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Annual Report to Congress



OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

MASTER

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Following two-and-a-half-years without a permanent director for the Office of Civilian Radioactive Waste Management, in April 1990, Secretary of Energy James D. Watkins officially swore in Dr. John W. Bartlett as Director. This action fulfilled a major milestone announced by the Secretary in the November 1989 Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program.



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Executive Summary

This seventh Annual Report to Congress by the Office of Civilian Radioactive Waste Management (OCRWM) describes activities and expenditures of the Office during fiscal years (FY) 1989 and 1990. In November 1989, Secretary of Energy James D. Watkins announced changes in the OCRWM program designed to strengthen it and increase its effectiveness. During the remainder of FY 1990, those changes were implemented.

The newly confirmed (April 1990) OCRWM Director, Dr. John Bartlett, followed the Secretary's lead by conducting evaluations and making additional adjustments to streamline the program and improve its performance. With the support of the Secretary, Dr. Bartlett has taken several initiatives to reorganize and strengthen management within the program. These initiatives include

- developing a strategy for carrying out the U.S. high-level radioactive waste program mandated by Congress in the Nuclear Waste Policy Act of 1982 (NWPA), as amended;
- developing effective working relationships with stakeholders in the program;
- ensuring that methods and criteria for demonstrating compliance with regulatory requirements are developed and ready when needed;
- focusing actions on goals and essential activities; and
- improving cost effectiveness and accountability.

The Director's approach is to continue to develop a more

aggressive program that effectively implements the provisions of the NWPA, as amended.

Because of this new direction, it was determined that the annual reports for FY 1989 and 1990 should be combined into a single report. The past 2 years have seen the waste management program achieve major accomplishments in many technical and institutional activities important to attaining the goal of safe and permanent disposal of spent nuclear fuel and high-level radioactive waste. Throughout FY 1989 and 1990, the OCRWM program reached several goals in the achievement and assurance of quality at all program levels through the issuance of the Quality Assurance Requirements Document and the Quality Assurance Program Description. During FY 1990, many enhancements were made to both of these documents, and OCRWM worked to consolidate the Quality Assurance programs of the OCRWM headquarters and the Yucca Mountain Site Characterization Project Office.

A major achievement in the geologic disposal area was the publication of the Site Characterization Plan (SCP) in December 1988. The SCP describes the activities that will be undertaken during the scientific investigation of the Yucca Mountain site. In February 1990, OCRWM reoriented its site characterization program to focus on early evaluation of site suitability. In addition, the Testing Prioritization Task (TPT) will consider and prioritize all tests enumerated in the SCP.

Unsuitability conditions based on the Department of Energy's (DOE) Siting Guidelines (10 CFR 960) and

the Nuclear Regulatory Commission's (NRC) Siting Criteria (10 CFR 60.122) are the basis for determining which site conditions should be investigated early and, in addition, which testing activities are most likely to detect and/or characterize these conditions. The development of a site suitability methodology is now part of a separate but parallel and consistent effort. The methodology is intended to support early and periodic interim evaluations to determine whether the site is suitable for continued investigation and possible repository development.

OCRWM initiated a major study of alternatives for the Exploratory Shaft Facility (ESF) in January 1990. A decision methodology will be used to evaluate the relative merits of various exploratory shaft and ramp configurations and construction methods based on requirements in 10 CFR 60 and other State and DOE requirements. The results of this analysis (which incorporates the results of the Calico Hills Risk/Benefit Analyses) will be integrated into the TPT.

During FY 1989, OCRWM completed a series of system studies that were initiated to determine the benefits of a Monitored Retrievable Storage (MRS) facility as part of an integrated waste management system. In FY 1990, the MRS Review Commission submitted its report to Congress as mandated by the Nuclear Waste Policy Amendments Act of 1987 (Amendments Act).

An important event pertaining to the MRS was the appointment of the Nuclear Waste Negotiator. OCRWM will fully support efforts by the Negotiator to find a State or Indian Tribe willing to host an MRS facility or a repository under conditions mutually agreed upon by the host and approved by Congress.

Five contracts were awarded to develop truck and rail/barge spent fuel shipping cask designs in FY 1988, and OCRWM reviewed all 5 preliminary designs in FY 1989. In FY 1990, OCRWM proceeded to the final design phase with two fully funded contracts and two contracts funded at a reduced level. Work was completed in FY 1990 on the Cask Maintenance Facility Feasibility Study.

In the area of systems integration, OCRWM completed three of four volumes of the *Waste Management System Requirements* and the *Waste Management System Description* and updated the *System Engineering Management Plan*. OCRWM also developed the *Management Systems Improvement Strategy*.

Significant progress was made in FY 1989 in spent fuel storage and engineering development. Early in FY 1989, OCRWM initiated the Concrete Cask Testing

Project, a 2-year project to develop an alternative to metal storage casks. As required by the NWPA, as amended, OCRWM submitted to Congress the *Final Version Dry Cask Storage Study* in March 1989 with NRC comments and also submitted the fifth annual deployment plan for Federal Interim Storage.

Throughout FY 1989 and 1990, OCRWM continued to participate in several repository technology programs in cooperation with other nations. OCRWM also engaged in many information exchange activities with foreign countries and international organizations.

OCRWM continues to support an active public outreach program. As part of its outreach, OCRWM interacted with the Nuclear Waste Technical Review Board (NWTRB), which submitted its first report to Congress in March 1990. In its report, NWTRB outlined 24 recommendations presented in 3 categories: technical and scientific, strategic technical and non-technical, and science policy.

Nye, Clark, and Lincoln Counties in Nevada are designated affected local governments. Both Inyo County, California, and Esmeralda County, Nevada, applied for affected status and were subsequently denied this designation. During FY 1989 and 1990, no Indian Tribes were designated affected. In FY 1989, the State of Nevada and Nye, Clark, and Lincoln Counties were awarded financial assistance grants as provided for in the NWPA, as amended.

OCRWM made great strides in the area of science education and engineering in FY 1989 and 1990 by continuing to provide support to undergraduates and graduates through its fellowship programs and by implementing new initiatives to improve teacher skills. Also, OCRWM reviewed and improved INFOLINK in FY 1989, an electronic bulletin board. The new version of INFOLINK is easier to access and provides more program information than the previous version.

New site characterization activities have been delayed due to Nevada's refusal to process DOE's permit applications submitted in 1988. On January 5, 1990, the State of Nevada filed a petition in the U.S. Court of Appeals for the Ninth Circuit for a declaration that actions by the State constituted a valid and effective notice of disapproval of the Yucca Mountain site. On January 25, 1990, DOE filed suit in the U.S. District Court for the District of Nevada requesting an order that the State act on the permits. The District Court granted a stay pending resolution of the matter before the Court of Appeals. In September 1990, the Court of Appeals decided in DOE's favor, holding that the State's actions

did not constitute a valid notice of disapproval, and that the attempted legislative veto was preempted by the NWPA. On October 1, 1990, DOE refiled its applications for environmental permits with the State. On November 19, 1990, the State returned two of the three applications that DOE resubmitted, and on December 17, 1990, the State filed a petition for certiorari with the U.S. Supreme Court. The District Court stay remains in effect.

OCRWM reorganized in July 1990 and now consists of 5 offices headed by Associate Directors and 3 other offices. The heads of all of these offices report directly to the OCRWM Director. These offices are: Office of Geologic Disposal; Office of Storage and Transportation; Office of Systems and Compliance; Office of Contract Business Management; Office of Program and Resources Management, headed by Associate Directors; Office of External Relations; Office of Strategic Planning and International Programs; and Office of Quality Assurance, headed by Office Directors.

Foreword

This is the seventh OCRWM Annual Report to Congress. The report is required by Section 304(c) of the NWPA (P.L. 97-425), as amended by the Nuclear Waste Policy Amendments Act of 1987, Title V, P.L. 100-203. It is submitted to inform Congress of OCRWM's activities and expenditures during FY 1989 and 1990, from October 1, 1988, to September 30, 1990.

OCRWM was established within DOE to implement the provisions of the NWPA. The NWPA 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 from the Nation's defense programs. 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 development of a transportation system for the waste.

The Amendments Act, 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 was to interact.

Following passage of the Amendments Act, Congress directed that the Secretary of Energy report on

DOE's ability to implement the waste management program. The Secretary's November 1989 *Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program* called for significant changes in the structure and management of the program. This report announced a three-point plan of action centering on initiatives for the restructuring of OCRWM, initiatives to gain access to the Yucca Mountain site to continue the scientific investigations needed to evaluate the site's suitability for a repository, and an initiative for establishing integrated monitored retrievable storage. Because the Secretary's report was issued early in FY 1990 before the Annual Report for FY 1989 had been completed, OCRWM elected to combine activities for both years into one report in order to provide a more cohesive overview of its activities and progress during this period.

Although much work had been accomplished, the reassessment of the program concluded that new directions were needed. Dr. John Bartlett, the newly confirmed OCRWM Director (April 1990), followed the Secretary's lead by conducting evaluations and making additional adjustments to streamline the program and to improve its performance. This report shows that these changes have already yielded many positive results.

Dr. Bartlett's approach is to continue to develop a more strongly goal- and action-oriented program. These goals include determining the suitability or unsuitability of the Yucca Mountain site, beginning acceptance of spent fuel from the utilities in 1998, establishing a

national consensus on spent-fuel management strategy, and developing more effective working relationships with external parties who have a stake in the waste disposal mission.

Dr. Bartlett is developing methods and criteria for demonstrating compliance with regulatory standards that will be ready when needed. In addition, the OCRWM Director is streamlining operations to improve cost effectiveness, to improve accountability, and to focus actions on goals and essential activities.

Chapter I of this report describes the mission and objectives of the waste management program, and outlines the directives and the strategic principles for planning and decisionmaking being developed by Dr. Bartlett. The activities and accomplishments of OCRWM during FY 1989 and 1990 are discussed in Chapters II through X, and the financial statements of the Nuclear Waste Fund are presented in Chapter XI.

Chapter

Introduction

Mission and Objectives of the Civilian Radioactive Waste Management Program

OCRWM is responsible for disposing of the Nation's spent nuclear fuel and high-level radioactive waste in a manner that protects the health and safety of the public and the quality of the environment. Although embodied in the Federal repository program that began with studies in the late 1950s, this mission was explicitly established by the NWPA and reaffirmed by the Amendments Act.

To direct the implementation of its mission, OCRWM has established the following objectives:

1. *Safe and timely disposal*: to establish as soon as practicable the ability to dispose of radioactive waste in a geologic repository licensed by the NRC.
2. *Timely and adequate waste acceptance*: to begin the operation of the waste management system as soon as practicable in order to obtain the system development and operational benefits that have been identified for the MRS facility.
3. *Schedule confidence*: to establish confidence in the schedule for waste acceptance and disposal such that the management of radioactive waste is not an obstacle to the nuclear energy option.
4. *System flexibility*: to ensure that the program has the flexibility necessary for adapting to future circumstances while fulfilling established commitments.

To achieve these objectives, OCRWM is developing a waste management system consisting of a geologic repository for permanent disposal deep beneath the surface of the earth, a facility for MRS, and a system for transporting the waste.

Complexity and Uniqueness of the Program

The development of the waste management system for nuclear waste storage, transportation, and disposal is a complex undertaking that poses the unprecedented technical challenge of demonstrating the expected performance of a repository for thousands of years into the future. Also, there is the challenge of maintaining technical excellence while responding to the problems posed by accumulating wastes and, given the priority of technical excellence, conducting the program cost-effectively.

The demonstration of acceptable performance will be required in order to obtain a license from NRC, which has never before licensed a geologic repository. DOE, for its part, has never submitted and defended a license application; nor has DOE ever developed and implemented an NRC-regulated quality assurance program. In addition, the repository licensing process will entail the application of requirements that have not been previously adjudicated.

The program is made more complex by the

involvement of a wide variety of affected and interested parties with disparate views and goals. These parties include the public and its elected representatives; affected States, units of local government, and Indian Tribes; the electric utilities, their ratepayers, and the rate-setting bodies; Federal agencies; and the scientific community participating as represented in the program. Ensuring that these parties are fully informed and enabled to exercise their roles is a continuing challenge.

Secretary's Reassessment of the Civilian Radioactive Waste Management Program

In the Fall of 1989, the Secretary completed a comprehensive reassessment of the Civilian Radioactive Waste Management Program. The reassessment led to the development of an action plan for restructuring the program that centers on three initiatives. The first initiative was concerned with management and organization. It included the long-awaited appointment of a Congressionally confirmed OCRWM Director, the establishment of direct-line reporting by the manager of the site characterization project to OCRWM at DOE Headquarters, the streamlining of contractor support, the implementation of more formal management controls, and the establishment of a realistic schedule for the repository that delays the start of operations from 2003 to 2010.

The second initiative addressed the site characterization project, which is investigating the suitability of a candidate site at Yucca Mountain in Nevada. It included litigation to expedite the processing of needed environmental permits that have been denied by the State of Nevada and are required for starting new surface disturbing site-evaluation activities; changes in priorities and focus for site-evaluation activities, with emphasis on the early evaluation of potential site disqualifiers; and the deferral of major design activities.

The third initiative pertained to the establishment of an integrated MRS facility, with a target for waste acceptance in 1998. This initiative identified the need to modify the schedule linkages between the MRS facility and the repository as established in the Amendments Act.

An overview of the Secretary's reassessment was presented in the *Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program* issued in November 1989. This report was prepared in response to Congressional concerns about the schedule and the management of the program.

Director's Initiatives

The OCRWM Director is responsible for carrying out the functions assigned to the Secretary of Energy under the NWPA, as amended. Until the Senate's confirmation of Dr. John Bartlett as OCRWM Director in April 1990, the program had been headed by Acting Directors since November 1987. Dr. Bartlett's appointment marked a significant step toward resolving Congressional concerns regarding the management of the Civilian Radioactive Waste Management Program.

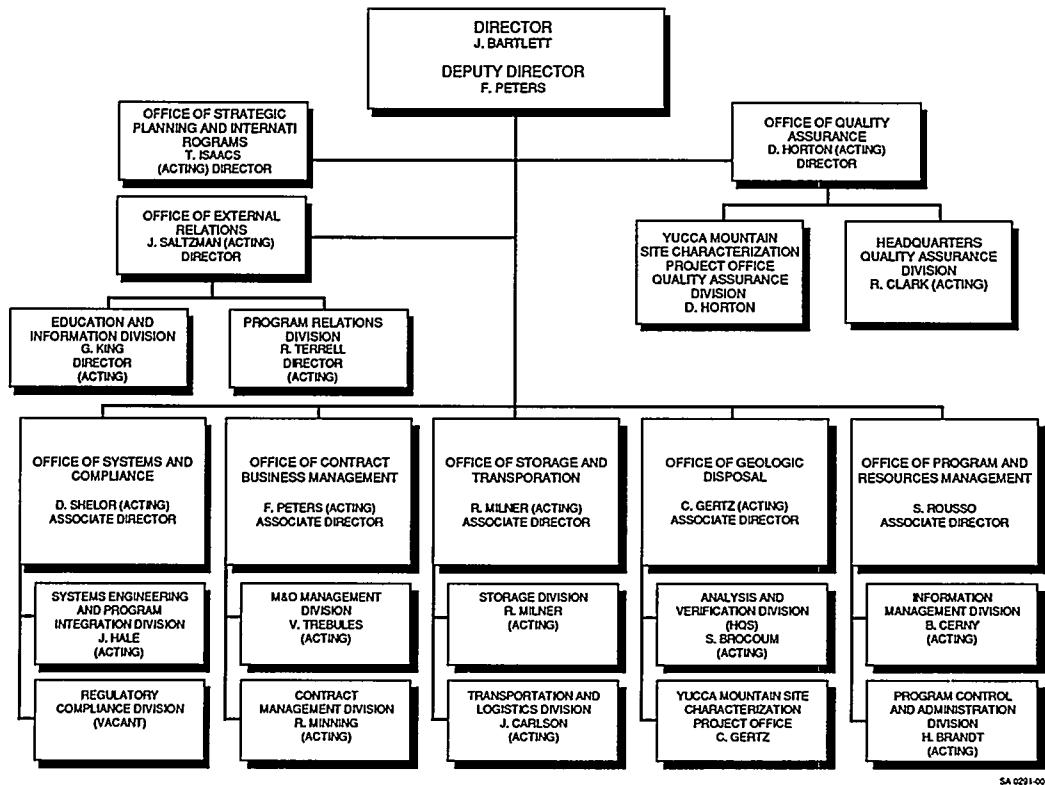
Since his confirmation as OCRWM Director, Dr. Bartlett has been making key decisions on program policy, strategy, and operations. Such decisions are to serve three basic objectives: to have the program known and respected for excellence in management; to have OCRWM play a leadership role in stewardship of Federal Government responsibilities for high-level radioactive waste management; and to build a foundation of policy, principles, and operations that will serve the long-range needs of the program. Among the initiatives instituted after Dr. Bartlett assumed leadership of the program, the OCRWM reorganization and the Management Systems Improvement Strategy (MSIS) are key steps toward meeting these three basic objectives.

The MSIS identifies the process to be followed in analyzing, designing, and developing the waste management system. This strategy has been carefully integrated into the restructured organization to delineate clear lines of responsibility, authority, and accountability for managing implementation of the program.

Dr. Bartlett has also articulated his policy on how OCRWM management will exercise its responsibilities and authorities. This policy includes:

- establishment of direct reporting by the Yucca Mountain Site Characterization Project Office to the OCRWM Director's Office;
- delegation of decisionmaking authority to the most appropriate and practical level;
- openness and effectiveness in inter-Office and intra-Office communications;
- assurance of effectiveness in communications between DOE and its contractors;
- initiatives for improvement in all aspects of program activities; and
- effectiveness in implementing the Quality Assurance program, developing and implementing the products of the MSIS, and supporting consolidation and revision of contractor support.

Office of Civilian Radioactive Waste Management



The Director's reorganization of OCRWM, which moves away from the matrix structure that had existed over the past two-and-a-half years, is designed to provide clear lines of responsibility, authority, and accountability for the program and its contractors. The proposed reorganization has been incorporated into the MSIS.

Strategic Principles

In implementing the initiatives resulting from the restructured and revitalized program, Dr. Bartlett is developing — in consultation with affected and interested parties — strategic principles for planning and decisionmaking. The purpose of the principles is to permit decisions to be made in a rational, goal-oriented manner directed at achieving the objectives of the program while allowing adequate opportunity for meaningful predecisional involvement by affected and interested parties.

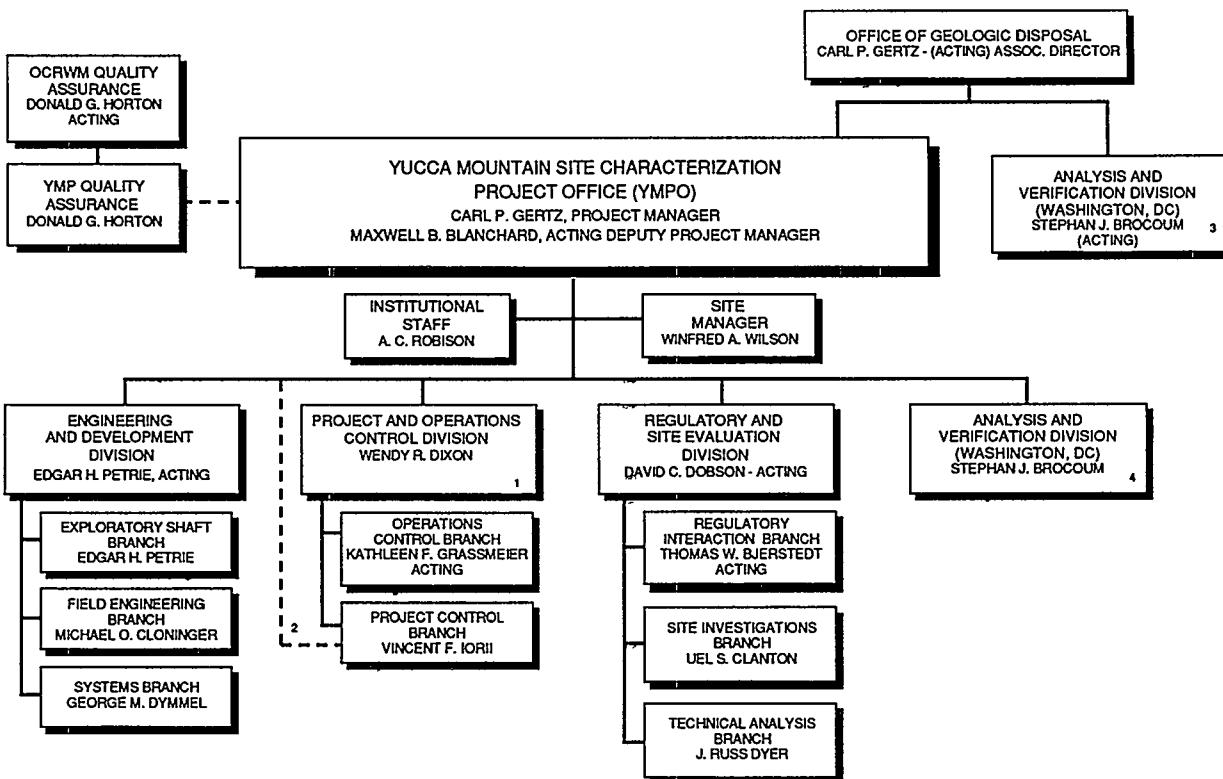
The strategic principles will be shared with interested parties and will serve as a foundation for the more detailed plans and studies that will be necessary to successfully administer waste management activities. In view of the complexity of the program and its first-of-a-kind nature, the principles are to be used as guides for decisions and actions rather than rigid constraints.

The following strategic principles are believed to be acceptable to many affected and interested parties:

Management

- Maintain the focus of the program on permanent disposal
- Provide facilities for the timely acceptance of spent fuel
- Establish and implement strict environmental-compliance programs
- Maintain standards of excellence

Office of Geologic Disposal and Yucca Mountain Site Characterization Project Office



SA 0291 001

- Ensure that all quality-assurance requirements are met
- Assign equal importance to institutional and technical activities
- Coordinate the technical, institutional, and management activities of the program

Technical

- Apply the concept of "defense in depth" in waste management and disposal
- Provide alternatives and contingency plans
- Use state-of-the-art systems-engineering techniques in developing and designing waste-management facilities and operations

- Use simple and proven designs and technologies
- Provide external forums for the discussion of technical issues

Institutional

- Provide for the involvement of affected parties in the decisionmaking process
- Provide support to educational programs
- Work cooperatively with affected parties
- Consider potential benefits to the host community

ties in siting and designing waste-management facilities

In addition, OCRWM has identified a number of issues of strategic importance for which strategic principles may need to be developed. These issues include priority for accepting spent fuel, the use of peer reviews, sharing information on a timely basis, the use of dual-purpose casks for spent-fuel storage and transportation, steps to be taken if the candidate site for a repository is found to be unsuitable, phased licensing for the repository, providing long-term cooling for spent fuel before disposal, conducting demonstration projects to increase confidence in the performance of a repository, and providing the means for predecisional participation by involved parties. OCRWM will seek external input on these issues and intends to invite representatives of affected and interested parties to participate in a series of workshops that will be devoted to these issues. The workshops were held on December 4-5, 1990, in Salt Lake City and January 15-16, 1991, in Washington, D.C.



Chapter

9

Quality Assurance

Secretary Watkins and Dr. Bartlett are dedicated to assuring high quality in all activities, at all levels of the waste-management program. For this reason, all program activities with implications for radiological safety and selected non-safety-related activities of special importance to the program are subject to Quality Assurance (QA) requirements. During the reporting period, enhancements were made both to the QA program and to the methods of implementing the program. Early in FY 1989, the Quality Assurance Plan for High-Level Radioactive Waste Repositories was replaced with the OCRWM Quality Assurance Requirements Document (QARD) and the OCRWM Quality Assurance Program Description (QAPD). The QARD sets forth the program quality assurance requirements with which all OCRWM program elements are required to comply. The QAPD describes the methods to be used in implementing the QA program at OCRWM Headquarters and identifies the implementing procedures that are required to apply to the QA program.

Since the initial issuance of the QARD and QAPD, several additional enhancements have been made:

- In March 1990, the QARD was revised to incorporate QA requirements for high-level waste form production. Since that time, OCRWM has been actively coordinating with waste form producers in the development of QAPDs that reflect the requirements of the QARD.
- Consolidation of the QA Program Plans for

OCRWM Headquarters and the Yucca Mountain Site Characterization Project Office — previously separate — began in February 1990 and was completed in May 1990. The purpose of this change was to reduce the amount of manpower required to maintain the separate programs and to provide for a consistent, unified set of QA requirements and procedures. Evaluations of existing OCRWM Headquarters and Yucca Mountain Site Characterization Project Office QA procedures are in progress to facilitate procedure consolidation.

The latest revision to the QARD was distributed in October 1990 and contains changes to reflect the OCRWM reorganization and addresses some comments that resulted from the NRC review of the previous revisions.

The current QARD applies to all OCRWM program participants and affected organizations. Affected organizations include all non-OCRWM organizations performing activities associated with the program, such as prime and subcontractors, national laboratories, other U.S. Government organizations, etc. Affected organizations are required to establish QA programs that comply with the provisions of the QARD.

The most pressing QA issue currently facing the OCRWM program is the completion of the qualification of the OCRWM and affected organization QA programs. In FY 1990, OCRWM performed evaluations of the QA programs of all major Yucca Mountain affected organiza-

tions and determined that their QA programs were adequate to initiate new site characterization activities. QA qualification audits of Headquarters and the Yucca Mountain Project Office were completed shortly after the end of the fiscal year, and OCRWM believes that successful completion of the exercise was a major step forward in terms of its readiness to begin site characterization.

Throughout the reporting period, OCRWM actively engaged in prelicensing consultations with NRC to discuss QA concerns. To ensure that NRC is kept abreast of OCRWM's progress in QA implementation, ongoing bimonthly QA program review meetings are held to provide a forum for NRC, Edison Electric Institute, the State of Nevada, and other interested organizations to participate in resolving QA issues. These meetings provide information on the status of the development and progress of QA-related actions.

Chapter 3

Geological Disposal

Site Characterization Plan

A major program achievement was publication of the Site Characterization Plan (SCP) for the Yucca Mountain site on December 28, 1988. The basic purpose of the SCP is threefold:

1. To describe the site, the preliminary designs of the repository and the waste package, and the waste-emplacement environment in sufficient detail so that the basis for the site characterization program can be understood.
2. To identify the issues to be resolved during site characterization, including the issues related to site suitability; to present the strategy for resolving the issues; and to identify the information needed to resolve the issues.
3. To describe general plans for the work needed to obtain the information deemed necessary for performance assessments and design, and to resolve outstanding issues.

The SCP was submitted for review and comment to NRC, the Governor and legislature of the State of Nevada, affected units of local government, and the public. Public hearings on the SCP were held in Nevada in March 1989.

OCRWM is reviewing comments on the SCP from NRC and the State of Nevada. Responses to the March 1989 public hearings in Nevada were issued on July 31, 1990. Responses are also being prepared for comments

received from other Federal and State Agencies. DOE will consider all NRC comments and relevant State comments before initiating any new ground-disturbing site characterization activities.

Another important achievement was issuance of the Surface-Based Investigations Plan (SBIP) in December 1988. The SBIP covers all activities described in the SCP that are related to surface-based site characterization work (e.g., mapping, trenching, and drilling, excluding the activities related to the Exploratory Shaft Facility (ESF)). It also summarizes planned activities and their technical rationale, and provides detailed maps of where surface-based testing and construction activities will be conducted.

A Progress Report on the Scientific Investigation Program for the Nevada Yucca Mountain Site for FY 1989 was issued in February 1990. The progress report summarizes the status of site characterization and cites the technical and research reports that provide more detailed information on these activities. The report covers work started, in progress, and completed and documented during FY 1989. The report also discusses major changes in the site characterization program.

Site Characterization

Surface-Based Testing

During FY 1990, DOE made important changes in the emphasis of the site characterization program. DOE's original approach called for the construction of explor-

atory shafts and underground facilities that would allow it to evaluate the site as a total system consisting of engineered barriers and the geology of the site itself. In response to comments from the Edison Electric Institute and the State of Nevada, DOE has reoriented its investigations of the Yucca Mountain site to focus on the evaluation of site suitability. This new approach will use surface-based tests to give an early indication of whether the site is unsuitable for repository development.

Because surface-based testing will be used to test for unsuitability conditions, the construction of exploratory shafts and the underground testing facility has been delayed as reported in DOE's *Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program*. As a result, DOE plans to apply to NRC for a construction license in October 2001 instead of January 1995 as originally planned, and does not expect to begin repository operations until 2010.

In February 1990, a Surface-Based Testing Prioritization (SBTP) task force was established to study and make recommendations on prioritizing surface-based tests for evaluating site suitability. Recently, the scope of that effort has been revised as the Testing Prioritization Task (TPT) to consider all tests enumerated in the SCP. Unsuitability conditions based on DOE's Siting Guidelines (10 CFR 960) and NRC's Siting Criteria (10 CFR 60.122) are the basis for determining which site conditions should be investigated early and, in addition, which testing activities are most likely to detect and/or characterize these conditions. The development of a site suitability methodology is now part of a separate but parallel and consistent effort. The methodology is intended to support early and periodic interim evaluations to determine whether the site is suitable for continued scientific investigation and future repository development. Although these evaluations are still in progress, several categories of surface-based tests are expected to be initiated early in the site characterization program.

New scientific investigation activities will be initiated when (1) the permitting impasse with the State of Nevada is resolved, (2) the necessary quality-assurance controls are in place, and (3) appropriate study plans and procedures are completed. Once these prerequisites are met, DOE will begin on-site drilling to confirm that prototype dry-drilling method and procedures can be applied to the site and to collect information on the unsaturated zone. DOE will also excavate trenches to collect information on recent faulting and the potential for earthquakes and surface offsets in the vicinity of the

proposed surface facilities. Additional trenches will be excavated to help understand whether calcite-silica deposits at the site are indicators of past saturated conditions in the proposed repository horizon; were formed from hot ground water injected from depth; were formed as low-temperature spring deposits; or, are merely the product of soil-forming processes.

The emphasis on early surface-based testing will delay construction of exploratory shafts until 1992. In addition, DOE is also deferring further design of the repository and the waste package until more information is available on the suitability of the site. DOE's early focus on surface-based testing is intended to determine if there are any potential disqualifiers prior to the beginning of extensive underground testing.

Major Achievements in Technical Program Planning

Exploratory Shaft Facility Alternatives Study

In April 1989, the Nuclear Waste Technical Review Board (NWTRB) suggested that DOE consider several changes to its plans for the ESF, including using mechanical mining for one or both of the exploratory shafts, delaying the start of noncritical tests planned within the exploratory shafts, and conducting a more extensive program of excavating exploratory tunnels. In response to these suggestions, DOE sponsored two independent reviews, the results of which were provided to NWTRB in August 1989 (Golder Associates, 1989; Weston, 1989). The reviews concluded that (1) given the need for testing during construction, mechanical mining generally took less time than conventional mining; (2) the sequencing of tests could have a significant effect on the construction time for the ESF; and (3) an additional exploratory drift to the Ghost Dance fault would be advisable, but there were insufficient data for a decision on the need for further exploratory drifting at this time. The Ghost Dance Fault passes through the proposed repository block; however, its structural and hydrologic significance to the performance of the proposed repository is not well defined at this time.

NWTRB then requested that DOE review alternative methods for constructing the ESF. On January 16, 1990, DOE completed a plan for implementing its study of alternatives for the exploratory shafts. The study established a formal decision methodology that DOE is currently implementing. It includes evaluating the relative merits of various exploratory shaft and ramp configurations and construction methods based on 10

CFR Part 60 and State and DOE requirements. A decision on the alternatives is expected in early FY 91.

Other Studies

Calico Hills Risk/Benefit Analysis

Another major study, the Calico Hills Risk/Benefit Analysis, is proceeding in parallel with the TPT and evaluation of ESF alternatives. The Calico Hills stratigraphic unit is an important natural barrier between the repository horizon and the underlying ground-water table. The NRC staff was concerned that plans for excavation and testing in the Calico Hills unit were not based on an analysis of the risks and benefits of alternative methods for obtaining the needed information. Their objection, cited in their review of the Consultation Draft of the SCP, was resolved on the basis that DOE would perform this risk/benefit analysis and that the NRC staff would be consulted before the results of the analysis are implemented. The results of the Calico Hills Risk/Benefit Analysis will be integrated into the study of alternative ESF configurations and the TPT.

Other Significant Achievements

Study Plans

DOE devoted significant effort to the development of site characterization study plans during FY 1990. These plans describe the activities to be conducted in greater detail than the SCP provides; they are the link between the studies described in the SCP and the technical procedures that will be used in the field and laboratory. There are 106 activities identified in the SCP for which study plans are needed. At the end of FY 1990, almost half of all the required study plans were under preparation.

The development of study plans for ongoing activities is an especially high priority. An activity is considered to be ongoing if it was in progress at the time the Yucca Mountain site was recommended for characterization in 1986 and has continued. Examples of ongoing activities include hydrologic, meteorologic, and seismic monitoring at the site; geodetic surveys; and analyses of degradable and irreplaceable samples.

Study plans are provided to NRC for review and comment. By the end of FY 1990, 10 plans had been sent to NRC for review and comment. NRC has indicated that plans for "Quaternary Regional Hydrology," "Location and Recency of Faulting near Prospective Surface Facilities," "Characterization of Volcanic Features," and

"Mineralogy/Petrology Along Transport Pathways" are acceptable to initiate these studies.

Geophysical Studies

A major report on the *Status of Data, Major Results, and Plans for Geophysical Activities, Yucca Mountain Project* was issued in July 1990. Known informally as the "Geophysics White Paper," the report provides references to available geophysical data on the site, major conclusions derived from those data, and plans for gathering additional data. The report was produced in response to NRC comments on the SCP concerning the need for integration of the geophysical studies during site characterization.

Sample Management Facility

Drill cores and related records from earlier site investigations of the Yucca Mountain site were transferred from the Nevada Test Site Core Library to a new Sample Management Facility, a central facility designed for the management and storage of samples obtained during site characterization. The facility is now fully operational, and staff are using samples collected during the prototype drilling program to test and refine procedures for managing and preparing samples.

Lead Report

A Report to Congress on the Potential Use of Lead in the Waste Packages for a Geologic Repository at Yucca Mountain, Nevada was published by DOE in December 1989. The report, which was subjected to peer review, concluded that for the conceptual waste package design described in the SCP, lead has no applications. For the alternative design program, lead could be useful as a filler or a liner material, but extensive research will be required to evaluate lead and other materials.

Other Research Programs

DOE continued to monitor conditions at the site and conduct investigations in the field and the laboratory to characterize the site during FY 1989 and 1990. Included were monitoring of moisture conditions, water-table levels, surface-water infiltration, meteorology, streamflow, and debris transport.

The physical and chemical parameters of existing core and drill cuttings and outcrop samples were measured in the laboratory. Investigations continued to determine the origin of hydrogenic calcite-silica deposits located near the site. Revisions also continued on geologic, gravity, and aeromagnetic maps.

The potential for volcanism in the region of the site was the subject of increased interest. One study suggests that the Lathrop Wells cone, 20 kilometers south of Yucca Mountain, may be much younger than the previously reported 200,000 to 300,000 years. Also, new models were developed to identify potential structural controls of volcanic activity.

A variety of activities was conducted to gain a better understanding of seismic conditions in the region around the site. Operation of the Southern Great Basin seismographic network continued. Preparations were made to purchase new, more sensitive seismic stations, satellite-telemetry apparatus, and computer hardware and software. Work continued on updating the catalog of seismic events through literature surveys and seismic-network reports. Studies of the effects of underground nuclear explosions at the Nevada Test Site and ground motion modeling efforts continued. In FY 1989, a portable array of seismometers was deployed near Lake Mead.

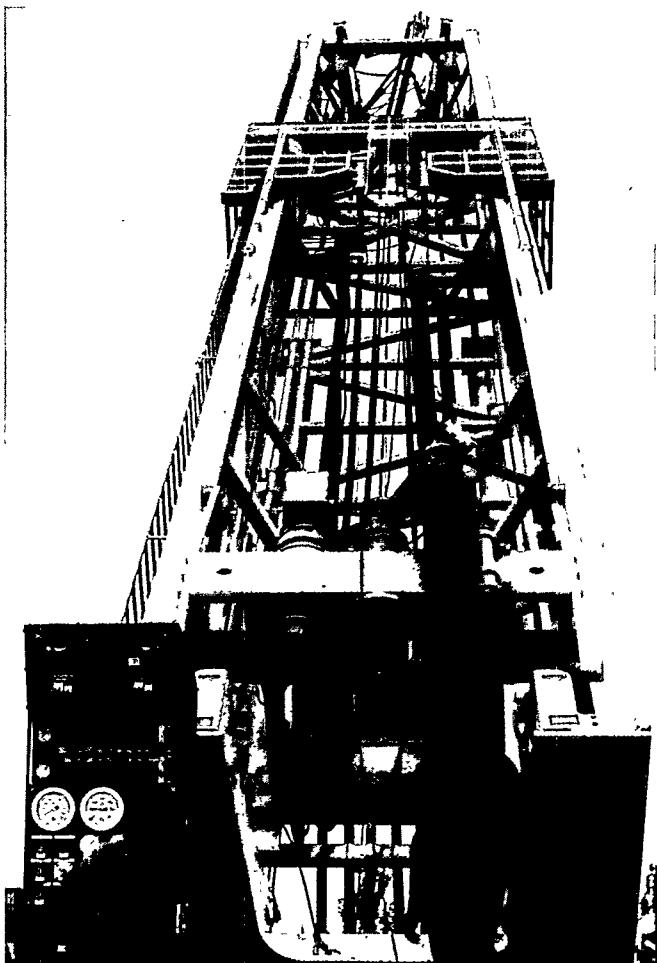
Testing in the G-Tunnel on the Nevada Test Site (NTS) to develop planned subsurface tests was terminated in December 1989 due to budgetary constraints. Los Alamos National Laboratory summarized the status of the prototype testing activities.

DOE conducted a prototype drilling program to demonstrate that specially designed and built drilling and coring equipment can retrieve high quality borehole core samples suitable for analysis of at-depth conditions. Prototype drilling operations were successfully conducted in Utah and Arizona. Success in the prototype drilling program enables the program to prepare for drilling on the NTS and the Yucca Mountain site.

Design Activities

DOE has deferred further repository and waste package design until more information is available on the suitability of the site. Design of the exploratory shaft facility was also suspended pending completion of the ESF Alternatives Study.

In December 1988, the Yucca Mountain Site Characterization Project Office issued the ESF Title I Design Summary Report, which contained the major plans for ESF development. As a result of meetings with NRC, DOE undertook a technical review of the adequacy of the ESF Title I design. Although DOE found that the ESF Title I design was adequate, it determined that additional criteria should be incorporated into the ESF Title II design. DOE also determined that consideration of waste isolation did not discriminate in the selection of



Raising the mast on the new LM-300 drill rig.

current shaft location. The results of these analyses were provided to NRC in February 1989.

After a management review was conducted in March 1989, Title II design of the ESF was initiated in April 1989. The design activities encompassed the surface facilities only and were halted at the point of 30 percent of design completion.

In a meeting with NRC and the State of Nevada in July 1989, DOE presented a revised process for controlling the ESF design. NRC indicated that the revised process appeared to be adequate, and it has now been incorporated into DOE administrative procedures.

In response to concerns about an inferred fault near the planned location of the exploratory shafts, DOE initiated a Technical Assessment Review of the issue. Subject to limited uncertainties, the review did not find conclusive evidence for the presence of a fault that would affect the ability to construct the proposed exploratory

shafts. Results of the review and recommendations are contained in the Review Record Memorandum.

Socioeconomic and Environmental Studies

Socioeconomic Studies

OCRWM continues to focus its socioeconomic program on assessing and monitoring impacts that could occur as a result of scientific investigations at the Yucca Mountain site. In December 1988, DOE issued the "Section 175 Report." This report identified 12 categories of potential impacts from locating a repository at Yucca Mountain.

Since the issuance of the Section 175 Report, OCRWM has developed a Socioeconomic Plan (SP) for Yucca Mountain. The SP describes OCRWM's socioeconomic program for the scientific investigation phase and is designed to integrate data collection, data analyses, and reporting efforts. A consultation draft of the SP was issued in April 1990, and, when all comments are reviewed, follow-up efforts to resolve the comments will be initiated.

In 1989 and 1990, OCRWM has continued to monitor the size, location, and distribution of the project-related workforce and the associated population in Nevada. It has issued a series of data reports that provide information on the project-related workforce and population. These reports will continue to be issued on a quarterly basis, and the information contained in the reports, along with the other community information, will be used to monitor the potential impacts of the Yucca Mountain site characterization project in Nevada.

Environmental Monitoring and Mitigation

The NWPA requires that DOE conduct all site characterization activities in a manner that minimizes significant impacts on the environment. As a consequence, in 1988, DOE developed an *Environmental Monitoring and Mitigation Plan* that provides for the continuous monitoring of air quality, water resources, and terrestrial ecosystems and cultural resources including Native American cultural and archaeological components. In 1988 and 1989, DOE developed *Environmental Field Activity Plans* pursuant to which it is now collecting data on air quality, water resources, and terrestrial ecosystems that will be used to determine the environmental effects of site characterization and to minimize these effects to the extent practicable. DOE has monitored cultural resources since the mid-1980s and, in addition, has instituted an outreach program to obtain the advice and

recommendations of Native Americans with ties to the Yucca Mountain area on the mitigation measures that should be employed to protect cultural and archaeological resources. In the process, it has surveyed about 10,000 acres and identified 440 sites of interest.

Reclamation

In 1989, DOE developed a *Reclamation Program Plan* (RPP) to ensure the return of areas disturbed during and following site characterization to a stable ecological state with a form and productivity similar to the predisturbance state. To implement this plan, DOE has prepared and executed a Reclamation Implementation Plan (RIP) that describes how the requirements of the RPP will be met. For example, DOE established ecological study plots to examine natural succession in the desert ecosystems around Yucca Mountain. The data obtained from these plots, together with soil survey and laboratory data obtained in 1990, will be used to guide future reclamation activity.

Performance Assessment

Performance assessment refers to the process of evaluating the geologic disposal system in order to (1) demonstrate compliance with numerical performance objectives specified in 10 CFR Part 60, (2) support the design and construction of the repository system, and (3) guide testing during site characterization. DOE made significant advances in the development of performance assessment models during FY 1989 and 1990.

Performance assessments are conducted for the preclosure and postclosure periods. Preclosure assessments evaluate the risks to workers and the general public from normal repository operations and unexpected accidents. Postclosure performance assessment predicts the behavior of the repository system after permanent closure.

Preclosure Performance Assessment

Several analyses supporting the assessment of pre-closure safety were completed during FY 89, including the following:

- Identification of repository structures, systems, and components important to safety
- Assessments of safety for workers and the public
- Preliminary analysis of safety during normal operating conditions

- Preliminary analysis of safety and radiological consequences during unexpected accidents
- Analysis of items important to radiation-safety for the exploratory shaft

An analysis was begun to evaluate the effects of uncertainties on the calculation of radiological consequences of accidents. These uncertainties will be evaluated to determine the probability of various levels of exposure to radiation as a result of accidents.

A study is being conducted to evaluate alternative configurations of spent fuel in the repository. The study will develop potential accident scenarios and configurations of spent-fuel containers, and their emplacement will be designed to ensure that critical mass cannot occur during the preclosure or postclosure periods.

Postclosure Performance Assessment

Postclosure performance assessments consider the following components of the geologic disposal system:

- Natural barriers (to evaluate ground-water travel time and radionuclide retardation)
- Engineered-barriers (to evaluate containment provided by the waste packages and the rate of release from the engineered-barrier system after the containment period)
- Total system (to evaluate waste isolation after permanent closure)

Natural Barriers. Several analyses of various components of the natural barrier system important to postclosure performance assessment, especially ground-water flow systems, were completed:

- Lateral fluid flow at Yucca Mountain
 - Uncertainty in hydrologic parameters
 - Fluid and heat flow near waste packages
- Gas-phase flow
- Capillary-driven flow in fractures

Progress was also made in developing and analyzing models for assessing the performance of natural barriers, including the following:

- Various approaches to calculating ground-water travel time
- Evaluation of the hydrologic effects of constructing the Exploratory Shaft Facility

- Analysis of proposed laboratory experiments
- Development of computational and experimental procedures for predicting ground-water flow
- Analysis of ground-water flow system that takes into account the construction of an exploratory shaft

Several other studies concerning infiltration flow instability in porous media and fractures, and the potential impact on Yucca Mountain, are currently in progress. A presentation was made to the NWTRB Hydrogeology and Geochemistry Panel on December 11-12, 1989, on *Conceptual Models for Fracture/Matrix Flow*. Comments from the presentation appeared in the *First Report to the U.S. Congress and the U.S. Secretary of Energy*, issued by NWTRB on March 22, 1990. Computer codes used in hydrologic modeling were also improved substantially to increase their efficiency and capabilities.

Engineered Barrier System. An improved computer model (EQ3/6) of geochemical conditions at the site was released for testing and verification, and development of advanced conceptual design of the model is underway. The model is being tested for systems and conditions important for performance assessment. The model also incorporates a newly developed kinetic model of how glass is affected by water. It is anticipated that some defense high-level waste will be formed into glass logs (vitrified) before emplacement in the repository.

The first version of a computer code for assessing the performance of the waste-package was developed and tested. Other progress included the development and testing of a computer code for simulating how ground water corrodes spent-fuel cladding (zircaloy) and container materials.

Total System. Progress was made in developing models for assessing the performance of the total repository system, including the initial documentation of the total system performance assessment code (TOSPACE). Results of preliminary analyses of total system performance were compiled to support design of the exploratory-shaft facility.

A model of volcanic events at the Yucca Mountain site is also under development. The model will account for the placement and content of waste containers, evidence of magma, and the history of volcanism in the region around the site. A preliminary analysis of the potential for gaseous carbon-14 releases from the repository was performed.

Work began in December 1989 on the identifica-

tion of postclosure release scenarios. An event tree technique was chosen to construct the release scenarios and perform decision analysis. A scenario is defined as a single, continuous path starting with an initial condition and ending with a possible release of radionuclides.

Performance Assessment Planning

DOE issued the following three major guidance documents for performance assessment in FY 1990:

- Performance Assessment Management Plan* (PAMP) describes the organizational structure and the functional relationships between the various organizations that are conducting performance assessments. Seven working groups coordinated performance assessment activities, three of which were active during FY 1990.
- Performance Assessment Strategy Plan* (PASP) establishes the strategy to be followed through submittal of the license application.
- Performance Assessment Implementation Plan* (PAIP) contains one-page descriptions for each of the activities to be performed during each year. The descriptions include the participants, budget, and short-term schedule.

Much of the PAIP is dedicated to the Performance Assessment Calculational Exercise (PACE-90) effort. The purpose of PACE-90 is to conduct preliminary assessments using limited data in order to identify critical processes and elements, develop computational facilities, and provide sensitivity studies to support program evaluations.

Participants in PACE-90 are organized into three working groups: Total Systems Performance Assessment (TSPA), Engineered Barrier System (EBS), and Natural Barrier System (NBS). A data set was assembled for PACE-90, including hydrologic/stratigraphic and sorptive properties for use by the working groups. Other data sets will be developed to support other analyses. Nominal and disturbed case results were presented in April 1990 and August 1990, respectively. Sensitivity calculations were expected in September 1990.

The Performance Assessment Implementation Plan also addresses the development of models and computer codes for use in the PACE calculations. If needed, existing codes were enhanced or otherwise modified in order to perform the required calculations. In addition to the PACE, performance assessment calculations were

performed in support of the Alternative Licensing Strategy.

Licensing Strategy

DOE's strategy of taking the steps necessary to clarify the interpretation of applicable regulations, to suggest modification if appropriate, and to resolve licensing issues prior to the submittal of an application for a construction authorization remains unchanged. To implement this strategy, particularly as it pertains to the development of the information required for the license application, DOE has, in response to NRC and NWTRB suggestions, been investigating alternative approaches for obtaining the required information (i.e., "alternative licensing strategies"), alternative configurations for the ESF, and the priorities that should be assigned to the tests that have to be carried out to evaluate the suitability of the Yucca Mountain site with particular emphasis on surface-based tests. Appropriate DOE interactions with Federal agencies are an integral part of this strategy and are discussed in Chapter IX.

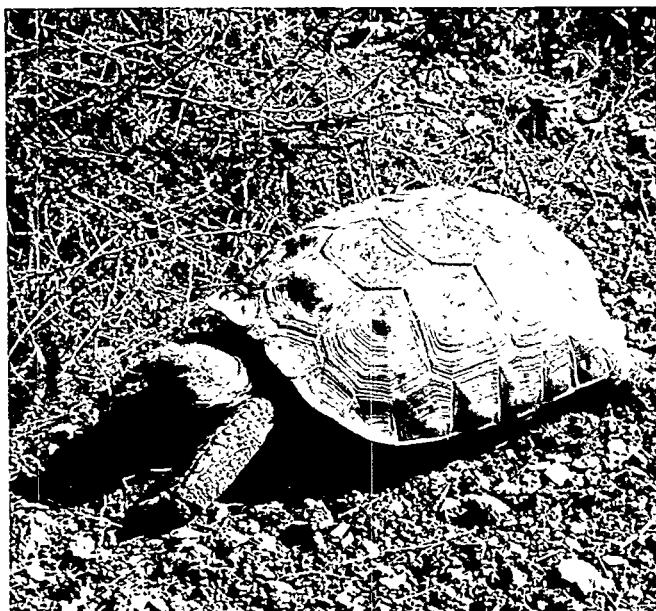
Alternative Licensing Strategies

In his reassessment of the waste management program, the Secretary made a commitment to identify alternative licensing strategies that could permit DOE to receive spent fuel at a repository earlier than 2010. To meet this commitment, DOE established a task force to evaluate *Alternatives To the Current License Application Strategy* (ATLAS). The task force is also considering contingencies and interim storage of high-level waste. DOE is supporting the ATLAS task by developing a methodology for quantitatively assessing licensing alternatives.

Permits

During the last reporting period, DOE efforts were concerned with obtaining the six Federal and three State permits and approvals required for beginning new site characterization activities at the Yucca Mountain site. At the end of FY 1990, three of the Federal approvals had been obtained and approval of the remaining three was expected before the end of calendar year 1990. None of the required State permits had been obtained.

During the past year, the U.S. Fish and Wildlife Service (FWS) placed the desert tortoise on its list of threatened species, an action that could have precluded site characterization activities at Yucca Mountain. DOE worked closely with FWS, which has, as a result, con-



cluded that the proposed activities are not likely to jeopardize the continued existence of the desert tortoise. DOE and FWS are now developing the measures that will be used to ensure the protection of this species at Yucca Mountain. Approval of the remaining DOE requests for a free-use permit from the Bureau of Land Management, a Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers, and the DOE-required flood plains/wetlands assessment is expected soon after completion of the DOE/FWS effort to develop desert tortoise protection measures.

The State of Nevada has refused to act on the required Underground Injection Control permit, Air Registration certificate, and Ground-Water Appropriation permit.

Current Litigation

In 1989, the State of Nevada enacted legislation providing that it is unlawful for any person or governmental entity to store high-level radioactive waste in the State. The Nevada Attorney General then issued an opinion concluding that the State's transmittal of the legislation to Congress constituted a valid and effective "notice of disapproval" under Section 116 (b) (2) of the NWPA, as amended; that Congress had failed to override such disapproval; and that action upon the DOE permit applications should therefore be considered as "unnecessary." In January 1990, Nevada filed a petition in the U.S. Court of Appeals for the Ninth Circuit seeking a declara-

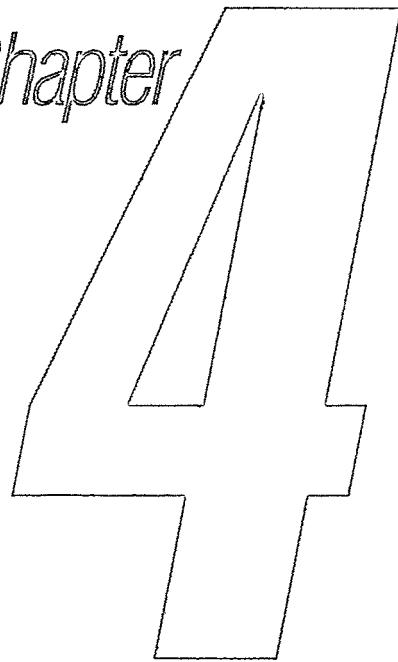
tion that the site was disapproved and an injunction terminating site characterization of Yucca Mountain. In September 1990, the Court ruled unanimously in favor of DOE, holding that Nevada's attempted legislative veto of the Secretary's site characterization activities was ineffective and preempted by the NWPA. In December 1990, the State filed a petition for certiorari with the U.S. Supreme Court.

In January 1990, the Department of Justice, on behalf of DOE, filed a complaint in the U.S. District Court for the District of Nevada requesting that the Court direct the State to act on the DOE permit applications. However, this action was stayed pending disposition of the above case by the U.S. Court of Appeals. The stay remains in effect. The State has returned the DOE permit applications and refused to act on them.

In a separate matter, the State appealed a decision by the U.S. District Court finding that Nevada lacked standing to challenge the Bureau of Land Management's 1988 grant to DOE of a 13-year right-of-way over public land near Yucca Mountain for the conduct of site characterization activities. In November 1990, the U.S. Court of Appeals affirmed the dismissal. The State has announced its intent to appeal to the Supreme Court.

In two related petitions presently pending before the U.S. Court of Appeals, the State of Nevada challenges the Yucca Mountain environmental assessment and the DOE siting guidelines. Briefing has been completed and oral argument is to be scheduled.

Consolidated cases involving Esmeralda County, Nevada, and Inyo County, California, seek review of the Secretary's decision to deny their designation as affected units of local government pursuant to Section 2 (31) of the NWPA. Oral arguments were heard in August 1990 before the U.S. Court of Appeals.



Monitored Retrievable Storage

Role of MRS Facility

OCRWM plans to develop a facility for MRS as an integral part of the waste management system. The development of this facility is authorized by the NWPA, as amended, which establishes specific conditions limiting the MRS storage capacity and linking the schedule of the MRS facility to the schedule of the repository.

The MRS facility will provide temporary, above-ground storage for spent fuel shipped to it from commercial nuclear reactors that generate electricity. When the geologic repository begins operating, spent fuel will be shipped from the MRS facility to the repository for permanent disposal. Technically suitable sites for the MRS facility can be found throughout the continental United States.

An MRS facility that can begin accepting waste well in advance of the start of repository operations will reduce utilities' needs for additional onsite storage capacity for their spent fuel. It will also provide an important demonstration of the Federal Government's ability to manage high-level radioactive waste safely and reliably.

As a storage and staging facility that links reactor and repository operations, the MRS facility will add reliability and flexibility to the waste-management system and greater efficiencies to the nationwide system for transporting spent fuel.

MRS System Studies

During FY 1989, OCRWM completed a series of MRS System Studies, initiated in 1988 to determine the benefits of an MRS facility as part of the waste management system authorized by the NWPA, as amended. The studies included generic engineering and tradeoff analyses for alternative MRS packaging functions, assessments of storage technologies that could be utilized at the MRS facility, identification of licensing concerns, transportation impacts of generic eastern and western management systems, and the impacts on at-reactor operations of the various system configurations and operating scenarios. The findings of these system studies were summarized in the *MRS System Study Summary Report* issued in June 1989.

The results of the MRS System Studies were provided to the MRS Review Commission for its use in developing its report to Congress. The studies also formed the basis for DOE's official position on the need for monitored retrievable storage as reported in *The DOE Position on the MRS Facility*.

MRS Review Commission

The Amendments Act established an MRS Review Commission to provide an independent assessment of the need for and feasibility of an MRS facility and to prepare a report, including 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 was to obtain comments from affected and interested parties, including States containing potentially acceptable sites.

Findings

The MRS Review Commission submitted its report to the Congress on November 1, 1989. The Commission found that "cumulatively the advantages of an MRS would justify the building of an MRS if: (1) there were no linkages between the MRS and the repository; (2) the MRS could be constructed at an early date; and (3) the opening of the repository were delayed considerably beyond its presently scheduled date of operation" (i.e., considerably beyond the year 2003). The Commission recommended that Congress authorize the construction of a Federal emergency storage facility with a capacity limit of 2000 metric tons of heavy metal; authorize the construction of a user-funded interim storage facility with a capacity limit of 5000 metric tons; and reconsider the need for additional interim storage in the year 2000.

Siting the MRS Facility

The Secretary's November 1989 reassessment of the repository program showed that the start of waste acceptance at the repository would be delayed by 7 years to the year 2010. To allow timely and predictable acceptance of spent fuel, the Secretary announced an initiative to develop an MRS facility that would be an integral part of the waste-management system.

The Amendments Act established two parallel paths for siting an MRS facility: (1) siting through an OCRWM-directed survey-and-evaluation process and (2) siting through the efforts of the Nuclear Waste Negotiator.

OCRWM believes that external, non-DOE efforts, such as those of the Office of the Nuclear Waste Negotiator, offer the best opportunities to solicit interest in the MRS facility and negotiate an agreement to site an MRS facility with a volunteer host. Consequently, OCRWM's near-term role in MRS siting will be to monitor the progress of external efforts to find a volunteer host and, if requested, undertake activities in support of these efforts. In late FY 1990, OCRWM established plans to assess the progress of external efforts; if they do not appear to be progressing on a schedule consistent with the objective of starting MRS operations in 1998, OCRWM would be prepared in FY 1991 to modify its role in siting as appropriate.

Appointment of the Negotiator

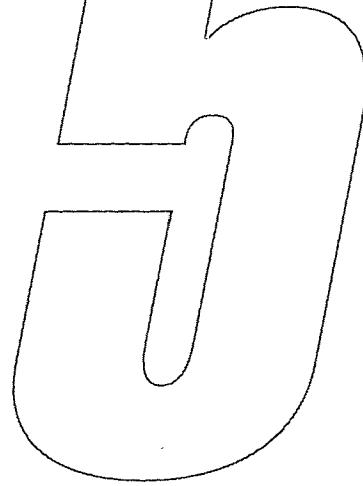
On August 4, 1990, the President's nominee for the Nuclear Waste Negotiator, David Leroy, was confirmed by the Senate. OCRWM will make every reasonable effort to respond to any requests for support which the Negotiator may make.

Design of the MRS Facility

To meet the objective of timely waste acceptance and allow adequate time for a cooperative siting process, OCRWM is planning to use an MRS configuration that would allow the facility to be constructed quickly and would apply proven technologies to the greatest extent practicable. OCRWM is evaluating technology and configuration alternatives that can provide safe, timely, and cost-effective waste management.

The various alternative configurations that can be selected for the MRS facility have both different development implications for the Federal waste-management system and potential effects on how the transfer of fuel to the Federal system is accomplished at the reactor sites. OCRWM has continued to develop more-detailed cost and schedule information, and it is examining procedural mechanisms that might allow the resolution of licensing and technical issues in prelicensing interactions with NRC.

Chapter



Transportation

Role of Transportation

The OCRWM transportation program will constitute an integral element of the waste-management system. The mission of the OCRWM transportation program is to transport spent nuclear fuel and high-level radioactive waste from its storage locations to the repository or an MRS facility in a manner that protects the health and safety of the public, protects the quality of the environment, and is secure and cost-effective. A requirement of the NWPA, as amended, is to use private industry to the fullest extent possible in each aspect of the transportation system.

Materials will be shipped in NRC-certified casks. Shipments may be made by rail, truck, or barge or any combination of these transport modes. The shipments will be conducted in compliance with all applicable Federal regulations; DOE procedures; and applicable State, Indian Tribal, and local government requirements that are consistent with Federal law.

OCRWM has organized its transportation program into four major areas: cask design and development, institutional interactions, operational planning and support, and systems development and economic and system analysis.

Cask Design and Development

In the cask design and development area, OCRWM's priority is to design and develop "from-reactor" spent nuclear fuel transportation casks for shipping to either a

repository or an MRS facility. As required by the NWPA, as amended, all cask designs will be certified by NRC. In 1988, 5 contracts were awarded to develop cask designs for legal weight truck and rail/barge transport modes. In 1989, all 5 preliminary designs were submitted to DOE and reviewed. In FY 1990, OCRWM redirected its cask development program by deciding to proceed into the final design phase with 2 contracts on a fully-funded basis and 2 on a reduced level of funding. The fifth contract was cancelled. The two fully-funded contracts are General Atomics' legal-weight truck cask designs and Babcock and Wilcox's rail/barge cask design. Westinghouse's legal-weight truck cask and Nuclear Assurance Corporation's rail/barge cask designs are funded at a reduced level to focus on their unique technical features. The new casks will provide increased carrying capacity, thereby decreasing the number of shipments required and consequently reducing overall transportation risk and operating cost.

To assist it in finding solutions to common issues in spent fuel cask design, OCRWM conducts a cask development technology program. The focus of the cask technology development work is on technical design issues including burn-up credit, source term, materials, components, automated handling, certification testing, and radiological issues.

In addition to the from-reactor cask development, OCRWM is planning for shipments for research and development purposes. In July 1989, NRC issued a certificate of compliance for the TN-BRP shipping cask

and, in May 1990, one for the TN-REG cask. These casks will be used for research and development; shipment of spent fuel from the Nuclear Fuel Services facility in West Valley, New York; and subsequent temporary storage at the Idaho National Engineering Laboratory.

Economic and Systems Studies

Numerous technical models and databases provide input to economic and systems studies and ensure integration within the transportation program and with the overall waste-management system. Documentation and modifications for more specific route analyses by the RADTRAN risk assessment code are continuing. The Near-Site Transportation Infrastructure Study was initiated in FY 1990 to determine each nuclear-utility reactor site's shipping capabilities. Studies are also ongoing to determine more fully the costs and risks of various transportation alternatives such as dedicated trains and overweight trucks.

Operational Planning and Support Systems Development

During 1990, work was completed on the *Cask Maintenance Facility Feasibility Study* that provides cost and schedule estimates for design concepts and interface definitions with potential repository and MRS facilities. Monitoring of industry and DOE shipments continues as does review of foreign technology and experience with the intent of applying lessons learned to the OCRWM transportation program. Operational testing plans are also being developed for vehicles and casks.

Institutional Interactions

Institutional interactions related to transportation are one of the primary components of OCRWM's transportation program. OCRWM recognizes that the key to a successful transportation program will be the establishment of public understanding and confidence. To meet this goal, many avenues of communication and interaction are used with States, Indian Tribes, local governments, utilities, industry organizations, the media, the public, and other Federal agencies concerned with the transport of high-level nuclear waste and spent fuel.

Interactions with all parties concerned with the OCRWM transportation program are provided through regular Transportation Coordination Group (TCG) meetings. In July 1989, the TCG met in Chicago, Illinois, and, in February 1990, the TCG met in Lexington, Kentucky. Eight cooperative agreements between

OCRWM and national or regional governmental and transportation groups are used to assist in the study of transportation issues and to develop policies and procedures affecting the transportation program. OCRWM engages in numerous activities with the Edison Electric Institute Utility/Nuclear Waste and Transportation Program's Transportation Working Group. OCRWM has provided presentations to industry, trade, and professional groups and other interested parties. In June 1989, OCRWM participated in the 9th International Symposium on the Packaging and Transportation of Radioactive Materials. During April 1990, five sessions of the International High-Level Radioactive Waste Management Meeting were devoted to the OCRWM transportation program.

Throughout FY 1989 and 1990, development of a draft strategy for providing the training-assistance requirements of Section 180(c) of the NWPA, as amended, continued. A preliminary draft Strategy to Provide Training Assistance as required by 180(c) will be released and discussed at the December 1990 TCG meeting. The DOE will work with its institutional network in developing implementation plans to provide funding and training assistance to States and Indian Tribes through whose jurisdictions spent fuel will be transported.



Systems Integration

The development of the waste management system involves management of a complex set of multi-disciplinary activities. Systems integration links the major elements of the system in a manner that maximizes overall safety, efficiency, and cost effectiveness so that there can be a high degree of confidence in resulting operations. Systems engineering plays a key role in the OCRWM effort to integrate the varied disciplines necessary for the waste management system to perform its multiple missions. The systems engineering process is an iterative approach that establishes the functions to achieve the mission; defines the requirements for the functions; creates the design concepts to satisfy the requirements; selects the preferred system; and builds, tests, and demonstrates the chosen system.

The Amendments Act directed DOE to conduct a number of systems studies, including an evaluation of the use of dry cask storage technology for storing spent fuel at the sites of civilian nuclear reactors. The initial study was performed in FY 1988. The final report, which incorporates comments from the NRC, State, and local governments, the public and other interested parties, was prepared in FY 1989 for submission to Congress.

The Amendments Act authorized DOE to site, construct, and operate an MRS facility subject to certain conditions and also established an MRS Review Commission to provide an independent assessment of the need for an MRS facility. In light of these developments, OCRWM decided to update its analysis of the role of the MRS facility in the waste-management system and,

therefore, initiated a series of systems studies discussed in Chapter IV. The results of these studies were used to update DOE's position on the role of the MRS facility in the configuration of the waste-management system.

OCRWM Waste Management System Requirements and Description

As part of the Systems Engineering process, a constant evaluation of the existing technical baseline documents against program needs and directions is required. As a result of this evaluation, an effort to develop a new set of baseline documents was proposed, approved, and initiated during FY 1988 in order to best serve the needs of the OCRWM program.

The OCRWM Waste Management System Requirements (WMSR) and Waste Management System Description (WMSD) documents were prepared in early FY 1990. The system description document and three of the four requirements volumes were approved and represent the present technical baseline against which program performance and progress can be measured. The WMSR provides the top level of a hierarchy of increasingly detailed technical documents that will be prepared for each program element. The WMSR also provides a consistent reference for controlling the technical development of the waste management system. The WMSD is the description of the reference system. It contains the system assumptions and definitions of the top-level system interfaces. Rigorous functional analysis with participation of system engineers and technical

experts in each of the system elements was reinitiated in late FY 1990 to ensure comprehensive definition of requirements for systems functions. The WMSR documents will be upgraded to reflect the results.

Other Activities

Also during FY 1990, OCRWM updated its Systems Engineering Management Plan (SEMP). The SEMP provides guidance for the development of the technical baseline and for the application of systems engineering to the waste management system and provides the methods that will be used to measure progress and ensure integration of the system.

The Management Systems Improvement Strategy (MSIS) was issued in August 1990 to provide a new program approach for achieving the mission specified by the Amendments Act. This strategy recognizes that, just as facilities and equipment composing the physical waste-management system must perform certain functions, so must various programmatic and management functions be performed in order to successfully bring the physical system into being. Functional analysis of these program functions was initiated in late FY 1990. It will identify and link the detailed functions and requirements for each of the major programmatic and management functions and integrate each function with other internal and external functions. The strategy is expected to produce improvements to the technical baseline and other major OCRWM management documents and enable OCRWM to accommodate unique program characteristics in achieving the overall program mission.

A Facility Interface Capability Assessment (FICA) was completed during FY 1990. The assessment includes the physical capabilities of utilities to handle and deliver waste. The FICA report will be used to define the capability of utilities to transfer waste to the Federal waste-management system.

Work was also initiated on a Configuration Management Plan for OCRWM in FY 1990. The purpose of configuration management is to ensure that the product acquired satisfies the program's requirements and that the technical requirements are clearly defined and controlled throughout the total life cycle of the program.

Spent Fuel Storage & Engineering Development

Significant progress was made in FY 1989 in advancing the technology for spent fuel dry storage, developing and demonstrating dry rod consolidation equipment, and performing engineering evaluations of promising technologies for possible application to the waste-management system.

Dry Storage Demonstrations

As a result of a cooperative agreement between OCRWM and the Carolina Power and Light Company (CP&L) for the demonstration of dry storage of spent nuclear fuel, CP&L applied for and, in 1986, was granted a license by NRC for an independent spent fuel storage installation at its H. B. Robinson plant. Three horizontal concrete storage modules were subsequently completed under terms of the agreement. Tests of the performance of the modules confirmed the installation performs as the design analyses predicted that it would, and the modules have been put into routine service. A final report on this activity was drafted in FY 1989 and is now being finalized. Upon publication of the report, OCRWM will formally close out this successful cooperative agreement.

At the end of FY 1989, OCRWM was in the process of closing out a second successfully completed cooperative agreement with the Virginia Power Company that involved the demonstration of the storage of spent nuclear fuel in metal casks. Under this agreement, Virginia Power had developed and operated an NRC-licensed independent spent fuel storage installation at its

Surry plant since July 1986 without encountering any problems.

Concrete Cask Development

Early in FY 1989, OCRWM initiated the Concrete Cask Testing Project (CCTP), a 2-year effort to develop and test a cost-effective alternative to metal storage casks, to demonstrate the feasibility of a new design concept, and to support licensing of at-reactor dry storage.

The CCTP will yield heat transfer and shielding data on at-reactor concrete casks representative of those that may be used by DOE and the nuclear utilities for interim storage of spent nuclear fuel. The project involves the conduct of concrete cask performance tests using consolidated spent fuel to measure fuel and cask temperatures and gamma radiation and neutron dose rates.

Dry Rod Consolidation

Research and development efforts related to rod consolidation continued in FY 1989 under the Prototypical Spent Fuel Consolidation Equipment Demonstration Project (PCDP). The objective of the PCDP is to develop and test production-scale horizontal dry rod consolidation equipment. This testing will provide operational cost data to assist OCRWM in determining whether consolidated fuel rods are to be the reference waste form for an MRS or a repository. Phase III of the PCDP — fabrication and cold testing of rod consolidation equipment —



In the early 1980's Carolina Power & Light Co., in cooperation with the Department of Energy and the Electric Power and Research Institute (EPRI), began work on a dry storage demonstration project at CP&L's H.B. Robinson nuclear plant near Hartsville, S.C. Spent fuel assemblies were loaded into the dry storage modules in early 1989. In the dry storage project, there are eight modules each holding seven fuel assemblies, totaling 56 assemblies.

began in June 1989 and was expected to continue for 29 months. During FY 1990, mock-up fuels and fuel canisters were delivered to equipment contractors, all consolidation equipment was fabricated, and construction of the test facility was completed. In addition, installation of consolidation equipment in the test facilities was begun; test acceptance criteria and test procedures were documented; and quality assurance audits, inspections, and other support were provided. Phase III will develop definitive test and cost data needed for the repository and MRS programs and will verify equipment operability. In late 1991, following evaluation of Phase III results, a decision will be made whether or not to proceed with Phase IV, a hot demonstration project using actual spent fuel.

Dry Cask Storage Study

Section 135 of the NWPA, as amended, directed DOE to conduct a study and evaluation of the use of dry cask storage technologies at nuclear reactor sites. The study, titled the *Final Version Dry Cask Storage Study*, concluded that existing dry storage technologies constitute safe, technically feasible, and environmentally acceptable options for storing spent nuclear fuel at reactor sites until a Federal facility is available to accept spent fuel. The final report, completed in February 1989, was submitted to NRC for comment, and both the report and NRC's comments thereon were transmitted to Congress in March 1989. NRC, in its comments, stated that, "In

general, we find it a well-balanced presentation of spent fuel storage requirements, of the in-pool consolidated fuel storage and dry storage technologies available to address those requirements for at-reactor storage, and of the impacts and costs of such storage."

Federal Interim Storage

As required by Section 135(f) of the NWPA, as amended, OCRWM prepared and submitted to Congress the fifth annual deployment plan for Federal Interim Storage (FIS). This plan included updated information on shipping capabilities, data on spent fuel that may require FIS, and a generic outline of activities that would be required to develop the capacity for such storage. In accordance with Section 136(a) of the NWPA, as amended, fees that would have been charged for FIS for calendar year 1989 were published in the *Federal Register* (52 FR 49348) on December 7, 1988.

The legislation authorized DOE to enter into contracts for the deployment of FIS only through January 1, 1990, and no applications were received prior to the expiration of the provision.

Chapter 8

International Programs

OCRWM is carrying out an international program in cooperation with several other nations. Its purpose is to actively pursue, implement, and successfully complete programs designed to provide information that will facilitate the development and licensing of the waste management system and promote international understanding and consensus in radioactive waste management issues. The program encompasses the handling, storage, and transportation of radioactive wastes; site characterization; repository development; performance assessment; the regulation of system design and operations; and public information.

Repository Technology Projects

OCRWM currently participates in several repository technology projects. These include the STRIPA Project, sponsored by Europe's Organization for Economic Cooperation and Development (OECD); phase III of this project, scheduled to be completed in 1991, has involved site characterization, the development of remote sensing instrumentation, and studies of radionuclide transport. The Pocos de Caldas Project in Brazil was completed in 1990. This project involved an analysis of migration patterns of naturally occurring uranium daughter products. Results of the analysis will be used to validate models of radionuclide transport. Also expected to be completed in 1990 is the INTRAVAL project that is directed at validating geosphere models for radionuclide transport. In addition to OCRWM, INTRAVAL has participants from 20 organizations from 11 nations.

Information Exchange

During FY 1989 and 1990, the OCRWM international program held a series of information exchange activities with countries and international organizations. The majority of OCRWM activities in this area have involved the following countries:

Canada

The United States has a bilateral agreement with Canada covering the exchange of information and conduct of cooperative activities in nuclear waste management.

Subsidiary Agreement I under this bilateral agreement (1986-1988) focused on extension of the shaft at Canada's Underground Research Laboratory in Manitoba, planning for in-situ tests, surface-based geologic characterization, and performance assessment code transfer. This agreement was set aside in June 1988 as a result of the passage of the Amendments Act, which terminated OCRWM site-specific activities in crystalline rock.

During FY 1989 and 1990, Subsidiary Agreement II has been under negotiation.

Switzerland

The recent focus of the U.S. bilateral agreement with Switzerland has been on negotiating Project Agreement 3. It will likely focus on aspects of saturated and unsaturated flow, diffusive transport, and geophysical measurement techniques. Project Agreement 2, which expired in

1989, benefitted OCRWM by assisting the development of an integrated approach to characterization of fractured hydrology, and an improved understanding of saturated and unsaturated fracture flow, diffusive transport, and geophysical tomographic techniques.

Sweden

The current focus of technical exchanges concerns the study of geochemistry and saturated flow, nuclide transport, geology and tectonics, spent fuel characterization, container materials, mineral evolution, performance assessment, and assignment of a Swedish Nuclear Fuel and Management Company (SKB) staff member to the Yucca Mountain Site Characterization Project Office. A new initiative is reviewing an SKB proposal for OCRWM to participate in the Swedish Hard Rock Laboratory (HRL). The HRL is the proposed underground research laboratory to support repository development. The benefits of cooperation with Sweden have included direct transfer of SKB technology to OCRWM, an independent technical review of Site Characterization Study Plans, the transfer of technology and experience from a successful nuclear waste facility siting program, and the use of SKB site evaluation experience at Yucca Mountain.

Radioactive Waste Management Committee (RWMC)

The purpose of RWMC is to formulate and coordinate activities associated with national and international issues pertinent to all aspects of the radioactive waste system being developed by 23 participating nations.

RWMC supports national radioactive waste management and demonstration programs through generic studies of selected technical areas, and through the development of international consensus statements, recommendations, and guidance on criteria, methods, and procedures, and improving the data base available to member countries. It also supports the improvement of national programs through the enhancement of international coordination and promotion of public understanding of radioactive waste storage and disposal issues. The United States participates actively in RWMC and its various subgroups.

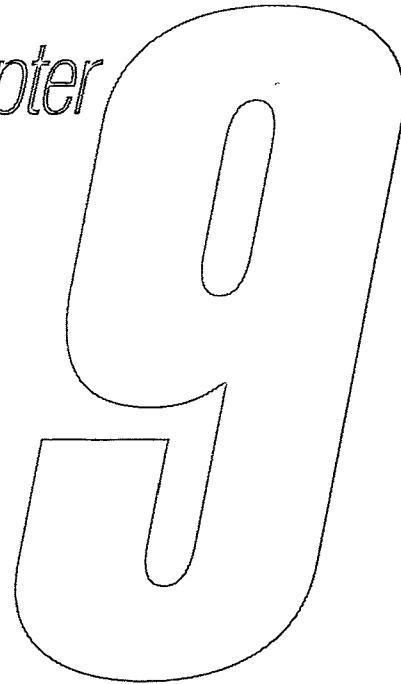
Cooperation with Non-Nuclear Weapon States

Section 223 of the NWPA, as amended, requires that DOE and NRC, for 5 consecutive years, jointly publish in the *Federal Register* and offer to cooperate and provide technical assistance to non-nuclear weapon states in the fields of spent fuel storage and disposal. The require-

ment to publish such offer in the *Federal Register* expired in 1988, but assistance continues to be provided.

During FY 1989 and 1990, ongoing assistance to the South Korean Ministry of Science and Technology, the Korean Advanced Energy Research Institute, and the Coordinating Committee for North American Affairs (representing Taiwanese interests) was continued in the form of planning meetings and site visits to facilities in the U.S., Korea, and Taiwan. As a result of continuing Korean and Taiwanese interest and encouragement from NRC, the State Department, and the Arms Control and Disarmament Agency, interactions are expected to continue in the foreseeable future.

External Relations and Outreach



Relations with NWTRB

The Nuclear Waste Technical Review Board (NWTRB) was established by the NWPA, as amended, and has been in operation since March 1989. The President appointed 8 members in January 1989 and one in June 1990. To date, the remaining two members have not been appointed. DOE has established a cooperative and productive relationship with NWTRB.

NWTRB submitted its first report to the U.S. Congress and the Secretary of Energy in March 1990. In its report, NWTRB stated that its recommendations were made "to aid DOE in its effort to improve technical work being conducted at the site, to assist DOE in its overall study plan, and to advise Congress and the Secretary of Energy on regulatory or legislative areas of potential future concern." The report outlines 24 recommendations presented in 3 categories: technical and scientific, strategic technical and non-technical, and science policy. DOE has submitted its response to NWTRB's first report. The second NWTRB report to Congress and the Secretary of Energy was released in Fall 1990.

NWTRB has formed seven internal panels: Structural Geology and Geoengineering; Hydrogeology and Geochemistry; Risk and Performance Analysis; Transportation; Environment and Public Health; Engineered Barrier System; and Quality Assurance. To date, there have been 29 meetings between DOE and NWTRB, including 23 panel meetings and 6 full Board meetings.

Utility group representatives provided a briefing to

NWTRB in December 1989. In addition, NWTRB is holding public hearings on topical issues. Hearings on transportation and environment and public health have been conducted. Two more hearings on related issues are scheduled in the early part of FY 1991.

DOE has developed an automated database management system to organize and track issues resulting from NWTRB interactions. With the automated system, DOE is able to track NWTRB's observations and recommendations, and develop responses to be discussed with NWTRB. DOE provides information to NWTRB as requested and is considering recommendations that have resulted from DOE-NWTRB interactions.

NWTRB has generally presented a positive assessment of the quality of scientific investigations performed by DOE and its contractors.

Relations with Federal Agencies

Nuclear Regulatory Commission (NRC). DOE's relations with NRC are designed to promote mutual understanding of DOE's program and the regulations with which it must comply and, in particular, to provide for early identification and resolution of licensing issues to the extent practicable. These interactions are an integral part of DOE's strategy for licensing the MRS and the repository and are intended to facilitate the licensing process.

DOE's interactions with NRC are ongoing. They are regularly scheduled and have been focused on

aspects of the program important to the commencement of site characterization activities. They have involved, among other things, site visits, extensive technical discussions on quality assurance, the prioritization of surface-based testing activities, tectonic models, seismic hazards, regulatory strategy, the integration of performance assessment into site characterization activities, and the development of a schedule for future interactions.

DOE participated in a final rulemaking action related to adopting review procedures for implementing the National Environmental Policy Act as it pertains to the development of geologic repositories, proposed amendments to the NRC waste confidence rule, and proposed revisions to NRC's rules of practice in order to facilitate NRC's ability to comply with the schedule set forth in Section 114 (d) of the NWPA. In FY 1990, DOE petitioned for a rulemaking, formally requesting that NRC amend its regulations in 10 CFR Part 60 pertaining to the disposal of high-level radioactive wastes in geologic repositories to include a specific dose criterion for design basis accidents.

Environmental Protection Agency (EPA). In response to Federal judicial mandate, EPA has been revising its Environmental Radiation Protection Standards for Management and Disposal of Spent Fuel, High-Level and Transuranic Waste (40 CFR 191). To fully participate in that activity and to ensure that its views are taken into account, DOE established a steering group that includes OCRWM to provide comments to EPA on working drafts of revisions to this regulation. The steering group has provided comments on Working Draft 2 and will review and comment on subsequent revisions and the proposed rule when they are issued.

National Academy of Sciences (NAS). NAS recently published a report addressing management and regulation of high-level radioactive waste. This report reflects the findings of the National Research Council's Board on Radioactive Waste Management, which was based to a large extent on a 1988 meeting. Several key recommendations have already been adopted. The report called for fundamental changes in DOE's approach to site characterization; repository design, construction, and operation; regulation in general; and the involvement of the public. The Board attributes DOE's lack of flexibility in large measure to the laws and regulations with which DOE must comply.

The present high-level radioactive waste program is, to a considerable extent, consistent with the Board's recommendations. DOE must comply with applicable

laws and regulations that do, in fact, permit some degree of flexibility in the way it interprets and applies the requirements to a specific site. Also, the present system provides a variety of opportunities for public involvement.

DOE supports the scientific discussion generated by the Board's report, and will be pleased to participate in any further discussions that may be conducted by scientific peer review groups to further strengthen the regulatory framework and to assure consistency of approach between the DOE's siting guidelines, the EPA and NRC regulations, and the NWPA, as amended.

Relations with State and Local Governments and Indian Tribes

Section 117 of the NWPA, as amended, includes several provisions governing interactions between OCRWM and parties affected by facility siting, including a requirement for the Secretary to consult and cooperate with affected governments in an effort to resolve concerns regarding public health and safety, environmental, and economic impacts of facility development. In FY 1989 and 1990, the repository program was the focus of most OCRWM interactions with State, local, and Indian Tribal governments. In the MRS program, OCRWM prepared to support the Nuclear Waste Negotiator's interactions with State, local, and Indian Tribal governments.

These provisions also describe interactions between OCRWM and parties affected by repository scientific investigation activities, including affected status, the formal consultation and cooperation process, informal interactions, benefits agreements, and technical participation.

Affected Status

The State of Nevada and Nye County, Nevada, are currently designated affected governments according to the definition in the NWPA, as amended; and the Secretary of Energy has also designated contiguous Clark and Lincoln Counties, Nevada, as affected. Both Inyo County, California and Esmeralda County, Nevada applied for affected status and were denied.

No Indian Tribes are currently designated affected; however, DOE's Yucca Mountain Site Characterization Project Office meets informally with the 16 Indian Tribes and Tribal groups identified as having traditional cultural and spiritual ties to Yucca Mountain, and consults in accordance with the Programmatic Agreement for Historic Preservation for the Yucca Mountain candidate site.

Formal Consultation and Cooperation

Section 117 of the NWPA, as amended, requires the Secretary of Energy to seek to enter into negotiations with affected States and Indian Tribes to reach binding consultation-and-cooperation (C&C) agreements that specify formal procedures for interactions between the participants. The Amendments Act did not alter the C&C provisions of the NWPA. DOE continues to hold open its offer to the State of Nevada to enter into C&C negotiations. To date, the State of Nevada has declined the offer.

Informal Interactions

There are many informal interactions between OCRWM and affected governments, including frequent staff contacts, information exchanges, and mutual attendance at meetings, workshops, and hearings sponsored by either DOE or Nevada organizations, including State participation in DOE's semi-annual public Project Update Meetings. Section 116 of the NWPA, as amended, provides for financial assistance to the State of Nevada and any affected units of local government, including participation and oversight grants, impact assistance, and payments-equal-to-taxes.

During FY 1989, Secretaries of Energy Herrington and Watkins corresponded regularly with Governors Bryan and Miller, respectively, of Nevada. One of the main subjects of this correspondence was the SCP review and comment process. In response to requests by Governor Miller, Secretary Watkins extended the SCP public comment period by 45 days; added an extra day for each of the Las Vegas and Reno, Nevada, SCP public hearings; agreed to record and consider comments received on any topic; and pledged that DOE would continue to hold Project Update Meetings throughout the site characterization period, and that all comments received would be recorded, evaluated, and their disposition made available to the public.

Secretary Watkins met in May 1989 with Governor Miller and the Nevada congressional delegation to discuss important issues related to the Yucca Mountain investigation site, including the issue of State environmental permits. During the 1989 Session, the Nevada State Legislature adopted Assembly Joint Resolutions 4 and 6, urging the Congress not to allow the placement of a repository in Nevada and expressing the Legislature's refusal to consent to placement of a repository in Nevada. Governor Miller signed both Resolutions in July 1989. The Nevada Legislature also enacted Assembly

Bill 222, stating that it is unlawful for any person or entity to store high-level radioactive waste in Nevada.

In November 1989, the Secretary released his *Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program*. The Secretary found that, while DOE has attempted to work constructively and positively with the State over the past years, the State government has been adamantly opposed to the program and has failed to provide environmental permits. He concluded that, while DOE would continue efforts to resolve the current permitting impasse through direct negotiations, it was necessary to request the Department of Justice (DOJ) to initiate litigation. Lawsuits were filed by both the State of Nevada and by the DOJ on behalf of DOE in January 1990. The status of these suits is discussed in the Current Litigation section of this report.

In December 1989, the Chairman of the Nye County Board of Commissioners wrote to Secretary Watkins stating that the County intends to continue to exercise its rights to participation and monitoring of DOE activities and expressing concern about the lack of organized and systematic efforts on DOE's part to consult with the County. The Chairman indicated Nye County would like to formalize its interactions with DOE. Preliminary meetings have taken place between DOE and Nye County representatives to discuss these issues.

Prior to his April 1990 confirmation as OCRWM Director, John W. Bartlett met with members of Nevada's congressional delegation and with State representatives. Since then, Dr. Bartlett has met several times with members of the delegation and State and local government representatives.

State representatives continue to participate in program activities, including DOE's Project Update meetings. DOE is working with local governments and Indian Tribes by providing economic development assistance, holding government procurement workshops, and attending local meetings, as well as interacting on cultural resources and socioeconomic studies.

OCRWM intends to work in a businesslike and cooperative manner with the affected governments in Nevada and will continue to conduct interactions with State, local, and Indian Tribal representatives.

Benefits Agreements

The NWPA, as amended, provides for the Secretary to attempt to enter into a benefits agreement with the State of Nevada for the repository and a host State or Indian Tribe for the MRS facility. Annual benefits payments

under such an agreement are specified in the NWPA. Parties to a benefits agreement would waive the right to disapproval of the site and to impact assistance. To date, the State of Nevada has declined the Secretary's offer to negotiate a benefits agreement.

Technical Participation

The NWPA, as amended, provides for any State, Indian Tribe, or local government with jurisdiction over a candidate repository or MRS facility site an opportunity to designate an on-site oversight representative whose expenses will be paid out of the Nuclear Waste Fund. Currently, the State of Nevada and Nye County are eligible and the Secretary extended offers to both to appoint representatives. The Governor of Nevada assigned the duty of oversight to the Nevada Agency for Nuclear Projects/Nuclear Waste Project Office. Nye County did not designate a representative during FY 1989 or 1990.

The State of Nevada participates extensively in the repository technical program. State representatives participate in DOE-NRC meetings, NWTRB meetings, and DOE Exploratory Shaft Facility design reviews. They observe DOE Quality Assurance audits, receive geotechnical data, and provide review and comment on technical documents. The State has applied for and received general access permits allowing representatives to enter the site for the purpose of observing site characterization activities. The State has filed several Field Activities Operations and Safety Plans for the performance of environmental and geological studies in connection with oversight of the program. State geoscientists attended DOE demonstration drilling activities in Utah during the Summer of 1989. In addition, the University of Nevada System is carrying out several technical and scientific projects through agreements with DOE.

During FY 1989 and 1990, a major focus of technical participation was review and comment on the Consultation Draft Site Characterization Plan (CD/SCP), issued in January 1988, and the SCP, issued in December 1988. The State of Nevada submitted comments to the DOE on the CD/SCP in September 1988; DOE responded to these comments in October 1989. The State provided preliminary comments on the Exploratory Shaft Facility portions of the SCP in May 1989, and comments on the remainder of the SCP in October 1989. The Lincoln County Board of Commissioners also provided written comments on the SCP. The State's and Lincoln County's comments are currently being evaluated by DOE, and

DOE responses to comments received at the March 1989 SCP public hearings have been released.

Interactions with the Public

There are many "public interests" in the waste-management program, and OCRWM interacts with a variety of organizations and individuals who have an interest in the program. The primary goals of OCRWM's public information and outreach programs are to provide opportunities for public involvement, to provide complete and accurate information about the program, and to support long-term efforts for waste management education.

The primary vehicles for public involvement in the program are public meetings and hearings that provide opportunities to comment on program documents. To this end, project update meetings and widely-advertised informal meetings are held every six months. In March and April 1990, more than 300 people attended the project update meetings in Nevada.

OCRWM conducts an active public information and outreach program. It maintains information offices in Beatty and Las Vegas, Nevada, where a diverse range of publications, videos and exhibits are available. Printed materials published during both FY 1989 and 1990 included the monthly OCRWM Bulletin, Backgrounder, Fact Sheets, and brochures. During FY 1989, the OCRWM Bulletin was mailed monthly to 8,000 subscribers; more than 110,000 copies of publications were distributed in response to nearly 2,000 requests; and the OCRWM mobile exhibits were displayed 35 times in 28 states, Canada and Switzerland. In the first 6 months of 1990, there were 24 showings of the OCRWM exhibit with 75,000 attendees.

A major effort in FY 1989 was the review and improvement of INFOLINK, a computerized bulletin board and communication network available to individuals or groups interested in the OCRWM program. INFOLINK accesses and provides program information and is capable of conducting searches. Moreover, it has an Alert/News Flash feature that identifies and presents the latest information on new program developments and DOE positions on waste management issues. The full text of OCRWM press releases, selected speeches and technical papers, Congressional testimony, and the current OCRWM Bulletin are accessible on INFOLINK. Users may also order OCRWM publications through the system. The system is available free to anyone who wishes to use it and who has communications compatibility.

Educational Initiatives

In order to sufficiently implement the NWPA requirements, OCRWM will have a sustained need for personnel from a broad range of science-based disciplines for many years. The waste-management program will need the involvement of significant numbers of trained scientists and engineers in determining the suitability of sites, constructing and operating a repository, and developing a safe and efficient transportation system. OCRWM is actively implementing programs to ensure that it continues to have the vital human resources needed to support its multifaceted technical and scientific activities well into the next century.

In addition to realizing the benefits of DOE department-wide science education initiatives, OCRWM is also supporting its own efforts through the implementation of specific activities. OCRWM initiatives focus on educational activities beginning with kindergarten and continuing through graduate school.

OCRWM is supporting general science literacy in grades K through 12 through the development of specialized curricula within existing scientific programs. These curricula are designed to enhance scientific problem-solving skills and increase understanding of the high-level radioactive waste management program. The elementary educational curriculum will focus on providing students in grades 4 through 8 with objective, factual information about nuclear waste.

At the secondary school level, OCRWM is developing a four-unit curriculum for teachers of science and social studies in grades 8 through 12 that complies with State curricula guidelines and presents information on the source, volume, and nature of nuclear waste and discusses processes for its management and disposal. The four-unit curriculum, "Managing Our Nation's Nuclear Waste," covers nuclear waste issues and risk, sources and characteristics of nuclear waste, ionizing radiation, and the integrated waste-management system.

At the university level, "Radioactive Waste Issues for the Non-Science Major" was developed and pilot-tested during the 1989-90 academic year with 150 non-science majors at Hope College in Michigan. It is currently part of the approved curriculum. This course approaches radioactive waste management as both a science and a policy issue. The curriculum will increase awareness of university students to radioactive waste issues as well as educate tomorrow's decisionmakers and scientists about the technical and policy issues surrounding radioactive waste management.

The OCRWM graduate school fellowship program supports highly capable students in one or more of the following academic areas related to the management of spent fuel and high-level radioactive waste: nuclear engineering, health physics, environmental engineering, geology, chemistry, and radiation sciences.

As part of the program, fellows are required to spend a minimum of three months at DOE Headquarters, a DOE laboratory, or the Yucca Mountain Site Characterization Project Office or another DOE-approved site. This experience provides the fellows access to on-going R&D programs and allows them the opportunity to interact with DOE and DOE contractor scientists and engineers. The program is also designed to encourage universities to support and improve research activities and academic programs related to the management of spent fuel and high-level radioactive waste.

Since the OCRWM fellowship program's inception in 1985, 42 fellowships have been awarded. In FY 1989 and 1990, 20 students participated in the program. In September 1990, the Universities of Ohio and Nevada at Las Vegas joined the fellowship program bringing the total number of schools involved to 17. Currently, 12 of the universities have received fellowship appointments.

The University of Nevada at Las Vegas (UNLV) has obtained a supercomputer to be used for educational activities as well as to support Federal agencies such as DOE. The UNLV plans to devote a percentage of its computer time to research in engineering, computing, mathematics, physics, chemistry, biology, and social studies.

OCRWM's educational initiatives also include teacher accreditation workshops and cooperative agreements with various civic, public, and international organizations to develop basic information about the program. Efforts underway to improve teacher skills include: the Nevada Science Project; In-service/Graduate Credit Workshops; the Earth and Space Science Summer Institute; presentations at Professional Society Meetings; the preparation of a Clearinghouse/Directory of information and the provision of resources for Nevada School Media Centers. In addition, the OCRWM Speakers Bureau is available to provide in-person presentations to technical and professional organizations and groups.

OCRWM's international education activities include its hosting and managing of the 1990 meeting of the OECD/NEA High-Level Radioactive Waste Public Information Working Group. The meeting included general sessions involving a panel discussion of waste

management programs of member countries, discussions with members of the University of Nevada System, participation in the American Nuclear Society's in-service workshop for high school teachers in cooperation with UNLV and tours of Yucca Mountain and the Yucca Mountain Site Characterization Project Office.

OCRWM's educational outreach activities include an extensive array of travelling exhibits, speaker programs, publications and videos, and a computerized bulletin board. The exhibits provide an overview of the integrated waste-management system. During FY 1990, exhibits were displayed in 28 States, Canada, and Switzerland to more than 100,000 viewers. The exhibit showings were presented at professional society meetings, educational institutions, and public meetings.

Financial Assistance

The NWPA, as amended, provides for financial assistance to the State of Nevada, affected units of local government, and affected Indian Tribes. Grants are provided to allow recipients to participate in repository and MRS development including activity reviews, developing requests for impact assistance, performing independent monitoring and testing, keeping residents informed, and requesting information from, and making comments to, DOE. For FY 1989, the following grants were awarded: State of Nevada, \$11,000,000; Nye County, \$1,031,000; Clark County, \$3,509,876; Lincoln County, \$582,358.

For FY 1990, Congress appropriated \$11,000,000 for the State of Nevada, of which \$6,000,000 was to be provided at the Secretary's discretion; \$1,000,000 was to be made available to the University of Nevada-Reno for infrastructure studies; up to \$1,000,000 was to be made available to the University of Nevada System for geology and hydrology studies; and up to \$1,000,000 was to be dedicated to socioeconomic and transportation studies. Congress also appropriated \$5,000,000 to affected units of local government, and up to \$10,000,000 to the University of Nevada-Las Vegas for acquisition of the supercomputer that the State of Nevada needs to carry out independent analysis and oversight responsibilities under the NWPA, as amended.

Although FY 1991 appropriations were not finalized as this report was drafted, the Senate approved \$5,000,000 for the State of Nevada and approximately \$6,000,000 for the local governments, with additional funds earmarked for specific activities and studies.

The NWPA, as amended, also provides for financial assistance in the form of grants to assess the feasibility

of hosting an MRS. These grants are provided for under Title IV, which establishes the Office of the Nuclear Waste Negotiator and establishes his duties. The Negotiator was appointed, and was confirmed in August 1990; no financial assistance has been awarded under this provision to date.

Program Management

In July 1990, Dr. Bartlett announced the proposed reorganization of the office which was expected to be approved shortly after the new fiscal year. The new organizational structure establishes clear lines of responsibility, authority, and accountability for the program participants and will facilitate effective implementation of the program. The proposed new structure is project-oriented and includes a single office responsible for geologic disposal and another office responsible for MRS and transportation. In addition, the new organization clearly separates the Headquarters policy and guidance role from the field office implementation role.

The new OCRWM organization consists of five offices headed by associate directors and three offices headed by directors, all of whom report directly to the OCRWM Director. A brief description of the responsibilities of each follows.

- Office of Geologic Disposal: responsible for conducting the scientific evaluations needed to determine whether the Yucca Mountain site is suitable for a geologic repository.
- Office of Storage and Transportation: responsible for directing the MRS program, developing a transportation system, developing systems for spent-fuel acceptance, and systems logistics activities.
- Office of Systems and Compliance: responsible for establishing systems requirements based on

regulatory, legislative, and other external requirements, overseeing the implementation of program requirements, and providing systems integration.

- Office of Contract Business Management: responsible for managing business relations with a proposed management-and-operating contractor and support services contractors and for consolidating contractor services.
- Office of Program and Resources Management: responsible for controlling the Program's schedule and cost, managing the Nuclear Waste Fund, managing program information systems and budget activities, and for providing administrative support services, including the acquisition and development of human resources.
- Office of External Relations: responsible for managing intergovernmental relations and interactions with affected and interested parties and for managing education and public information programs.
- Office of Strategic Planning and International Programs: responsible for strategic, long-range, and contingency planning and for managing relations with programs in other nations.
- Office of Quality Assurance: responsible for developing quality-assurance requirements for the program, overseeing compliance with the requirements, and interfacing with the NRC's quality-assurance requirements.

Financial Management

OCRWM's primary financial management responsibility is the management of the Nuclear Waste Fund (NWF) established by the NWPA to ensure that the Government recovers from the generators and owners of high-level radioactive waste and spent nuclear fuel the full cost of activities relating to 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, developing total system life cycle cost estimates, and establishing and maintaining the program's cost baseline.

OCRWM secured the services of a certified public accounting firm to provide an independent audit of the NWF financial statements. The report of that firm, KPMG Peat Marwick on the financial statements for September 30, 1989 and 1988, (with cumulative amounts from the inception of the NWF) is included herein. The auditors' report for FY 1990 will be issued in February 1991.

Nuclear Waste Fund

For FY 1990, the NWF had total revenue of \$872 million, compared to total revenue of \$603 million in FY 1989. The total revenue includes payments of 1.0 mill per kilowatt-hour (kWh) fees; the interest earned on one-time spent fuel fees and U.S. Treasury securities; and the net gain (loss) on sales of U.S. Treasury securities. At September 30, 1990 the book value of NWF investments was approximately \$2.6 billion as compared to \$2.248 billion in 1989. For the year ended September 30, 1990 and 1989, interest earned on the NWF's investments totaled \$199 million and \$169 million, respectively. The financial statements in Chapter XI provide further information on Fund revenue and expenses.

Since FY 1986, DOE has reimbursed or credited 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 Circuit which ruled that the ongoing fee should be based on net rather than gross electric generation. Fees reimbursed or credited since 1986 as a result of this ruling totaled \$42.936 million of which none and \$303,000 were charged against 1990 and 1989 kWh fees, respectively.

On March 17, 1989, the U.S. Court of Appeals for the District of Columbia Circuit ruled that DOE's definition of the term "net kilowatt hour generated" did not conform to the "generated and sold" provision

specified in Section 302(a)(2) of the Act. The Court held that in order to meet the definition of electricity "generated and sold," DOE is required to "implement some reasonable and fair method" to account for losses in the transmission and distribution of electricity in addition to deductions for normal onsite nuclear service station loads, as well as to account for other electricity not sold. On September 7, 1990, DOE issued a Notice of Proposed Rulemaking to change the basis of the fee, consistent with the Court ruling. Estimated fees to be reimbursed or credited total \$220 million of which \$20 million and \$200 million were charged against kWh fees for FY 90 and FY 89, respectively.

Total System Life Cycle Cost

A comprehensive analysis of the total cost of the radioactive waste management system over its complete life cycle has been performed each year to provide the basis for the required annual evaluation of the adequacy of the disposal fee to cover those costs. The latest *Analysis of the Total System Life Cycle Cost for the Civilian Radioactive Waste Management Program*, otherwise known as the TSLCC analysis, was published in May 1989. This analysis also reflected pertinent provisions of the Amendments Act of 1987. Alternative estimates were presented for systems with either one or two repositories and an MRS facility. The estimates of total costs for a single repository system were between \$23.8 billion and \$24.8 billion (constant 1988 dollars) depending upon whether intact or consolidated spent fuel was assumed.

An addendum to the May 1989 TSLCC analysis was developed and is scheduled for issuance early in FY 1991. The costs contained in this report represent a preliminary analysis of the cost impacts associated with the Secretary's *Report to Congress on the Reassessment of the Civilian Radioactive Waste Management Program* issued in November 1989. Based on the restructured program, the total-system cost estimates ranged from \$25.6 billion to \$34.6 billion (constant 1988 dollars) depending upon the number of repositories and the projection of spent fuel assumed. The restructured program resulted in an increase of approximately \$2 billion in total-system costs from the May 1989 TSLCC report. The majority of the impact was due to the costs projected to be incurred during the 7-year delay in the repository program. Additional increases in costs were due to the transport/storage system assumed to provide waste acceptance at the MRS facility in 1998 and beyond.

Fee Adequacy Assessment

The Fee Adequacy Assessment was not published in conjunction with the May 1989 TSLCC analysis. During FY 1990, the sixth annual evaluation of the adequacy of the 1.0 mill per kWh fee for nuclear waste disposal was prepared and by the end of the fiscal year was in the final stages of obtaining DOE approval. It is scheduled for submittal to Congress in early FY 1991. This report, *Nuclear Waste Fund Fee Adequacy: An Assessment*, will present a summary analysis of projected revenues and total system life cycle cost estimates based on assumptions from the Secretary's *Report to Congress on the Reassessment of the Civilian Radioactive Waste Management Program*.

Program Management System

Program Management System Manual

The Program Management System Manual (PMS Manual) is OCRWM's top-level management directive. It describes the hierarchy of plans required to develop and maintain the program's baselines and establishes the management policies and procedures to be used in program implementation. It assigns responsibilities for the preparation, concurrence, and approval of the baseline, policy and procedural documents and changes thereto. The PMS Manual was completely revised and issued as Revision 3 in August 1990 to incorporate the quality assurance concept into the conduct of program activities, to effect necessary functional realignments and to strengthen program direction and control functions. Additionally, recently completed and currently ongoing revisions were initiated to reassign responsibilities under the proposed new organization and enhance vertical integration between the requirements and guidance provided in program-level documents and the implementing baselines and procedures developed at the project level.

Cost and Schedule Baseline

In July 1989, the Secretary established a task force to review the program schedule. The comprehensive review of the OCRWM schedule resulted in the establishment of a new program schedule based on a realistic assessment of activity durations and past experience. This schedule showed a significant slip for the expected start of repository operations, now scheduled for 2010. The 1998 target for waste acceptance at the MRS was maintained.

To accompany the *Secretary's Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program* on November 29, 1989, the Scientific Investigation Plan/Near-Term Decision Plan (NTDP) and the Scientific Investigation Plan (Through Repository License Application) were issued. The NTDP shows the detailed planning milestones for approximately one year ahead, while the Scientific Investigation Plan (Through Repository License Application) presents major planning milestones through submittal of the repository license application.

The NTDP and the Scientific Investigation Plan (Through Repository License Application) were the basis for the January 1990 issuance of the schedule portion of the Program Cost and Schedule Baseline (PCSB). The cost baseline was added to the PCSB during the latter part of calendar year 1990 and was expected to be approved by the Program Change Control Board early in FY 1991. Detailed schedule networks are maintained to show the activities and logic required to support the PCSB and NTDP milestones. The PCSB includes procedures to ensure that OCRWM's cost and schedule are controlled in an orderly, efficient, and well-documented fashion.

Project Decision Schedule

Section 114(e) of the NWPA requires that the Secretary of Energy issue and update, as appropriate, in cooperation with all affected Federal agencies, a Project Decision Schedule (PDS) to portray the optimum way to attain operation of the repository. The PDS includes a description of Program objectives and deadlines for actions required by other Federal agencies in order to achieve this goal.

The NWPA requires that any Federal agency that determines that it cannot comply with a deadline in the PDS, or fails to so comply, shall submit a written report to the Secretary of Energy and to the Congress to explain its failure or expected failure to meet that deadline. The Secretary, in turn, is required to submit to the Congress a response to that Agency's report, including the reasons the Secretary could not amend the PDS to accommodate the Federal agency involved.

In FY 1990, OCRWM initiated a first revision of the original PDS issued in March 1986. The activity deadlines in the revised PDS are based on the Nuclear Waste Policy Amendments Act of 1987 and the Program Cost and Schedule Baseline. The revised PDS has been reviewed by affected Federal agencies and their comments have been incorporated, as appropriate. Revi-

sion 1 of the PDS is scheduled for issuance early in calendar year 1991.

Annual Capacity Report

DOE did not issue an Annual Capacity Report (ACR) in 1989. As a result of the Secretary's *Report to Congress on the Reassessment of the Civilian Radioactive Waste Management Program*, issued in November 1989, DOE determined that it would not be useful for planning purposes to publish an ACR prior to developing revised waste acceptance schedules. A letter was issued to contract holders in April 1990 stating that an ACR would not be issued for 1989. DOE expects to resume publication of the ACR in 1990.

The ACR 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. This report also provides a mechanism for communicating to the owners and generators of spent fuel and high-level radioactive waste how DOE intends to discharge its responsibilities under the contract.

Information Resources Management

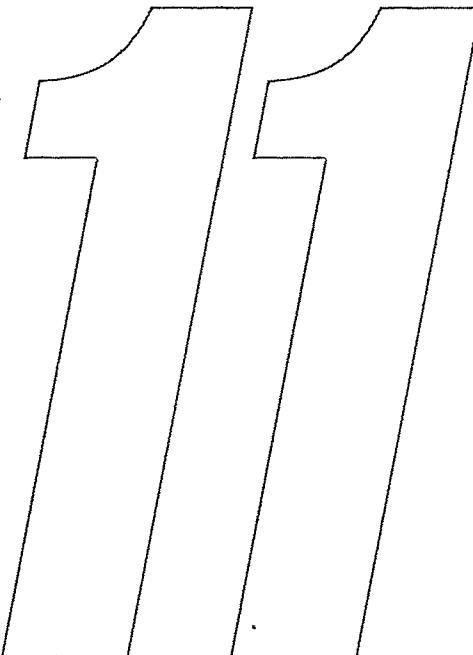
In order to successfully build the Nation's first waste-management system for high-level nuclear waste, OCRWM must have the ability to readily produce, file, store, access, retrieve and transfer a wide array of technical and institutional data and information. Therefore, OCRWM information management activities focused on the development of the Licensing Support System, the establishment of the OCRWM Central Records Facility, and the Quality Records Center, and the preparation of strategic information technology and telecommunications plans for OCRWM. Specific activities included data base administration oversight and development and management of necessary program-wide standards, procedures, system specifications, data dictionary, and system documentation. All activities were subject to information system quality assurance requirements to ensure uniform quality, security, and integrity of all OCRWM information management systems.

During FY 1989 and 1990, OCRWM managed the highly technical and complex process of preparing all the necessary planning and documentation to provide technical direction, specifications, and functional detail that was necessary to support the design, development, acquisition, implementation, and operation of OCRWM's

local area network and wide area network for information resource management. These computer-based information systems include software and hardware for OCRWM program-wide applications.

In May 1989, DOE published the *OCRWM Office Automation Plan* (OAP) and *Telecommunications Network Plan* (TNP). The OAP and TNP charted the course to move OCRWM's existing office automation environment into a new, enhanced environment that would extend the existing information resources at OCRWM Headquarters out to the Project Offices. Now DOE staff in Washington, D.C. are able to communicate electronically from personal computers at their desks to other DOE and contractor staff located across the Nation.

Chapter



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 KPMG Peat Marwick auditors' report on the financial statements for FY 1989 and FY 1988. The auditors' report for FY 1990 was not available for inclusion in this annual report. However, the Department has included unaudited financial data for that year. The audited financial statements will be included in the next annual report.

Independent Auditors' Report on Financial Statements

We have audited the accompanying balance sheets of the Nuclear Waste Fund as of September 30, 1989 and 1988, 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, 1989. 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.

Except as discussed in the following paragraph, we conducted our audits in accordance with generally accepted auditing standards and *Government Auditing Standards* 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.

We were unable to obtain an audited statement of costs or to examine evidence supporting program management expenses of \$40 million in connection with recovery of costs incurred for pre-license application activities by the Nuclear Regulatory Commission for the year ended September 30, 1989.

In our opinion, except for the effects of such adjustments, if any, as might have been determined to be necessary had we been able to examine evidence regarding the recovery of costs incurred by the Nuclear Regulatory Commission, the financial statements referred to in the first paragraph present fairly, in all material respects the financial position of the Nuclear Waste Fund at September 30, 1989 and 1988, and the results of its operations and changes in its financial position for the periods indicated above, in conformity with generally accepted accounting principles.

Washington, DC
December 21, 1989

KPMG Peat Marwick

NUCLEAR WASTE FUND
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
UNITED STATES DEPARTMENT OF ENERGY

Balance Sheets

September 30, 1989 and 1988
(Dollars in thousands)

Assets	1989	1988
Cash	\$ 1,196	1,025
U.S. Treasury securities (note 2)	2,248,544	1,923,027
Receivables from utilities (note 3):		
One-time spent fuel fees	899,659	902,162
KWH fees	130,100	125,802
Interest on one-time spent fuel fees	<u>567,447</u>	<u>454,483</u>
	<u>1,597,206</u>	<u>1,482,447</u>
Receivable from Department of Energy for defense high-level waste disposal costs (note 1(b))	—	—
Accrued interest on U.S. Treasury securities (note 2)	72,197	58,150
Other receivables and advances	1,325	1,394
Capital equipment, less accumulated depreciation of \$20,019 in 1989 and \$16,495 in 1988	<u>31,713</u>	<u>34,047</u>
	<u>\$ 3,952,181</u>	<u>3,500,090</u>
Liabilities		
Accounts payable and accrued expenses	67,508	42,706
Estimated payable to utilities on overpayment of KWH fees (note 3)	200,000	—
Deferred revenue	<u>3,684,673</u>	<u>3,457,384</u>
Total liabilities	3,952,181	3,500,090
Fund balance	—	—
Contingencies (notes 3 and 8)	<u>\$ 3,952,181</u>	<u>3,500,090</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, 1989 and 1988
and cumulatively from January 7, 1983, date of inception
to September 30, 1989
(Dollars in thousands)

	<u>1989</u>	<u>1988</u>	<u>Cumulative</u>
Revenue:			
Fees (note 3):			
One-time spent fuel fees	\$ -	(196)	2,334,777
KWH fees	317,186	515,724	2,508,535
Interest:			
One-time spent fuel fees (note 3)	116,490	84,450	583,215
U.S. Treasury securities	169,304	141,586	608,697
Gain (loss) on sale of U.S. Treasury securities	(132)	3,694	32,181
	602,848	745,258	6,067,405
Less amount deferred	<u>(227,289)</u>	<u>(357,227)</u>	<u>(3,684,673)</u>
	<u>375,559</u>	<u>388,031</u>	<u>2,382,732</u>
Expenses:			
First repository	237,306	294,695	1,761,618
Second repository	989	8,126	108,610
Monitored retrievable storage	1,567	1,374	39,766
Transportation and systems integration	38,269	31,432	116,380
Program management	93,395	44,741	334,362
Interest (notes 1 and 3)	45	7,663	18,008
Transfer appropriation (note 5)	3,988	-	3,988
	<u>375,559</u>	<u>388,031</u>	<u>2,382,732</u>
Excess of revenue over expenses	\$ -	-	-

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, 1989 and 1988
and cumulatively from January 7, 1983, date of inception
to September 30, 1989
(Dollars in thousands)

	1989	1988	Cumulative
Cash provided from:			
Revenue received	\$ 733,368	694,796	4,789,529
Expenses paid	<u>(337,840)</u>	<u>(399,779)</u>	<u>(2,270,602)</u>
 Cash provided from operations	 395,528	 295,017	 2,518,927
 Borrowings from U.S. Treasury	 —	 —	 264,964
Proceeds from sales and maturities of U.S. Treasury securities	181,112	388,579	2,265,410
Borrowings from DOE for capital equipment	—	—	9,739
 Total cash provided	 <u>576,640</u>	 <u>683,596</u>	 <u>5,059,040</u>
 Cash used for:			
Capital equipment	10,450	12,369	76,202
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	552,416	669,679	4,689,611
Purchase of accrued interest on U.S. Treasury securities	13,672	1,126	16,003
Increase (decrease) in advances	<u>(69)</u>	<u>(307)</u>	<u>1,325</u>
 Total cash used	 <u>576,469</u>	 <u>682,867</u>	 <u>5,057,844</u>
 Increase (decrease) in cash	 <u>\$ 171</u>	 <u>729</u>	 <u>1,196</u>

(Continued)

**NUCLEAR WASTE FUND
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
UNITED STATES DEPARTMENT OF ENERGY**

Statements of Changes in Financial Position, Continued

Years ended September 30, 1989 and 1988
and cumulatively from January 7, 1983, date of inception
to September 30, 1989
(Dollars in thousands)

	1989	1988	Cumulative
Changes in cash:			
Charges not affecting cash:			
Depreciation	\$ (7,108)	(5,440)	(25,361)
Amortization of premiums and accretion of discounts on U.S. Treasury securities	(45,654)	(46,410)	(175,524)
Net book value of dispositions and charge-offs of capital equipment	(5,808)	(5,268)	(19,260)
	<hr/>	<hr/>	<hr/>
	(58,570)	(57,118)	(220,145)
Increase in assets excluding cash:			
U.S. Treasury securities	371,303	281,100	2,424,200
Receivables	128,737	97,691	1,670,728
Capital equipment	10,450	12,369	76,202
	<hr/>	<hr/>	<hr/>
	510,490	391,160	4,171,130
Increase (decrease) in liabilities:			
Accounts payable and accrued expenses	224,802	(22,456)	267,508
Deferred revenue	227,289	357,227	3,684,673
	<hr/>	<hr/>	<hr/>
	452,091	334,771	3,952,181
Increase (decrease) in cash	\$ 171	729	1,196

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, 1989 and 1988

(I) 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 framework 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.

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.

On December 22, 1987, the President signed into law The Omnibus Budget Reconciliation Act of 1987 (Amendments Act), which contained amendments to the Act. 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 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 of Energy 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

NUCLEAR WASTE FUND
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
UNITED STATES DEPARTMENT OF ENERGY

Notes to Financial Statements

Continued

(Dollars in thousands)

of Appeals as discussed in note 3. Interest paid or credited to the utilities on account of these overpayments during 1989 and 1988 totaled \$45 and \$7,663, respectively.

On November 29, 1989, the Secretary of Energy made a report to Congress on the reassessment of the Civilian Radioactive Waste Management program. At the direction of the Secretary, a comprehensive review of the schedule for repository-related activities was performed resulting in a schedule based on a realistic assessment of activity durations and past experience. This schedule shows a significant slip for the expected start of repository operations from the year 2003 to approximately 2010. In developing the revised schedule, the DOE was mindful that certain activities, such as the issuance of environmental permits by the State of Nevada and the Nuclear Regulatory Commission review of the license application, are outside the DOE's control.

One new emphasis of the program's efforts will be on completing an integrated array of near-term milestones directed at the scientific investigation of the potential site at Yucca Mountain in Nevada. To promote the DOE's ability to achieve such milestones and goals, the Secretary announced the initiation of a three-point action plan. This plan centers on a restructuring of the Office of Civilian Radioactive Waste Management, initiatives to gain access to the Yucca Mountain site to continue the scientific investigations needed to evaluate the site's suitability for a repository, and an initiative for establishing integrated MRS with a target for spent-fuel acceptance in 1998.

In its report of November 1, 1989, the MRS Review Commission found that "cumulatively the advantages of an MRS would justify the building of an MRS if: (1) there were no linkages between the MRS and the repository; (2) the MRS could be constructed at an early date; and (3) the opening of the repository were delayed considerably beyond its presently scheduled date of operation." The MRS Review Commission recommended that the Congress authorize the construction of a Federal Emergency Storage facility to provide storage before permanent geologic disposal.

Although the Amendments Act prohibits the selection of an MRS site through a DOE-directed site-survey process until the repository site is formally selected, it allows for expedited siting to proceed via a Negotiator, who may negotiate a proposed agreement with a State or Indian Tribe that offers a technically qualified site on reasonable terms. The Secretary is working in close cooperation with the White House to facilitate the appointment of a Nuclear Waste Negotiator as provided for in the Nuclear Waste Policy Amendments Act.

(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 of nearly 100 years.

The Act requires an annual evaluation of the adequacy of fees to insure full cost recovery and provides for adjustment of such fees, as needed, with the approval of Congress. No evaluation has been issued since June 1987 due to the continuing changes in the program brought about by the Amendments Act and the strategies and plans contained in the DOE's *Draft 1988 Mission Plan Amendment*. The total-system cost for the system with a repository at Yucca Mountain, Nevada, a facility for MRS, and a transportation system is estimated at \$24 billion (expressed in constant 1988 dollars). In the event that a second repository is required and is authorized by the Congress, the total-system cost is estimated at \$31 to \$33 billion, depending on the quantity of spent fuel to be disposed of.

To estimate the share of the total-system costs that should be allocated to the disposal of defense high-level waste in the civilian repositories, the methodology

announced by the DOE in the *Federal Register* in August 1987 was used. Estimates of the defense-waste share of the Costs are about \$4 billion (15 percent of the total) for the single-repository system and about \$6 billion (17 percent of the total) for the two-repository system. Defense waste quantities and cost estimates will be modified annually.

To date, the Department of Energy has not entered into an agreement with the NWF for payment of fees and interest on its defense high-level waste share of costs. NWF has estimated that approximately \$483,000 of costs incurred to date by the NWF, including interest of \$101,000, if assessed from passage of the Act (January 1983), are attributable to defense high-level waste based on the methodology previously published.

Inasmuch as Congress has not appropriated any funds for the DOE to begin payment of fees and interest to the NWF, and as there is no agreement stipulating DOE's current and future liability for its share of high-level waste costs or as to payment of fees and calculation of interest, no accrual has been included in these statements for fees from DOE's defense waste programs.

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:

	1989		1988	
	Book value	Market value	Book value	Market value
Due within 1 year				
\$ 560,499	559,896	168,421	168,305	
Due after 1 year but within 5 years				
1,518,536	1,496,451	1,402,925	1,370,647	
Due after 5 years but within 10 years				
169,509	162,401	351,681	336,087	
\$ 2,248,544	2,218,748	1,923,027	1,875,039	

Accrued interest receivable on U.S. Treasury securities as of September 30, 1989 and 1988 totalled \$72,197 and \$58,150, 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;

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 UNITED STATES DEPARTMENT OF ENERGY

Notes to Financial Statements

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(Dollars in thousands)

(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 1989 and 1988, payments (refunds) of one-time spent fuel fees by (to) owners and generators of civilian high-level waste and spent nuclear fuel consisted of:

	1989	1988
Option (1)	\$ 2,503	2,260
Option (2)	-	(56)
Option (3)	-	(140)
	\$ 2,503	2,064

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

	1989	1988
One-time spent fuel fees:		
Option (1)	\$ 164,343	166,846
Option (2)	735,316	735,316
	899,659	902,162
Kilowatt-hour fees	130,100	125,802
Interest on one-time spent fuel fees:		
Option (1)	97,039	78,926
Option (2)	470,408	375,557
	567,447	454,483
	\$ 1,597,206	1,482,447

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 since 1986 as a result of this ruling totaled \$42,936 of which \$303 and \$2,517 were charged against 1989 and 1988 KWH fees, respectively.

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 sought judicial review of DOE's treatment of transmission and distribution losses in calculating net generation. On March 17, 1989, the Court decided that transmission and distribution losses should not be considered in the calculation of net generation. A revised method of calculating net generation has not been determined at this date, however, NWF has estimated that \$200,000, as of September 30, 1989, calculated using industry-wide data of transmission and distribution losses, will be reimbursed or credited to the utilities in connection with this decision. This estimated amount has been recorded at September 30, 1989 as a charge against current year KWH fees.

Although the NWF has previously paid or credited interest to the utilities on account of the KWH overpayments based on the December 5, 1985 decision, no accrual has been included in these financial statements for interest to be paid on the estimated \$200,000 of KWH overpayments as discussed above. The NWF cannot pay interest without Congressional approval of such payment. The Under Secretary of DOE has approved Departmental action to seek such legislative approval. NWF management has estimated that the liability for interest to be paid or credited to the utilities, if authorized by Congress, could range from \$40,000 to \$50,000 at September 30, 1989, depending on the rates to be used.

(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. 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) Transfer Appropriation

During 1989, a transfer appropriation of \$3,988 was made to the Nuclear Waste Technical Review Board (Board) established under the Amendments Act. The Board, an independent establishment within the executive branch of the U.S. government, was established to evaluate the technical and scientific validity of activities undertaken by the NWF including site, characterization activities and activities relating to the packaging or transportation of high-level radioactive waste or spent nuclear fuel.

(6) 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. 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 1989 and 1988 was \$1,038 and \$1,125, 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.

(7) 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, 1989 and 1988, the NWF owed other government agencies \$19,638 and \$9,849, respectively, for services and costs provided to the NWF. For the years ended September 30, 1989 and 1988, the NWF had incurred costs of \$26,489 and \$20,013, respectively, for services and costs provided by other government agencies.

(8) Contingencies

Litigation is pending before the United States Court of Appeals concerning siting guidelines, adequacy of environmental assessments and procedures, and the decision to undertake site characterization without withdrawing public land in connection with the selection of the Yucca Mountain site in Nevada for characterization.

The state of Nevada is seeking declaratory relief in the U.S. Court of Appeals on the claim that action by the Nevada State Legislature constitutes notice of disapproval under Section 116 of the Act, thus barring further study of Yucca Mountain as a possible nuclear waste repository site. Additionally, Nevada seeks an order directing DOE to terminate all site characterization activities and to reclaim the site, as well as costs of its suit.

In the event of an adverse decision on the aforementioned pending litigation, the NWF would be affected by extending the schedules for implementing the program,

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Notes to Financial Statements

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(Dollars in thousands)

however, the effect on the financial position of the NWF cannot be determined.

The NWF is also involved in other litigation arising from its activities. Resolution of this other litigation is not expected to have a material effect on the financial position of NWF.

Under the Act, the NWF is also responsible for payment of amounts equal to the taxes that each state or local government would receive if they were authorized to tax site characterization activities at each site, to each state and unit of local government which was recommended as a candidate site. No provision for these amounts has been made as the method of calculating the taxes has not been determined at this date.

**NUCLEAR WASTE FUND
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
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Balance Sheets

September 30, 1990 and 1989
(Dollars in thousands)

Assets	(Unaudited)	
	1990	1989
Cash	\$ 2,489	1,196
U.S. Treasury securities	2,630,169	2,248,544
Receivables from utilities		
One-time spent fuel fees	896,875	899,659
KWH fees	131,600	130,100
Interest on one-time spent fuel fees	<u>685,707</u>	<u>567,447</u>
	1,714,182	1,597,206
Receivable from Department of Energy for defense high-level waste disposal costs	—	—
Accrued interest on U.S. Treasury securities	92,264	72,197
Other receivables and advances	586	1,325
Capital equipment, less accumulated depreciation of \$24,209 in 1990 and \$20,019 in 1989	<u>31,238</u>	<u>31,713</u>
	\$ 4,470,928	3,952,181
Liabilities		
Accounts payable and accrued expenses	31,352	67,508
Estimated payable to utilities on overpayment of KWH fees	280,000	200,000
Deferred revenue	<u>4,159,576</u>	<u>3,684,673</u>
Total liabilities	4,470,928	3,952,181
Fund balance	—	—
Contingencies	—	—
	\$ 4,470,928	3,952,181

NUCLEAR WASTE FUND
 OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
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Statements of Operations

Years ended September 30, 1990 and 1989
 and cumulatively from January 7, 1983, date of inception
 to September 30, 1990
 (Dollars in thousands)

	(Unaudited) 1990	1989	(Unaudited) Cumulative
Revenue:			
Fees			
One-time spent fuel fees	\$ -	-	2,334,777
KWH fees	551,512	317,186	3,060,047
Interest:			
One-time spent fuel fees	121,503	116,490	704,718
U.S. Treasury securities	199,428	169,304	808,125
Gain (loss) on sale of U.S. Treasury securities	<u>17</u>	<u>(132)</u>	<u>32,198</u>
	872,460	602,848	6,939,865
Less amount deferred	<u>(474,903)</u>	<u>(227,289)</u>	<u>(4,159,576)</u>
	397,557	375,559	2,780,289
Expenses:			
First repository	203,304	237,306	1,964,922
Second repository	249	989	108,859
Monitored retrievable storage	2,109	1,567	41,875
Transportation and systems integration	39,875	38,269	156,255
Program management	61,191	93,395	395,553
Interest	60,000	45	78,008
Transfer appropriation	<u>30,829</u>	<u>3,988</u>	<u>34,817</u>
	397,557	375,559	2,780,289
Excess of revenue over expenses	\$ -	- -	- -

Civilian Radioactive Waste R&D Account

The year-end statements for OCRWM's Civilian Radioactive Waste R&D account for fiscal years 1989 and 1990 are provided in the table on page 52. Civilian Radioactive Waste R&D activities are authorized by Title II of the NWPA. The financial data contained in the table are unaudited.

**SUMMARY STATEMENTS OF ACCRUED COSTS
CIVILIAN RADIOACTIVE WASTE R&D ACCOUNT
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT**

(Dollars in Millions)
(Unaudited)

	Actual	Accrued	Costs
	1990	1989	1988
Spent Fuel Storage			
Development			
Operating Expenses	\$ 2.1	\$ 2.8	\$ 6.4
Plant and capital equipment	.2	0.0	0.0
Subtotal	2.3	2.8	6.4
Alternative Disposal Concepts			
Operating expenses	0.0	0.0	0.2
Plant and capital equipment	0.0	0.0	0.1
Subtotal	0.0	0.0	0.3
Generic Methods and Supporting Studies			
Operating Expenses	0.0	0.2	1.1
Subtotal	0.0	0.2	1.1
Program Direction			
Operating Expenses	0.0	0.0	0.2
Subtotal	0.0	0.0	0.2
TOTALS			
Operating Expenses	2.1	2.8	7.9
Plant and capital equipment	0.2	0.2	0.1
Total Civilian Radioactive Waste R&D	\$ 2.3	\$ 3.0	\$ 8.0

List of Acronyms

ACR	Annual Capacity Report	PAIP	Performance Assessment Implementation Plan
CCTP	Concrete Cask Testing Project	PAMP	Performance Assessment Management Plan
CFR	Code of Federal Regulations	PCDP	Prototypical Spent Fuel Consolidation Equipment Demonstration Project
CP&L	Carolina Power and Light	PCSB	Program Cost and Schedule Baseline
EBS	Engineered Barrier System	PDS	Project Decision Schedule
ESF	Exploratory Shaft Facility	PMS	Program Management System
FIS	Federal Interim Storage	QA	Quality Assurance
FR	Federal Register	QAPD	Quality Assurance Program Description
FWS	Fish and Wildlife Service	QARD	Quality Assurance Requirements Documents
FY	Fiscal Year	RIP	Reclamation Implementation Plan
HRL	Hard Rock Laboratory	RPP	Reclamation Program Plan
IRMD	Information Resources Management Division	RWMC	Radioactive Waste Management Committee
MSIS	Management Systems Improvement Strategy	SBIP	Surface-Based Investigations Plan
NBS	Natural Barrier System	SBTP	Surface-Based Testing Prioritization
NRC	Nuclear Regulatory Commission	SCP	Site Characterization Plan
NTDP	Near-term Decision Plan	SEMP	Systems Engineering Management Plan
NTS	Nevada Test Site	SKB	Swedish Nuclear Fuel and Management Company
NWF	Nuclear Waste Fund	SP	Socioeconomic Plan
NWPA	Nuclear Waste Policy Act	TCG	Transportation Coordination Group
NWPAA	Nuclear Waste Policy Amendments Act	TNP	Telecommunications Network Plan
NWTRB	Nuclear Waste Technical Review Board	TOSPACE	Total System Performance Assessment Code
OAP	Office Automation Plan	TSLCC	Total System Life Cycle Cost for Civilian Radioactive Waste Management
OCRWM	Office of Civilian Radioactive Waste Management	TSPA	Total System Performance Assessment
OECP	Organization for Economic Cooperation and Development	WMSD	Waste Management System Description
OPARM	Office of Program and Resource Management	WMSR	Waste Management System Requirements
PACE	Performance Assessment Calculational Exercise	UNLV	University of Nevada at Las Vegas



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