*Office Of Civilian Radioactive
Waste Management*

Annual Report To Congress

December 1989

*U.S. Department of Energy
Office of Civilian Radioactive Waste Management
Washington, DC 20585*

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED *ep*

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, make any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

Executive Summary

This sixth Annual Report to Congress by the Office of Civilian Radioactive Waste Management (OCRWM) describes activities and expenditures of the Office during fiscal year 1988. An epilogue chapter reports significant events from the end of the fiscal year on September 30, 1988 through March 1989.

Throughout the year, OCRWM focused its efforts and resources on implementing the policy direction and specific provisions of the Nuclear Waste Policy Act of 1982, as amended by the Nuclear Waste Policy Amendments Act of 1987 (Amendments Act), which was enacted on December 22, 1987. The *Draft 1988 Mission Plan Amendment*, issued in June 1988 for public review and comment, presented the overall program strategy for developing the authorized waste management system, as well as OCRWM's technical and institutional plans. Following the evaluation of comments received on the draft Amendment, a revised document, entitled *OCRWM Mission Plan Amendment II*, was prepared and was undergoing Departmental review.

To facilitate implementation of an effective quality assurance (QA) program, OCRWM established a separate Office of Quality Assurance in April 1988. Three major QA documents, the *Quality Assurance Requirements*, the *Quality Assurance Program Description* and the *Yucca Mountain Project QA Plan* documents were issued and accepted by the NRC.

In response to a requirement of the Amendments Act, program activities at the Deaf Smith, Texas, and Hanford, Washington, candidate repository sites were phased out, while site characterization proceeded at the Yucca Mountain, Nevada, candidate site. In December 1988, the statutory site characterization plan (SCP) for Yucca Mountain was issued, incorporating comments received on the consultation draft SCP released for public review in January 1988. In conjunction with issuance of the SCP, the Environmental Regulatory Compliance Plan and the Environmental Monitoring and Mitigation plan for site characterization were also published.

In compliance with a reporting requirement of the Amendments Act, OCRWM developed and submitted to Congress the *Section 175 Report: Secretary of Energy's Report to the Congress Pursuant to Section 175 of the Nuclear Waste Policy Act, As Amended*. The report addressed a range of potential socioeconomic impacts of locating a repository at the Yucca Mountain candidate site and presented recommen-

dations for the mitigation of such impacts.

Work in the systems integration area progressed on the development of OCRWM's *Systems Engineering Management Plan* and on the *Waste Management System Requirements* and the *Waste Management System Description* documents.

Five contracts for the design of "from-reactor" casks (legal weight truck casks and rail/barge casks) were awarded. The contractors will be required to obtain design certification from NRC.

OCRWM began an analysis of the optimal functions and benefits of a monitored retrievable storage facility fully integrated into the authorized waste management system. The results of this analysis will be provided to the MRS Review Commission for use in developing its report to Congress on the need for an MRS facility.

Development and demonstrations of technologies for expanding at-reactor spent fuel storage technologies continued through cooperative efforts with utilities and generic research. Licensed demonstrations of metal storage casks and horizontal concrete modules, as well as in-pool consolidation, took place with OCRWM support.

As required by the Amendments Act, OCRWM conducted an evaluation of the use of temporary dry cask storage at nuclear reactor sites until a Federal facility is ready to receive the spent fuel. The *Final Version Dry Cask Storage Study* was submitted in March 1988 to Congress, along with NRC's comments.

In addition to continuing its diverse public information and outreach program, OCRWM provided general briefings and specifically requested information to the MRS Review Commission and worked with the Nuclear Waste Technical Review Board, eight members of which were appointed by the President in January 1989.

OCRWM also continued and expanded its interactions with affected parties as provided by the Nuclear Waste Policy Act, as amended, to meet their special information needs and to permit their concerns to be aired and evaluated. In April 1988, the Secretary of Energy sent to the State of Nevada an invitation renewing earlier offers to begin negotiations for a consultation and cooperation agreement, as specified in the Nuclear Waste Policy Act, and further offered to initiate the development of a benefits agreement and to work with a designated onsite representative in accordance with provisions of the Amend-

ments Act. The State responded by indicating its desire to continue to rely on informal procedures to meet the interaction requirements of the legislation.

Nye, Clark and Lincoln Counties in Nevada were designated affected units of local government (the first by definition, the others by application) and, as such, received initial grants for participation in OCRWM's waste management program.

In April 1988, OCRWM implemented significant modifications to its organizational structure to enhance program effectiveness and to reflect the high priority accorded to quality assurance. As a result of the reorganization, OCRWM is currently comprised of five major components: the Office of Quality Assurance, the Office of Program Administration and Resources Management, the Office of Facilities Siting and Development, the Office of Systems Integration and Regulations, and the Office of External Relations and Policy.

In FY 1988, OCRWM issued an RFP for a management and operating (M&O) contractor to assume responsibility

for overall technical direction of the characterization of the Yucca Mountain candidate site, MRS siting and design, repository and waste package design, assisting OCRWM in developing the waste transportation system, and obtaining required licenses from NRC, among other duties. On December 9, 1988, the selection of Bechtel Systems Management, Inc., was announced for award of the M&O contract. TRW Environmental Safety Systems, Inc., subsequently filed a complaint, and a Federal Claims Court judge enjoined DOE, on a preliminary basis, from awarding the contract. A hearing on a permanent injunction began on March 30, 1989.

A second legal decision with an impact on OCRWM's program was rendered on March 17, 1989, by the U.S. Court of Appeals for the District of Columbia in *Consolidated Edison Co., et al. v. U.S. Department of Energy* (Case Number 88-1194). The Court ruled that the ongoing fee in the Standard Disposal Contract applies only to nuclear electricity that is both generated and sold.

Table of Contents

	<i>Page</i>
Executive Summary	i
Foreword	vii
I. Program Policies and Strategies	1
Summary of the Nuclear Waste Policy Amendments Act of 1987	1
First Repository	1
Second Repository	1
Monitored Retrievable Storage	1
Other Provisions	1
Draft Mission Plan Amendment	2
II. Quality Assurance	3
III. Site Characterization	5
Site Characterization Plan	5
Site Characterization Activities	6
Site Investigation	6
Repository Engineering and Technology	6
Environmental and Socioeconomic Studies	8
International Cooperative Research	8
Financial Assistance	9
Site Closeout and Reclamation	9
Repository Litigation	10
IV. Systems Integration	11
Integrating the Waste Management System	11
Transportation	13
Cask Design and Development	13
Economic and Systems Studies	13
Support System Development	13
Transportation Operations Planning	13
Institutional Interactions	13
Monitored Retrievable Storage	14
V. Spent Fuel Storage and Engineering Development	15
Spent Fuel Storage	15
Demonstrations of Spent Fuel Storage	15
Supporting Studies for Spent Fuel Storage	15
Rod Consolidation	18
Federal Interim Storage	18
International Cooperation	18
Cooperation with Nonnuclear Weapon States	18
Engineering Development	18
VI. External Relations and Outreach	21
Public Information and Outreach	21
External Boards and Commissions	22
Consultation and Cooperation	22

	<i>Page</i>
VII. Program Management	25
Financial Management	25
Nuclear Waste Fund Revenues and Expenses	25
Litigation	25
Total System Life Cycle Cost Study and Fee Adequacy Assessment	25
Program Management System	25
Information Management	26
Program Cost and Schedule Baseline	26
Annual Capacity Report	26
Management Organization	26
Office of Quality Assurance	28
Office of Program Administration and Resources Management	28
Office of Facilities Siting and Development	28
Office of Systems Integration and Regulations	28
Office of External Relations and Policy	28
Operations Offices and Project Offices	28
Staffing the Organization	30
VIII. Financial Statements	31
Nuclear Waste Fund	31
Civilian Radioactive Waste R&D Account	42
IX. Epilogue	45
Program Policies and Strategies	45
Quality Assurance	45
Site Characterization	45
Spent Fuel Storage and Engineering Development	46
External Relations and Outreach	46
Program Management	46
Bibliography	49

List of Figures

	<i>Page</i>
3-1 Location of the Yucca Mountain Site in Southern Nevada	5
3-2 Perspective of the Proposed Repository at Yucca Mountain	7
4-1 Generic Systems Engineering Process	12
5-1 Storage Cask Emplacement at Virginia Power's ISFSI	16
5-2 Dry Storage Technology Utilized by CP&L	17
5-3 Prototypical Configuration of Rod Consolidation Equipment	19
7-1 Office of Civilian Radioactive Waste Management Organization	27
7-2 DOE Operations Offices Responsible for Major Projects	29

List of Tables

	<i>Page</i>
8-1 Balance Sheets September 30, 1988 and 1987	34
8-2 Statements of Operations, Years Ended September 30, 1988 and 1987 and Cumulative Amounts from January 7, 1983 (date of inception) to September 30, 1988	35
8-3 Statements of Changes in Financial Position, Years Ended September 30, 1988 and 1987 and Cumulative Amounts from January 7, 1983 (date of inception) to September 30, 1988 ...	36
8-4 Summary of Accrued Costs, Civilian Radioactive Waste R&D Account	43

Foreword

This is the sixth Annual Report to Congress by the Office of Civilian Radioactive Waste Management (OCRWM). This report is required by Section 304(c) of the Nuclear Waste Policy Act (NWPA) of 1982 (P.L. 97-425), as amended by Title V, Subtitle A, P.L. 100-203. It is submitted to inform the Congress of OCRWM's activities and expenditures during fiscal year 1988, which ended on September 30, 1988.

OCRWM was established within the Department of Energy to implement the provisions of the NWPA. That act established the Federal policy for the management and permanent disposal of spent nuclear fuel from civilian nuclear power reactors and of high-level radioactive waste.¹ To finance the waste management program, the NWPA established the Nuclear Waste Fund, which is composed of payments by the generators and owners of the waste. The NWPA included provisions for ensuring the participation of States, affected Indian Tribes and the public in the program, and it prescribed both a schedule and a process for the siting of two geologic repositories, authorized the construction of one repository and mandated the develop-

ment of a transportation system for the waste. Other provisions included in the NWPA were to conduct research, development and demonstration for the dry storage of spent nuclear fuel, to undertake a cooperative program to encourage the development of technology for consolidating spent fuel rods, and to submit to the Congress a proposal for the construction of a monitored retrievable storage facility as part of the waste management system.

The Nuclear Waste Policy Amendments Act of 1987 (Title V, Subtitle A of P.L. 100-203), enacted on December 22, 1987, made significant changes to the NWPA relating to repository siting and monitored retrievable storage and added new provisions for the establishment of several institutional entities with which OCRWM will interact.

Therefore, a dominant theme throughout this report is the implementation of the policy focus and specific provisions of the Amendments Act. Policy developments in response to that Act are described in Chapter I of this report, the activities and accomplishments of OCRWM during fiscal year 1988 are discussed in Chapters II through VII, and the audited financial statements of the Nuclear Waste Fund are presented in Chapter VIII. Chapter IX, the epilogue, updates the report with a brief summary of significant progress made since the end of the fiscal year on September 30, 1988, through March 31, 1989.

¹ For convenience and brevity, the terms "radioactive waste" "nuclear waste" and, simply, "waste" are often used in this report to mean both spent nuclear fuel and high-level radioactive waste.

I.

Program Policies and Strategies

This chapter describes major provisions of the Amendments Act and subsequent changes in OCRWM's policies and strategies designed to meet these new requirements in planning and executing the waste management program.

Summary of the Nuclear Waste Policy Amendments Act of 1987

The Amendments Act, signed by the President on December 22, 1987, streamlines and focuses the waste management program established by the NWPAA; it authorizes an integrated waste management system consisting of one repository, an MRS facility and a transportation system.

First Repository

The Amendments Act directs OCRWM to characterize only the Yucca Mountain candidate site in Nevada to assess its suitability as a potential site for a repository. It authorizes the siting and construction, subject to existing licensing requirements, of a geologic repository. If the site is found at any time to be technically unsuitable, site characterization activities are to be terminated; the Congress and the Governor and legislature of Nevada are to be notified of the termination and the reasons therefor; and, not later than 6 months following termination, a recommendation is to be provided to the Congress regarding the permanent disposal of the waste.

An orderly phaseout of site-specific activities, other than reclamation, at the Hanford, Washington, and Deaf Smith, Texas, sites, was required to be completed within 90 days of enactment of the Amendments Act.

Second Repository

The Amendments Act prohibits site-specific activities with respect to a second repository unless the Congress expressly authorizes and appropriates funds for that purpose. Funding for research programs designed to evaluate the suitability of crystalline rock as a potential host medium for a second repository was to be phased out within 6 months of enactment of the Amendments Act. The Secretary is to report to Congress between 2007 and 2010 on the need for a second repository.

Monitored Retrievable Storage

The Secretary is authorized by the Amendments Act to site, construct, and operate a monitored retrievable storage (MRS) facility, subject to certain conditions. An independent MRS Review Commission was established and is to report to the Congress, by November 1, 1989² on the need for an MRS facility as part of an integrated waste management system. After the MRS Review Commission has submitted its report, the Secretary may start surveying and evaluating potentially suitable MRS sites. However, an MRS site may not be selected until the site for the first repository has been recommended to the President. Other conditions specify that the construction of the MRS facility cannot begin until the Nuclear Regulatory Commission (NRC) has issued a construction authorization for the repository, that no more than 10,000 metric tons of heavy metal (MTHM) may be stored at the MRS facility until the repository begins receiving waste, and that the quantity of waste present at the MRS site at any time thereafter may not exceed 15,000 MTHM.

Other Provisions

In addition to the MRS Review Commission, other new organizations established by the Amendments Act include the Office of the Nuclear Waste Negotiator and the Nuclear Waste Technical Review Board.

A Nuclear Waste Negotiator is to be appointed by the President, with the advice and consent of the Senate. The Negotiator is to seek a State or Indian Tribe willing to host a repository or MRS facility, at a technically qualified site, on reasonable terms. Any proposed agreement that is negotiated is to be submitted to the Congress, and an environmental assessment is to be prepared for the site concerned. Such a negotiated agreement would become effective only if it is enacted into law.

An eleven-member Nuclear Waste Technical Review Board is to be appointed by the President to evaluate the technical and scientific validity of waste management program activities and to report its findings not less than

² The Amendments Act originally required submission of the Commission's report by June 1, 1989; however, a provision of Public Law 100-507 extended that date to November 1, 1989.

twice a year to Congress and the Secretary of Energy.

The Amendments Act authorizes the Secretary of Energy to enter into benefits agreements with the Governor of Nevada and with the governing body of the Indian Tribe or with the Governor of the State containing the site selected for the MRS facility. A schedule for benefits payments is specified for both the repository and the MRS facility, and any State that receives a benefits payment is to transfer at least one-third of that payment to affected units of local government. In connection with any benefits agreement, the Amendments Act provides for the establishment of a review panel for the appropriate repository or MRS facility. The review panel is to include members selected by the State or Indian Tribe that is party to the agreement and by affected units of local government.

In addition, the Amendments Act expands the role of local governments affected by the siting and development of the repository and MRS facility. Affected units of local government may receive grants from OCRWM to enable them to participate directly in the review of siting, characterization and development activities and the preparation of impact assistance requests. The State and local government with jurisdiction over the proposed site of a repository or MRS facility are also given the opportunity to designate an onsite representative to perform oversight of program activities.

Draft Mission Plan Amendment

OCRWM'S strategy for developing the waste management system authorized by the Amendments Act was presented in the *Draft 1988 Mission Plan Amendment*.³ The *Mission Plan for the Civilian Radioactive Waste Management Program* was published in 1985, in response to a requirement of the NWPA, and two amendments to that document, apprising the Congress of significant developments in the program and OCRWM's plans, have since been issued; the first in 1987 and a second, in draft form, in June 1988.

In addition to describing the authorized waste management system and OCRWM's strategy for its development, the *Draft 1988 Mission Plan Amendment* presented the technical plans for developing an integrated system comprised of diverse program elements and the activities affecting them (e.g. the siting and the design of the repository and the MRS facility, licensing, and quality assurance). It also discussed OCRWM's institutional program, including plans for interaction with the new entities established by the Amendments Act, the State of Nevada,

affected units of local government in Nevada, the State or Indian Tribe that may host the MRS facility, the public, other Federal agencies, and regional, national and international organizations. Finally, the amendment described the management of the program, program funding, and DOE's contracts with electric utilities for waste disposal.

As explained in the *Draft 1988 Mission Plan Amendment*, the program for developing the authorized waste management system has been streamlined and focused by the Amendments Act. As a result, OCRWM will be able to concentrate more effectively on developing an integrated system that can achieve optimal efficiency, reliability and manageability. More important for the system as a whole and for each element of the system, OCRWM will also be able to focus its resources more effectively on the technical activities, on those actions that are required to ensure the protection of public health and safety, and on quality assurance.

The primary program strategy is to develop the authorized system in a technically sound and cost-effective manner. During the development process, system analyses will be performed to ensure that potentials for improving the system are identified and incorporated where appropriate. Contingency plans will be developed to prepare the program for adjustments that may be necessary in the future.

OCRWM is confident that the system authorized by the Congress is prudent, reasonable, and workable. Schedules developed at that time to meet the requirements of the Amendments Act showed that the MRS facility could be operational by 2003, and that the repository can also begin accepting waste in 2003. It may be possible to accelerate the schedule for waste acceptance at the MRS facility by developing it in phases. The first phase might be limited to facilities for receiving and storing spent fuel. The second phase would provide all other MRS capabilities for spent fuel preparation, including the loading of spent fuel into canisters, and would also include shipping facilities. The facilities required for spent fuel storage only could be constructed relatively quickly.

It is important to note that the primary requirement for any site remains technical suitability and ability to meet the licensing requirements of the Nuclear Regulatory Commission. Thus, although OCRWM intends to pursue aggressively the development of the waste management system authorized by the Congress, the protection of public health and safety and of the environment continue to be of paramount importance. It is also important to recognize that the ultimate objective of the waste management program remains permanent disposal in a geologic repository, and that the functions of the other components of the waste management system will be integrated to support that goal.

³ The final document is titled *OCRWM Mission Plan Amendment II*.

II.

Quality Assurance

An effective quality assurance (QA) program is essential to the achievement of the OCRWM mission and is required for demonstrating compliance with regulatory standards. The OCRWM QA program addresses the entire waste management system, including the geologic repository, storage and transportation activities and the Monitored Retrievable Storage facility. All items and activities with implications for radiological safety and waste isolation, and selected nonsafety-related activities of special importance to the OCRWM program are subject to the QA requirements established by the Nuclear Regulatory Commission. In addition, implementation of the QA program will assist in establishing public confidence in OCRWM's ability to build and operate its facilities safely.

OCRWM management has made a firm commitment to quality and is actively involved in all phases of the development of the QA program to ensure its success. OCRWM'S QA program flows down, through headquarters line organizations, to the project offices, contractor line organizations, and, ultimately, to the individual scientist, engineer, or technician performing the work.

In April 1988, OCRWM established a separate Office of Quality Assurance, whose Director reports directly to the Director, OCRWM. This direct reporting relationship assures that the official responsible for coordinating the development, implementation, and maintenance of quality-related activities is directly responsible to the highest management level in the organization.

During the year, the Office of Quality Assurance consolidated existing OCRWM QA documents, i.e., the OCRWM QA Management Policies and Requirements document and the QA Plan for High-Level Radioactive Waste Repositories, into the OCRWM QA Requirements and QA Program Description documents. These two documents constitute the basis for the ongoing development of the QA program, including specific QA administrative and technical procedures. Six OCRWM Headquarters QA administrative procedures were approved by the Director, OCRWM, in 1988, and eighteen others were in various stages of development. These procedures provide a tool for implementing QA requirements for all program activities.

The OCRWM QA Requirements and Program Description documents are supplemented by the *Yucca Mountain*

Project QA Plan (Nevada Nuclear Waste Storage Investigation/88-9) and other program participants' QA program documents.

During 1988, required program-wide indoctrination and training of all program participants, to ensure that they fully understand QA requirements and their individual responsibilities for quality, were initiated both at Headquarters and the Project Office. In addition, several surveillances were conducted to verify that the program is functioning according to requirements and plans and, when necessary, to correct any deficiencies.

Throughout this process, OCRWM actively engaged in 1988 in preclicensing consultations with NRC to discuss and resolve several NRC quality assurance concerns. In a July 1988 meeting with NRC, a master list of QA issues was developed, and strategies for their resolution were discussed. To ensure that NRC is kept abreast of OCRWM's progress in its QA implementation efforts, monthly program review meetings were initiated to establish a forum for participation by NRC, Edison Electric Institute, the State of Nevada, and other interested organizations and to provide status reports on the development and progress of QA-related actions.

In response to NRC concerns, OCRWM agreed to implement a step-by-step approach for resolving NRC comments associated with individual program participants' QA plans prior to the start of new site characterization activities. Toward that end, OCRWM identified (1) those portions of the QA program that need to be in place to support near-term site characterization efforts, (2) the activities required to establish and qualify those portions of the QA program, and (3) the schedule for completion of those activities, commensurate with the schedule for site characterization. The initial plan and schedule addressing near-term program activities was completed during 1988 and will be updated periodically in conjunction with QA program implementation.

This phased approach to satisfying quality concerns allows both OCRWM and NRC to monitor the progress of QA program development and implementation, to ensure that QA program development and qualification activities are scheduled and completed as needed, and to allocate the necessary resources.

III.

Site Characterization

Site Characterization is the collection of the scientific information necessary to determine the suitability of a site for development as a repository, to design the repository and the waste package, to prepare an environmental impact statement, and to obtain a construction authorization from NRC.

The NWPA established a process and a schedule for the development of geologic repositories. The Amendments Act narrowed the NWPA provision authorizing the characterization of three potential candidate repository sites by directing OCRWM to characterize only a single site—Yucca Mountain, Nevada—for the development of a geo-

logic repository. In addition, the Amendments Act required that site-specific activities be phased out at the Deaf Smith, Texas, and Hanford, Washington, sites within 90 days after enactment.

Site Characterization Plan

The NWPA, as amended, requires the development of a site characterization plan (SCP) for the Yucca Mountain candidate site (Figure 3-1). The SCP is to describe: (1) the

Figure 3-1
Location of the Yucca Mountain Site in Southern Nevada

site, the preliminary designs for the repository and the waste package, and the waste emplacement environment, to provide a context and basis for understanding the site characterization program; and (2) the issues which must be resolved during site characterization, the data required to resolve these issues, and the strategy for obtaining the required data.

The Yucca Mountain Site Characterization Plan-Consultation Draft (SCP-CD) was issued in January 1988 for review, and OCRWM had numerous interactions throughout the year with the Nuclear Regulatory Commission (NRC) and the State of Nevada concerning the characterization of Yucca Mountain. Comments on the SCP-CD were received from NRC, the State of Nevada, the U.S. Geological Survey and the Edison Electric Institute. Meetings were held with NRC in March, April, July and October 1988 to discuss NRC concerns regarding the exploratory shaft facility and issues pertaining to the recognition and use of alternative conceptual models. Following a thorough evaluation of the review comments, appropriate revisions were made. Additionally, a major effort was undertaken to develop more detailed cost and schedule estimates. As a result, revised site activity schedules were included in the SCP. Completion of the statutorily required SCP was on schedule for a planned release in December 1988.

Study plans, which support the SCP by providing a greater level of detail regarding planned investigations, were being written, reviewed, and, as necessary, revised. As completed, copies of study plans were to be sent to NRC and the State of Nevada for review. Altogether, more than 100 study plans were to be prepared.

Site Characterization Activities

During the site characterization period, detailed studies and tests will be conducted at the site and in the surrounding area to obtain necessary data to resolve major outstanding issues pertinent to the suitability of Yucca Mountain as a geologic repository. The site characterization process is designed to be flexible, and testing can be readily enhanced should results of early studies indicate that additional investigations are needed. Any changes to the program will be reported on a semiannual basis to NRC and to the Governor and legislature of the State of Nevada.

Site Investigation

Surface-based site investigations and data collection activities, as well as laboratory testing, initiated at the Yucca Mountain site in previous years, continued in 1988. These activities included hydrologic, geologic and geochemical studies. Moisture conditions and water levels were monitored from wells, and gas samples were also obtained periodically from the wells. Channel scour chains were monitored at three locations to measure the amount

of erosion that occurs in washes during times of heavy runoff. A weather station was operated to monitor precipitation, temperature and rainfall. Seismometers in the Yucca Mountain region continued automatically to record data on vibratory ground motion. Determinations of soil characteristics were conducted on a seasonal basis for the purpose of soil modeling; activities included dust-trap sampling, determination of field capacity of soils, and the periodic measurement of carbon dioxide and other soil gas concentrations.

Laboratory studies, using rock samples collected in the Yucca Mountain area, were conducted to enhance knowledge of geochemical field conditions. These studies addressed dynamic transport, mineralogy/petrology, sorption, natural isotopes, groundwater chemistry, solubility and hydrothermal conditions.

The entire site characterization program must adhere to rigorous quality assurance (QA) standards similar to those required for the characterization of a nuclear power reactor site. OCRWM will characterize the site using a fully qualified QA program to assure that high-quality data will be available to support the application for a license from NRC to construct and operate a nuclear waste repository. More importantly, the implementation of QA standards will help insure that the construction and operation phases of a nuclear waste repository, as well as the postclosure period, will pose no hazard to the public or the environment.

Repository Engineering and Technology

The ESF Title I Design was completed in 1988, and the ESF Title I Design Summary Report was scheduled to be available concurrently with the issuance of the SCP in December 1988. As part of the Title II Design project, procurement specifications will be prepared, and detailed procedures for the actual construction of the shafts and the underground test facility will be developed. During the ESF design process, numerous meetings and workshops were held with NRC to resolve problems. State and Indian Tribe representatives were also present during these interactions, which will continue as the design is further refined.

Repository design work for the Yucca Mountain candidate site proceeded during 1988. The *Site Characterization Plan Conceptual Design Report* (SCP-CDR) had been issued in September 1987. This SCP-CDR supports the discussion of the conceptual repository design provided in the consultation draft of the SCP for the Yucca Mountain candidate site. A perspective view of the proposed Yucca Mountain repository is shown in Figure 3-2. The conceptual design is based on vertical emplacement of waste packages as the reference case, with emplacement of multiple waste packages in long horizontal boreholes (up to 363 feet in length) as an alternative. The feasibility of variations of the horizontal concept is also being studied.

The Advanced Conceptual Design (ACD) phase for both the repository and the waste package will be used to explore design alternatives, as well as to refine and fix firmly the

Figure 3-2
Perspective of the Proposed Repository at Yucca Mountain

design criteria and concepts to be finalized in later design efforts, such as the License Application Design. It is expected that OCRWM's management and operating contractor (see Chapter IX) will be responsible for the initiation of the ACD. At the same time, OCRWM is proceeding with numerous pre-ACD studies of repository and waste package design features to support future ACD activities.

Waste package activities in FY 1988 emphasized development and refinement of postclosure compliance strategies for the required substantially complete containment period of 300 to 1000 years, followed by gradual controlled release of radionuclides. Through materials testing and evaluation activities, several metal alloys— austenitic stainless steel, high nickel alloys, copper, and copper alloys— were identified for further evaluation as container materials. Evaluation of lead as a waste package material, initiated in response to a Congressional directive in the fiscal year 1988 appropriations bill, will be completed in fiscal year 1989. The waste acceptance preliminary specifications for the Defense Waste Processing Facility and West Valley Demonstration Project were revised to resolve previously reserved items, as sufficient information became available.

Environmental and Socioeconomic Studies

Environmental protection planning is a critical component of repository project management. Requirements of the National Environmental Policy Act and other applicable environmental statutes and regulations will be met at the appropriate junctures in the civilian radioactive waste management program. To facilitate and coordinate the timely implementation of required environmental activities, a number of documents were under development in FY 1988, including an Environmental Program Overview, the Environmental Regulatory Compliance Plan (Revision 1), the Environmental Monitoring and Mitigation Plan and several Environmental Field Activity Plans.

The primary purpose of OCRWM's socioeconomic activities is to determine the impacts of site characterization and repository development and to mitigate any adverse impacts, as warranted. During 1988, socioeconomic activities focused on integrating the various data collection, data analysis and report preparation efforts that are necessary to assess the impacts of site characterization.

In 1988, OCRWM continued to monitor the size and distribution of the repository-related work force employed in Nevada. OCRWM was also preparing a socioeconomic impacts report for submittal to Congress in December 1988, in response to Section 175 of the NHPA, as amended. This report provides a preliminary assessment of potential repository-related socioeconomic impacts of the site characterization, construction, operation and decommissioning phases of the repository project. OCRWM's *Socioeconomic Monitoring and Mitigation Plan* will incorporate additional impact categories identified in the Section 175 report as being potentially affected by the repos-

itory project, and OCRWM will monitor and evaluate options for the mitigation of these impacts.

International Cooperative Research

During 1988, OCRWM continued its cooperation with foreign countries and international organizations on the storage, transportation, and disposal of spent nuclear fuel and high-level radioactive waste to obtain the benefits of foreign experience and to further the technology for disposal of radioactive waste.

In January 1988, OCRWM initiated a comprehensive review of its cooperative programs with other nations and international organizations. Section 161(c) of the Amendments Act required DOE to terminate research evaluating the suitability of crystalline rock as a potential host medium for a geologic repository. That mandate, and the direction provided by other sections of the Amendments Act to focus on the Yucca Mountain site, required OCRWM to undertake a thorough evaluation of its domestic and international research programs to determine which activities must be terminated, which should be continued or redirected, and which were no longer relevant to the current U.S. program. This review addressed bilateral exchange activities with Belgium, Canada, the Federal Republic of Germany (FRG), France, Japan, Sweden, Switzerland, the United Kingdom, and the Commission of European Communities, along with those cooperative activities being performed through participation in the Organization for Economic Cooperation and Development's Nuclear Energy Agency (OECD/NEA) and the International Atomic Energy Agency (IAEA). The review, completed in March 1988, resulted in the following actions:

- Site-specific, non-generic cooperative activities with the FRG, investigating salt as a potential repository medium, were terminated. However, OCRWM and the FRG will continue to exchange technical information in such areas as the development of storage casks and transportation systems.
- The subsidiary agreement between the U.S. and Canada has been set aside. OCRWM and Atomic Energy of Canada, Limited, are currently negotiating a new subsidiary agreement that will support current plans and technical objectives for studies at the Yucca Mountain site.
- The project agreement between OCRWM and the Swiss National Cooperative for the Disposal of Radioactive Waste was modified through the elimination of one task.
- Specific elements of the activities contained in the bilateral agreement between OCRWM and the Swedish Nuclear Fuel and Waste Management Company were eliminated.
- Other international activities, including the multinational work being performed in the Stripa Project

through the OECD/NEA to develop technology for application to repository investigations and assessments in fractured rock masses, and to develop techniques and materials to seal man-made penetrations into such masses, will be continued.

Cooperation with the Nuclear Power Inspectorate (SKI) of Sweden on the HYDROCOIN project, which compared the results of computer codes from participating nations using the same input data in a benchmark exercise, was completed in 1988. A published report of the results of studies involving five experiments and field studies in various media is expected in 1989, and a committee to draft a report focusing on sensitivity and uncertainty analysis is expected to meet in 1989. In addition, OCRWM continued cooperation with the SKI in the INTRAVAL project. INTRAVAL is currently addressing the validation of transport calculations using field studies. The INTRAVAL Validation Organizing and Integration Group was to meet early in 1989 to develop details of a working procedure for participating nations.

During 1988, OCRWM continued participation in the natural analog study in the Pocos de Caldas district of Brazil. The other participants in the multinational project are Sweden, Switzerland, the United Kingdom, and Brazil.

OCRWM also continued to participate in OECD/NEA waste management activities conducted by the Radioactive Waste Management Committee, the Advisory Group on In-Situ Research Investigations for Geologic Disposal, the Performance Assessment Advisory Group, and the Probabilistic Systems Assessment Codes Users Group. In addition, OCRWM continued to exchange program descriptions which further facilitated communications on the subjects of waste management policies, strategies and activities, and technical exchange meetings helped to ensure that the experiences of others are considered for possible specific application to the OCRWM program.

OCRWM continued participation in relevant IAEA activities through review of and comment on IAEA documents on guidelines, standards, and technical activities. In April 1988, OCRWM participated in the IAEA's first Coordinated Research Program meeting on the Behavior of Spent Fuel and Facility Components During Extended Storage (BEFAST II).

Financial Assistance

The Amendments Act provides for financial assistance only to the State of Nevada and affected units of local government. Therefore, no new funds were to be provided to Louisiana, Mississippi, Texas, Utah, or Washington after December 22, 1987. For phaseout activities by these States, OCRWM approved the use of portions of funds previously authorized. Phaseout activities in Louisiana, Mississippi and Utah—the salt sites that had not been selected as candidate repository sites—were completed by March 22, 1988. The States of Washington and Texas

completed phaseout activities later in the year. The Amendments Act directed OCRWM to phase out and terminate grants to Indian Tribes by December 22, 1988. For the Nez Perce, Umatilla, and Yakima Indian Tribes' phaseout activities, OCRWM approved the use of funds previously authorized; however, for the Yakima, who had only minimal carryover funds, it was necessary to approve an additional grant.

In June 1988, the Congressional appropriation to the Department for FY 1989 provided for financial assistance to the State of Nevada in an amount not to exceed \$11 million on an annualized rate for the period July 1, 1988, through June 30, 1989 (the period constituting the State of Nevada's fiscal year 1989), and not to exceed \$5 million on an annualized rate to affected units of local government.⁴ In FY 1988, the State of Nevada was awarded \$4.3 million for the period beginning July 1, 1988. The balance of the grant was to be awarded in FY 1989.

Nye, Clark, and Lincoln Counties in Nevada were designated as affected units of local government under Section 2(31) of the NWPAA, as amended, and have applied for financial assistance. Grants will be awarded early in FY 1989.

Site Closeout and Reclamation

The Amendments Act called for an orderly phaseout of site-specific activities other than reclamation at the basalt site (Hanford, Washington) and the salt site (Deaf Smith, Texas), within 90 days of enactment. In order to implement this requirement, OCRWM took the following steps:

- All prime contractors, grantees, national laboratories, and other Federal agencies were immediately notified of the requirements for termination of site-specific activities and for an orderly phaseout.
- Formal, technical guidance directing these parties to suspend or limit their activities was issued.
- A comprehensive review of all activities and the development of plans for an orderly phaseout were concurrently undertaken. The planning process was intended to ensure that site-specific activities would be terminated no later than March 21, 1988, and that valuable information that might be needed for future uses would be preserved.
- The development of plans for reclamation was directed.
- Formal termination letters containing specific directives to the majority of prime contractors were issued to ensure near-term completion of open contracts.

By March 22, 1988, OCRWM had terminated all activities except for the following reclamation and managerial and administrative tasks:

⁴ An affected unit of local government is defined in the Amendments Act as "the unit of local government with jurisdiction over the site of a repository or a monitored retrievable storage facility. Such term may, at the discretion of the Secretary (of Energy), include units of local government that are contiguous with such unit."

- Compilation, review, editing, and/or publication of key project documents, including computer programs;
- Disposition of records and documents, and storage of core samples;
- Final cataloging, classification, and disposition of surplus property;
- Determination of payments-equal-to-taxes for Washington State;
- Closing of information offices in Louisiana, Mississippi, Utah, Washington and Texas;
- Employee outplacement; and
- Management and administration of grants and terminated contracts.

OCRWM's reclamation policy requires the return of sites, as nearly as practicable, to their original condition, including reseeding them to replace natural vegetation. At the basalt site, in Washington, the Near-Surface Test Facility, the exploratory shaft site, borehole sites, and the 2101-M Hazardous Waste Pond were being reclaimed. In Louisiana, OCRWM restored boreholes, tiltmeter sites, and access routes. In Mississippi and Utah, boreholes and access routes were restored. In Texas, OCRWM removed the erosion monitoring and weather monitoring stations and a seismic monitoring network. All reclamation activities were to be completed in 1989.

Repository Litigation

More than 30 lawsuits involving major repository siting decisions were pending against the Department at the end of fiscal year 1988. These cases are all being heard by the U.S. Court of Appeals for the Ninth Circuit.

Litigated repository siting issues have been divided into three groups. The cases dealing with the repository siting guidelines published by DOE in December 1984 were consolidated by the Court under *Environmental Policy*

Institute v. Herrington (Case Number 84-7854). The second group of cases concerns the decisions and actions announced by the Secretary of Energy on May 28, 1986, regarding the first repository program. These cases have been consolidated under *State of Nevada v. Herrington* (Case Number 86-7307). The issues being litigated in this group include: (1) the final environmental assessments, (2) the nomination of five sites as suitable for characterization, (3) the recommendation of three sites for characterization, (4) the President's approval of the sites to be characterized, and (5) the preliminary determination that these three sites are suitable for the construction of a repository. The third group consists of the cases challenging the decision to postpone site-specific investigations for a second repository. These cases were consolidated by the Court under *State of Washington v. Herrington et al.* (Case Number 87-7085).

In February 1988, DOE filed, with the U.S. Court of Appeals for the Ninth Circuit, a motion to dismiss most of the pending lawsuits which challenge the siting guidelines and the May 28, 1986 decisions and actions on the first repository program. The exceptions involve two lawsuits by the State of Nevada, the first of which challenges the validity of the siting guidelines, while the second challenges the Department's authority to begin site characterization at Yucca Mountain without withdrawing public lands in accordance with the Federal Land Policy and Management Act.

Additionally, based on the Amendments Act, the Department filed a memorandum in January 1988 with the U.S. Court of Appeals for the Ninth Circuit to supplement the motion it had filed in October 1987 for dismissal of the lawsuits challenging the postponement decision on the second repository project. On April 26, 1988, the Court dismissed the petition. In February, the same Court dismissed the motions filed by the States of Nevada and Washington to enjoin site characterization pending promulgation of the EPA environmental standards.

IV.

Systems Integration

The NWPA, as amended, requires OCRWM to develop a system for the permanent disposal of spent fuel and high-level waste. The system consists of three elements: transportation, monitored retrievable storage (MRS), and a repository, each of which is individually complex. The development of the waste management system, therefore, involves the management of multidisciplinary activities, i.e., research, development, siting, design, and licensing. The objective of systems integration is to ensure that all elements of the waste management system are integrated in a manner that maximizes safety, operational efficiency and flexibility. The primary focus of systems integration during fiscal year 1988 was on revising major technical and baseline program documents to implement the Amendments Act.

Integrating the Waste Management System

Systems engineering plays a key role in OCRWM's efforts to integrate the elements of the waste management system. The systems engineering process is an interactive approach that defines the purpose of, and establishes the requirements for, major elements of the system; creates a design concept to satisfy the requirements; selects the preferred overall system; evaluates and optimizes the selected system; and builds, tests and demonstrates the chosen system. The generic systems engineering process is illustrated in Figure 4-1.

Work was initiated to update and expand OCRWM's Systems Engineering Management Plan (SEMP) which delineates organizational responsibilities and authority for the implementation of the systems engineering approach. The SEMF also establishes the methods by which progress will be measured, contains procedures to ensure integration through close coordination of efforts in diverse highly specialized engineering disciplines, and provides guidance for the development of individual program element SEMFs for transportation, monitored retrievable storage and the repository.

OCRWM's *Waste Management System Requirements and Description* document was divided into two separate parts—a *Waste Management System Requirements* (WMSR) document and a *Waste Management System*

Description document (WMSD). This will facilitate the periodic revision of the WMSD to ensure that it continues to reflect accurately the current system as the design and configuration evolve, while the WMSR will not be subjected to frequent revisions, permitting lower-level designs and studies to proceed with minimal disruption.

The WMSR serves as the apex of a hierarchy of increasingly detailed technical requirements documents prepared for each program element and provides a consistent reference for controlling the technical development of the waste management system. It will be complemented by a supporting volume which presents the rationale for including or excluding specific requirements.

The WMSD focuses on the documentation of a reference system and the associated assumptions, as well as documenting alternative systems under consideration.

The first draft of an integrated program-level logic network was initiated in 1988. This network includes all major activities of the program elements, specifies interfaces among program elements, and identifies key decision points and milestones.

Work also began on a System Study Plan to provide a methodical basis for the definition and timely implementation of studies to ensure that the information required to make programmatic decisions is available when needed.

Modeling efforts to provide analytic tools for use in systems integration studies included the development of three models, providing the capability to analyze the waste stream, system operations and logistics, and system costs. These models will be used to evaluate the interaction of the subsystem and system elements, to assist in their successful integration into an efficient and economical system, and to evaluate alternative system configurations and designs.

It is anticipated that the waste management system will be required to comply with U.S. and international safeguards regulations. Since certain elements of the system represent first-of-a-kind facilities and operations, current regulations and requirements must be expanded and possibly modified to apply the basic principles of nuclear materials accountancy and control to the overall waste management system. Therefore, in 1988, OCRWM initiated preliminary studies to identify and characterize potential issues associated with the development and imposition of international safeguards on the waste management system. This work served to support the U.S. delegation to

Figure 4-1
Generic System Engineering Process from DOE Order 4700.1

the initial meeting, in September 1988, of the International Atomic Energy Agency Advisory Group on Safeguards for Management and Disposal of Radioactive Waste. It also provided a basis for planning a more definitive OCRWM effort to address pertinent technical safeguards issues and to continue support of U.S. activities in the policy development area.

Transportation

Notable progress continued in 1988 toward the development of a safe, efficient, and environmentally acceptable transportation system, with work focusing on five major areas: cask design and development, economic and systems analysis, support system development, planning for transportation operations, and institutional interactions. Transportation system planning was expanded in 1988 to incorporate the requirements in the Amendments Act that only casks based on NRC-certified designs be used for waste shipment, that NRC shipment pre-notification procedures be followed, and that technical assistance and funding be provided to States for the training of local government personnel and Indian Tribes through whose jurisdictions the waste is to be transported.

Cask Design and Development

OCRWM proceeded with the design and development of a new generation of casks with larger carrying capacities for shipping spent fuel from commercial reactor sites to a repository or to an MRS facility. During February through July 1988, OCRWM completed negotiations and signed five contracts for the design of "from-reactor" casks. Under the contracts, General Atomics and the Westinghouse Electric Corporation will design legal-weight truck casks, and the Nuclear Assurance Corporation, Babcock and Wilcox, and Nuclear Packaging, Incorporated, will design rail/barge casks. Contract values range from \$7.7 million to \$14.9 million. Related contract activities, spanning 7 to 10 years, will require contractors to obtain design certification from NRC. The cask contractor efforts are being supported by an OCRWM research program that addresses broad technical and design issues.

Economic and Systems Analysis

Major activities in the economics and systems analysis area included the completion of a logistics model, continued development of data bases and the refinement of computer models for use in future cost and risk analyses. In addition, specific transportation options for truck and rail transportation were studied, and development of a systems study plan continued. The plan will assist in formalizing the approach used to define technical studies needed and schedules for their completion.

Support System Development

Evaluations of alternative approaches for providing the support facilities, equipment and services needed for an operating transportation system also continued in 1988. Primary efforts focused on the preliminary review of the function of a cask maintenance facility and definition of options and schedules for developing other support services, such as an operations control center.

Transportation Operations Planning

Operations planning proceeded in 1988 in two major areas: reviewing management options and evaluating the technical and procedural requirements for an operational transportation system. Consistent with provisions of the NWPA, as amended, OCRWM plans to use private industry to the maximum extent possible in conducting future transportation operations. An ongoing study was therefore continued in 1988 to review potential management configurations for conducting operations and industry's willingness and ability to provide efficient management services. OCRWM also initiated the drafting of documents defining the requirements and description of an operational transportation system that complies with NRC and Department of Transportation regulations.

Institutional Interactions

To support active participation in program planning by interested parties, OCRWM continued to hold meetings, distribute information, and extend cooperative agreements with State, Tribal and local groups. The Transportation Coordinating Group (TCG) met twice during 1988, once in Atlanta, Georgia, and once in Kansas City, Missouri. Public information materials were developed to reflect new program developments and planning. To foster the study of regional, national, and technical transportation issues and to approach a wide variety of institutional interests within an effective organizational structure, OCRWM extended cooperative agreements with the Southern States Energy Board, the Western Interstate Energy Board, the Commercial Vehicle Safety Alliance, the National Conference of State Legislatures and the National Congress of American Indians. Agreements with the Midwest Office of the Council of State Governments and the Council of Radiation Program Control Directors were also initiated. OCRWM continued to work closely with other Federal agencies to coordinate planning and address issues that include emergency preparedness, vehicle inspection, and the enforcement of safety regulations.

OCRWM also continued working with States and Indian Tribes to address their needs for information about waste shipment. As required by the Amendments Act, OCRWM will comply with NRC prenotification regulations which

require that written notification be provided to States before waste shipments are conducted within or through their borders. In 1988, OCRWM began evaluating the potential use of satellites to track shipments and provide real-time shipping information.

During 1988, OCRWM developed a phased approach for meeting the training provisions of the Amendments Act. The first phase involves the determination of the training needs of local governments and Indian Tribes. As part of this effort, Federal, State, local and Indian Tribal roles in shipment inspection and emergency response activities must be defined and, subsequently, existing training programs must be evaluated to determine which local and Tribal jurisdictions require additional training. It is expected that technical and financial training assistance will be provided 3 to 5 years before the shipment of waste to a repository or MRS facility begins.

Monitored Retrievable Storage

The NWPA directed the Secretary of Energy to prepare a proposal outlining a program for the siting, development, construction and operation of a monitored retrievable storage (MRS) facility. OCRWM formally submitted the MRS proposal to Congress on March 31, 1987. The proposal recommended that Congress authorize the Department to construct and operate, subject to NRC licensing, an MRS facility at a site on the Clinch River within the Roane County portion of the city of Oak Ridge, Tennessee.

Sections 142-149 of the NWPA, as amended, annulled this proposal, but did authorize siting, construction and operation of an MRS facility subject to certain conditions. An independent MRS Review Commission was established

and is to report to the Congress by November 1, 1989⁵, on the need for an MRS facility. After the Commission's report has been submitted, OCRWM may survey, evaluate, and identify potentially suitable sites.

The Amendments Act specifies several conditions for the MRS facility which establish a connection between the MRS facility and the repository. First, a site for an MRS facility may not be selected until after the Secretary of Energy has recommended to the President a site for development of a repository. Second, the construction of the MRS facility may not begin until NRC has issued a construction authorization for the repository. Third, if the construction authorization for the repository is revoked, or if the construction of the repository ceases, the construction of, or waste acceptance by, the MRS facility must also cease. In addition, the Amendments Act specifies that no more than 10,000 metric tons of heavy metal (MTHM) can be stored at the MRS facility until the repository begins receiving waste; the quantity of waste present at the MRS site at any one time thereafter may not exceed 15,000 MTHM.

In response to provisions in the Amendments Act concerning MRS, OCRWM is updating its analysis of functions for an MRS facility integrated into the waste management system. This activity began in 1988 and will be completed in early 1989 so that the results of these studies will be available to the MRS Commission for use in its review. The studies being conducted include generic engineering and design tradeoff analyses for alternative MRS packaging functions, assessments of storage technologies which could be utilized at the MRS, identification of licensing concerns, transportation impacts of generic eastern and western MRS sites, the need for storage within the waste management system, and the impacts on at-reactor operations of various system scenarios. Results of these studies were to contribute to the development of an updated DOE position on the optimal functions of the MRS facility.

⁵ The Amendments Act originally required submission of the Commission's report by June 1, 1989; however, a provision of Public Law 100-507 extended that date to November 1, 1989.

V.

Spent Fuel Storage and Engineering Development

Significant progress was made in 1988 in advancing the technology for spent fuel storage, developing and demonstrating rod consolidation equipment, and performing engineering evaluations of promising technologies for applications in the waste management system. Storage technology benefitted from OCRWM's participation in international activities, and cooperation in providing technical assistance to nonnuclear weapon states continued under Section 223 of the NWPA. Finally, plans for a Federal interim storage program were updated as required under Subtitle B, Title I, of the NWPA.

Spent Fuel Storage

Demonstrations of Spent Fuel Storage

Dry storage technologies, such as casks, silos, drywells and vaults, are a promising method for providing additional capacity for spent fuel storage at nuclear power plants. Full-scale demonstrations of two of these technologies—dry storage casks and horizontal concrete silos—continued under cooperative agreements with two utilities, Virginia Power (VP) and Carolina Power and Light Company (CP&L). These demonstrations and associated engineering tests will provide the utility industry with information for the licensing of dry storage installations by the NRC.

Site-specific licenses have already been issued to VP and CP&L for independent spent fuel storage installations (ISFSI) at the sites of the Surry plant and the H.B. Robinson plant, respectively. The Surry plant ISFSI employs dry storage in metal casks, and the installation at the Robinson plant uses dry storage in modularized horizontal concrete silos.

During 1988, VP increased the number of dry storage casks in use to eight. Figure 5-1 shows the fourth cask being emplaced at the Surry plant ISFSI. CP&L completed construction of its facility and began final testing prior to operation. The storage technology used by CP&L is depicted in Figure 5-2. As an indication of the utility of these technology demonstrations, Duke Power applied for an NRC license in 1988 to establish and operate an ISFSI at its Oconee plant in South Carolina. This facility would utilize an expanded version of the technology currently employed by CP&L.

Supporting Studies for Spent Fuel Storage

In support of the DOE/VP cooperative agreement, work was conducted at the Idaho National Engineering Laboratory to collect heat transfer and radiation shielding test data using three dry storage casks containing unconsolidated spent fuel assemblies. Testing was conducted in both vertical and horizontal orientations with vacuum, nitrogen, and helium atmospheres. All three cask tests were completed in 1988.

Generic R&D work in support of spent fuel storage technologies continued in 1988 for the purpose of providing generically applicable licensing information. The studies conducted relate to the performance of dry storage systems that utilities may implement at reactor sites and the development of the technical bases needed to show that dry storage is a safe storage method that will not degrade the integrity of the spent fuel or the storage system.

In 1988, tests and matrix demonstrations to examine the behavior of spent fuel in storage continued. A statistically designed test was initiated with light water reactor fuel rod segments containing intentionally manufactured defects to determine the extent of fuel cladding degradation over time and other phenomena under a variety of test conditions. The results of these tests facilitate the development of models defining recommendations of acceptable conditions for storing spent fuel in an oxidizing atmosphere. The experimental data gathered permitted the verification, in 1988, of two computer models developed by OCRWM to permit predictions of heat transfer characteristics of dry storage systems.

Progress was also made in 1988 in the assembly of a base of information for dry storage and rod consolidation that contributes to generic design, licensing, and operation of storage concepts. These data are derived from numerous laboratory tests, DOE/utility cooperative demonstrations, and the monitoring of foreign dry storage technology experience. Several spent fuel storage-related reports were completed in 1988 addressing characteristics of fuel crud; categorization of failed fuel; cover gas recommendations for spent fuel; recommended temperature limits for zircaloy-clad fuel in inert gases and nitrogen; performance, integrity, storage, and handling behavior of extended burn-up fuel; and dry storage licensing issues.

Figure 5-1
Storage Cask Emplacement at Virginia Power's IFSF

Figure 5-2
Dry Storage Technology Utilized by CP&L

As required by the Amendments Act, a study was begun in January 1988 to evaluate the use of dry cask storage at nuclear reactor sites as a means of temporary storage of spent fuel until a Federal facility is ready to receive the waste. This study was issued in draft form, under the title *Initial Version Dry Cask Storage Study*, in August 1988, for review by NRC, the States and the public. Following a careful evaluation of the comments received on the draft document and appropriate revision, the final study, along with final NRC comments, was expected to be transmitted to the Congress early in 1989. The final Dry Cask Storage Study was to provide a comprehensive review of at-reactor spent fuel storage requirements, the status and description of dry storage technologies, and the projected impacts of dry spent fuel storage on the overall waste management system in terms of costs, health and safety, and environmental considerations.

Rod Consolidation

Rod consolidation involves the dismantling of a spent fuel assembly, separating the fuel rods from the hardware that holds them together, rearranging the rods into a more compact array, and separately storing the non-fuel-bearing components. This procedure is a method for significantly increasing the amount of spent fuel that can be stored in some reactor storage pools and for reducing the capital cost of providing dry storage at a reactor site. Consolidation also has the potential to provide cost savings in spent fuel transportation and emplacement in a repository. Figure 5-3 illustrates prototypical equipment that is planned for use in demonstrating the technical feasibility of rod consolidation.

Equipment for spent fuel rod consolidation in a dry environment was installed at the Idaho National Engineering Laboratory in May 1987. By the end of 1987, 48 assemblies (24 metric tons of uranium) had been successfully consolidated. This was the first demonstration anywhere of dry rod consolidation at a significant level, and it provided information on the technology, equipment design, and operations. The resulting technical data also provided input for the development and demonstration of prototypical, production-scale, dry rod consolidation equipment that was designed during 1987. In 1988, a single contractor was selected to fabricate and conduct cold (non-radioactive) checkout of the prototypical dry rod consolidation equipment. Equipment delivery and cold testing is expected to begin at INEL in 1990.

Federal Interim Storage

As required by Section 135(f) of the NWPA, OCRWM prepared and submitted to Congress the sixth annual deployment plan for Federal interim storage (FIS). This plan included updated information on shipping capabilities, data on spent fuel that may require Federal interim storage, and a generic outline of the activities that would be

required to develop the capacity for such storage. In accordance with Section 136(a) of the NWPA, fees to be charged for Federal interim storage for calendar year 1989 were scheduled for publication in the *Federal Register* in December 1988.

The NWPA, as amended, does not authorize the Department to enter into contracts for FIS after January 1, 1990. No utility has applied for FIS and, in view of the availability of demonstrated at-reactor dry storage technologies, none are expected to apply.

International Cooperation

The United States is a participant in IAEA's BEFAST (Behavior of Spent Fuel Assemblies in Extended Storage) coordinated research program. During 1988, the BEFAST II working group published its final report summarizing the work to date on the project. The U.S. participated by providing the lead consultant for the preparation of a world survey of wet and dry spent fuel storage experience. Issuance of the draft report was planned for late FY 1988. In addition, an IAEA advisory group continued development of a report on the economics of spent fuel storage.

Cooperation with Nonnuclear Weapon States

Section 223 of the NWPA requires that both DOE and NRC offer cooperation and technical assistance in spent fuel storage and disposal to nonnuclear weapon states, including assistance in the health, safety, and environmental regulation of such activities. Since the first offer of assistance appeared in the *Federal Register* (48 FR 13253) on March 30, 1983, 16 countries have requested either information or technical assistance. In response to some of these requests, OCRWM has arranged visits to various U.S. facilities and provided technical briefings on the spent fuel management program.

The *Federal Register* notice (52 FR 10792) renewing this offer for the fifth and last consecutive year was issued jointly by the Department of Energy and NRC in April 1988.

During 1988, followup meetings to monitor the status of cooperative activities were held with representatives of the Korean Ministry of Science and Technology and with the Coordination Council for North American Affairs from Taiwan.

Engineering Development

One of the technical issues to be addressed during the development of the waste management system is the degree to which new and improved technologies (e.g. robotics) should be included in the design of waste management facilities. Both new and more traditional, fully demonstrated candidate

Figure 5-3
Prototypical Configuration of Rod Consolidation Equipment

technologies must be evaluated and, if found to be appropriate, adapted for use in OCRWM's waste management facilities through engineering development and design accommodations. A major objective is to optimize system availability, reliability, and maintainability.

Steps were taken in 1988 to catalog the operational requirements and unit operations for each element of the

waste management system. This information will direct the analyses and cost tradeoff studies of candidate technologies and components on which the selection of technological options and the advanced designs of waste management facilities are based. The analyses will also identify any research and development efforts which may be required to adapt the technologies for use by OCRWM.

VI.

External Relations and Outreach

The NWPA, as amended, contains extensive provisions to ensure that accurate and timely information about the radioactive waste management program is available to affected States and Indian Tribes, local governments, and the general public. It is OCRWM's policy to enhance understanding of program goals and activities in order to promote and encourage constructive participation by interested parties in the planning and implementation of the civilian radioactive waste management program. In addition, the Amendments Act established several new institutional entities with which OCRWM must interact in carrying out the provisions of the legislation.

OCRWM's information and outreach efforts are tailored to meet the specific needs of the various interest groups. This chapter discusses, in turn, the range of interactions undertaken by OCRWM to meet the needs of each.

Public Information and Outreach

Public participation in the planning and development of the waste management program is essential to its success. Therefore, OCRWM has maintained the policy that opportunities for participation by the public and affected parties not be sacrificed for the sake of accelerating program schedules. While some of these opportunities were explicitly included in the siting process specified by the NWPA, as amended, others were provided by OCRWM on its own initiative. A recent example of the latter is the distribution for public comment of the *Draft 1988 Mission Plan Amendment*.

OCRWM remains optimistic that continued exchange of information and interactions with all affected parties will eventually lead to a better understanding of and greater support for its program. The mechanisms for these interactions include notification, through the news media and State and local officials, of upcoming meetings and workshops for, or open to, the public; the development and distribution of publications and information materials; the operation of a speakers' bureau; the development of educational programs; the maintenance of community information offices; the conduct of formal public hearings; the support of cooperative agreements with national organizations such as the League of Women Voters, the National Conference of State Legislatures and the National Con-

gress of American Indians; and the provision of responses to public comments on key program documents and issues.

Since the Amendments Act has produced significant changes in the scope, content, and focus of the program, OCRWM is carefully reviewing outreach materials and is updating them as appropriate. In addition, as the program progresses, new public information materials will be developed and made available. A high-priority initiative that is currently under way is the development of a 5-year communications plan for OCRWM. Its purpose is to define, seek, evaluate, and regularly update the opportunities, mechanisms, and processes for participation by affected and interested parties. Included in this plan will be an outreach and participation plan for the repository project at the Yucca Mountain candidate site.

OCRWM routinely prepares a number of printed publications about the waste management program. These printed materials include the monthly *OCRWM Bulletin*, which announces program activities; the *OCRWM Backgrounder*, a series of papers dedicated to specific program activities and topics; *OCRWM Fact Sheets*, which describe various elements or activities of the program; reports on various technical topics; and press announcements. Both the *OCRWM Bulletin* and the *OCRWM Backgrounder* have attracted growing and widely diversified audiences. The mailing list for the *Bulletin* has expanded from approximately 125 recipients 3 years ago to nearly 8,000 in 1988.

Computer-based information services include the OCRWM INFOLINK, an electronic bulletin board providing current information on program policy, and a group of computer codes that can be used to assess various aspects of the waste transportation system. Also available are data bases and models that can aid in estimating radiation doses, radionuclide transport, and related factors.

The most important effort in 1988 was the development of a public outreach program to accompany the issuance of the site characterization plan (SCP) for the Yucca Mountain site. In addition to official briefings for the State of Nevada and the Nuclear Regulatory Commission, this outreach program includes public briefings; public hearings; the distribution of fact sheets, an *SCP Public Handbook* and a comprehensive SCP overview prepared specifically for the public; press announcements and releases; and an opportunity for submitting written comments.

External Boards and Commissions

The Amendments Act establishes several new organizations with which OCRWM must interact: the MRS Review Commission, the Nuclear Waste Technical Review Board, repository and MRS review panels, and the Office of the Nuclear Waste Negotiator. OCRWM is prepared to support these entities by responding promptly to requests for information, data collection, analyses, briefings, and other assistance they may require in carrying out their responsibilities. To facilitate its interactions with these entities, OCRWM has designated personnel to coordinate requests for information and other support.

The MRS Review Commission was appointed by the President *pro tempore* of the Senate and the Speaker of the House of Representatives and sworn in on June 14, 1988. Its members are Mr. Alexander Radin, former executive director of the American Public Power Association, Chairman of the Commission; Dr. Dale E. Klein, Deputy Director of the Center of Energy Physics at the University of Texas at Austin; and Dr. Frank L. Parker, Professor at Vanderbilt University and Chairman of the Board on Radioactive Waste Management of the National Research Council. The Commission is to submit to the Congress, by November 1, 1989⁶, a report on the need for an MRS facility as part of a waste management system that achieves the purposes of the Amendments Act. The report is to include: (1) an evaluation of the status and adequacy of DOE's evaluation of the advantages and disadvantages of an MRS facility, (2) an evaluation of the technical utility of an MRS facility, and (3) a recommendation to the Congress as to whether an MRS facility should be included in the waste management system. In preparing the report, the Commission will obtain comments from affected parties, including States containing potentially acceptable sites. In 1988, the Commission held meetings with OCRWM, with other interested parties, and the public. OCRWM has provided briefings and information specifically requested by the Commission, as well as documents that the Commission may find useful.

The Nuclear Waste Technical Review Board is an independent board that is to consist of 11 members appointed by the President from among candidates nominated by the National Academy of Sciences. The Board is to evaluate the technical and scientific validity of activities of the waste management program and is to report its findings not less than twice a year to the Congress and the Secretary of Energy. The Board will exist until a year after the repository begins operation.

A review panel will be established if OCRWM enters into a benefits agreement with a State or an Indian Tribe for

siting a repository or an MRS facility. Each panel is to include members selected by the Governor or the governing body of the Tribe, as well as by the affected units of local government. Other members, representing those making payments into the Waste Fund and other public interests, are to be selected by the Secretary of Energy. The duties of the panel include reporting to the Secretary the results of its evaluations of the performance of the repository or the MRS facility and recommending corrective measures, as appropriate.

The Nuclear Waste Negotiator, to be appointed by the President and confirmed by the Senate, is to seek a State or Indian Tribe willing to host a repository or an MRS facility, at a technically qualified site, on reasonable terms. Specifically, the Nuclear Waste Negotiator has authority to attempt to reach a proposed agreement specifying the terms and conditions under which the State or Indian Tribe would offer to host a repository or an MRS facility; to consult with any State, Indian Tribe, or local government that may be affected by the siting of such facilities; and to consult with other Federal agencies as to the suitability of the site for an MRS facility or for characterization as a candidate site for a repository. If a proposed agreement is reached, the Negotiator is to submit it to the Congress. The agreement must be enacted into Federal law before it becomes effective.

Consultation and Cooperation

OCRWM believes that effective institutional relations and consideration of the recognized needs of affected parties will enhance the potential for success of the waste management program. In this regard, consultation and cooperation is viewed broadly as an ongoing process which includes (1) the elements of the NWSA that address formal Consultation and Cooperation Agreements for affected party interactions and the provision of benefits or impact assistance, (2) informal interactions with affected parties, and (3) oversight by onsite representatives of affected parties.

On April 6, 1988, OCRWM sent an invitation to the State of Nevada to begin negotiations for a Consultation and Cooperation Agreement under Section 117 of the NWSA, as amended. This was a renewal of an earlier offer made on November 19, 1986. In addition, the State was invited to enter into negotiations to develop a benefits agreement as outlined in Section 170. Finally, an offer was extended to work with a designated onsite representative to conduct oversight activities at Yucca Mountain, per Section 117.

The State subsequently responded in a May 20, 1988 letter, indicating its desire to continue the use of informal procedures to meet its interaction requirements with the Department and not to seek formal negotiations on a Consultation and Cooperation Agreement at that time. Further, the State expressed its intent not to seek a Benefits Agreement but, instead, submit an impact assistance re-

⁶ The Amendments Act originally required submission of the Commission's report by June 1, 1989; however, a provision of Public Law 100-507 extended that date to November 1, 1989.

quest, per Section 116. While a specific onsite representative was not identified by the State, the letter indicated that the State's oversight role will be performed by Nevada's Agency for Nuclear Waste Projects.

Informal interactions with affected parties will continue to be an ongoing activity that addresses the need of affected parties for understanding program plans and permits their concerns to be aired and evaluated. OCRWM will continue to maintain informal working relationships with affected parties. At the same time, OCRWM recognizes that its ability effectively to address significant issues raised would be enhanced substantially by having formal mechanisms for resolving differences defined in negotiated agreements.

The NWPA, as amended, provides that affected local governments are also to be afforded the opportunity to participate in the consultation and cooperation process. As the unit of local government having jurisdiction over the site, Nye County was designated an "affected" unit of local government in accordance with the definition in Section 2 of the NWPA, as amended. Section 2 also provides that the Secretary may confer affected status on units of local government that are contiguous with Nye County. After considering applications from Clark and Lincoln Counties, these counties were also designated "affected" units of local government. This status establishes these counties' eligibility for financial assistance under the provisions of Section 116.

VII.

Program Management

This chapter reports on program management activities and accomplishments during 1988 and provides a summary description of the management organization.

Financial Management

OCRWM'S primary financial responsibility is the management of the Nuclear Waste Fund (NWF) established by the NWSA to ensure that the Government recovers from the owners and generators of radioactive waste the full cost of the disposal services it provides. In addition to preparing, submitting and executing budgets, management of the NWF includes establishing fees, handling investments, accounting for revenue and expenses and conducting annual evaluations of fee adequacy.

Nuclear Waste Fund Revenues and Expenses

During fiscal year 1988, the ongoing fee of 1 mill per kilowatt-hour (kWh) on electricity generated by nuclear power plants produced \$515.7 million in revenue. As of September 30, 1988, the book value of the NWF's investments was \$1.923 billion, compared to \$1.688 billion a year earlier. For the fiscal year ending on September 30, 1988, interest earned on the Fund's investments totaled \$142 million. Audited financial statements of the NWF, in Chapter VIII, provide further information on Fund revenues and expenses.

During fiscal years 1986 and 1987, the Department of Energy reimbursed utilities for overpayments into the NWF pursuant to a December 6, 1985 decision of the U.S. Court of Appeals for the District of Columbia in the case *Wisconsin Electric Power Company v. Department of Energy*. The effect of this decision was to define the electric generation on which the ongoing fee is levied as "net generation," i.e., the electricity leaving the site of the power plant, rather than "gross" electric generation at the plant. In 1988, OCRWM obtained Congressional authorization for the payment of interest on the amounts refunded; the applicable interest rates were set by the U.S. Department of the Treasury. Accordingly, during FY 1988, interest payments totaling \$7.7 million were paid or credited to utilities.

Litigation

Two Standard Disposal Contract-related lawsuits were pending against the Department at the end of FY 1988. The first, *Consolidated Edison Co., et al. v. U.S. Department of Energy* (Case Number 88-1194), represented an action by three utilities that requested judicial review of the basis for payment of fees into the NWF. Specifically, these utilities were seeking a determination that certain categories of electricity generated by nuclear power plants should not be included in the generated electricity upon which the fee is assessed. The second, *Commonwealth Edison Co. v. DOE* (Case Number 88-1585), sought review of DOE's interpretation of a contract provision governing the rate at which interest will accrue on the one-time fees collected for spent nuclear fuel generated prior to April 7, 1983. Initial briefs were filed with the U.S. Court of Appeals for the District of Columbia Circuit by both Commonwealth Edison Company and DOE in 1988.

Total System Life Cycle Cost Study and Fee Adequacy Assessment

Analysis and implementation of the changes to the waste management program directed by the Amendments Act resulted in a delay in the preparation of the annual total system life cycle cost study for OCRWM and the fee adequacy assessment, neither of which was published in fiscal year 1988. Both documents were scheduled for issuance in 1989.

Program Management System

Revision of the OCRWM program management system began in 1988 to reflect passage of the Amendments Act; to bring major documents, such as the Program Management System Manual, into alignment with the current OCRWM organization that was implemented in April 1988; and to acknowledge the role of a management and operating (M&O) contractor for systems engineering, development and management. A Source Evaluation Board was established by OCRWM in 1987 to begin the procurement process leading to the ultimate selection of the M&O

contractor. In 1988, OCRWM continued to issue the Quarterly Report on Program Cost and Schedule and published its second Annual Capacity Report in June 1988.

Information Management

Managing the collection, storage, and retrieval of program information is critical to the success of the licensing process and to establishing public confidence in the program. In July 1988, OCRWM issued its *Records Management Policies and Requirements* document which established standards for OCRWM records management activities. Standard procedures for the collection, coding, storage and retrieval of documents at headquarters and project offices resulted in the addition of more than 82,000 documents to the automated Records Information System over the last year. As a result of the closure of the Salt and Basalt project offices, important records were transferred to headquarters control, and information management equipment and systems from the closed sites were redistributed within the program to enhance management support and reduce operating costs. The functional requirements for systems to track the resolution of issues and the fulfillment of commitments were defined, and prototype systems were under development. Progress continued in the development of a licensing support system (LSS), which is required to support the repository license application, with the publication of a preliminary needs analysis, preliminary data scope analysis, conceptual design, and benefit-cost analysis documents. OCRWM participated with NRC and potentially affected parties in a negotiated rulemaking to determine how the LSS will be used. When operational, the LSS will be managed by the NRC, with major computer facilities located at the University of Nevada, Las Vegas.

Program Cost and Schedule Baseline

As a result of the Amendments Act and the OCRWM Headquarters reorganization, the concept of the program-level cost and schedule baselines was revised. Work began on a combined OCRWM *Program Cost and Schedule Baseline* (PCSB) to replace the existing *Program Reference Schedule Baseline* (PRSB) and the planned *Program Reference Cost Baseline* (PRCB). This PCSB will provide OCRWM with a single document for cost and schedule baseline control, which will be administered in an integrated fashion by multiple-level change control boards to ensure that decisionmaking occurs at appropriate levels. This single, integrated document for managing the baseline is required in order to ensure that senior OCRWM management is kept fully aware of the implications that individual, lower-level changes may have on the overall program schedule and cost. The PCSB will initially cover the costs and major milestones for the repository and transportation elements of the program.

During 1988, significant progress was made towards developing the PCSB. An iterative process of identifying Headquarters-controlled milestones subject to baseline management (i.e., related to reporting, monitoring, analysis, corrective action plans, and change control) was undertaken by headquarters and project office staffs. This process has resulted in a set of program milestones that cover the period through submittal of the repository license application to NRC. A new feature included in the baseline, which was not part of the PRSB, is a statement of explicit criteria defining when each milestone is completed. Dates for milestones in the PCSB were being revised in conjunction with the preparation of the *OCRWM Mission Plan Amendment II*. The costs in the PCSB will be consistent with OCRWM budget requests submitted to Congress.

Annual Capacity Report

The second *Annual Capacity Report*, required by the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste, was published in June 1988. This report provides, for planning purposes, the projected annual receiving capacity of the waste management system and a ranking for annual acceptance of spent fuel during the first 10 years of facility operation. The report also provides a mechanism for communicating to the owners and generators of spent fuel and high-level radioactive waste how the Department intends to discharge its responsibilities under the contract.

The first ACR (June 1987) included an offer by DOE to work cooperatively with the Purchasers to resolve contract-related issues. The Utility Nuclear Waste Management Group, in cooperation with the United States Council for Energy Awareness, formed an ACR Response Team which invited OCRWM to participate in staff-to-staff technical exchanges to identify, prioritize and exchange views on issues of concern. The issue resolution process progressed during the year, with meetings held on December 8 and 9, 1987; March 3, 1988; and October 13, 1988. As a result of this joint effort, 11 priority issues were identified which will assist OCRWM in establishing waste acceptance criteria, defining allocation and delivery strategies, and developing waste classification procedures necessary for the waste acceptance process to proceed.

Management Organization

Significant modifications to OCRWM's organizational structure were approved and implemented in April 1988. The reorganization was designed to enhance the effectiveness of the program, as redirected by the Amendments Act, and to reflect the high priority OCRWM accords quality assurance. The new management structure (Figure 7-1) is comprised of five major components:

Figure 7-1
Office of Civilian Radioactive Waste Management Organization

Office of Quality Assurance

The Director, Office of Quality Assurance is responsible for the management, coordination, integration and overview of OCRWM quality assurance activities, to ensure that documentation of technical work meets NRC requirements for licensing of component parts of the waste management system and that all aspects of the waste management program comply with NRC quality assurance requirements. In addition, the Director is responsible for conducting internal QA audits, as well as audits of the project offices and headquarters-managed contractors, and providing appropriate QA training

Office of Program Administration and Resources Management

The Associate Director for Program Administration and Resources Management has primary responsibility within OCRWM for the development, implementation and maintenance of an OCRWM-wide program management system (PMS), a program management information system, the project decision schedule, and for the proper management and administration of the Nuclear Waste Fund and Interim Storage Fund. Resource management responsibilities include activities related to fee collection and payment procedures, establishment of methods for review and the actual performance of an annual review to determine fee adequacy, management of contracts for disposal and interim storage services, land acquisition activities, management of financial assistance activities, preparation and execution of OCRWM budgets, fund control and accounting activities, review of cost and schedule plans prepared by project offices, preparation and maintenance of overall program schedules, management of information and data systems, preparation of special management studies and provision of administrative support services to OCRWM. The Office also has responsibility for management of the Headquarters support services contract and other procurement support activities.

Office of Facilities Siting and Development

The Associate Director for Facilities Siting and Development has primary responsibility within OCRWM for site screening and characterization of the Nevada site and a Monitored Retrievable Storage (MRS) site, providing management oversight and technical direction of geoscience activities; developing programmatic guidance on policy and procedures for selection of the site of the first repository and the MRS facility (in the absence of a volunteer host), preliminary and final site selection for both the geologic repository and MRS facility; design and construction of exploratory shafts; design, development, construction, operation and decommissioning of a geologic repository and MRS facility; design, development, siting,

construction, and operation of a test-and-evaluation facility (TEF), if required; providing socioeconomic and institutional support for the facility siting and evaluation process; management of RD&D activities, and providing direction and approval of cost and schedule plans for assigned responsibilities.

Office of Systems Integration and Regulations

The Associate Director for Systems Integration and Regulations has primary responsibility within OCRWM for planning, managing, and overseeing the integration of the civilian radioactive waste management system, developing and managing the transportation program, developing a program for the development and demonstration of rod consolidation equipment, management and coordination of the OCRWM safety program, providing direction and approval of cost and schedule plans for assigned responsibilities; and preparation and coordination of environmental impact statements. In addition, the Associate Director is charged with preparing and developing a licensing plan for the first geologic repository and an MRS facility, managing the regulatory compliance program, developing the Waste Management System Requirements and Waste Management System Description documents, and ensuring that the Licensing Support System contains necessary information to meet licensing requirements, including rulemaking procedures. The Associate Director is also responsible for coordinating and managing activities leading to the licensing of a geologic repository and MRS, including the development of a license application and safety analysis report; performing safety, risk and performance assessments to support repository and MRS design, and demonstrating compliance with regulatory requirements and with State and local environmental regulations.

Office of External Relations and Policy

The Associate Director for External Relations and Policy has primary responsibility within OCRWM for developing overall program policy and strategy and is generally responsible for OCRWM interactions with external (non-DOE) entities, i.e., all Congressionally mandated commissions and boards, the Nuclear Waste Negotiator, potential volunteer States or Tribes, and the National Academy of Sciences. The Associate Director also coordinates OCRWM's international and Congressional affairs, public information and media relations, and institutional program activities.

Operations Offices and Project Offices

Major programmatic activity assignments to DOE operations offices are shown in Figure 7-2.

Two operations offices had assignments for major elements of the transportation system. The Idaho Operations

Figure 7-2
DOE Operations Offices Responsible for Major Projects

NOTES:

1. The Richland Operations Office administers, without a Project Office, studies related to monitored retrievable storage (MRS).
2. Two operations offices administer activities related to spent-fuel storage. Richland administers storage technology. Idaho administers dual-purpose cask development.
3. Two operations offices administer transportation activities. Idaho administers transportation cask development. Chicago administers transportation activities related to institutional, economic, and environmental issues and activities related to the operation of the transportation system.
4. In addition, the Oak Ridge Operations Office provides support in the areas of data collection, validation, and verification for the integrated data base.

Office managed the development of transportation casks, and the Chicago Operations Office was responsible for institutional, operational, economic and environmental issues. An OCRWM project office assigned to the Chicago Operations Office managed repository technology development, and a project office in Las Vegas, Nevada, was responsible for site characterization of Yucca Mountain.

Staffing the Organization

Staffing levels declined slightly in FY 1988, primarily due to reductions at the Deaf Smith, Texas, and Hanford, Washington, sites, where activities related to repository

development were terminated. In FY 1988, OCRWM and the project offices used 295 full-time equivalent (FTE) staff years, of which 292 FTEs were charged to the Nuclear Waste Fund, and 3 were funded from the Civilian Radioactive Waste R&D account. The total included 18 FTEs in other DOE organizations that were charged to the Nuclear Waste Fund for work in support of OCRWM activities.

Given competition with compensation levels in the private sector, OCRWM continued to experience difficulties in attracting professionals who meet specialized skill and experience criteria to technical positions. Efforts began late in the fiscal year to establish permanent positions in the newly created Office of Quality Assurance.

VIII.

Financial Statements

The NWPA authorizes program expenditures for civilian radioactive waste management under three accounts. Two of these—the Interim Storage Fund (Section 136) and the Nuclear Waste Fund (Section 302)—are special funds established in the U.S. Treasury. The third, the Civilian Radioactive Waste Research and Development (R&D) account, provides for expenditures from the General Fund on taxpayer-supported programs authorized under Sections 151, 218, 222, and 223 of the NWPA. There has been no request for Federal interim storage services. Thus, that fund has not been activated, and there are no plans to submit a budget request for that purpose. This chapter presents financial statements for the two active accounts, the Nuclear Waste Fund and the Civilian Radioactive Waste R&D account.

Nuclear Waste Fund

OCRWM secured the services of a certified public accounting firm to provide an independent audit of the Fund's financial statements for those who finance the waste management program. This section contains the report of that firm, Peat Marwick Main & Co., for fiscal years 1988 and 1987, and cumulative amounts from the inception of the Nuclear Waste Fund (January 7, 1983) through September 30, 1988.

**Nuclear Waste Fund
Office of Civilian Radioactive
Waste Management
United States Department of Energy**

Financial Statements

September 30, 1988 and 1987

(With Independent Auditors' Report Thereon)

Certified Public Accountants

Peat Marwick Main & Co.
2001 M. Street, N.W.
Washington, DC 20036

Independent Auditors' Report on Financial Statements

Office of Civilian Radioactive
Waste Management
United States Department of Energy:

We have audited the accompanying balance sheets of the Nuclear Waste Fund as of September 30, 1988 and 1987, and the related statements of operations and changes in financial position for the years then ended and cumulatively from inception (January 7, 1983) to September 30, 1988. These financial statements are the responsibility of the Fund's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with generally accepted auditing standards and the standards for financial and compliance audits contained in Standards for Audit of Governmental Organizations, Programs, Activities and Functions (1981 Revision) issued by the U.S. General Accounting Office. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the Nuclear Waste Fund at September 30, 1988 and 1987, and the results of its operations and changes in its financial position for the the periods indicated above, in conformity with generally accepted accounting principles.

Peat Marwick Main & Co.

December 16, 1988

Nuclear Waste Fund
Office of Civilian Radioactive Waste Management
United States Department of Energy

Balance Sheets

September 30, 1988 and 1987
(Dollars in thousands)

<u>Assets</u>	<u>1988</u>	<u>1987</u>
Cash	\$ 1,025	296
U.S. Treasury securities (note 2)	1,923,027	1,688,337
Receivables from utilities (note 3):		
One-time spent fuel fees	902,162	904,479
KWH fees	125,802	108,100
Interest on one-time spent fuel fees	454,483	373,801
	<u>1,482,447</u>	<u>1,386,380</u>
Accrued interest on U.S. Treasury securities (note 2)	58,150	56,219
Other receivables and advances	1,394	1,701
Capital equipment, less accumulated depreciation of \$16,495 and \$9,882	<u>34,047</u>	<u>32,386</u>
	<u>\$3,500,090</u>	<u>3,165,319</u>
 <u>Liabilities</u>		
Accounts payable and accrued expenses	42,706	65,162
Deferred revenue	<u>3,457,384</u>	<u>3,100,157</u>
	<u>\$3,500,090</u>	<u>3,165,319</u>

See accompanying notes to financial statements.

Nuclear Waste Fund
Office of Civilian Radioactive Waste Management
United States Department of Energy

Statements of Operations

Years ended September 30, 1988 and 1987
and cumulatively from January 7, 1983, date of inception
to September 30, 1988
(Dollars in thousands)

	<u>1988</u>	<u>1987</u>	<u>Cumulative</u>
Revenue:			
Fees (note 3):			
One-time spent fuel fees	\$ (196)	—	2,334,777
KWH fees	515,724	442,359	2,191,349
Interest:			
One-time spent fuel fees (note 3)	84,450	73,071	466,725
U.S. Treasury securities	141,586	131,130	439,393
Gain on sale of U.S. Treasury securities	<u>3,694</u>	<u>16,641</u>	<u>32,313</u>
	745,258	663,201	5,464,557
Less amount deferred	<u>(357,227)</u>	<u>(200,441)</u>	<u>(3,457,384)</u>
	<u>388,031</u>	<u>462,760</u>	<u>2,007,173</u>
Expenses:			
First repository	294,695	360,914	1,524,312
Second repository	8,126	25,886	107,621
Monitored retrievable storage	1,374	1,394	38,199
Transportation and systems integration	31,432	29,056	78,111
Program management	44,741	45,510	240,967
Interest	<u>7,663</u>	<u>—</u>	<u>17,963</u>
	<u>388,031</u>	<u>462,760</u>	<u>2,007,173</u>
Excess of revenue over expenses	<u>\$ —</u>	<u>—</u>	<u>—</u>

See accompanying notes to financial statements.

Nuclear Waste Fund
Office of Civilian Radioactive Waste Management
United States Department of Energy

Statements of Changes in Financial Position

Years ended September 30, 1988 and 1987
and cumulatively from January 7, 1983, date of inception
to September 30, 1988
(Dollars in thousands)

	<u>1988</u>	<u>1987</u>	<u>Cumulative</u>
Cash provided from:			
Revenue received	\$ 694,796	613,444	4,056,161
Expenses paid	<u>(399,779)</u>	<u>(436,410)</u>	<u>(1,932,762)</u>
Cash provided from operations	295,017	177,034	2,123,399
Borrowings from U.S. Treasury	—	—	264,964
Proceeds from sales and maturities of U.S. Treasury securities	388,579	640,371	2,084,298
Borrowings from DOE for capital equipment	<u>—</u>	<u>—</u>	<u>9,739</u>
Total cash provided	<u>683,596</u>	<u>817,405</u>	<u>4,482,400</u>
Cash used for:			
Capital equipment	12,369	11,745	65,752
Repayment of borrowings from DOE for capital equipment	—	—	9,739
Repayment of borrowings from U.S. Treasury	—	—	264,964
Purchase of U.S. Treasury securities	669,679	811,162	4,137,195
Purchase of accrued interest on U.S. Treasury securities	1,126	(3,247)	2,331
Increase (decrease) in advances	<u>(307)</u>	<u>(2,051)</u>	<u>1,394</u>
Total cash used	<u>682,867</u>	<u>817,609</u>	<u>4,481,375</u>
Increase (decrease) in cash	<u>\$ 729</u>	<u>(204)</u>	<u>1,025</u>

(Continued)

Nuclear Waste Fund
Office of Civilian Radioactive Waste Management
United States Department of Energy

Statements of Changes in Financial Position, Continued

	<u>1988</u>	<u>1987</u>	<u>Cumulative</u>
Changes in cash:			
Charges not affecting cash:			
Depreciation	\$ (5,440)	(4,318)	(18,253)
Amortization of premiums and accretion of discounts on U.S. Treasury securities	(46,410)	(40,303)	(129,870)
Net book value of dispositions and charge-offs of capital equipment	<u>(5,268)</u>	<u>(2,773)</u>	<u>(13,452)</u>
	<u>(57,118)</u>	<u>(47,394)</u>	<u>(161,575)</u>
Increase (decrease) in assets excluding cash:			
U.S. Treasury securities	281,100	170,791	2,052,897
Receivables	97,691	84,762	1,541,991
Capital equipment	<u>12,369</u>	<u>11,745</u>	<u>65,752</u>
	<u>391,160</u>	<u>267,298</u>	<u>3,660,640</u>
Increase (decrease) in liabilities:			
Accounts payable and accrued expenses	(22,456)	19,259	42,706
Deferred revenue	<u>357,227</u>	<u>200,441</u>	<u>3,457,384</u>
	<u>334,771</u>	<u>219,700</u>	<u>3,500,090</u>
Increase (decrease) in cash	<u>\$ 729</u>	<u>(204)</u>	<u>1,025</u>

See accompanying notes to financial statements.

**Nuclear Waste Fund
Office of Civilian Radioactive Waste Management
United States Department of Energy**

**Notes to Financial Statements
(Dollars in thousands)**

September 30, 1988 and 1987

**(1) Organization and Summary of
Significant Accounting Policies**

(a) Organization

The Nuclear Waste Policy Act (the Act) was signed into law on January 7, 1983. The Act establishes a frame-work for the financing, siting, licensing, operating and decommissioning of one or more permanent repositories for the Nation's spent nuclear fuel and high-level radioactive waste. In addition, the Act contains several other features including:

Assigning responsibility for the full payment of disposal cost to the owners and generators of high-level waste and spent nuclear fuel and, accordingly, creating a special Nuclear Waste Fund (NWF) within the Department of Energy (DOE).

Committing the federal government to study monitored retrievable storage (MRS) concurrent with mined geologic repositories.

Provision for contracts with the owners and generators of nuclear power plants and other waste producing facilities for DOE initial acceptance of spent nuclear fuel no later than January 31, 1998 in return for payment of specified fees to the NWF.

A requirement that consideration be given to the disposal of waste resulting from atomic energy defense activities (defense waste) through use of the civilian repositories. In April 1985, the President notified DOE of his determination that a separate defense waste repository was not necessary and directed DOE to proceed with arrangements for disposal of such waste. Fees, equivalent to those paid by commercial owners, must be paid for this use. In August 1987, DOE published in the Federal Register, a proposed methodology for sharing costs between the generators of commercial and defense wastes. An agreement specifying payment schedules has not been finalized.

Under the Act, the NWF can perform only nongeneric research. Costs incurred for this nongeneric research relative to repository media and general and administrative costs are expensed as incurred.

In June 1987, DOE issued the Office of Civilian Radioactive Waste Management (OCRWM) Mission Plan Amendment. The amendment, which was submitted to Congress, revised the schedule for the first repository extending the date for accepting spent nuclear fuel until the year 2003.

**(1) Organization and Summary of
Significant Accounting Policies (Continued)**

On December 22, 1987, the President signed into law The Omnibus Budget Reconciliation Act of 1987, which contained amendments to the Nuclear Waste Policy Act of 1982. The legislation directs DOE to characterize the Yucca Mountain site in Nevada for development of the first repository. Drilling of an exploratory shaft at the Yucca Mountain site may begin upon completion of the site characterization plan and public hearings required by the Nuclear Waste Policy Act.

The legislation also provided for the termination of site specific activities for the Hanford, Washington and Deaf Smith County, Texas sites within 90 days of enactment. In the event that the Yucca Mountain site proves unsuitable for use as a repository, DOE is required to terminate site-specific activities and report to Congress.

Additionally, the legislation annulled and revoked DOE's MRS proposal, submitted to Congress on March 31, 1987, to construct an MRS facility in Oak Ridge, Tennessee. However, the legislation authorizes an MRS facility and, subsequent to submission of the MRS Review Commission's report which is due November 1989, DOE's conducting of a survey of potentially suitable sites. The selection of a site for an MRS may not be made until after the Secretary recommends to the President, a site for development of the first repository.

Further, the legislation authorized DOE to pay interest on overpayments of KWH fees consistent with the December 5, 1985 ruling of the United States Court of Appeals as discussed in note 3. Interest paid or credited to the utilities on account of these overpayments totaled \$7,663 during 1988.

(b) Significant Accounting Policies

Revenue recognition—A one-time fee (see note 3) was recorded by the NWF as of April 7, 1983 for spent nuclear fuel generated prior to that date. Fees based upon kilowatt-hours (KWH) of electricity generated by civilian nuclear reactors on or after April 7, 1983 are accrued as earned. All fees are recognized as revenue to the extent of expenses incurred. Revenue in excess of current expenses is deferred. The life cycle of the program is expected to extend over a period in excess of 7 decades. The Act requires an annual evaluation of the adequacy of fees to insure full cost

Nuclear Waste Fund
Office of Civilian Radioactive Waste Management
United States Department of Energy

Notes to Financial Statements
(Dollars in thousands)

**(1) Organization and Summary of
Significant Accounting Policies (Continued)**

recovery and provides for adjustment of such fees, as needed, with the approval of Congress. The evaluation for 1987 (the latest evaluation available), including the provisions contained in the Mission Plan Amendment, issued in June 1987, and a facility for monitored retrievable storage, indicates total estimated program costs of \$32.1 to \$38.2 billion (in constant 1986 dollars).

U.S. Treasury Securities—U.S. Treasury securities are stated at cost, adjusted for amortization of premiums and accretion of discounts, which are recognized as adjustments to interest income using the effective interest method.

Capital Equipment—Capital equipment is capitalized at cost and depreciated over the estimated useful lives of the assets which range from 5 to 30 years. Capital equipment purchased prior to the Act and permanently transferred to nuclear waste activities, was recorded as an asset of the NWF with a corresponding liability to the federal government at the net book value of the transferring agency at the date of acquisition. Maintenance costs are borne by the NWF for equipment either on loan from non-NWF programs or shared with other programs.

Tax status—The NWF, as a part of the Department of Energy which is a federal agency, is not subject to federal, state or local income taxes.

(2) U.S. Treasury Securities

U.S. Treasury securities held as of September 30 of each year consisted of the following:

	1988		1987	
	Book value	Market value	Book value	Market value
Due within 1 year	\$ 168,421	168,305	80,074	80,855
Due after 1 year but within 5 years	1,402,925	1,370,647	1,291,447	1,243,391
Due after 5 years but within 10 years	351,681	336,087	316,816	283,588
	<u>\$1,923,027</u>	<u>1,875,039</u>	<u>1,688,337</u>	<u>1,607,834</u>

(2) U.S. Treasury Securities (Continued)

Accrued interest receivable on U.S. Treasury securities as of September 30, 1988 and 1987 totalled \$58,150 and \$56,219, respectively.

(3) Receivables—Utilities

All owners and generators of civilian high-level waste and spent nuclear fuel have entered into contracts with the DOE for nuclear waste disposal services and for payment of fees to the NWF.

The Act specifies two fees to be paid to the NWF for disposal services: (a) a one-time charge per kilogram of heavy metal in the high-level waste and spent nuclear fuel existing prior to April 7, 1983; and (b) an adjustable fee payable quarterly, initially one mill per kilowatt-hour, on all net electricity generated by nuclear reactors after April 6, 1983. The contracts provided three options for payment of the one-time spent fuel fee, one of which must have been selected by June 30, 1985, or within 2 years of contract execution. The options were:

(1) Payment of the amount due, plus interest earned from April 7, 1983, in 40 quarterly installments, with the final payment due on or before the first scheduled delivery of spent fuel to DOE;

(2) Payment of the amount due, plus interest from April 7, 1983, in a single payment, any time prior to the first delivery of spent fuel to DOE;

(3) Payment of the amount due, any time prior to June 30, 1985, or 2 years after contract execution, in the form of a single payment, with no interest due.

Under options (1) and (2), interest accrues from April 7, 1983 to date of first payment at the 13-week Treasury bill rate compounded quarterly. Under option (1), beginning with the first payment, interest is calculated at the 10-year Treasury note rate in effect at the time.

During 1988 and 1987, payments (refunds) of one-time spent fuel fees by (to) owners and generators of civilian high-level waste and spent nuclear fuel consisted of:

	1988	1987
Option (1)	\$2,260	1,745
Option (2)	(56)	—
Option (3)	(140)	—
	<u>\$2,064</u>	<u>1,745</u>

**Nuclear Waste Fund
Office of Civilian Radioactive Waste Management
United States Department of Energy**

**Notes to Financial Statements
(Dollars in thousands)**

(3) Receivables—Utilities (Continued)

Receivables from utilities at September 30 of each year consisted of:

	<u>1988</u>	<u>1987</u>
One-time spent fuel fees:		
Option (1)	\$ 166,846	169,107
Option (2)	<u>735,316</u>	<u>735,372</u>
	<u>902,162</u>	<u>904,479</u>
Kilowatt-hour fees	<u>125,802</u>	<u>108,100</u>
Interest on one-time spent fuel fees:		
Option (1)	78,926	65,998
Option (2)	<u>375,557</u>	<u>307,803</u>
	<u>454,483</u>	<u>373,801</u>
	<u>\$1,482,447</u>	<u>1,386,380</u>

On December 5, 1985, the United States Court of Appeals for the District of Columbia ruled against the DOE regarding the calculation of kilowatt-hour (KWH) fees. Consistent with the ruling, utilities were requested to recalculate their fees since April 7, 1983 and submit their request for reimbursement to NWF for approval and subsequent refund or credit against KWH fees. Fees reimbursed or credited as a result of this ruling totaled \$42,633 of which \$2,517 and \$2,649 were charged against 1988 and 1987 KWH fees, respectively.

(4) Financing

The Act provides that the NWF consist of:

- Unexpended balances available on the date of enactment for functions or activities incident to the disposal of civilian high-level radioactive waste or civilian spent nuclear fuel.
- Appropriations made by Congress
- Receipt of fees
- Investment income from authorized investments

Expenditures may be made from the NWF subject to appropriations which require triennial authorization. Investments may be made in U.S. obligations from funds in excess of current needs. If at any time monies available in the NWF are insufficient to discharge responsibilities under the Act, additional borrowings may be made from the U.S. Treasury.

(4) Financing (Continued)

The Act limits the NWF from incurring expenditures, entering into contracts and obligating amounts to be expended, except as provided in advance by appropriation Acts.

(5) Pension Plan

The employees of the Office of Civilian Radioactive Waste Management (OCRWM) of the DOE are covered by the Civil Service Retirement System or the Federal Employees Retirement System which became effective January 1, 1987. As required by law, employees make contributions based on a percent of their salaries to the plans with an equal amount contributed by OCRWM.

The total pension expense for 1988 and 1987 was \$1,125 and \$1,185, respectively.

A portion of pension benefits under the Civil Service Retirement System and the Federal Employees Retirement System relating to its employees is funded by the NWF. Data regarding the Civil Service Retirement System's and the Federal Employees Retirement System's actuarial present value of accumulated benefits, assets available for benefits, and unfunded pension liability are not allocated to individual departments and agencies and therefore not disclosed by the NWF.

(6) Related Parties

The Act established the Office of Civilian Radioactive Waste Management within DOE to carry out the provisions of the Act and created a separate fund in the Treasury of the United States. All of the investment and borrowing powers of the NWF are limited to transactions with the U.S. Treasury. In discharging its obligations under the Act, DOE contracts for services with numerous contractors including other federal government agencies. Further, significant administrative services are provided by DOE. The authority to incur indebtedness or enter into contracts obligating the federal government are effective only to such extent as is provided in advance by appropriation Acts.

As of September 30, 1988 and 1987, the NWF owed other government agencies \$9,849 and \$7,220, respectively, for services and costs provided to the NWF. For the years ended September 30, 1988 and 1987, the NWF had incurred costs of \$20,013 and \$17,428, respectively, for services and costs provided by other government agencies.

Nuclear Waste Fund
Office of Civilian Radioactive Waste Management
United States Department of Energy

Notes to Financial Statements
(Dollars in thousands)

(7) Contingencies

In May, 1986, the President named three sites, which had been formally nominated and recommended by DOE, to begin site characterization to determine the selection of an acceptable site for the first repository. Various litigation is now pending regarding the selection of these candidate sites. Resolution of this litigation is not expected to have a material effect on the financial position of NWF.

Litigation is pending before the United States Court of Appeals concerning an interpretation of the contract provision governing the interest rate to be used in the calculation of interest on one-time spent fuel fees paid or to be paid by the utilities to the Fund. Because the final outcome of this claim is not presently determinable, the Fund has not adjusted the amounts of interest presently accrued on one-time spent fuel fees. An unfavorable outcome could have a material effect on the financial position of the NWF by reducing past and future revenue. In the event of an unfavorable outcome, accrued interest receivable and deferred revenue could decrease by approximately \$20,000 as of September 30, 1988.

(7) Contingencies (Continued)

On March 16, 1988, a Petition for Review was filed before the U.S. Court of Appeals for the District of Columbia regarding a portion of the final rule on the calculation of net generation in determining on-going (KWH) fees to be paid by the utilities. The petition seeks judicial review of DOE's treatment of transmission and distribution losses in calculating net generation. The case has been briefed and argued before the Court, but no decision has been rendered at this date. An unfavorable outcome could have a material effect on the financial position of the NWF by reducing past and future revenue, however KWH fees can be increased as provided for in the Act.

A claim is pending before the United States Claims Court concerning the selection of the Management and Operating contractor for the program. The claim alleges that DOE's selection was, among other things, arbitrary and constituted a breach of the implied contract to all offerors under the request for proposal submitted for this contract. Resolution of this case is not expected to have a material effect on the financial position of the NWF.

Civilian Radioactive Waste R&D Account

The year-end statements for OCRWM'S Civilian Radioactive Waste R&D account for fiscal years 1988 and 1987 are provided in Table 8-4. These statements show the accrued costs for the four major activities funded through this account: spent fuel storage development, alternative disposal concepts, generic methods and supporting studies and program direction.

Spent fuel storage development is authorized by Section 218 of the NWPA. FY 1988 activities included the loading of dry storage casks with consolidated fuel, preparing spent fuel for shipment and completing final R&D fuel

integrity studies. Costs in 1988 were \$6.4 million, a decrease of \$0.3 million from the previous year. Activities in the alternative disposal category covered by Section 222 of the Act were limited to preparation and publication of final reports to close out the seabed disposal subprogram. Accrued costs for 1988 were \$0.3 million, a decrease of \$1.5 million from 1987. No activities were conducted in the generic methods category in 1988. The accrued costs of \$1.1 million, an increase of \$0.6 million over 1987, represent costs incurred as a result of prior year accounting adjustments. Program direction provided for overall management of the Civilian Radioactive Waste R&D program. The 1988 costs of \$0.2 million remain unchanged from 1987. For the total R&D account, 1988 costs were \$8.0 million, a decrease of \$1.2 million from the previous year.

Table 8-4
Summary Statements of Accrued Costs
Civilian Radioactive Waste R&D Account
Office of Civilian Radioactive Waste Management
(Dollars in Millions)
(Unaudited)

	Actual Accrued Costs	
	1988	1987
Spent Fuel Storage		
Development		
Operating expenses.....	\$ 6.4	\$ 6.6
Plant and capital equipment	<u>0.0</u>	<u>0.1</u>
Subtotal.....	6.4	6.7
Alternative Disposal Concepts		
Operating expenses.....	0.2	1.7
Plant and capital equipment	<u>0.1</u>	<u>0.1</u>
Subtotal.....	0.3	1.8
Generic Methods and		
Supporting Studies		
Operating expenses.....	<u>1.1</u>	<u>0.5</u>
Subtotal.....	1.1	0.5
Program Direction		
Operating expenses.....	<u>0.2</u>	<u>0.2</u>
Subtotal.....	0.2	0.2
TOTALS		
Operating expenses.....	7.9	9.0
Plant and capital equipment	<u>0.1</u>	<u>0.2</u>
Total Civilian Radioactive		
Waste R&D	<u>\$ 8.0</u>	<u>\$ 9.2</u>

IX.

Epilogue

The activities and accomplishments discussed in previous chapters are those which occurred during FY 1988, the period covered by the financial statements presented in Chapter VIII. This epilogue updates the report with a brief summary of the more significant publications issued and progress made since the end of the fiscal year on September 30, 1988, through March 1989.

Program Policies and Strategies

The *OCRWM Mission Plan Amendment II*, presenting information on OCRWM's plans for implementing the new focus for its program that was provided by the Nuclear Waste Policy Amendments Act of 1987, was prepared and was undergoing Departmental review. The final document incorporates comments received on the *Draft 1988 Mission Plan Amendment* issued in June 1988. The *OCRWM Mission Plan Amendment II* includes copies of the comment letters received and OCRWM's responses to the comments. In addition, it presents OCRWM's general strategy for achieving the objectives of the NWPA, as amended, as well as plans for the activities, both technical and institutional, that will be conducted to develop the waste management system. Copies of the Amendment will be sent to the States, affected units of local government, NRC and other Federal agencies, and the public.

Quality Assurance

Since the end of FY 1988, three major QA documents have been accepted by the NRC and issued: the *Quality Assurance Requirements* (QAR) and *Quality Assurance Program Description* (QAPD) documents and the *Yucca Mountain Project QA Plan*. The QAR presents the quality assurance requirements to be applied to OCRWM activities, and the QAPD describes how OCRWM will implement the QAR and discusses the interfaces between OCRWM and the Yucca Mountain Project Office for achieving quality. The *Yucca Mountain Project QA Plan* describes the quality assurance program for the Yucca Mountain Project.

Site Characterization

A major program milestone was attained in December 1988 with issuance of the statutorily mandated *Site Characterization Plan for the Yucca Mountain Site, State of Nevada* for public review. This eight-volume document, approximately 6,300 pages in length, describes the candidate repository site, planned tests and activities to be conducted during site characterization, criteria to be used to determine the suitability of the site for development as a repository, conceptual designs for a repository and packaging for spent nuclear fuel and high-level waste to be emplaced in a repository, and plans for decontamination and decommissioning, should the Yucca Mountain site be found unsuitable.

Two related documents were also issued in conjunction with the issuance of the SCP. *The Site Characterization Plan Overview: Yucca Mountain Site, Nevada Research and Development Area, Nevada* presents summaries of selected topics covered in the SCP to provide the general scope of and basis for site characterization activities for audiences who may lack the technical knowledge necessary to understand readily the detailed descriptions provided in the SCP itself. The *Site Characterization Plan Public Handbook for Yucca Mountain* explains the purpose of site characterization, how the SCP relates to it, and how to locate various subjects addressed in the SCP. The Handbook also identifies opportunities for public involvement in review of the SCP.

Five detailed study plans related to the ESF were completed and transmitted to NRC in February 1989.

In addition, the *Environmental Monitoring and Mitigation Plan* (EMMP) (Revision 2) was issued in December 1988. The EMMP describes how OCRWM will monitor site characterization activities identified as having potential to cause significant adverse environmental impacts and OCRWM's plans for mitigating any such impacts.

As required by the Amendments Act, OCRWM developed and submitted to Congress the *Section 175 Report: Secretary of Energy's Report to the Congress Pursuant to Section 175 of the Nuclear Waste Policy Act, As Amended* in December 1988. The Section 175 Report addresses the potential socioeconomic impacts—ranging from education to tourism—of locating a repository at the Yucca Mountain site and presents recommendations for the mitigation

of such impacts and the appropriate sources of funding for such mitigation. The report concluded that DOE has the necessary authorities and sources of funds to mitigate, in close consultation with the State of Nevada and affected units of local government, adverse impacts that may occur throughout the course of OCRWM's program. It further concluded that initial evaluations of need and appropriate mitigation actions should be made by the communities experiencing the impacts. To the extent that these evaluations demonstrate the need for assistance, OCRWM proposes to work closely with the State or affected unit of local government to reach agreement on the nature and level of assistance to be provided.

On March 25, 1988, the State of Nevada sued the Bureau of Land Management (BLM) seeking to overturn the issuance of a right-of-way to the Department of Energy which authorizes the conduct of site characterization activities on and around the Yucca Mountain site. On January 30, 1989, the U.S. District Court for the District of Nevada issued an order dismissing the State of Nevada's complaint.

On December 27, 1988, DOE filed an application with BLM to withdraw 4,255.5 acres of public land at the Yucca Mountain, Nevada, site. The withdrawal was proposed to prevent interference with site characterization activities, to protect the physical integrity of the subsurface environment from intrusions that could invalidate scientific studies and to formally notify the public of particularly sensitive areas in and around the Yucca Mountain site that could be adversely affected by the conduct of mining activities. On January 13, 1989, BLM published, in the *Federal Register*, a proposed withdrawal notice and opportunity for public meeting. The notice proposed closure of the land for up to 2 years to surface entry, mining and mineral leasing.

Pursuant to Section 116(c) of the NWSA, as amended, OCRWM awarded initial grants to three affected units of local government in Nevada. In October 1988, Nye County was awarded \$203,340; Clark County and Lincoln County received initial grants in the amounts of \$313,568 and \$156,490, respectively. The grants may be used by the counties to facilitate participation in OCRWM's waste management program.

Spent Fuel Storage and Engineering Development

OCRWM submitted the *Final Version Dry Cask Storage Study* to NRC in January 1989 for final review. Information copies of the document were also provided to Congress. After receiving final NRC comments on the study, OCRWM formally submitted the *Final Version Dry Cask Storage Study* to Congress in March 1989 accompanied by NRC's comments. The Study presents two major conclusions: (1) existing technologies are technically feasible, safe and environmentally acceptable options for storing spent fuel at civilian reactor sites until such time as a Federal facility is available to accept the spent fuel, and (2)

OCRWM is not authorized to provide direct financial support for at-reactor storage.

External Relations and Outreach

On January 18, 1989, the President announced his selection of eight members to serve on the eleven-member Nuclear Waste Technical Review Board. OCRWM's first meeting with the Board was held March 7-8, 1989. During this 2-day comprehensive briefing, OCRWM provided the Board with a history of the waste management program, as well as a current status of program activities and plans for achieving the objectives of the NWSA, as amended.

Program Management

To facilitate the technical management and integration of the waste management program, OCRWM announced on December 9, 1988, its selection of Bechtel Systems Management, Inc. (a newly formed subsidiary of Bechtel Corporation) for award of a management and operating (M&O) contract. The M&O contractor will assume a number of responsibilities, including assisting in efforts to ensure that the Yucca Mountain site is characterized in accordance with requirements of the NWSA, as amended, and, if found suitable, that the site is developed as a repository; assisting in siting an MRS facility; designing the repository, waste package, and MRS facility and maintaining oversight of transportation design activities. The M&O contractor will also assist in obtaining NRC licenses for the repository and MRS facility; integrating the work of the various program participants, e.g. national laboratories, other Federal agencies and DOE prime contractors; and assisting in making certain that all work meets safety, technical, environmental, quality assurance, schedule and cost requirements of NRC and the Environmental Protection Agency and is consistent with applicable DOE orders. In addition, the M&O contractor will assist in interactions with, and providing support to, the various entities established by the Amendments Act, e.g. the Nuclear Waste Technical Review Board and the Office of the Nuclear Waste Negotiator. The M&O contractor will be managed by an OCRWM headquarters project office.

On December 23, 1988, TRW Environmental Safety Systems, Inc. (TRW) filed a complaint in the U.S. Claims Court protesting the selection of Bechtel Systems Management, Inc. (Bechtel) for the award of OCRWM's M&O contract. TRW was one of two organizations not selected in the competition. On March 8, 1989, after a 4-day hearing, the judge responsible for the case enjoined DOE, on a preliminary basis, from awarding the contract to Bechtel. The judge issued the injunction to provide further opportunity to review the allegations made in the case. A hearing on a permanent injunction began March 30, 1989.

Revision I of OCRWM's *Program Change Control Procedure* was issued in February 1989. This document, part of the OCRWM Program Management System, estab-

lishes necessary policies and procedures to ensure that changes to any controlled document issued by OCRWM are assessed and approved through a process that entails adequate consideration of the potential impacts of such changes on the overall waste management program. The revision of the *Program Change Control Procedure* reflects the April 1988 OCRWM reorganization, the designation of the Deputy Director, OCRWM, as Chairman of the Pro-

gram Change Control Board, and updates the document to incorporate OCRWM records management procedures.

On March 17, 1989, the U.S. Court of Appeals for the District of Columbia rendered a decision in *Consolidated Edison Co., et al. v. U.S. Department of Energy* (Case Number 88-1194). The Court ruled that the ongoing fee in the Standard Disposal Contract applies only to nuclear electricity that is both generated and sold.

Bibliography

U.S. Department of Energy, "Fees For Federal Interim Storage, Calendar Year 1989," *Federal Register*, Volume 53, December 7, 1988.

U.S. Department of Energy, "Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste" (final rule), *Federal Register*, Volume 52, September 18, 1987.

U.S. Department of Energy, "Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste," *Federal Register*, Volume 48, April 18, 1983.

U.S. Department of Energy, Nevada Operations Office, *Environmental Regulatory Compliance Plan for Site Characterization of the Yucca Mountain Site*, December 1988 (DOE/RW-0209).

U.S. Department of Energy, Nevada Operations Office, *Draft Environmental Regulatory Compliance Plan For Site Characterization of the Yucca Mountain Site*, January 1988 (DOE/RW-0177).

U.S. Department of Energy, Nevada Operations Office, *Environmental Monitoring and Mitigation Plan For Site Characterization* (Revision 2), December 1988 (DOE/RW-0208).

U.S. Department of Energy, Nevada Operations Office, *Socio-economic Monitoring and Mitigation Plan for Site Characterization* (Revision 1), January 1988 (DOE/RW-0179).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Additional Information on Monitored Retrievable Storage*, November 1987 (DOE/RW-0166).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Annual Capacity Report*, June 1988 (DOE/RW-0191).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Annual Report to Congress*, August 1988 (DOE/RW-0189).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Consultation Draft Site Characterization Plan for the Yucca Mountain Site* (7 Volumes), January 1988 (DOE/RW-0160).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Program Over-*

view, December 1988 (DOE/RW-0207).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Mission Plan Amendment*, January 1987 (DOE/RW-0128).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft 1988 Mission Plan Amendment*, June 1988 (DOE/RW-0196).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Final Version Dry Cask Storage Study*, February 1989 (DOE/RW-0220).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Implementation Plan for Deployment of Federal Interim Storage Facilities for Commercial Spent Nuclear Fuel*, January 1989 (DOE/RW-0195).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Initial Version Dry Cask Storage Study*, August 1988 (DOE/RW-0196).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Managing the Nation's Nuclear Waste*, July 1988 (DOE/RW-0195).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Mission Plan For The Civilian Radioactive Waste Management Program* (3 Volumes), June 1985 (DOE/RW-0005).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Monitored Retrievable Storage Submission to Congress* (3 volumes), March 1987 (DOE/RW-0035).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *OCRWM Backgrounder Series:*

Activities During the Site Characterization Phase of the Geologic Repository Program, April 1987 (DOE/RW-0137).

Addressing Concerns About Water Through Repository Siting and Design, January, 1987 (DOE/RW-0123).

Characteristics and Inventories of Nuclear Waste, April 1987 (DOE/RW-0140).

Cooperative Demonstration Projects for Spent Nuclear Fuel, April 1987 (DOE/RW-0138).

Federal Agencies Involved in Implementation of the Nuclear Waste Policy Act of 1982, February 1987 (DOE/RW-0127).

Geographic Distribution of High-Level Radioactive Waste, May 1988 (DOE/RW-0168).

Health and Safety Protection in the Management of the Nation's High-Level Radioactive Waste, May 1988 (DOE/RW-0169).

The Multiple Barrier System of Geologic Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste, May 1988 (DOE/RW-0171).

Public Participation in the Development of the Transportation Institutional Plan, April 1987 (DOE/RW-0141).

Quality Assurance for Nuclear Waste Repositories, February 1987 (DOE/RW-0126).

Radiation and High-Level Radioactive Waste, May 1988 (DOE/RW-0167).

The Status of the Nuclear Waste Fund, January 1987 (DOE/RW-0034).

Shipments of Spent Nuclear Fuel in Support of Nuclear Waste Policy Act Research and Development Programs, January 1987 (DOE/RW-0124).

Studies of Alternative Methods of Radioactive Waste Disposal, April 1987 (DOE/RW-0139).

Transportation Casks for Spent Nuclear Fuel and High-Level Radioactive Waste, January 1987 (DOE/RW-0121).

Transportation Routing Issues Related to the Shipment of High-Level Nuclear Waste, January 1987 (DOE/RW-0122).

U.S. Department of Energy, *Office of Civilian Radioactive Waste Management Bulletin*, published monthly since July 1985.

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *OCRWM Fact Sheet Series*:

Can Nuclear Waste Be Transported Safely?, November 1986 (DOE/RW-0109).

How Much Nuclear Waste Is There?, November 1986 (DOE/RW-0111).

The Illustrated Mechanisms of Nuclear Waste Disposal, November 1986 (DOE/RW-0105).

Overview—Nuclear Waste Policy Act, November 1986 (DOE/RW-0104).

Radiation and Nuclear Waste—How Are They Related?, November 1986 (DOE/RW-0110).

What is Nuclear Waste?, November 1986 (DOE/RW-0107).

What is Spent Nuclear Fuel?, October 1986 (DOE/RW-0108).

What Rock Types are Being Considered for Nuclear Waste Repositories and Why?, November 1986 (DOE/RW-0112).

What Will a Nuclear Waste Repository Look Like?, November 1986 (DOE/RW-0106).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *OCRWM Mission Plan Amendment*, June 1987 (DOE/RW-0128).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *OCRWM Records Management Policies and Requirements*, July 1988 (DOE/RW-0194).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Program Management System Manual*, January 1986 (DOE/RW-0043).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Program Reference Schedule Baseline* (Revised), July 1987 (DOE/RW-0091/1).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Quality Assurance Management Policies and Requirements*, October 1985 (DOE/RW-0032).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Quality Assurance Plan for Transportation Cask System Development Program*, February 1988 (DOE/RW-0185).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Quarterly Report on Program Cost and Schedule*, issued quarterly since the first quarter of fiscal year 1987.

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Section 175 Report: Secretary of Energy's Report to the Congress Pursuant to Section 175 of the Nuclear Waste Policy Act, As Amended*, December 1988 (DOE/RW-0205).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Site Characterization Plan for the Yucca Mountain Site, State of Nevada*, December 1988 (DOE/RW-0199).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Site Characterization Plan Overview: Yucca Mountain Site, Nevada Research and Development Area, Nevada*, December 1988 (DOE/RW-0198).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Site Characterization Plan Public Handbook for Yucca Mountain*, January 1989 (DOE/RW-0206).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Waste Acceptance Preliminary Specifications for the Defense Waste Processing Facility High-*

Level Waste Form, December 1986 (DOE/RW-0125).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Waste Acceptance Preliminary Specifications for the West Valley Demonstration Project High-*

Level Waste Form, April 1987 (DOE/RW-0136).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Waste Management System Requirements and Description*, March 1986 (DOE/RW-0063).