., 1984 contract is only $6.2 million, it was not included in our sample.

[4]The difference between a fixed-fee contract and an award-fee contract is that for performance, a contractor receives all of the fixed fee established by the contract's terms. However, only a certain percentage of an award fee is guaranteed to the contractor. The remaining fee is awarded on the basis of DOE's evaluation that a contractor has performed in a better than satisfactory manner.

Figure 5.1: DOE Oversight of Contract Administration and Technical Performance



To some extent, the differences in contract types occur because the contractors who support DOE's commercial waste program at the Nevada and Richland offices have had long-term associations in other areas with the work of these operations offices. Waste work is only part of their larger contractual obligations to these offices and was not a prime consideration when the contracts were initially awarded. For example, Sandia has had a long-standing contract with the government dating from 1949. Sandia is 1 of 12 major, multiprogram national laboratories that DOE manages, providing scientific support and research on a variety of energy technologies. Commercial waste work represents only about 3 percent of Sandia's fiscal year 1984 contract funding with DOE. (See table 5.1.)

Table 5.1

Description of Contracts Reviewed by GAO

Contractor	Contract type	Contract award date	Contract period	Contract renewal date	FY 1984 contract funding level (millions)	FY 1984 number of subcontracts for waste work
Battelle Memorial Institute	Cost-plus-fixed fee	Jan. 1983[a]	3 months short of 5 years	Oct. 1987	Total-$128 All for NWPA	-
Los Alamos National Laboratory	Cost	Jan. 1943	Almost 6 years	Oct. 1987	Total-$600 NWPA-$9.1	7
Pacific Northwest Laboratory	Cost-plus-fixed fee	Jan. 1965	5 years	Oct. 1989	Total-$135 NWPA-$18.6	20
Rockwell Hanford Operations	Cost-plus-award fee	July 1977	5 years	Oct. 1987	Total-$350 NWPA-$45.5	91
Sandia National Laboratories	Cost	1949	5 years	Oct. 1988	Total-$646 NWPA-$18.3	55

[a]Battelle served as prime contractor and integrated the entire waste program beginning in April 1978.

The three laboratory contracts are strictly cost arrangements. That is, DOE reimburses only all allowable costs incurred under the Sandia and Los Alamos contracts. According to DOE's contracts guide,[5] cost contracts have limited appeal because the contractor does not receive a fee. Research projects by nonprofit organizations are the types of situations where this is considered appropriate.

Pacific receives a fixed fee in addition to the allowable costs incurred, as does the fourth contractor, Battelle. According to DOE's contracts guide, cost-plus-fixed fee contracts put maximum risk on the government and provide the contractor with minimum incentive for effective management control of costs because the fee does not vary and is not affected by poor performance. DOE's guidance further states that a cost-plus-fixed fee contract ". . . imposes a real obligation [on the government] to manage contract performance effectively and in a manner consistent with government objectives and concerns." According to DOE's guide, the advantages to DOE from these types of contracts are that they are usually easier to negotiate, especially when the scope of work or costs cannot be fully defined.

The fifth contract, Rockwell, is a cost-plus-award fee arrangement. Rather than being fixed at the time the contract is awarded, part of the fee is determined after performance is completed. According to DOE's contract guide, this type of contract is designed to encourage effective work by applying an incentive for good performance in specified areas. Waste work is one of the contract areas that is evaluated as part of the fee award process, counting toward 20 percent of Rockwell's award fee in 1984. In our opinion, one advantage to the award fee process in a contract where more than just waste activities are involved is that performance in the waste area can seriously affect the contractor's fee. For example, Rockwell was rated "satisfactory" for its performance supporting the basalt project from March to September, 1983 and, according to Richland officials, approximately 57 percent of its possible award fee for waste work was awarded. Overall, Rockwell's performance was rated "very good" and received 65 percent of the total fee. Table 5.1 presents additional information on the size and age of these five contracts.

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[5]DOE, Types of Contracts and Agreements Guide (Part 1), May 1981.

SYSTEMS USED TO MEASURE CONTRACT PERFORMANCE

Although the responsibility for contract oversight varies among projects, we found that all of the responsible DOE field officials oversee contractor performance through (1) the contractor's management control system and (2) periodic meetings with the contractor and reports.

Use of contractors' management control systems

DOE must review contract cost, schedule, and performance data to ensure that a contractor is accomplishing the contract's scope of work. Contractors generate these data through their internal management controls systems. In 1980 DOE established a set of criteria and implementation guides (DOE Order 2250.1A) that specify what conditions a contractor's management control system must meet to be validated or accepted by DOE. An accepted system is one that DOE considers acceptable on the basis of limited testing after the contract is awarded. A validated management control system must be certified by DOE's controller after a DOE review team more rigorously tests the system. Some types of capabilities a contractor's management control system is required to provide include

--realistic budgets for scheduled work to establish a baseline for contract performance measurement,

--control and accumulation of costs related to work progress, and

--reliable estimates of costs to complete remaining work.

Contractors have the flexibility to determine how these internal operations are conducted.

DOE's criteria require that certain contracts, e.g., those over $50 million, have validated systems. DOE has accepted each of the five contractors' management control systems. In addition, DOE validated Battelle's management control system in November 1983 and Rockwell's management control system in February 1985. According to DOE's Office of Project and Facilities Management, DOE has been negotiating with the national laboratories on their management control systems. As contracts are renegotiated, DOE will require that the laboratories have validated systems for major projects such as waste repository work.

Other methods used to monitor contractor performance

The responsible DOE field offices generally use periodic meetings and progress reports from the contractors to review

problem areas informally and identify needed actions. For example, all of our sample contractors meet monthly with DOE. In addition, because the Rockwell contract involves an award fee that varies according to performance, DOE's Richland office conducts formal semiannual appraisals. The office holds weekly meetings during which progress toward the goals for the 6-month period that DOE and Rockwell have mutually established is evaluated. Semimonthly reviews are held with Rockwell, which are accumulated into a 6-month evaluation report. The Pacific contract receives an annual appraisal from Richland, which is based on quarterly evaluation reports.

As a result of the various evaluation methods used at the Richland office, two of the five contractors in our sample--Rockwell and Pacific--have taken action to correct DOE-identified weaknesses in their waste-related activities. DOE field offices did not provide specific examples of corrective actions taken by the remaining three contractors in their waste activities, resulting from DOE's oversight and evaluation processes, either because their evaluations were not specific to waste, or no weaknesses requiring action had yet been identified.

AUDITS OF CONTRACTORS' WASTE ACTIVITIES HAVE BEEN LIMITED

Because DOE's waste program is contracting out millions of dollars of work and because these expenditures will increase as the program advances, we believe it is important for DOE to ensure that funds are being spent effectively and efficiently. Accountability for waste program expenditures has particular significance because nuclear utilities are financing the program through fees paid into the Nuclear Waste Fund. In addition to management control systems, systematic program audit coverage should be an important part of DOE's routine oversight activities and could help better assure utilities and the public that funds are being handled properly and in compliance with laws and regulations.

The contractors in our sample, responsible for supplying services valued at over $200 million in fiscal year 1984 (about 69 percent of the program's 1984 budget), have received limited audit coverage. In the past 2 fiscal years, 13 audits relating to waste activities have been conducted. These audits were limited in scope and frequency.

Audits have been limited in scope

In terms of scope, only 3 of the 13 audits, involving two contractors, were related to reimbursable costs--one is currently underway by DOE's Inspector General at Rockwell and the other two were undertaken by the Defense Contract Audit Agency at Battelle. Under DOE's regulations, however, all five contracts should be subject to this type of audit. DOE's procurement regulations

require that the amount reimbursable under cost-type contracts shall be determined on the basis of audits. Under these regulations such audits can be performed either directly by DOE or DOE can arrange for the audit services of another federal agency or independent auditors.

No single aspect of the waste program has been examined at all projects.[6] DOE's field offices did conduct audits of the quality assurance programs[7] of three contractors--Rockwell, Sandia, and Los Alamos--in 1984. According to DOE's comments on our report, the Salt Repository Project also conducted a quality assurance audit of Battelle during 1984. Six other audits were done in-house by Rockwell, Battelle, and Sandia and cannot substitute for DOE or other independent external review.

Audits have been limited in frequency

In terms of frequency, Pacific had no audit coverage of its waste activities during fiscal years 1983 and 1984. On the other hand, Battelle has been subject to annual cost audits. Battelle and Rockwell, with two independent or third-party audits each, received the most audit coverage in our sample.

The following table shows the number of commercial waste-related audits conducted either by or for the five contractors between October 1, 1982, and September 30, 1984.

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[6]In September 1984 OCRWM contracted with Main Hurdman, an independent public accounting firm, to audit the financial statements of the Nuclear Waste Fund. This audit examined financial transactions of each of our sample contractors and conducted work at all project offices.

[7]Quality assurance is an important aspect of DOE's program and is required by NRC regulations. Quality assurance includes quality control of the design, fabrication, construction, and operation of the components of the geologic repository. It also requires DOE to ensure that data collected to support its siting decisions and license application are accurate, verifiable, and retrievable.

Table 5.2

Number of Waste-Related Audits

Between October 1, 1982, and September 30, 1984

Contractor	Audit Organization: DOE Office of Inspector General[a]	DOE field office	Defense Contract Audit Agency[b]	Defense Contract Admin. Service[c]	Contractor internal audit	Total
Rockwell Hanford Operations	2[d]	1	-	0	2	5
Pacific Northwest Laboratory	0	0	-	0	0	0
Battelle Memorial Institute	0	0	2[e]	0	3	5
Sandia National Laboratories	0	1	-	0	1	2
Los Alamos National Laboratory	0	1	-	0	0	1
Total	2	3	2	0	6	13

[a]DOE's Office of Inspector General provides internal audits of DOE activities.

[b]The Defense Contract Audit Agency provides audit services to DOE and other federal agencies, including evaluations of costs claimed or proposed by contractors. DCAA would have responsibility for audits of the Battelle contract as well as subcontractors of the Hanford and the National Laboratory contracts.

[c]The Defense Contract Administration Service reviews contractors' property administration activities to ensure compliance with DOE requirements.

[d]Audits completed in 1984 but reports not yet published.

[e]One of these audits is ongoing and not yet completed.

In its 1983 report to the President and the Congress on the Department's internal controls, required by the Federal Managers Financial Integrity Act of 1982 (Public Law 97-255), DOE recognized that audit coverage of its integrated contractors has been a problem Department-wide.

"The Department needs to increase independent audit coverage for our government-owned contractor operations. We have moved aggressively in this area by establishing a plan for the cyclical review of our integrated, government-owned contractor operations."

DOE plans to audit all of its integrated contractors within the next 2 years. As part of this plan, DOE's Office of Inspector General has hired independent public accounting firms to increase audits of the financial activities of four contractors in our sample for which the Inspector General's office has primary responsibility (Rockwell, Los Alamos, Pacific, and Sandia). This corrective action should increase the frequency and number of audits of Rockwell and the national laboratories supporting the waste program. However, since DOE is just initiating these audits, it is too early to determine whether they will sufficiently cover waste activities to provide assurances that contractors are complying with their contract requirements.

CONCLUSIONS

Although we did not attempt to evaluate the performance of contractors supporting the waste program, we noted that waste work has received limited audit coverage either of a program management or financial nature. Funding for DOE's high-level radioactive waste program activities is provided by utilities and other generators of the waste. Thus, DOE has a responsibility to these financers to ensure that their resources are being applied efficiently and effectively. Even the most comprehensive management control techniques may not be effective unless periodic audits are made to verify that control systems are being implemented and contract provisions are being followed.

DOE's Inspector General has plans to increase financial audits of the contracts we reviewed, although it is uncertain to what extent these audits will specifically address contractors' waste activities. Without systematic audit coverage of this program, DOE has no assurance that its waste program contractors are using funds for the purposes for which they were authorized and are doing so economically and effectively.

AGENCY AND OTHER COMMENTS

DOE, Battelle, Pacific, Rockwell, and Sandia commented on this chapter of our report. This section reflects their major concerns and our response, if appropriate.

Contract operations

Pacific was concerned that our report did not address the role of each contractor in sufficient depth for a reader to have a full understanding of their roles in supporting DOE's waste management program. Pacific provided additional information

beyond that covered in our report on the role of DOE's multiprogram laboratories as well as Pacific's specific contract with DOE.

Battelle noted that incentives for good performance have been built into its contract. For example, Battelle's fixed fee is subject to annual negotiations. Battelle also stated that there are two other prime contractors for the salt project so that the entire project is not Battelle's responsibility. These other contractors, however, accounted for only $10 million in 1984 compared with Battelle's $128 million.

Pacific and Sandia noted that their contracts provide for DOE advance funding of allowable contract costs rather than reimbursement after costs are incurred. Pacific believed describing their contract as a cost-reimbursement type contract is misleading. We have added language to the report noting that such contractors can be advanced funds through letter-of-credit arrangements. However, in terms of DOE's contract classification system, they are cost-reimbursable contracts. Pacific provided additional information on the distinction between management and operating contractors (represented by Pacific, Los Alamos, Sandia, and Rockwell) and other DOE cost-reimbursement contractors.

Systems to measure contract performance

Pacific and Battelle commented on our discussion of contractor management control systems. Pacific noted that although its system is not validated, Pacific's project management system complies with DOE's criteria and has successfully interfaced with organizations using validated systems. Pacific believed that its management and DOE carefully reviewed the progress and quality of its work. In addition, Pacific believed the performance appraisals conducted quarterly and annually by DOE's Richland office have greatly benefited Pacific.

Battelle asked that our report explain the significance of having a validated management control system and the requirements of DOE Order 2250.1A. Battelle believed that because of this system there is a high degree of DOE review of their work and provided examples of various progress meetings held between DOE and Battelle. Our report noted that Battelle had one of two validated management control systems. However, according to DOE's Office of Project and Facilities Management, although there are differences in DOE's testing and approval procedures between accepted and validated systems, contractors must meet the same cost control criteria for both systems. Battelle also provided information on its subcontractor procurement procedures.

Contractor audits

DOE, Battelle, Pacific, and Rockwell believed that our discussion of audit coverage did not adequately reflect the extent

of audits of the waste program's contractors. DOE provided information on audits currently in process by the Department's Inspector General's offices. DOE also stated that our report did not recognize that since funding for the program is relatively recent and contracts have not been completed, procurement officials had not yet submitted a significant number of audit requests to the Inspector General. DOE believed that it has provided for more than normal audit coverage by having Main Hurdman provide an independent audit of the Nuclear Waste Fund and by "positive, aggressive action" to ensure that program funds are spent effectively and efficiently.

Battelle noted that Main Hurdman found no major deficiencies in their audit of Battelle. Battelle also stated that 10, rather than 3, internal audits were conducted during the 2 years discussed in our report, but did not provide copies of these additional 7 audit reports. On the basis of Battelle's earlier responses to our inquiries, we have identified only three of these audits as specific to the waste program.

Pacific also provided additional information on audits of their contract. Most of these audits occurred after the 2-year reporting period identified in our report. Pacific also noted, however, that no specific internal audits have been conducted of nuclear waste fund activities.

Rockwell also stated that it had completed many audits, primarily internal audits. However, Rockwell did not provide copies of these audit reports so that we could determine whether they were specific to waste activities. Moreover, contractor internal audits, as discussed earlier, cannot substitute for DOE or third-party independent review.

Our report identifies contractor audits of nuclear waste activities performed during the period October 1, 1982, to September 30, 1984. Although examples of other internal contractor reviews may indicate general oversight of a contractor's performance or procedures, they are not necessarily specific to the issue addressed in our report--implementation of the Nuclear Waste Policy Act. We also noted that as the Inspector General's Office increases its use of private accounting firms to audit DOE's integrated contractors, financial audits of the contractors discussed in this report would increase. These audits also do not deal solely with nuclear waste activities.

SELECTED TIME-SPECIFIC ACTIONS REQUIRED OF THE DEPARTMENT OF ENERGY UNDER THE NUCLEAR WASTE POLICY ACT OF 1982

NWPA Requirement	Date Due
Title I - Disposal and Storage of High-Level Radioactive Waste, Spent Nuclear Fuel, and Low-Level Radioactive Waste	
Subtitle A - Repositories for Disposal of High-level Radioactive Waste and Spent Nuclear Fuel	
Siting	
--Issue general guidelines for the recommendation of sites for repositories. (sec. 112(a))	Within 180 days of enactment (by July 7, 1983)*
--Recommend three sites to the President for characterization as first repository sites. (sec. 112(b))	By January 1, 1985
--Nominate five sites and recommend three for characterization as second repository sites. (sec. 112(b))	By July 1, 1989
--Identify states with one or more potentially acceptable repository sites. (sec. 116(a))	Within 90 days (by April 4, 1983)*
--Notify governor, state legislature and any affected Indian tribe in any state of the potentially acceptable sites within the state. (sec. 116(a))	Within 90 days of identification*
Subtitle B - Interim Storage Program	
Federal interim storage	
--Annually prepare and submit to the Congress a report on plans for providing federal interim	Within 1 year (by January 7, 1984)*

*Action completed.

NWPA Requirement	Date Due
storage--including a description of the specific manner selected for providing storage. (sec. 135(f))	
--Enter into contracts to provide federal interim storage, if needed, up to 1,900 metric tons. (sec. 136(a))	Until January 1, 1990
--Undertake a study to establish payment charges for any federal interim spent fuel storage required. Report to the Congress, including description of method and measure of collection of fees, and the rates and manner of payment. (sec. 136(a)(2))	Within 180 days (by July 7, 1983)*
Subtitle C - Monitored Retrievable Storage	
--Provide a proposal to the Congress for the construction of one or more monitored retrievable storage facilities for the long-term storage of spent fuel. (sec. 141(b))	By June 1, 1985
Title II - Research, Development, and Demonstration Regarding Disposal of High-level Radioactive Waste and Spent Fuel	
Research, development, and demonstration	
--Select one, but not more than three, private sector participants for cooperative research, development, and demonstration activities to establish dry storage and rod consolidation technologies for use at commercial reactor sites. (sec. 218)	Within 1 year (by January 7, 1984)*
Technical assistance to nonnuclear weapons states	
--Publish a notice in the Federal Register stating that the United States is prepared to cooperate	Within 90 days (by April 7, 1983)*

APPENDIX I

NWPA Requirement	Date Due
with and provide technical assistance to nonnuclear weapons states in storage and disposal of spent fuel. (sec. 223(b)(1))	
--Update and reissue notice annually for 5 succeeding years. (sec. 223 (b)(2))	Update due within 1 year (by April 7, 1984)*
Title III - Other Provisions Relating to Radioactive Waste	
Mission Plan	
--Submit draft Mission Plan, providing an information basis sufficient to permit informed decisions to be made in carrying out the repository program and the research, development and demonstration programs, to the states, Indian tribes, NRC, and other government agencies for comment. (sec. 301(b)(1))	Within 15 months (by April 7, 1984)*
--Submit the revised Mission Plan to the appropriate committees of the Congress. (sec. 301(b)(2))	Within 17 months (by June 7, 1984)*
Nuclear Waste Fund	
--Establish a one-time fee per kilogram of heavy metal in spent fuel or high-level waste for disposal of spent fuel generated prior to April 7, 1983, equivalent to an average charge of 1.0 mill per kilowatt hour. (sec. 302(a)(3))	Within 90 days (by April 7, 1983)*
--Establish procedures for collection and payment of fees. (sec. 302 (a)(4))	Within 180 days (by July 7, 1983)
--Annually review the amount of the fees established to evaluate whether collection of the fee will provide sufficient revenues to offset disposal costs. The Secretary will propose that an adjustment be	--

NWPA Requirement	Date Due
made to the fee, if necessary, to ensure full cost recovery. (sec. 302(a)(4))	
Contracts for disposal	
--Enter into contracts for spent fuel or high-level waste transportation and waste disposal services. (sec. 302(a) and (b)(2))	By June 30, 1983*
Alternative management approaches	
--Undertake a study of alternative approaches to managing the construction and operation of all civilian radioactive waste management facilities, including the feasibility of establishing a private corporation for such purposes and submit a report to the Congress. (sec. 303)	Within 1 year (by January 7, 1984)*
Office of Civilian Radioactive Waste Management	
--Establish in DOE an Office of Civilian Radioactive Waste Management headed by a Director appointed by the President. (sec. 304(a))	January 7, 1983*
--Annually prepare and submit to the Congress a comprehensive report on the activities and expenditures of the Office. (sec. 304(c))	--
Test and evaluation facility	
--Transmit to the Congress a report setting forth whether the Secretary plans to locate the test and evaluation facility at the site of a repository. (sec. 305(a))	Within 1 year (by January 7, 1984)*

FUNDING ARRANGEMENTS FOR SPENT FUEL STORAGE RESEARCH AND DEVELOPMENT COOPERATIVE DEMONSTRATIONS

The Nuclear Waste Policy Act states that the total DOE contribution from federal funds and the use of federal facilities or services shall not exceed 25 percent of the total costs of the spent fuel storage research and development demonstration programs, as estimated by DOE. All other costs will be paid by the utilities. These terms are contained explicitly in the arrangements negotiated between DOE and Virginia Power and CP&L. In the signed contracts, the participating utilities agree that, upon completion of work, they will compensate DOE for any federal funds spent that exceed 25 percent of the total program costs. The total program costs equal the cost of the at-reactor demonstration plus the cost of (1) any research and development conducted at a federal site to support these demonstrations and (2) DOE's consultative and technical assistance. DOE's contribution will include expenses associated with the storage of the fuel after completion of the tests until final disposal. The utility participants will pay final disposal costs.

Tables II.1 and II.2 contain estimated costs for the two dry storage demonstration cooperative agreements being implemented under the act.[1] These estimates show that while DOE's percentage of contribution varies each year, DOE's portion of the total projected costs is 25 percent, in keeping with the act's requirements.

[1]These cost estimates were provided by DOE. We did not independently verify them.

Table II.1

Estimated Costs of Virginia Power Dry Storage Demonstrations

Source of funds	FY 84	FY 85	FY 86	FY 87	FY 88	Total cost
	(000)					
Virginia Power reactor site	$1,546	$10,412	$ 5,559	$3,822	$661	$22,000
Federal sites	602	0	1,740	924	0	3,266
Total	2,148	10,412	7,299	4,746	661	25,266
DOE	683	3,737	3,363	375	264	8,422
Total	$2,831	$14,149	$10,622	$5,121	$925	$33,688
Percentage of DOE participation	24.1	26.4	31.5	7.3	28.5	25.0

Source: Letter from Director, Commercial Spent Fuel Management Program Office, DOE Richland Operations Office, Nov. 19, 1984.

Table II.2

Estimated Costs[a] of Carolina Power and Light Dry Storage Demonstration

Source of funds	FY 84	FY 85	FY 86	FY 87	Total cost
	(000)				
Carolina Power and Light[b]	$725	$ 650	$ 825	$350	$2,550
DOE	60	380	290	120	850
Total	$785	$1,030	$1,115	$470	$3,400
Percentage of DOE participation	7.6	36.9	26.0	25.5	25.0

[a]Estimates are current as of the end of February 1985.

[b]CP&L's costs include those of the Electric Power Research Institute and NUTECH, which are supporting CP&L in this demonstration.

Source: DOE/CP&L Licensed At-Reactor Dry Storage Demonstration Cooperative Agreement, March 1984.

INFORMATION REQUIRED BY THE NUCLEAR WASTE POLICY ACT AND THE CORRESPONDING CONTENT OF DOE'S MISSION PLAN

Requirements of Nuclear Waste Policy Act [section 301(a)(1) through (11)]	Information Included in Part II of Mission Plan
(1) Identify primary scientific, engineering, and technical information needed for siting and construction of a test and evaluation facility and repositories.	Lists and explains the types of information needed to site, design, construct, operate, and permanently close a repository. Deficiency: the test and evaluation facility information needs are not separately addressed because DOE has not yet determined the need for and role of such a facility. However, DOE believes the information needed to site and construct a test and evaluation facility will essentially be the same as for a repository.
(2) Identify any needed information that is not available; a schedule with specific milestones for the research, development, and demonstration program and activities to provide this information; a schedule for the activities necessary to achieve important programmatic milestones; and an estimate of costs for the research, development, and demonstration programs.	Presents DOE's plans for obtaining the needed information through technical tasks in the repository program, such as site investigations, and use of exploratory shafts. Shows schedules for these activities. Gives estimated annual costs of research and development activities for the waste management program on the basis of a revised repository reference schedule.

(3) Evaluate financial, political, legal, or institutional problems that may impede implementation of the act, plans to resolve such problems, and recommendations for legislation needed to resolve such problems.	Discusses financial, political, legal, and institutional problems identified as having the potential to impede implementation of the act; presents DOE's plans for their resolution, and recommends no legislative changes.
(4) Comment on the purpose and program of the test and evaluation facility.	Discusses DOE's future plans to decide on the need for a test and evaluation facility colocated with a repository.
(5) Discuss the significant results of research and development programs conducted and the implications for each of the different geologic media under consideration for repositories, and compare the advantages and disadvantages of use of such media for repository sites.	Presents the results of research and development in geology, hydrology, geochemistry, and geomechanics for each of the host rocks under consideration for only the first repository (basalt, bedded and dome rock salt, and volcanic tuff); gives the implications of these results where possible; and summarizes the advantages and disadvantages of these host rocks. Deficiency: does not address the results of study of crystalline rocks for the second repository because, according to DOE, significant results obtained through field studies are not yet available.
(6) Present the repository siting guidelines.	Included as an appendix to the Mission Plan.
(7) Describe known sites at which site characterization activities should be undertaken, and the nature of these activities, such as	Presents descriptions of the nine sites identified as potentially acceptable for the first repository. Describes activities specified in the act and states that, in some cases, more detailed information is available in individual draft EAs for the nine sites.

--the extent of planned excavations,	Deficiency: description of known sites for characterization and specific plans are not included because the program has not advanced to this stage.
--plans for on-site testing,	
--plans for any investigation activities that may affect a site's capability to isolate waste.	
(8) Identify the process for solidifying high-level radioactive waste or packaging spent nuclear fuel, including	Presents a discussion of current spent fuel disposal packaging concepts, and of the solidification of high-level waste, including,
--a summary and analysis of the data to support the selection of the solidification process and packaging techniques,	--a discussion of the basis for a future choice of process and packaging materials,
--an analysis of the requirements for the number of solidification facilities needed,	--a discussion of factors bearing on the number of waste-treatment facilities required. Deficiency: states that the number of facilities needed cannot be determined yet.
--a description of the state of the art for the packaging materials and their availability, and	--a discussion of the availability of materials for waste packaging, and

APPENDIX III

--a description and schedule of a plan for an aggressive research and development program to provide a high-integrity disposal package at a reasonable price.	--a description of waste package research and development plans and schedules.
(9) Estimate:	Presents:
--the total repository capacity required to accommodate all waste expected to be generated through 2020,	--projections of nuclear-electricity generating capacity, and the amounts of spent fuel requiring disposal through 2020;
--the number and type of repositories required to provide such capacity,	--factors that might affect the number and capacities of repositories;
--a schedule for construction of these repositories, and	--schedules for construction of two repositories; and
--the period during which each repository will be accepting waste.	--schedules for accepting spent fuel for disposal.
(10) Estimate, on an annual basis, the costs:	Presents annual cost estimates in three major categories: development and evaluation; repository construction, operation, closure, and decommissioning; and transportation.
--to construct and operate the repositories anticipated to be needed,	

--to construct and operate a test and evaluation facility, and	
--to carry out any other activities under the act.	Deficiency: does not include costs for an integral MRS facility or research funded by appropriations.
(11) Identify possible adverse economic and other impacts to states or Indian tribes that may arise from the development of a test and evaluation facility or repository.	Discusses some of the potential demographic, economic, community service, social, and fiscal impacts that may accompany the development of a repository, and, to a lesser extent, a test and evaluation facility.

APPENDIX IV

Department of Energy
Washington, D.C. 20585

JUN 24 1985

Mr. J. Dexter Peach
Director, Resources, Community and
Economic Development Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Peach:

The Department of Energy (DOE) appreciates the opportunity to review and comment on the General Accounting Office (GAO) draft report entitled, "Nuclear Waste Policy Act: 1984 Implementation Status, Progress, and Problems" (GAO/RCED-85-100).

The Department believes that this report, by focusing on a few early deadlines missed, does not provide a balanced view of either the status or the progress made by DOE in implementing the Nuclear Waste Policy Act (NWPA) of 1982. The report does not appear to recognize fully that inherent conflicts in the NWPA between the mandated processes and milestones require DOE to make trade-off decisions between consultation and cooperation, scheduling, and quality considerations, and that the quality of the final products is at least equally, and probably more, important to the successful implementation of the NWPA.

The report emphasizes the fact that only 5 of the 13 activities projected for completion during FY 1984 in the FY 1985 budget request for the Nuclear Waste Fund were actually accomplished. The report fails to note that this was the first budget submitted for the Nuclear Waste Fund, and that it had to be prepared during the period when the new Office of Civilian Radioactive Waste Management (OCRWM) was being organized. The NWPA required the Department to complete many complex, and often unique, tasks within the first two years following enactment, while at the same time DOE had to organize and staff OCRWM to implement the Act.

By concentrating on a few delayed milestones without recognizing the substantial accomplishments of DOE during this period, the GAO fails to provide an accurate report of the status and progress in implementing the NWPA during 1984.

The Department disagrees with the GAO on its principal findings concerning: (1) the reasons for the delay in issuing the environmental assessments (EAs); (2) the siting approach for the first repository; and (3) the perceived conflict between the repository and Monitored Retrievable Storage (MRS) elements of the integrated waste management system. In regard to its siting approach, DOE prepared and issued, for public review and comment, draft environmental assessments on all nine of the potentially acceptable sites for the first repository, even though this was not required under the NWPA. In regard to plans for MRS, GAO concludes that MRS will introduce a competition for resources that is likely to delay the repository program. Neither the record to date nor DOE's plans support this conclusion.

Although DOE concurs with the intent of the GAO's recommendations to the Secretary, it disagrees with some of the particulars.

- o DOE concurs that it should keep the Congress currently and fully informed. DOE believes it has done this in issuing two drafts of the Mission Plan, publishing draft environmental assessments, submitting reports on major issues and decisions, testifying at Congressional hearings, and providing individual responses to a large number of inquiries from the Congress.

- o DOE believes that it is taking a conservative and prudent approach in the selection of a site for the first repository in full compliance with the provisions of the NWPA.

- o DOE is planning to provide the Congress with comprehensive information in its MRS proposal. DOE believes that both its past record and current plans provide assurance that OCRWM will give the highest priority to expeditious deployment of a repository. DOE also believes that there is no conflict between the geologic repository and the MRS elements of the program as both are integral parts of an efficient radioactive waste management system. DOE indends to submit a complete budget for the project as part of the MRS proposal.

Specific substantive comments related directly to the GAO report are enclosed in support of the DOE position. In addition to disagreeing with GAO's findings on the EAs, siting approach and MRS, one of these comments takes exception to the section of the report on auditing. A list of specific editorial comments is being transmitted separately to Mr. Sam Madonia of your staff.

The comments provided to Mr. Madonia are generally in the nature of technical corrections to the report. The Department hopes that these comments will be of help to GAO in the preparation of the final report.

Sincerely,

Martha Hesse Dolan
Assistant Secretary
Management and Administration

Enclosure

GAO note: Full text of comments is available on request from GAO.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

June 20, 1985

Mr. J. Dexter Peach
Director, Resources, Community, and
Economic Development Division
U.S. General Accounting Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Mr. Peach:

We appreciate the opportunity to comment on the draft GAO report, "Nuclear Waste Policy Act: 1984 Implementation Status, Progress, and Problems." This report is the second annual audit of the Department of Energy's Office of Civilian Radioactive Waste Management, as required under Section 304(d) of the Nuclear Waste Policy Act.

Enclosed are the staff's recommendations for changes that we feel should be made in preparing your final report.

Sincerely,

William J. Dircks
Executive Director
for Operations

Enclosure:
Comments on GAO Recommendations

GAO note: Full text of comments is available on request from GAO.

(301661)

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