DOE/RW-0004/1

Office Of Civilian Radioactive Waste Management

Annual Report To Congress

May 1985

U.S. Department of Energy
Office of Civilian Radioactive Waste Management

DOE/RW-0004/1

Office Of Civilian Radioactive
Waste Management

Annual Report To Congress

May 1985

U.S. Department of Energy
Office of Civilian Radioactive Waste Management
Washington, D.C. 20585

Table of Contents

Tables

Figures

FOREWORD

This report responds to the mandate of Section 304(c) of the Nuclear Waste Policy Act (NWPA) of 1982, Public Law 97-425. It is the second Annual Report on the activities and expenditures of the Office of Civilian Radioactive Waste Management (OCRWM) and covers the fiscal year ending September 30, 1984. Copies of this document are also being forwarded to the Nation's electric utilities, the States, Indian tribes, and other entities who have an interest in the timely, safe, and cost-effective disposal and storage of civilian radioactive waste. Thus, it also serves as an annual report to the "stakeholders" in the Civilian Radioactive Waste Management Program.

Research over the past 30 years has shown that high-level radioactive waste and spent nuclear fuel can be safely disposed of in geologic repositories. With this information available, the Congress provided both a policy mandate and a reliable source of funds by passing the NWPA in December 1982. The Act established OCRWM as a single-purpose organization within the Department of Energy (DOE) with the sole function of conducting the Civilian Radioactive Waste Management Program. As prescribed in Section 304(b) of the NWPA, the Director is responsible directly to the Secretary of Energy for carrying out the functions of the Secretary under the Act. On May 25, 1984, following confirmation by the U.S. Senate, Benard C. Rusche was sworn in as the Office's first permanent director.

Chapter I of this report provides an overview of the OCRWM organization. The specific accomplishments of the Office are presented in Chapters II through V. Chapter VI contains the Office's financial statements for fiscal years 1983 and 1984, and a concluding chapter updates the report with a brief summary of key accomplishments since the end of fiscal year 1984.

I

ORGANIZATION

Fiscal 1984 was the first full year during which the Civilian Radioactive Waste Management Program was conducted by OCRWM. The program's 1984 manpower ceiling was 206 full-time equivalents (FTEs).[1] This provided for the establishment of 100 full-time positions each at OCRWM Headquarters and OCRWM project offices, plus a modest allocation of FTEs to other DOE organizations rendering support to OCRWM. By the end of the year, 92 of the 100 Headquarters positions and 96 of the 100 field positions had been filled.

HEADQUARTERS ORGANIZATION

Initially, OCRWM Headquarters was organized as shown in Figure 1-1, with an Institutional Relations Staff reporting to the Acting Director, and three major offices: (1) Management; (2) Geologic Repository Deployment; and (3) Storage and Systems Development. Following the appointment of its permanent Director, it was determined that the organization required enhanced staff capabilities for centralized planning, policy development, and management oversight to achieve the essential integration of all project activities. Therefore, OCRWM was reorganized in July 1984 as shown in Figure 1-2, by restructuring the three original offices and adding an Office of Policy, Integration and Outreach. The new organization implemented during 1984 was designed to address the unique challenges of the program. By necessity, the work of investigating potential repository sites is geographically dispersed, and much of the technical effort must be managed locally. However, the passage of the NWPA underscored the need for careful coordination and integration of the individual site investigations and other program elements. The new organization stresses increased technical and financial control and improved coordination of individual projects that are managed on a day-to-day basis by the OCRWM Project Offices. These Project Offices are further described in the final section of this Chapter.

Office of Resource Management

The Office of Resource Management has primary responsibility within OCRWM for development and management of the contracts between DOE and nuclear utilities for the provision of Federal disposal and/or storage services, management of the Nuclear Waste Fund, and management of the Interim Storage Fund, if activated. Fund management activities include budgeting, accounting, reporting, auditing, fee collection and verification, and annual analyses of the sufficiency of the fees to fully recover the costs of the program. The Office also develops, implements, and maintains the OCRWM-wide Program Management System; prepares the Fund Management Plan; conducts special management analyses; and provides comprehensive support services such as personnel, contract, and information systems management.

Office of Geologic Repositories

The Office of Geologic Repositories is responsible for siting, licensing, constructing, operating, and decommissioning mined geologic repositories for the permanent disposal of radioactive waste. The Office plans and directs the repository site screening and characterization process; the selection and recommendation of sites; the design and construction of exploratory shafts; the evaluation of regulatory requirements; and the licensing of repository construction, operation, and decommissioning. In addition, the Office is responsible for test-and-evaluation facilities; research and development for both repositories and other means of permanent disposal of radioactive wastes; interaction with State and local governments, Indian tribes, and other Federal agencies; day-to-day oversight of Project Offices; and for safety and quality assurance activities pertaining to the geologic repository subprogram.

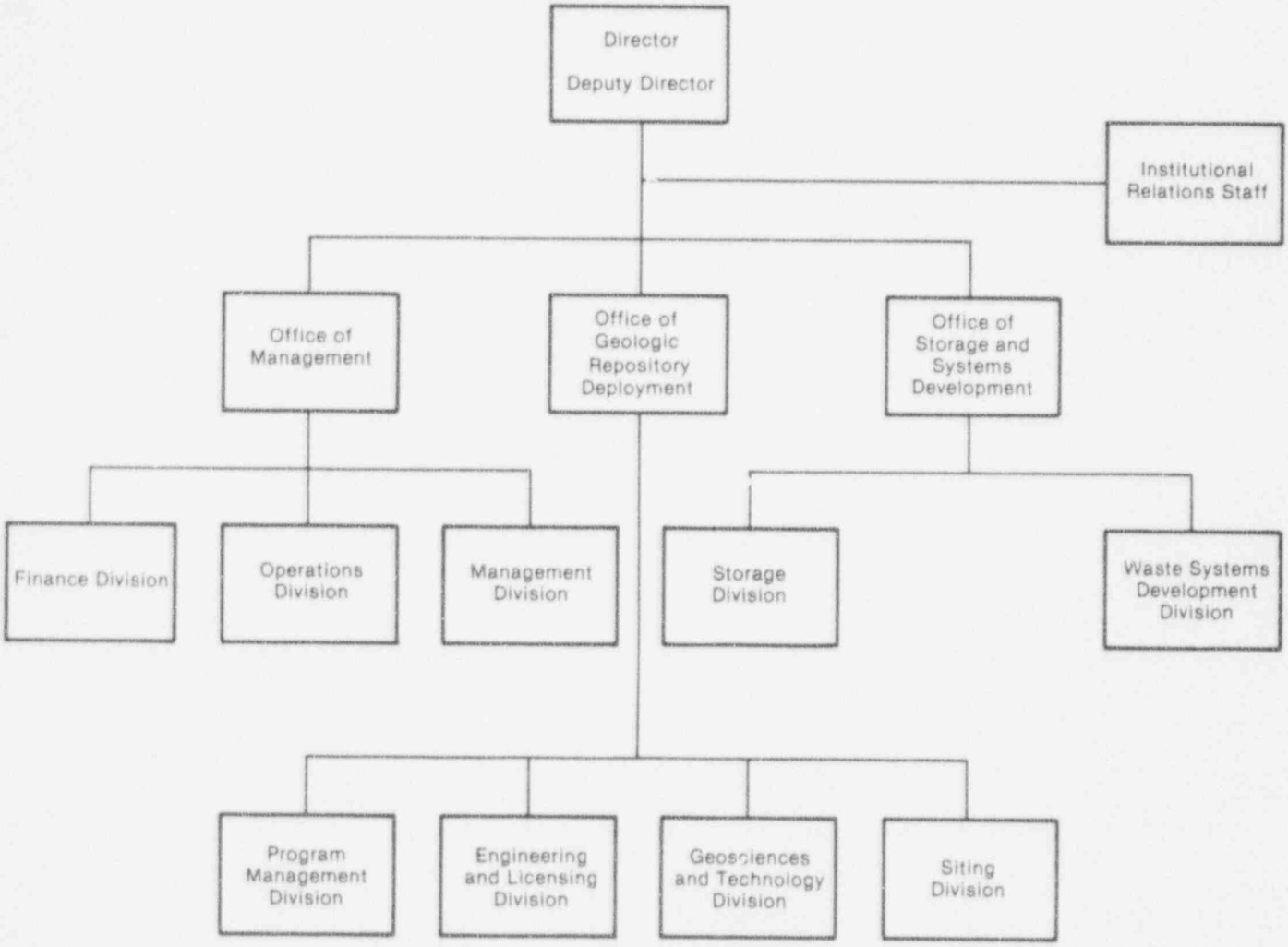
Office of Storage and Transportation Systems

The Office of Storage and Transportation Systems has primary responsibility for the implementation of Subtitle B and C, Title I, and Sections 218 and 220, Title II, of the NWPA and for other activities related to both interim and long-term storage and transportation of radioactive waste. The Office manages the development of waste packaging, handling, and transportation technologies and systems; prepares the Congressionally mandated proposal for construction of one or more Monitored Retrievable Storage (MRS) facilities; and offers international cooperation in areas related to its activi-

[1] A full-time equivalent represents 2087 hours of compensable staff-time.

FIGURE 1-1

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT PRIOR TO JULY 1984



ties. It is responsible for coordinating OCRWM-wide systems integration efforts to ensure that a safe, efficient, and timely waste management system is developed and implemented. The Office also develops and implements the overall systems engineering process, including preparation of the OCRWM Systems Engineering Management Plan and a System Requirements and Description Document.

Office of Policy, Integration and Outreach

The Office of Policy, Integration and Outreach provides direct staff support to the Director and assists in policy formulation, program planning, and implementation. This includes the integration, with the Associate Directors, of program elements in headquarters and the field, as well as coordination of international activities. A major task is to establish a dedicated public outreach activity that goes beyond the public affairs functions normally associated with other Government programs.

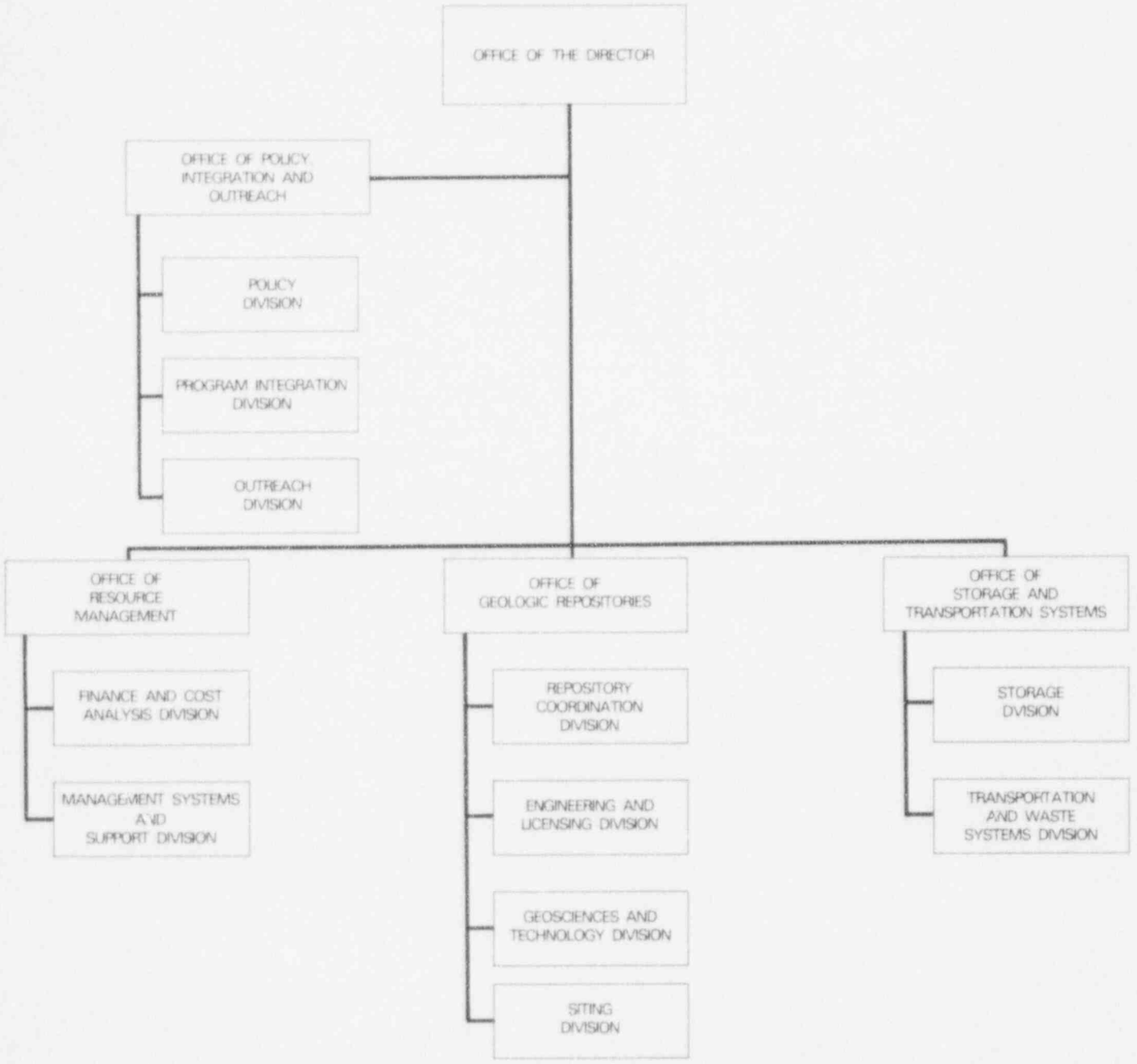
PROJECT MANAGEMENT

OCRWM's management organization is consistent with DOE's overall philosophy of decentralized management of individual projects; however, it also recognizes the need for centralized planning and control. Accordingly, headquarters provides policy guidance, general program direction, and technical review, while project offices and contractors are responsible for the execution of programs and the management of project performance.

Under DOE's decentralized project management structure, project offices are assigned responsibility for major projects which, in turn, are carried out by contractors. Pay-

FIGURE 1-2

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT



ments to these contractors constitute approximately 85 percent of total Nuclear Waste Fund expenditures.

DOE Operations Offices perform a variety of program management and administrative functions. The Operations Offices administer contracts and provide support services in such activities as quality assurance, accounting, budgeting, and procurement.

Although OCRWM Project Offices are part of the established DOE Operations Offices, they report to the Director, OCRWM, for overall program policy guidance and to the Associate Director for Geologic Repositories and the Associate Director for Storage and Transportation Systems, respectively, for technical direction and review of project performance. The project offices are responsible for providing programmatic guidance and oversight to the contractors. In addition to technical management, the project offices have extensive responsibilities for interaction with other Federal agencies and with the States and Indian tribes.

Contractors are responsible for the preparation of detailed project plans, schedules, cost estimates, and budgets, and for the performance of site-specific work.

II

RESOURCE MANAGEMENT

The key financial concept in the NWPA is that the cost to the Federal Government of providing disposal and/or storage services shall be fully recovered from the generators and owners of the radioactive waste.

To implement this concept, the Act established two special funds in the U.S. Treasury: (1) the Interim Storage Fund, and (2) the Nuclear Waste Fund. These Funds are the financing mechanisms for DOE's Civilian Radioactive Waste Management Program conducted by OCRWM in accordance with the mandates of the NWPA.

Resource management activities during 1984 focused on developing management systems to achieve cost-effective performance of the civilian radioactive waste management mission and the unique fiduciary responsibilities placed on OCRWM with respect to Fund management.

MANAGEMENT SYSTEMS AND STUDIES

Primary objectives in this area were the development of a comprehensive Program Management System (PMS) for OCRWM, development and acquisition of management information systems, revision of the Fund Management Plan, and completion of the study required by Section 303 of the NWPA on alternative means of managing the construction and operation of radioactive waste management facilities.

Program Management System

Prior to the enactment of the NWPA, the National Waste Terminal Storage Program utilized DOE's Project Management System for Major System Acquisition (MSA) as specified in DOE Order 5700.4A. This directive will continue to guide OCRWM in the management of major projects, and all MSA policies and procedures were being implemented at the project level during the year. However, while proven effective for the management of specific, well-defined projects, the MSA system by itself is not sufficient to effectively plan and control the exceptionally complex Civilian Radioactive Waste Management Program.

Thus, a special OCRWM task force was organized to design and begin implementing OCRWM's Program Management System (PMS). DOE Order 5700.4A forms the foundation for the PMS. In addition, substantial emphasis was placed on systems analysis in developing a centralized management system for planning, integrating, directing, and controlling the Civilian Radioactive Waste Management Program. Documentation of the PMS was begun during the year and is expected to be completed and published as a PMS Manual during 1985.

Management Information Systems

In addition to initiating development of an overall PMS, OCRWM has been pursuing the identification, analysis, and scoping of automated management information systems (MIS) needed to improve either OCRWM's operational efficiency or its responsiveness to stakeholders and the general public. An analysis was conducted in October 1983 to determine the requirements for, and potential gains from, applications of MIS. That analysis formed the basis for preparation of a long-range MIS implementation plan. OCRWM determined that immediate attention should be focused on developing automated data systems for Nuclear Waste Fund management and the intergovernmental and interagency consultation and coordination processes mandated by the NWPA. In early 1984, OCRWM formed a Headquarters/Project Office steering committee to coordinate MIS planning and development, identify corporate applications, define parameters, and assign responsibilities. The systems selected for immediate implementation included a corporate budget/financial management system and an external interactions system. In addition, development of a licensing data base and a program MIS to provide the data base for the centralized PMS were assigned high priority.

Fund Management Planning

As indicated earlier, the NWPA established two special funds in the U.S. Treasury: the Interim Storage Fund (Section 136) and the Nuclear Waste Fund (Section 302). The Interim Storage Fund has not been activated as there have been no requests to date for Federal interim storage services. Therefore, Fund management planning is currently focused almost exclusively on management of the Nuclear Waste Fund. Effective management of the Nuclear Waste Fund is of exceptional importance to OCRWM because of the full cost recovery mandate of Section 302 of the NWPA and the fiduciary

responsibility that it places on OCRWM. Therefore, Fund management planning was given early priority, and the initial Fund Management Plan was completed and published in May 1983. A comprehensive revision of the Plan was issued in August 1984.

The Fund Management Plan is one of the hierarchy of documents in OCRWM's overall program management system. It delineates OCRWM's Fund management objectives and the policies and procedures to be followed in controlling costs; evaluating and collecting fees; and conducting all financial activities such as budgeting, accounting, and reporting.

Study of Alternative Means of Financing and Managing (AMFM) Radioactive Waste Facilities

Section 303 of the NWPA requires a study and report to Congress on alternative approaches to managing the construction and operation of all civilian radioactive waste facilities, including the feasibility of establishing a private corporation for such purposes. The Act imposed a deadline of 1 year after enactment for completion of the study and submission of the report.

To provide an independent, unbiased assessment of this issue, the Secretary appointed an advisory panel consisting of 13 members who, collectively, represented both the diverse interests affected by the Civilian Radioactive Waste Management Program and the variety of disciplines necessary to properly evaluate alternative approaches to its management. The AMFM Panel held its first meeting January 24-25, 1984.

In the course of its study, the Panel conducted eight public meetings during FY 1984. Panel members also toured facilities and met with waste management organizations in both the United States and Europe to evaluate existing management practices. The study was continuing at the end of the year.

The Panel reviewed 13 specific types of management organizations and decided to examine 4 of these in greater detail. These were: (1) the existing Office of Civilian Radioactive Waste Management; (2) an independent Federal commission; (3) a Federally chartered corporation; and (4) a private corporation. During the September 25, 1984, meeting, 7 of the 13 Panel members voted to select the Federally chartered corporation as the Panel's preferred alternative. The Panel's final report was transmitted to the Secretary on January 15, 1985. In addition to recommending that DOE investigate the steps necessary to implement a new organization such as the Federally chartered corporation, the Panel's report included a listing of 14 "key components" for adoption by any waste management organization.

COST ANALYSIS AND FEE EVALUATION

Section 302 of the NWPA requires an annual review of the 1-mill per kilowatt-hour fee established by the Act as the major source of financing for the Nuclear Waste Fund. If it is determined by this review that either excess or insufficient revenues are being collected to achieve full cost recovery, the Secretary is to propose an adjustment of the fee.

Fee Adequacy Analysis

The second annual report on the adequacy of the fee was submitted to Congress in July 1984 and made available to the public. This report, *Nuclear Waste Fund Fee Adequacy: An Assessment*, summarized the results of the detailed analyses of total system life cycle costs and revenues conducted earlier in the year. The detailed analyses of total system life cycle costs and revenues underlying the summary report were published by DOE's Pacific Northwest Laboratory in September 1984.

The report concludes that the fee is sufficient to recover all costs if the rate of inflation averages no more than 2 percent during future years, and if real cost estimates turn out to be reasonably accurate. If inflation averages above 2 percent yearly, the fee will need to be adjusted upward. However, the report recommends delaying a decision on indexing or changing the fee until better cost estimates are available later in this decade.

Work was underway during the final quarter of 1984 to develop cost estimates that are consistent with the waste management system as it will be described in the Mission Plan. Progress was also made on development of a total system life cycle cost model that will enable OCRWM to prepare and evaluate cost estimates under alternative assumptions.

Integrated Data Base

During 1984, OCRWM assumed responsibility for coordinating the development and publication of DOE's integrated data base for spent fuel and radioactive waste inventories. The data base contains comprehensive information on current inventories and characteristics of the various forms of radioactive waste and projects inventories to the year 2020. A report on these data, *Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics*, was published in September 1984.

FINANCIAL MANAGEMENT

In addition to performing the traditional financial management tasks of budgeting, accounting, and reporting, the Office was engaged in a number of special activities during 1984. These activities enhanced OCRWM's financial management and responded to the special requirements imposed by the NWPA.

In coordination with the DOE Controller's Office, a draft DOE directive was completed which establishes Department-wide policies and procedures for the financial management, accounting, budgeting, and cash management of the Nuclear Waste Fund. The directive also provides a definition of administrative costs and delineates the responsibilities and authorities of various organizations in DOE for management of the Nuclear Waste Fund.

The Office also completed a Cash Management Plan that describes the methods to be used in handling accounts receivable and for accelerating fee collections. It provides procedures for optimizing the timing of disbursements and delineates OCRWM's investment strategies.

OCRWM developed and brought on line its separate automated budget and financial data system to supplement the Department's Financial Information System. This system enables OCRWM to implement the Cash Management Plan by providing the current information and monthly projections of collections and disbursements needed to carry out borrowing and investment strategies.

The Office also instituted an internal control system during 1984 to meet the requirements of the Federal Manager's Financial Integrity Act of 1982 and OMB Circular A-123. The system establishes internal controls to prevent fraud, waste, and abuse.

On September 4, 1984, DOE signed a contract with a certified public accounting firm, Main Hurdman, to provide professional auditing services for the Nuclear Waste Fund. The contract resulted from a competitive solicitation issued on May 4, 1984. Under this contract, the firm will determine whether the financial statements of the Nuclear Waste Fund present the financial position and results of operations in accordance with generally accepted accounting principles. The report of Main Hurdman and the financial statements covering the period from inception of the Fund to the end of fiscal year 1983 and the full 1984 fiscal year are presented in Chapter VI of this report.

III

GEOLOGIC REPOSITORIES

Geologic repository activities during the year centered on siting of the first repository and the preliminary identification of areas with potential sites for the second repository. The siting phase is one of the most critical stages of the Civilian Radioactive Waste Management Program. Complex technical, social, and economic issues must be resolved to identify and select the optimum site for a repository. In addition, the NWPA requires extensive consultation and cooperation with State governments and Indian tribes and the active participation of other Federal agencies throughout the siting process.

SITING GUIDELINES

As required by the NWPA, OCRWM issued general guidelines for the recommendation of sites for repositories. Draft guidelines were initially released to the public in February 1983. Subsequently, there was additional public review and extensive consultation with the States. The guidelines were then forwarded to the Nuclear Regulatory Commission (NRC) for concurrence on November 22, 1983. Following NRC's preliminary concurrence, the guidelines were revised to reflect DOE's response to NRC comments and were forwarded in May 1984 for final concurrence. The NRC concurrence was obtained, and the guidelines were prepared for December 1984 publication in the *Federal Register*.

The guidelines specify the geologic considerations which are primary criteria for site selection and the elements which would qualify or disqualify a site. The guidelines also consider such factors as proximity to population centers and natural resources, the cost and impact of transportation, and the advantages of regional distribution. Finally, the guidelines include a provision that different geologic media should be considered when recommending repository sites.

CONSULTATION AND COOPERATION

During 1984, OCRWM continued to attach great importance to consultation and cooperation with the States and Indian tribes. Many meetings and briefings were held to inform both State officials and the public of the activities of the Office. Public information offices were established in Louisiana and Mississippi to provide coverage of project-specific activities.

OCRWM will negotiate and seek to enter into written consultation and cooperation (C&C) agreements with eligible States and Indian tribes which request such agreements following notification of potentially acceptable sites. These agreements are to cover areas of mutual concern, such as the health, safety, environmental, and socioeconomic impacts of a repository; access to and sharing of technical data and expertise; joint surveillance and monitoring of project activities; public education programs; procedures for resolving conflicts and off-site concerns; financial assistance to the States; and notification of proposed transport of high-level waste and spent nuclear fuel. Negotiations of a C&C agreement between the Department and the State of Washington continued during 1984. Negotiations of a C&C agreement with the Yakima Indian Nation begun in 1983 were in abeyance in 1984 pending finalization of the agreement with the State of Washington.

Grants have been awarded to all the first repository States and Indian tribes. Grants have also been awarded to 16 of the 17 States included in the regions being considered in the second repository project. In addition, a grant was awarded to the National Congress of American Indians Council of Energy to provide information to all interested Indian tribes regarding OCRWM activities. By the end of 1984, OCRWM had awarded more than $10 million in financial assistance grants to State and tribal governments or related associations.

In addition to the interactions with States and Indian tribes, project-specific agreements were developed in accordance with a formal procedural agreement finalized with NRC in 1984. These agreements cover guidelines for interaction between OCRWM and NRC, provide information on arrangements for meetings, and establish points-of-contact between NRC and OCRWM Project Offices. OCRWM also installed a nationwide toll-free telephone service to enable members of the public to stay abreast of upcoming meetings between DOE and NRC.

FIRST REPOSITORY

The NWPA sets forth a schedule of activities and decision points for developing the Nation's first geologic repository for disposal of commercial high-level radioactive waste and spent nuclear fuel. The major focus of activity during 1984 was on the site selection phase of this schedule.

The process of selecting a repository site began with the identification of potentially acceptable sites (Figure 3-1). The next step is issuance of the general guidelines for the recommendation of sites as described above in Section A. Following issuance of the guidelines, DOE will nominate at least five sites as suitable for characterization. These nominations must be accompanied by environmental assessments for each site. Three sites will then be recommended to the President for characterization. Section 302 of the NWPA establishes January 31, 1998, as the date the first repository is to begin disposal operations.

Environmental Assessments

The Secretary identified nine sites in six States as being potentially acceptable for the first repository and notified the affected States and Indian tribes in February 1983. The identification of these sites was based on data collected after several years of geologic and environmental studies and existing siting criteria. Each site to be nominated for characterization must be accompanied by a comprehensive environmental assessment, which will be made available to the public for review and comment. The draft environmental assessments for all nine potentially acceptable sites were nearly complete at the end of the year.

Each environmental assessment will include the following: a detailed description of the site; a comparison among the sites considered in the nomination process; the probable impacts of site characterization and repository development activities; the alternatives available to avoid the impacts of site characterization; and an evaluation of the suitability of the site relative to the siting guidelines. According to the draft assessments, five of the nine sites would be proposed for nomination as suitable for characterization, and three of these would be proposed for recommendation for detailed characterization. The tentative nominations and recommendations in the draft environmental assessments are listed in Table 3-1. A detailed plan for briefings and public hearings covering the environmental assessments was prepared.

Site Investigation Activities

A number of site investigation and exploratory shaft design and planning activities were performed during 1984. Accomplishments included the drilling and testing of boreholes and the analysis and modelling of geologic, hydrologic, and geochemical data. Exploratory shaft designs (Figure 3-2) and preliminary plans for the in-situ test programs were developed in 1984 and will be revised and completed in 1985. Site characterization plans will also be prepared in 1985.

FIGURE 3-1
POTENTIALLY ACCEPTABLE SITES FOR THE FIRST REPOSITORY

TABLE 3-1

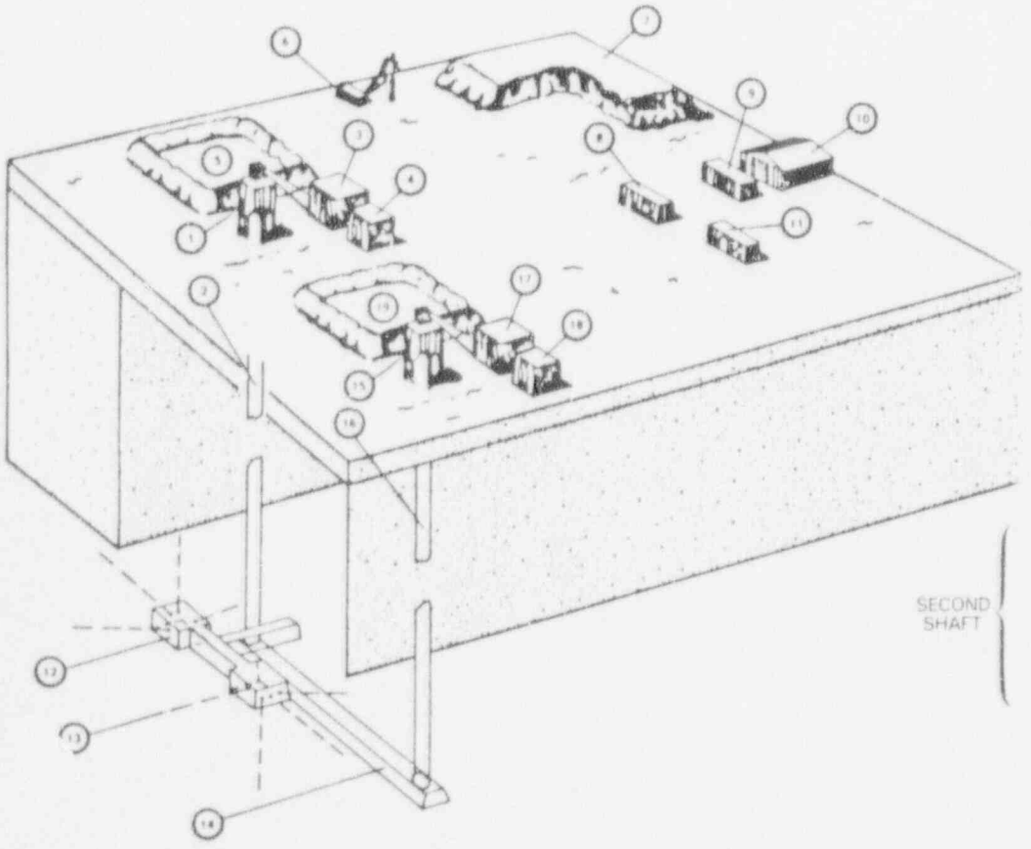
SITES PROPOSED FOR NOMINATION AS SUITABLE FOR CHARACTERIZATION

STATE	SITE	GEOLOGIC MEDIUM
Mississippi	Richton Dome	Domal Salt
Nevada	Yucca Mountain*	Tuff
Texas	Deaf Smith County*	Bedded Salt
Utah	Davis Canyon	Bedded Salt
Washington	DOE Hanford Site*	Basalt

*Preliminary recommendation for detailed characterization

FIGURE 3-2

EXPLORATORY SHAFT CONCEPTUAL ARRANGEMENT



The following discussion groups specific activities during 1984 by major project, i.e., according to the three types of geologic media (tuff, basalt, and salt) that are under investigation for the first repository site.

Tuff

During 1984, significant progress was made in obtaining data relevant to the characterization of tuff. Some of the more notable accomplishments included: detailed fracture mapping and characterization near the planned site for the exploratory shaft; hydraulic tests in several bore holes; soil sample collection in several trenches; environmental area surveys; gathering of climatological data; mechanical tests of rock samples; a report on in-situ stress measurements; and continued operation of the 50-station seismic network. In addition, several reports associated with seismic reflection surveys, aeromagnetic data, and interpretation of the Yucca Mountain area were completed. Models associated with gas flow in the unsaturated zone and hydrologic/conceptual flow for the unsaturated zone were developed. Advances in the drilling program have produced water samples from the targeted depth of 3000 feet. This enabled OCRWM, for the first time, to perform average porosity and directional flow studies. An underground facility architect-engineer firm was selected and joined the previously selected surface facility architect-engineer firm in working on the repository conceptual design. Appropriate coordination continues with State authorities and regulatory agency staff.

The final design for the first exploratory shaft in tuff, based on a finished inside diameter of 12 feet, was completed. This shaft is to be excavated by conventional mining methods and lined with concrete. Mined underground openings, equivalent to about 1100 linear feet of a 15 x 15 foot drift, are to be constructed in the Topopah Spring unit at about the 1200-foot level, and about 8 lateral 500-2000-foot core holes would be drilled from rooms at the end of two principal drifts that are to extend up to 150 feet from the centerline of the shaft. A limited development consisting of a shaft station and breakout room may be constructed at about the 520-foot level. A second shaft with a 6-foot diameter is to be constructed to comply with safety regulations. In addition, OCRWM accepted delivery of the exploratory shaft head frame, conducted acceptance tests on the hoists, updated the Title II design, and issued an exploratory shaft quality assurance plan.

Basalt

Basalt formations at the Hanford Reservation in Washington are under study as a potential site for the first repository. During 1984, two of the accomplishments were the construction of the baseline hydrologic monitoring system and establishment of the seismic surveillance network.

The final design for the first exploratory shaft in basalt was completed in 1984. Design of the underground development and of the second shaft required for the in-situ test program was initiated. The first exploratory shaft is to be blindbored, lined, and grouted to a finished inside diameter of 6 feet. A steel liner capable of withstanding the lithostatic load and hydrostatic head to the total depth will be used. OCRWM received 3,350 feet of fabricated 72-inch exploratory shaft Phase I liner during 1984. The liner is to be equipped with portholes to allow testing in selected horizons before and after breakout into the Cohasett horizon. Approximately 1000 feet of underground drifts are to be constructed from the first shaft station to the second shaft. A preliminary plan for a 24-month in-situ testing program was prepared and reviewed in 1984.

Salt

Bedded and domal salt formations on non-DOE lands are the third medium being evaluated as a potential host for the first repository. During the past year, accomplishments associated with salt site investigations included: operation of a 60-station microseismic network in the Permian and Paradox Basins; in-situ stress hydraulic fracture tests at one hole and pump testing in two other holes in the Permian Basin; completion of a position paper on the Gulf Coast geohydrologic setting; completion of the Permian Basin area geologic characterization report; and completion of the Permian Basin location recommendation report. In addition, a Gulf Coast geohydrologic setting information document was completed. Tests were also performed to assist in defining the various parameters associated with salt. Some of these include hollow cylinder tests to understand rock response to room excavation techniques, heat transfer studies on rough surfaces, accelerated borehole closure corejack tests at Avery Island in the Pacific, and activation of four test sites at the Asse mine in West Germany for evaluation of the effect of heat and radiation in salt. In addition, a Memorandum of Understanding (MOU) between OCRWM and DOE's Waste Isolation Pilot Plant (WIPP) project was signed in 1984. The MOU provides for information exchange and describes the principles and content of a cooperative research program.

Preliminary designs for the first exploratory shaft in salt were completed during 1984. After selection of a specific salt site for characterization, a borehole will be drilled to provide the data required to complete the final designs. The preliminary plan calls for two exploratory shafts, each with an inside diameter of 12 feet, mined and lined with steel and concrete liner (hydrostatic head). There will be 5000 feet of underground drifts including 1500 feet of test drifts.

Repository Design and Development

Repository and waste package design and development activities were conducted for each of the three geologic media under investigation for the first repository.

Accomplishments relating to the tuff project during 1984 included: completion of the conceptual design of the repository horizontal emplacement hole drill and liner installation equipment; a preliminary concepts report for the subsurface and surface facilities; and preparation of a re-

pository sealing plan. Waste package-related activities focused on completion of a waste package conceptual design for the unsaturated zone in tuff; performance of corrosion tests for irradiated zircalloy and alternative materials; documentation of waste acceptance specifications for defense high-level waste, commercial high-level waste, and spent fuel; and completion of release rate performance tests of spent fuel and high-level waste with tuff and waste samples. Additionally, functions of packing material for use in spent fuel waste packages for the unsaturated zone were defined.

Basalt project activities during 1984 centered on waste form and waste package evaluation. Most representative of this work was completion of the methodology for evaluating waste package alternatives and the development of a probabilistic waste package containment and release performance model. A waste package materials performance engineering test plan and an emplacement configuration study were completed. Other accomplishments included: corrosion tests conducted on reference and alternative waste package overpack materials; spent fuel and high-level waste tests performed with other waste package components, host rock, and ground water to assess interactive behavior; and completion of design criteria for the advanced conceptual design of a repository.

Salt project activities during 1984 emphasized repository design, systems engineering, and waste form studies. Accomplishments included the issuance of a draft systems engineering management plan and the issuance of a salt repository performance assessment plan. Initial results from the glass leaching model and waste form corrosion model were published. Tests of waste package overpack corrosion and waste form performance in salt were continuing during the year. Generic design studies for a repository in salt were initiated in 1984.

SECOND REPOSITORY

Crystalline rock is the major geologic medium being considered for the second repository. The rock formations are located in 17 States in the northcentral, northeastern, and southeastern regions of the United States (see Figure 3-3). To date, investigations of crystalline rock sites are in a preliminary regional stage and are being conducted with cooperation and in consultation with State officials. The regional phase consists of a literature-based compilation of geologic and environmental data for each of the States being studied. The draft regional characterization reports were nearly ready for publication at the end of the year.

FIGURE 3-3

REGIONS BEING CONSIDERED FOR THE SECOND REPOSITORY

State review of these draft reports is an integral part of OCRWM's process for involving the States in this national program. Data contained in the draft reports will be used in conjunction with a screening methodology, based on the siting guidelines, to select crystalline formations in the three regions (shown in Figure 3-3) for more intensive study in the next phase (area phase) of the crystalline rock project.

Major 1984 crystalline rock project accomplishments included development of a region-to-area screening methodology and conduct of region-to-area screening workshops with several States. The Office continued to develop regional data bases and prepared a detailed response to State comments on the regional characterization reports submitted for review in 1983. Topical reports were completed on geology, hydrology, and mineral resources of crystalline rock areas of the northeastern United States; crystalline rocks of the northeastern United States; geology, hydrology and mineral resources of crystalline rock areas of the Lake Superior Region; and crystalline rocks of the Lake Superior Region. Further progress was made in providing eligible States with financial assistance to enable them to participate in repository cooperation and consultation activities.

RESEARCH AND DEVELOPMENT

Test and Evaluation Facility

Section 305(a) of the Act requires that a report be submitted to Congress on the location of a Test and Evaluation Facility (TEF). The Department notified Congress in April 1984 that the TEF will be collocated with the repository if the need for such a facility is established. The need for a collocated TEF will depend on the data requirements of the repository subprogram after site characterization. This need can be established in the 1987 timeframe, subsequent to issuance of the initial site characterization plans. In addition, Section 217(f) of the Act requires the Department and the NRC to reach a written understanding on the TEF. The Department and the NRC have decided to defer completion of the written understanding pending a decision regarding the need for the TEF.

International Activities

OCRWM has continued active participation in international cooperation and information exchange through both bilateral and multilateral agreements and through international agency forums and programs. These activities are part of the Department's overall program under current agreements with the Federal Republic of Germany (FRG), Canada, Belgium, Sweden, France, United Kingdom, Japan, the Commission of European Communities, the International Atomic Energy Agency, and the Nuclear Energy Agency (NEA) of the Organization for Economic Cooperation and Development. OCRWM is currently most active in joint projects with Canada, the FRG, Sweden, and the NEA. These projects include: (1) an underground crystalline rock research laboratory in Canada; (2) ongoing tests in the Asse salt mine in the FRG; and (3) the Stripa mine in Sweden where repository tests in crystalline rock are under way. Activity with other countries has been increasing, and an additional agreement will be concluded with Switzerland.

Subseabed Disposal Program

In accordance with Section 222 of the NWPA, OCRWM continued research on alternative means and technologies for the permanent disposal of high-level waste. Subseabed disposal is being studied as a potential alternative to mined geologic repositories. It is the only alternative disposal concept that is currently being funded by OCRWM. The basic concept is to implant solidified wastes in high-integrity canisters beneath the ocean floor within sediments of the midplate regions. The major activity was research and development on the concept of subseabed disposal targeted toward a report on its feasibility in 1990.

OCRWM's Subseabed Disposal Study Project is being conducted in cooperation with other nations. A Subseabed Working Group, organized by the Nuclear Energy Agency of the Organization for Economic Development, coordinates the international research activities.

Major accomplishments included testing of non-radioactive experimental components to evaluate the concept. The components of an in-situ heat transfer experiment were deployed to the ocean floor and successfully retrieved in preparation for a year-long test in 1986. A series of free fall penetrator tests as an alternative to drilling was successfully completed in the Nares Abyssal Plain (Northwest Atlantic) in cooperation with the United Kingdom, France, The Netherlands, and the Commission of the European Communities. Penetration depth of 30 to 36 meters into the sediment was observed as predicted. The telemetry system successfully transmitted the deceleration data to surface ships. The capability to predict contaminant transport was developed, and a physical oceanographic field program to obtain the necessary data was started. Radiation sensitivity studies on bacteria were initiated to use the change in DNA complexes as an indicator of radiation effects. International cooperation on site characterization studies continued in the North Atlantic Nares Abyssal Plain and the Great Meteor East sites. These two sites resulted from a reduction of the large study areas into two specific sites for study.

IV

STORAGE AND TRANSPORTATION SYSTEMS

The Department of Energy has been packaging, handling, storing, and transporting high-level radioactive waste and spent nuclear fuel safely for many years. However, these individual activities have not, to date, been performed as elements of a complete waste management system. Therefore, one of OCRWM's major objectives is to develop and demonstrate more cost-effective and even safer methods of accomplishing these functions as part of a single, integrated waste management system. In addition to systems development, major areas of activity during 1984 were spent fuel research and development, Federal interim storage planning, preparation of a proposal for construction of Monitored Retrievable Storage (MRS) facilities, and technical assistance to nonnuclear weapon states.

SYSTEMS DEVELOPMENT

During 1984, OCRWM focused on two major activities in this area: (1) Preparation of the OCRWM-wide Systems Engineering Management Plan and a Systems Requirement and Description Document for the Civilian Radioactive Waste Management Program; and (2) the study of waste packaging, handling, and shipping systems concepts to maximize the efficiency and flexibility of operations to manage nuclear waste from any of its sources to the final repository.

Work on the Systems Engineering Management Plan and the Systems Requirements and Description Document continued throughout 1984. Preliminary drafts of both were nearly complete at the end of the year.

The movement of nuclear waste to the repository involves major investments in facilities and equipment and requires a number of discrete packaging, handling, and shipping operations. Each of these activities entails potential health, safety, and licensing issues. It is clearly advantageous to limit the total number of required operations and to make certain that early activities facilitate, rather than impede, subsequent operations. Therefore, an integrated systems approach is being adopted to reduce overall risks, costs, and radiation exposure.

A competitive solicitation was issued in March 1984 inviting proposals from industry for development of a safe, economical waste packaging and handling system. Six contracts were awarded as a result of this solicitation to conduct studies of a variety of concepts over a 12-month period. These contractors are studying several ideas including the use of multipurpose casks and canisters; centralized and regional packaging facilities; and compact, portable dry rod consolidation equipment. The results of these studies will be evaluated to identify the most promising concepts for further development.

TRANSPORTATION

The transportation of spent fuel and high-level radioactive waste is a critical component in the implementation of the Nuclear Waste Policy Act. The Office's overall transportation objective is to ensure that safe, environmentally acceptable, and cost-effective transportation systems are available and operated to ship spent fuel and high-level radioactive waste from civilian nuclear reactor sites to a repository and/or an MRS facility. In accordance with Section 137 of the Act, the Office will utilize private industry to develop, supply, and operate these systems to the maximum extent possible. However, OCRWM plans to remain an active participant during the equipment design and development stage. This will limit the up-front risk for private industry, while at the same time ensuring that the system will be in place when needed. Requests for proposals are being developed for the design of new, improved equipment. Several transportation packages will be designed and developed as equipment will be required for all surface modes.

In addition to the design of new casks and other required transportation equipment, the Office was developing plans for: (1) logistical, economic, and environmental analyses; (2) resolution of institutional issues; (3) data base development; and (4) a testing program.

A major accomplishment during 1984 was the preparation of a report entitled, "Transportation Business Plan: Strategy Options Document." This document focused discussions with the industry and others on alternative methods for conducting OCRWM's transportation activities in ways that would maximize private sector involvement. Based on these discussions, a Transportation Business Plan will be prepared and published that will define how OCRWM will deal with private industry over the life of the program.

Institutional issues are a major concern in the establishment of a safe and efficient nuclear waste transportation system. A Transportation Institutional Plan is being developed

to address the issues affecting various stakeholders. Several meetings were held during the year with State, Indian tribe, and local government representatives. OCRWM provided discussion papers on key policy issues for comment at these meetings.

Development of a long-term procedural agreement with the Department of Transportation (DOT) was initiated in 1984 to clarify the division of transportation responsibilities between DOE and DOT under the NWPA. Also, a procedural agreement on transportation was negotiated and signed by DOE and NRC. The purpose of this agreement is to enhance the exchange of information and to seek ways to minimize licensing uncertainties. Pursuant to this agreement, several meetings were held with NRC during 1984.

The development of generic information for the evaluation of risks associated with transporting waste to the potential repository sites was completed. This information is being published in the draft environmental assessments issued for the nine potentially acceptable repository sites identified in Chapter III. In accordance with its commitment to the provision of technical assistance to eligible States and affected Indian tribes, OCRWM conducted the first of a series of technical assistance workshops on transportation risk assessment by use of computer models.

SPENT NUCLEAR FUEL RESEARCH AND DEVELOPMENT

Spent fuel research and development activities are conducted in accordance with Section 218 of the NWPA. The major objectives are to encourage and expedite the efficient use of existing storage facilities and the addition of new at-reactor storage capacity through:

- A cooperative demonstration program with the private sector to demonstrate spent fuel rod consolidation in existing water basins;
- A cooperative demonstration program with the private sector to develop dry storage technologies that NRC can generically approve;
- Consultative and technical assistance to utilities on a cost-shared basis in anticipation of NRC licensing of on-site storage technologies; and
- A cost-shared dry storage research and development program at Federal facilities to collect the necessary licensing data.

Rod Consolidation

Rod consolidation involves the dismantling of the fuel assembly and rearranging the spent fuel rods into a more compact array. This procedure represents a cost-effective method for significantly increasing the capacity of some utility storage pools.

In 1983, Government-owned consolidation equipment was modified to handle boiling water reactor spent fuel for use in a cooperative demonstration program with the Tennessee Valley Authority (TVA). This demonstration of the disassembly and consolidation of 12 boiling water reactor assemblies is being conducted at TVA's Browns Ferry reactor spent fuel storage pool in Limestone County, Alabama. In May 1984, OCRWM issued a solicitation for cooperative agreement proposals for licensed in-basin rod consolidation demonstrations. One proposal was received, and negotiation of a contract is currently underway. The actual schedule for this project will depend on the negotiated scope of the cooperative demonstration.

Dry Storage Systems

Dry storage systems represent an alternative method for providing additional spent fuel storage at nuclear power plants. Potential systems for dry storage include casks, drywells, silos, or vaults.

The Department has over 20 years experience with dry storage technologies. Three methods — drywell, silo, and vault storage — have been demonstrated at DOE facilities in Nevada. However, dry storage of light water reactor spent fuel has not been licensed in the United States. OCRWM is continuing an activity begun in 1982, when DOE entered into an interagency agreement with TVA to demonstrate the licensed storage of boiling water reactor spent fuel in two prototype dry storage casks, the REA-2023 shown in Figure 4-1 and the CASTOR-IC. The REA cask is designed to store 52 boiling water reactor assemblies. The cask dry storage system is passive, modular, and characterized by low maintenance requirements. The modular method of adding storage in small increments offers the additional economic advantage of avoiding large initial financial outlays.

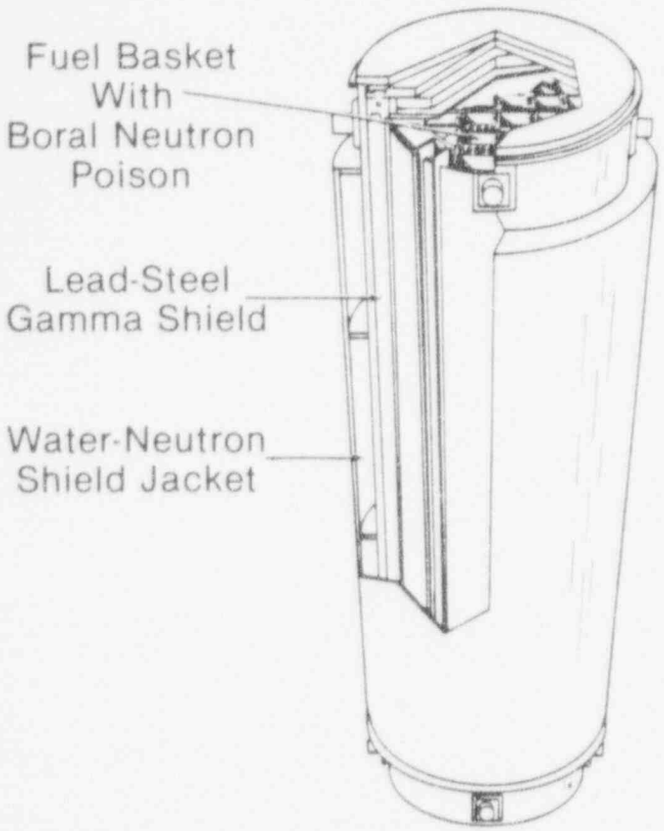
The DOE-owned REA cask was to be loaned to TVA for the demonstration. However, this project will now be limited to a licensed demonstration of the CASTOR-IC cask, and a license application is being prepared for submission to NRC. The cask will be loaded with fuel following NRC's approval of the license application, which could occur in 1986 or 1987. Fuel will be stored in the cask for about 2 years before being returned to the storage pool.

The REA-2023 cask will now be used in an unlicensed demonstration. It was shipped in December 1983 to the GE-Morris facility in Illinois and was loaded with fuel in June 1984. This will provide a hot characterization of the cask prior to decontamination and shipment to Browns Ferry for the unlicensed dry storage demonstration.

Agreements were signed in March 1984 with the Virginia Electric Power Company and the Carolina Power and Light Company for cooperative dry storage demonstrations of fuel in several types of storage casks and in horizontal modular concrete silos. These demonstrations will expand the data base for licensing dry storage and build on previous demonstrations, such as the one with TVA. Tests, some at Federal sites, are expected to include conditions approaching the bounding parameters and limiting conditions of the dry storage equipment.

FIGURE 4-1

REA 2023 DRY STORAGE CASK



FEDERAL INTERIM STORAGE

Section 131 of the Act specifies that owners and operators of civilian nuclear power reactors have primary responsibility for the interim storage of their spent fuel. It also places a responsibility on the Federal Government to encourage the effective use and expansion of on-site storage. Under Section 135 of the Act, the Secretary shall offer to enter into a storage contract to provide Federal interim storage capacity. This offer is made on the condition that NRC determines, in response to a request, that despite the diligent pursuit of licensed alternatives to Federal interim storage, adequate spent fuel storage capacity cannot reasonably be provided by the owner or operator of a civilian nuclear power reactor, and the continued orderly operation of the reactor is threatened. Total Federal interim storage capacity cannot exceed 1900 metric tons of spent nuclear fuel.

Current spent fuel inventory and storage projections indicate little, if any, immediate demand for Federal interim storage services. Accordingly, the Office has not submitted a budget to Congress to activate the Interim Storage Fund established under Section 136 of the Act. All costs of any Federal interim storage must be paid by the user utilities. Therefore, it would not be appropriate to request authority to borrow funds and implement costly storage preparation activities prior to receipt of an application by NRC or an NRC determination of eligibility.

As required by Section 136(a)(2) of the NWPA, fees to be charged for Federal interim storage for calendar year 1984 were published in the *Federal Register* on December 2, 1983. Fees will be assessed only if contracts for storage are actually executed with utility companies.[1] Also, as required by Section 135(f) of the NWPA, OCRWM prepared and submitted a deployment plan for Federal interim storage to Congress in January 1984. The second annual deployment plan was under development during the final quarter of 1984. It will include updated information on shipping capabilities, data on spent fuel that may require Federal interim storage, and a generic outline of the activities that would be required to develop the capacity for such storage.

MONITORED RETRIEVABLE STORAGE

Section 141 of the Act directs OCRWM to complete a detailed study of the need for, and the feasibility of, an MRS facility and to submit a proposal to Congress for construction of one or more MRS facilities.

The proposal was being developed during 1984 to include a program for the siting, development, construction, and operation of facilities to be licensed by NRC; detailed facility designs, specifications, and cost estimates; a funding plan so that the costs are borne by waste generators and owners; and a plan for integrating MRS with other storage and disposal methods.

The proposal is being developed, as specified in Section 141, to include a minimum of five alternative MRS site and design combinations for at least three alternative sites. Accomplishments during 1984 included the definition of the MRS performance requirements and identification of the most appropriate storage technologies for further design.

A study was underway to evaluate the role of an MRS within an integrated waste management system if Congress should approve an MRS. Preliminary analyses of overall waste system requirements indicate that development of an integrated MRS capability would be a prudent addition to the overall waste management program. The Office concluded that the MRS design should be sufficiently flexible to enable MRS to perform a variety of potential waste system roles. Flexibility was considered especially appropriate in such performance areas as the MRS receipt rate, MRS storage capacity, and waste package configuration.

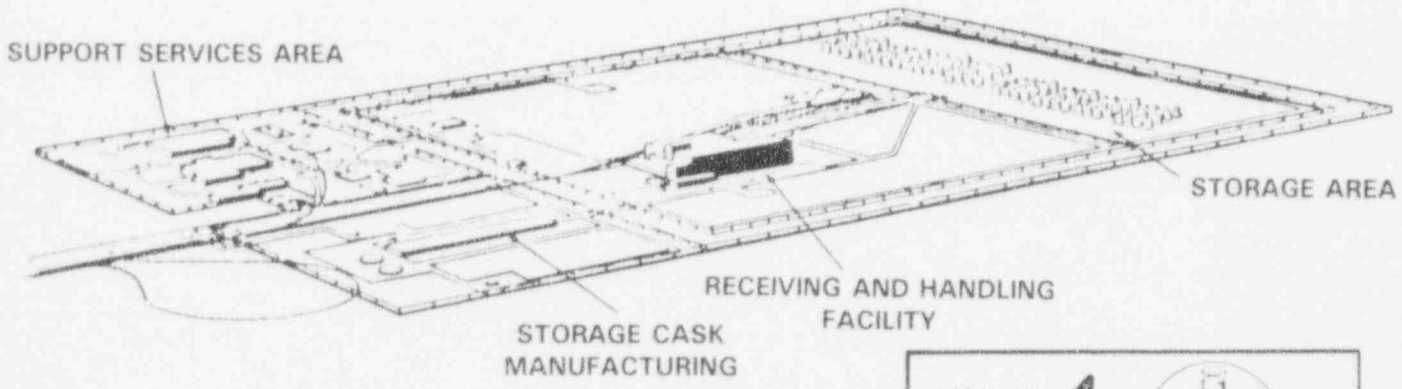
Based on a series of MRS conceptual system studies completed in 1984 and earlier, OCRWM selected dry storage of canistered spent fuel in sealed storage casks and field dry wells as the two storage technologies that should be further developed for the MRS proposal. These technologies were selected on the basis of their technical maturity, safety, and economics. Specific designs are being developed in such a manner that the resulting MRS could be safely constructed and operated at locations throughout the United States. During 1984, progress in developing the MRS proposal for Congress included the establishment of functional design criteria

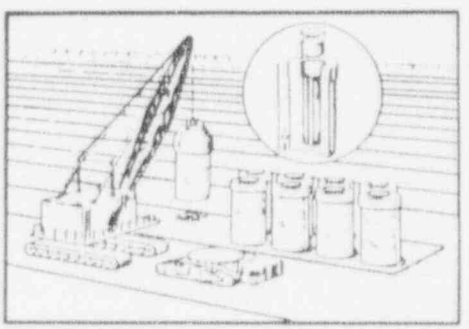
and the characteristics for arid, warm-wet, and cold-wet sites. In April 1984, a contract was signed with Ralph M. Parsons, Inc., following selection of that firm to develop the MRS facility designs and cost estimates needed for the proposal.

As now conceived, the MRS facility designs consist of two principal components -- the receiving and handling building and the storage modules. The receiving and handling building would contain a shielded transportation cask unloading capability and hot cells, where spent fuel assemblies would be disassembled and consolidated for more efficient storage and then packaged in high-integrity metal canisters for easier handling and increased safety. The canisters would be either shipped to a repository for disposal or loaded into metal-lined concrete containers or dry wells for storage. Both packaging designs provide multiple barriers against release of radioactive materials and can be readily monitored to ensure safe isolation of the radioactive materials. These particular technologies are also modular so that changes in storage requirements can be efficiently accommodated. Figure 4-2 illustrates a general layout of a sealed storage cask MRS, and Figures 4-3 and 4-4 show a sealed storage cask and field dry well, respectively.

FIGURE 4-2

CONCEPTUAL DRAWING OF A MONITORED RETRIEVABLE STORAGE FACILITY UTILIZING SEALED STORAGE CASKS

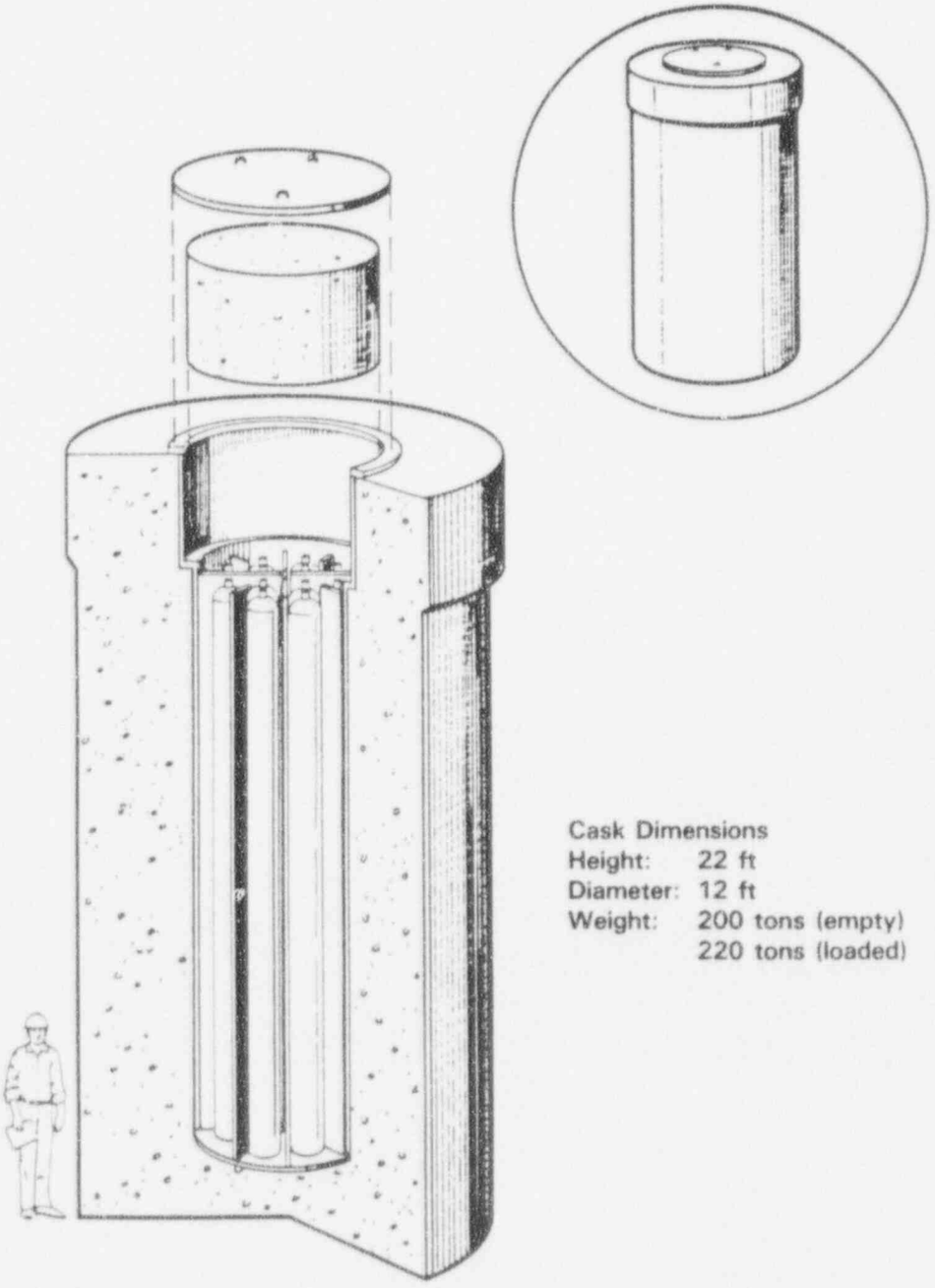




PRIMARY STORAGE CONCEPT-
SEALED STORAGE CASK

FIGURE 4-3

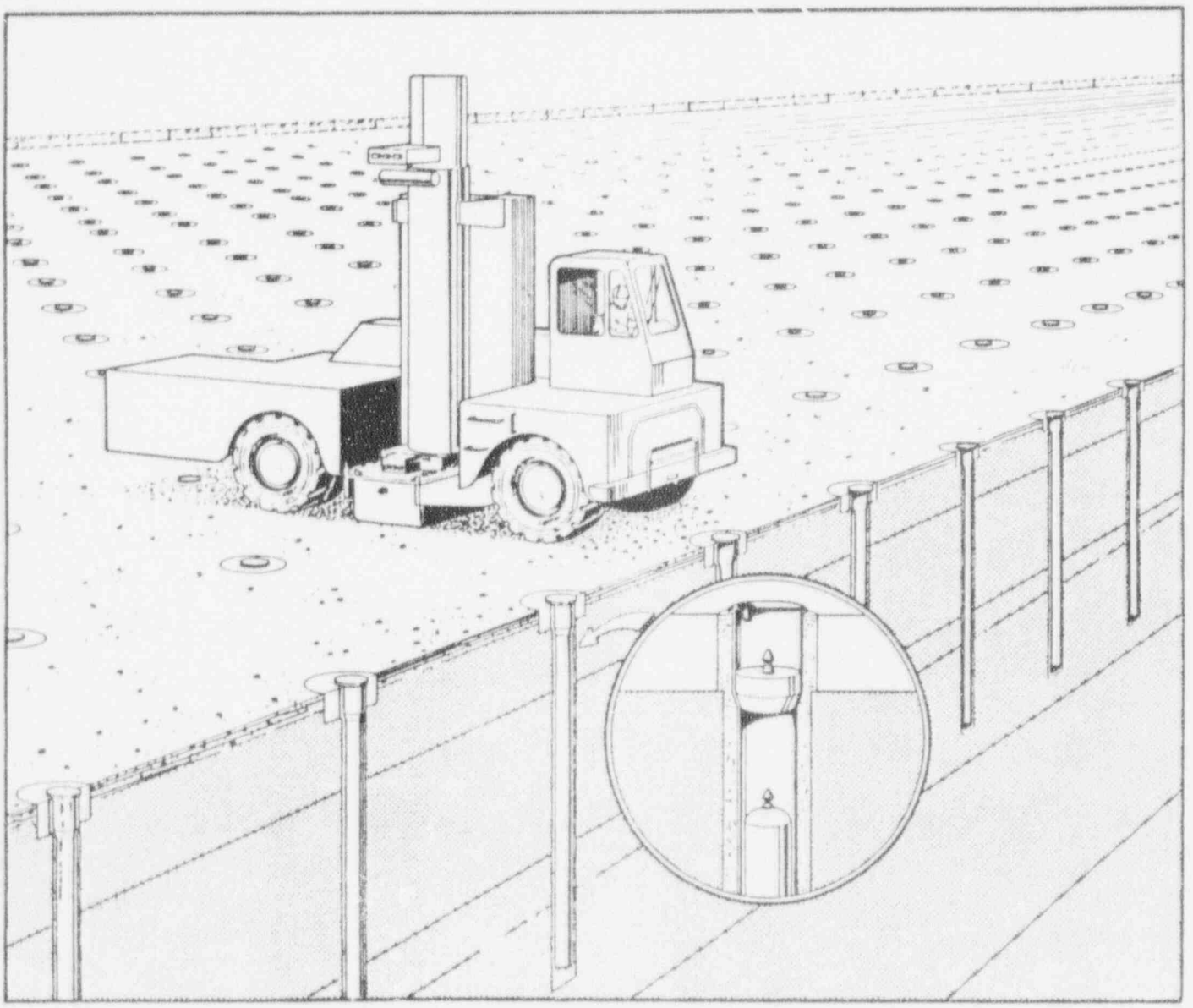
SEALED STORAGE CASK



Cask Dimensions
Height: 22 ft
Diameter: 12 ft
Weight: 200 tons (empty)
220 tons (loaded)

FIGURE 4-4

FIELD DRY WELL CONCEPT OF A MONITORED RETRIEVABLE STORAGE FACILITY



TECHNICAL ASSISTANCE TO NONNUCLEAR WEAPON STATES

In accordance with Section 223 of the NWPA, both DOE and NRC offer cooperation and technical assistance to nonnuclear weapon states in all facets of spent nuclear fuel storage. This includes assistance in the health, safety, and environmental regulation of storage activities. The *Federal Register* notice extending this offer was updated and reissued jointly by DOE and NRC on April 6, 1984 (49 FR 13858). Expressions of interest have been received from The Netherlands, Egypt, Brazil, the Republic of Korea, Taiwan, Mexico, and Indonesia, and others are anticipated. Reports of spent fuel storage research and development work and a listing of U.S. commercial firms that have expressed an interest in providing equipment and services to this market were sent to the seven respondents. In response to a U.S. offer, four of these nations requested briefings on the spent fuel management program. These programs will not result in any spent fuel or nuclear waste flow into the United States and will contribute to U.S. nonproliferation objectives by providing information on cost-effective storage options that are available through the private sector.

V

POLICY, INTEGRATION AND OUTREACH

The Civilian Radioactive Waste Management Program mandated in the Nuclear Waste Policy Act of 1982 is a complex and difficult undertaking. Care must be taken in planning and integrating the performance of each program element if OCRWM is to be successful in achieving its mission in a safe, timely, and cost-effective manner. In addition, the Act imposes unique requirements for consultation with State governments and Indian tribes, for coordination with other Federal agencies, and for cooperation with private industry and the general public. Therefore, program planning, policy development, integration, and outreach activities demand extraordinary attention.

PLANNING AND POLICY DEVELOPMENT

During 1984, OCRWM developed an official draft of the Mission Plan and initiated several policy development studies.

Mission Plan

The Mission Plan, required by Section 301 of the Act, is a comprehensive report " . . . which shall provide an informational basis sufficient to permit informed decisions to be made in carrying out the repository program and the research, development and demonstration programs required under this Act." Not later than 15 months after enactment of the NWPA (by April 7, 1984), a draft Mission Plan was to be submitted for comment to the States, Indian tribes, NRC, and other appropriate Government agencies.

Two drafts of the *Mission Plan for the Civilian Radioactive Waste Management Program* were completed during the year. A preliminary draft of Part I, Overview and Current Program Plans, was published in December 1983 and distributed widely for review and comment. The comments received were used in preparing the official draft of the complete two-part plan. Part II is the "Information Required by the Nuclear Waste Policy Act of 1982."

The complete draft Mission Plan was published in April 1984 and distributed to the States, affected Indian tribes, NRC, and other Federal agencies and made available to the general public. Approximately 2500 individual comments were received from over 100 agencies, organizations, and individuals.

These comments have been carefully considered by OCRWM in developing the final Mission Plan, which is scheduled for submission to Congress in May 1985. A comment response document is being readied for publication which will address all of the comments received.

Enhancing Community Participation

The NWPA stipulates a role for both executive and legislative branches of State governments in the siting, construction, and operation of repositories and other facilities authorized under the Act. Except for grants in lieu of taxes (Section 116(c)), the Act does not specify mechanisms for the involvement of local governments. It is clear that potentially affected local communities should be given an opportunity to participate. Therefore, OCRWM initiated planning and developed strategies during 1984 to enhance local community relations and gain local participation in the assessment and mitigation of any negative impact from program activities.

OCRWM plans to interact with potentially affected residents at informal briefings, public hearings, and through other mechanisms developed as part of the consultation and cooperation process. Local residents will have an opportunity to provide information on socioeconomic conditions in their community and to review the proposed plans for conducting socioeconomic impact assessments.

Regulatory Analysis

OCRWM has a responsibility to review and analyze the direct and potential impacts of all legislative and Federal regulatory actions on implementation of the NWPA. For example, during 1984, the Office evaluated the potential impact of NRC's definition of the components that would be characterized as high-level radioactive waste.

PROGRAM INTEGRATION

The addition of a program integration function at the headquarters staff level has provided a focus for coordination of all activities to ensure that individual projects are planned and pursued as part of an integrated Civilian Radioactive

Waste Management Program. Activities in this area during 1984 ranged from the development of internal management and quality assurance mechanisms to international relations.

External Coordination

During 1984, OCRWM developed a preliminary draft Project Decision Schedule (PDS). The PDS, required by Section 114(e) of the NWPA, is to be prepared in cooperation with all affected Federal agencies and is intended to portray the optimum schedule for attaining the operation of the radioactive waste management system within the time periods specified in the Act. The PDS includes a description of objectives and a sequence of deadlines for all Federal agencies that are required to take action during the development and subsequent operation of the radioactive waste management system. The preliminary draft document is to be submitted to the other Federal agencies for review and comment in January 1985.

During 1984, OCRWM planned, developed, and began implementing a comprehensive, automated external interactions system. This system provides a centralized indexing capability for technical documents, consultation and cooperation agreements, and interactions between OCRWM and other Federal agencies (NRC, EPA, etc.), Congress, States, Indian tribes, and others over the course of the program. The system is essential for cataloging and retrieving records that document OCRWM's implementation of the NWPA and for demonstrating good faith actions on the part of OCRWM concerning its handling of radioactive waste management issues. As an index system, it is designed to be queried and to produce reports based on keywords, State names, and date ranges.

The structure of the system was completed late in 1984. Documents and other records from OCRWM and project offices are currently being indexed and filed. Work will continue in 1985 on loading the External Interactions System data base and developing system reporting capabilities.

Quality Assurance and Program Management

Quality assurance (QA) is of key importance to the Civilian Radioactive Waste Management Program. It is critical in the NRC licensing process that OCRWM be able to document satisfactory control over the quality of each activity. Under the DOE system of decentralized project management, each major project is required to implement and maintain a rigorous QA program. However, it is also essential that project-level QA activities be coordinated and adequately integrated at headquarters.

During 1984, a comprehensive program-wide QA management program was initiated, and a preliminary draft of a QA management plan was near completion by the end of the year.

International Cooperation

It has long been U.S. policy to cooperate with other nations in developing radioactive waste management technology. Action was initiated in 1984 to prepare a comprehensive strategic plan for international cooperation and information exchange. In the interim, the Director, OCRWM, issued a statement of policy to ensure proper management of international activities and guide preparation of the strategic plan. The statement provides for central staff oversight and integration of international activities, compliance with NWPA requirements, continued honoring of existing commitments, and completion of a cost-benefit analysis before any new action is initiated. The evaluation of all existing activities and preparation of the strategic plan was completed in December 1984.

OUTREACH

OCRWM continued an outreach program during 1984 and initiated several new projects in its efforts to keep interested parties and the public at large informed of civilian radioactive waste management activities.

National Meetings

The Office held the first National Civilian Radioactive Waste Management Information Conference in Washington, D.C., from December 12 to 15, 1983. The attendance of nearly 1300 persons, including delegates from 14 foreign countries, is indicative of the widespread interest in the OCRWM program. The conference agenda included such topics as institutional and regulatory issues, transportation and waste packaging technology, transportation, international programs, geologic repository siting, repository design and research and development activities, and financial management.

In response to the expressions of continuing interest in the program, OCRWM began holding periodic public meetings during 1984 to provide information on emerging policy initiatives. Also, it organized a series of conferences with first repository States to exchange views on developing issues. Further exchanges of information were accomplished by OCRWM's participation in meetings sponsored by the National Conference of State Legislators, the National Congress of American Indians, the Western Interstate Energy Board, and other organizations.

Outreach Planning

The NWPA contains extensive requirements for consultation and cooperation with affected States and Indian tribes. Experience has shown that expanded mechanisms for the involvement of States and Indian tribes assist in ensuring accomplishment of program objectives. While more detailed institutional relations plans are being developed, OCRWM has implemented a number of enhancements to its outreach program.

For example, OCRWM has provided materials for public reference sections in libraries, established docket files, and opened information offices in local areas affected by the program. In addition, it is updating and expanding the information made available about the program and is developing educational projects, as well as providing more timely and comprehensive responses to public inquiries.

Outreach activities also included responding to an average of 150 calls per week from the press and the preparation and distribution of information releases on all aspects of the program. Finally, OCRWM representatives testified at seven Congressional hearings and responded to numerous requests for information from the Congress.

VI

FINANCIAL STATEMENTS

The NWPA authorizes programs and expenditures by OCRWM under three accounts. Two of these are special funds established in the U.S. Treasury – the Interim Storage Fund (Section 136) and the Nuclear Waste Fund (Section 302). The third, the Civilian Waste R&D account, provides for expenditures from the General Fund on taxpayer-supported programs authorized under Sections 151, 218, and 223 of the NWPA. Financial statements are presented in this Chapter for the two active accounts, the Nuclear Waste Fund (Section A) and Civilian Waste R&D account (Section B).

NUCLEAR WASTE FUND

To provide an independent review of Fund revenues and expenditures to those who finance the program through the payment of user fees into the Nuclear Waste Fund, OCRWM secured the services of a certified public accounting firm. This Section contains the report of that firm, Main Hurdman, for the period from inception of the Fund through September 30, 1983, and for the fiscal year ending September 30, 1984.

Main Hurdman

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

FINANCIAL STATEMENTS

FOR THE PERIOD FROM INCEPTION (JANUARY 7, 1983) THROUGH
SEPTEMBER 30, 1983 AND FOR THE YEAR ENDED SEPTEMBER 30, 1984

WITH

REPORT OF CERTIFIED PUBLIC ACCOUNTANTS

Main Hurdman
Certified Public Accountants

1050 Seventeenth Street, N.W., Washington, D.C. 20036, Telephone: 202/466-3010

Office of Civilian Radioactive
Waste Management
United States Department of Energy
Washington, D.C.

We have examined the statement of financial position of the Nuclear Waste Fund as of September 30, 1983 and 1984 and the related statements of operations and changes in financial position for the period inception (January 7, 1983) through September 30, 1983 and for the year ended September 30, 1984. Our examinations were made in accordance with generally accepted auditing standards and the standards for financial and compliance audits contained in the "Standards for Audit of Governmental Organizations, Programs, Activities and Functions" issued by the U.S. General Accounting Office and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the aforementioned financial statements present fairly the financial position of the Nuclear Waste Fund at September 30, 1983 and 1984, and the results of its operations and changes in its financial position for the periods indicated above, in conformity with generally accepted accounting principles applied on a consistent basis.

Main Hurdman

January 9, 1985

TABLE 6-1

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

STATEMENT OF FINANCIAL POSITION
SEPTEMBER 30
(Dollars in Thousands)

	1984	1983
ASSETS		
Cash	$ 221,182	$ 158,469
Contract receivables from utilities	2,414,730	2,405,966
Other receivables and advances	872	214
Capital equipment, less accumulated depreciation of $2,080 and $527	20,030	14,706
	$2,656,814	$2,579,355
LIABILITIES		
Accounts payable and accrued expenses	$ 45,819	$ 43,160
Appropriated debt	258,443	253,782
Deferred revenue	2,352,552	2,282,413
	$2,656,814	$2,579,355

The accompanying notes are an integral part of these financial statements.

TABLE 6-2

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

STATEMENT OF OPERATIONS
FOR THE PERIOD FROM INCEPTION (JANUARY 7, 1983)
THROUGH SEPTEMBER 30, 1983 AND FOR THE YEAR ENDED SEPTEMBER 30, 1984
AND CUMULATIVE AMOUNTS FROM INCEPTION TO SEPTEMBER 30, 1984
(Dollars in Thousands)

	1984	1983	Cumulative
Revenue:			
Fees			
Spent fuel fees	$	$2,332,085	$2,332,085
KWH fees	338,302	147,462	485,764
	338,302	2,479,547	2,817,849
Less amount deferred	(70,139)	(2,282,413)	(2,352,552)
	268,163	197,134	465,297
Expenses:			
Operating expenses			
Tuff Nuclear Waste Storage Investigations	62,184	51,795	113,979
Salt (Office of Nuclear Waste Isolations)	81,615	71,737	153,352
Basalt Waste Isolation Project	55,081	41,286	96,367
Other media	15,837	8,376	24,213
Monitored Retrievable Storage	10,433	3,817	14,250
Federal and State assistance	4,679	509	5,188
Program management	33,145	16,067	49,212
Interest	5,189	3,547	8,736
	268,163	197,134	465,297
Excess of revenue over expenses	$ -0-	$ -0-	$ -0-

The accompanying notes are an integral part of these financial statements.

TABLE 6-3

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

STATEMENT OF CHANGES IN FINANCIAL POSITION
FOR THE PERIOD FROM INCEPTION (JANUARY 7, 1983)
THROUGH SEPTEMBER 30, 1983 AND FOR THE YEAR ENDED SEPTEMBER 30, 1984
AND CUMULATIVE AMOUNTS FROM INCEPTION TO SEPTEMBER 30, 1984
(Dollars in Thousands)

	1984	1983	Cumulative
Cash provided from:			
Revenue received	$ 329,539	$ 73,580	$ 403,119
Operating expenses paid	261,072	163,185	424,257
Cash provided from (used for) operations	68,467	(89,605)	(21,138)
Cash provided from U.S.Treasury	4,661	253,782	258,443
Borrowings from other DOE appropriations for capital equipment		9,739	9,739
Total cash provided	73,128	173,916	247,044
Cash used for:			
Capital equipment	6,877	15,233	22,110
Repayment of borrowings from other DOE appropriations for capital equipment	2,880		2,880
Advances	658	214	872
Total cash used	10,415	15,447	25,862
Increase in cash	$ 62,713	$ 158,469	$ 221,182
Changes in cash:			
Charges not affecting cash:			
Depreciation	$ (1,553)	$ (527)	$ (2,080)
Increase in assets excluding cash:			
Contract receivables from utilities	8,764	2,405,966	2,414,730
Other receivables and advances	658	214	872
Capital equipment	6,877	15,233	22,110
	16,299	2,421,413	2,437,712
Increase in liabilities:			
Accounts payable and accrued expenses	2,659	43,160	45,819
Appropriated debt	4,661	253,782	258,443
Deferred revenue	70,139	2,282,413	2,352,552
	77,459	2,579,355	2,656,814
Increase in cash	$ 62,713	$ 158,469	$ 221,182

The accompanying notes are an integral part of these financial statements.

NUCLEAR WASTE FUND
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
DEPARTMENT OF ENERGY
NOTES TO FINANCIAL STATEMENTS
(Dollars in Thousands)

1. Organization and Significant Accounting Policies

Organization-The Nuclear Waste Policy Act (the Act) was signed into law on January 7, 1983. The Act establishes a framework for 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 concurrent with mined geologic repositories.
- Providing for a Presidential evaluation of also using repository capacity for disposal of defense waste and requiring the Federal Government to pay its share of cost.
- 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 1, 1998 in return for payment of specified fees to the Fund.

In accordance with the Act, a study has been completed with respect to alternative approaches to managing the contruction and operation of all civilian radioactive waste management facilities. The draft report recommends the establishment of a Federally chartered corporation for such purposes.

Revenue recognition-A one-time fee (see note 2) 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. 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. The life cycle of the program is expected to extend over a period of 5 decades, at an estimated cost of $24 to $29 billion (in constant 1984 dollars).

To date, research has been conducted relative to tuff, bedded salt, domed salt and basalt geological media to determine which of several potential candidate sites shall be nominated and recommended for site characterization for a first repository. Research has also commenced on potential media for a second repository. Under the Act, the NWF can perform only non-generic research. Costs incurred for this non-generic research relative to repository media and general and administrative costs are expensed as incurred.

Capital equipment-Capital equipment are capitalized at cost and depreciated over their estimated useful lives. Capital equipment purchased prior to the Act, which are currently dedicated and permanently transferred to nuclear waste activities, have been recorded as assets 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. Contract Receivables

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: (1) 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 (2) an adjustable fee payable quarterly, initially one mill per kilowatt-hour, on all electricity generated by nuclear reactors after April 6, 1983. The contracts provide three options for payment of the one-time fee, one of which must be selected by June 30, 1985, or within two years of contract execution. The options are:

(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. Contract Receivables (Continued)

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

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

Under options (1) and (2), interest would accrue 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 ten-year Treasury note rate in effect at the time. No interest has been accrued to date as the amount of such interest, if any, is dependent upon the option selected.

Contract receivables at September 30 consisted of:

	1984	1983
One-time fee	$2,332,085	$2,332,085
Kilowatt-hour fee	82,645	73,881
	$2,414,730	$2,405,966

3. 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.

Interest is determined on the amount of cumulative appropriations (appropriated debt) available less the undisbursed cash balance in the NWF. The interest rate, which is set by the Secretary of the Treasury, takes into consideration the average market yield during the month preceding each fiscal year, on outstanding marketable obligations of the United States of comparable maturity. Interest is payable annually in the month following the end of the fiscal year. The interest rates in effect for 1984 and 1983 were 10.375% and 11.0% respectively.

At September 30, financial balances consisted of:

	1984	1983
Cash	$221,182	$158,469
Due to U.S. Treasury		
Accrued expenses (interest)	$ 5,420	$ 3,547
Appropriated debt	258,443	253,782
	$263,863	$257,329

4. Pension Plan

The employees of the Office of Civilian Radioactive Waste Management (OCRWM) of the DOE are covered by the Civil Service Retirement System. As required by law, employees contribute 7 percent of their salaries to the plan with an equal amount contributed by OCRWM. The total pension expense for 1984 and 1983 was $500 and $308, respectively.

5. Related Parties

The Act established the Office of Civilian Radioactive Waste Management within the Department of Energy (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, the DOE contracts for services with numerous contractors including other Federal government agencies. Further, significant administrative services are provided by DOE. Its 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.

At September 30, 1984 and 1983, the NWF owed other DOE appropriations $18,292 and $25,543 for

NUCLEAR WASTE FUND
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
DEPARTMENT OF ENERGY
NOTES TO FINANCIAL STATEMENTS
(Dollars in Thousands)

5. Related Parties (Continued)

capital equipment transferred to the NWF and other services and costs.

6. Contingencies

The DOE is party to two suits challenging the legality of NWF fees. Lower courts have found in favor of the DOE and, in both instances, appeals have been made and are pending in the United States Court of Appeals of the District of Columbia. Fund management and DOE counsel are of the opinion that the appellate court will affirm the lower court rulings in favor of DOE.

7. Subsequent Event

In December, 1984, DOE issued draft environmental assessments on nine potentially acceptable sites for the first repository. Three of the nine sites were proposed, in the draft environmental assessments, for recommendation to the President for site characterization. After public comment is received, DOE will finalize the draft environmental assessments and formally nominate and recommend three candidate sites to the President for approval to begin site characterization. Various litigation is now pending regarding the selection of these candidate sites. Resolution of this litigation is not expected to have a material effect on the financial position of NWF.

CIVILIAN WASTE R&D ACCOUNT

The year-end statments for OCRWM's Civilian Waste R&D account for 1983 and 1984 are provided in Table 6-4. These statements show that program costs decreased by $10.6 million, or 38 percent, to $17.3 million in 1984. The major decreases are in the Spent Fuel Storage Development subprogram (-$0.5 million) and the Generic Methods and Supporting Studies subprogram (-$11.3 million). These decreases are partially offset by an increase in the Alternate Disposal Concepts subprogram (+$1.2 million). The Spent Fuel Storage Development subprogram encompasses such work as fuel integrity studies and cooperative demonstrations with utilities. The Alternate Disposal Concepts subprogram is presently limited to the subseabed disposal activity. The Generic Methods and Supporting Studies subprogram entails work on international activities and support to prestigious peer review panels.

The difference between the 1983 and 1984 funding levels results primarily from the transfer of some activities to the Nuclear Waste Fund on January 7, 1983, when the NWPA was enacted. This had the greatest impact on the Generic Methods and Supporting Studies subprogram by changing the manner in which work was charged. Costs for the repository and technical support contractor, for example, were transferred from the General Fund appropriation to the Nuclear Waste Fund as provided for in the Act.

TABLE 6-4

SUMMARY OF ACCRUED COSTS

CIVILIAN RADIOACTIVE WASTE R&D PROGRAM
DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
(In Millions of Dollars)
(Unaudited)

	1983[b] Accrued Costs (Actual)	1984 Accrued Costs (Actual)
Spent Fuel Storage Development[a]		
Operating expenses	$ 5.6	$ 4.5
Plant and capital equipment	0.6	1.2
Subtotal	$ 6.2	$ 5.7
Alternative Disposal Concepts		
Operating expenses	$ 5.6	$ 6.4
Plant and capital equipment	0.7	1.1
Subtotal	$ 6.3	$ 7.5[c]
Generic Methods and Supporting Studies		
Operating expenses	$15.3	$ 4.0
Subtotal	$15.3	$ 4.0
Program Direction[a]	$ 0.1	$ 0.1
Operating expenses	$ 0.1	$ 0.1
Subtotal	$ 0.1	$ 0.1
TOTALS		
Operating expenses	$26.6	$15.0
Plant and capital equipment	1.3	2.3
Total Civilian Radioactive Waste R&D	$27.9	$17.3

[a] Reflects comparability adjustments of $6.2 million in FY 1983 and $6.0 million in FY 1984 for Spent Fuel Storage Development and $0.1 million in FY 1983 and 1984 for Program Direction from Nuclear Fuel Cycle decision unit.

[b] Includes $15.3 million for Commercial Waste activities and $6.3 million for Alternative Disposal Concepts in FY 1983.

[c] Includes reprogramming of $2.9 million from other DOE accounts per Congressional Directive in the Conference Report 98-372 to Public Law 98-50.

VII

EPILOGUE

The activities and accomplishments discussed in previous chapters are those which occurred during the fiscal year and are thus consistent with the period covered by the financial statements. This chapter updates the report with a brief summary of the more significant accomplishments since the end of fiscal year 1984.

RESOURCE MANAGEMENT

Cash Management Policies and Procedures for the Nuclear Waste Fund was published in November 1984. This document is a detailed plan and guide to policies and procedures for cash management. It covers the handling of accounts receivable, procedures for payment and collection of fees, and the monitoring and review of letters of credit. It includes policies for optimizing the timing of disbursements and a detailed strategy for the investment of any excess balances in the Nuclear Waste Fund.

Following the July 1984 report, the schedule for the annual review of the 1-mill fee was changed so that its publication would coincide with submission of the budget to Congress. OCRWM prepared and published the first report on this new schedule in January 1985 under the title *Nuclear Waste Fund Fee Adequacy: An Assessment* (DOE/RW0020).

The report by the Advisory Panel on Alternative Means of Financing and Managing (AMFM) Radioactive Waste Facilities, *Managing Nuclear Waste—A Better Idea*, was delivered to the Secretary on January 15, 1985. The Secretary forwarded the report, along with the Department's own evaluation of its conclusions and recommendations, to Congress on April 18, 1985.

GEOLOGIC REPOSITORIES

General guidelines for the recommendation of sites for geologic repositories, required by Section 112(a) of the NWPA, were issued under the title *Nuclear Waste Policy Act of 1982: General Guidelines for the Recommendation of Sites for the Nuclear Waste Repositories: Final Siting Guidelines, 10 CFR Part 960*. These guidelines were published in the *Federal Register*, Part III, pages 47,714-47,770, on December 6, 1984.

Draft environmental assessments for the nine sites under consideration for the first repository were published and distributed on December 20, 1984. The environmental assessments include a comparative evaluation of the five sites proposed for nomination and describe the method used in the proposed recommendation of three of these sites for detailed characterization. The final environmental assessments are expected to be published later in 1985 following a series of public hearings and a public comment period.

Progress continued on the second repository with publication of draft regional geologic and environmental characterization reports on December 11, 1984. These reports, based on compilations of geologic and environmental data from the literature, were submitted to affected States for review and comment. The data in these reports will be used in selecting crystalline formations in three regions for more intensive study in the next phase of the second repository project.

STORAGE AND TRANSPORTATION SYSTEMS

The Implementation Plan for Deployment of Federal Interim Storage Facilities for Commercial Spent Nuclear Fuel was published in January 1985. This report is required by Section 135(f) of the NWPA. It assesses alternative methods for providing Federal interim storage services and examines existing facilities and commercial shipping capabilities. The deployment plan in this report will only be implemented if NRC determines that an owner or generator of spent nuclear fuel cannot reasonably provide the required storage capacity. To date, there has been no request to NRC for such a determination.

The *Transportation Business Plan: Strategy Options Document* was published in January 1985. This report was made available for public review but is designed primarily as a basis for discussions with the industry in development of the final business plan.

POLICY, INTEGRATION AND OUTREACH

A preliminary draft Project Decision Schedule was published in January 1985 and distributed to all affected Federal agencies for review and comment. The draft document contains reference schedules for siting, construction, licensing, and operation of both the radioactive waste management system and the key activities and decision points in meeting these schedules.

The evaluation of international activities initiated in September was completed in December 1984. Based upon this evaluation, a policy statement was developed to guide OCRWM international activities and ensure that these activities are both responsive to the requirements of the NWPA and of net benefit to OCRWM.

BIBLIOGRAPHY

RESOURCE MANAGEMENT

O'Scannlain, Diarmuid F., et al., Advisory Panel on Alternative Means of Financing and Managing Radioactive Waste Facilities, *Managing Nuclear Waste—A Better Idea*. A Report to the Secretary of Energy, December 1984.

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Cash Management Policies and Procedures, Nuclear Waste Fund*, November 1984, (DOE/S-0032).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Fund Management Plan*, August 1984, (DOE/S-0019).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, et al., *Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics*, September 1984, (DOE/RW-0006).

U.S. Department of Energy, Pacific Northwest Laboratory, *1984 Annual Review of the Adequacy of the 1-Mill/Kwh Waste Disposal Fee*, September 1984, (PNL-5241).

GEOLOGIC REPOSITORIES

Environmental Assessments

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment, Davis Canyon Site, Utah*, December 1984, (DOE/RW-0010).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment, Deaf Smith County Site, Texas*, December 1984, (DOE/RW-0014).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment, Lavender Canyon Site, Utah*, December 1984, (DOE/RW-0009).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment, Reference Repository Location Hanford Site, Washington*, December 1984, (DOE/RW-0017).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment, Richton Dome Site, Mississippi*, December 1984, (DOE/RW-0013).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment, Swisher County Site, Texas*, December 1984, (DOE/RW-0015).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment, Vacherie Dome Site, Louisiana*, December 1984, (DOE/RW-0016).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment, Yucca Mountain Site, Nevada Research and Development Area*, December 1984, (DOE/RW-0012).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment Overview, Cypress Creek Dome Site, Mississippi*, December 1984, (DOE/RW-0011).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment Overview, Davis Canyon Site, Utah*, December 1984, (DOE/RW-0010).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment Overview, Deaf Smith County Site, Texas*, December 1984, (DOE/RW-0014).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment Overview, Lavender Canyon Site, Utah*, December 1984, (DOE/RW-0009).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment Overview, Reference Repository Location Hanford Site, Washington*, December 1984, (DOE/RW-0017).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment Overview, Richton Dome Site, Mississippi*, December 1984, (DOE/RW-0013).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment Overview, Swisher County Site, Texas*, December 1984, (DOE/RW-0015).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment Overview, Vacherie Dome Site, Louisiana*, December 1984, (DOE/RW-0016).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Draft Environmental Assessment Overview, Yucca Mountain Site, Nevada Research and Development Area*, December 1984, (DOE/RW-0012).

Siting Guidelines

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *"General Guidelines for the Recommendation of Sites for the Nuclear Waste Repositories: Final Siting Guidelines," Federal Register*, Vol. 49, No. 236, December 6, 1984.

First Repository: Basalt

Rockwell Hanford Operations, *Archeological Inventory BWIP Hanford Reservation Washington*, July 1984, (D-BWI-TA-006).

Rockwell Hanford Operations, *Chemical Analysis Drilling Fluid Additives Used in a Cleanup Test in Borehole DC-14*, December 1984, (BD-BWI-TD-012).

Rockwell Hanford Operations, *Chemical and Physical Properties of Waste Package Packing Materials*, February 1984, (SD-BWI-TI-115).

Rockwell Hanford Operations, *Evaluation of Hydraulic Head Measurements in DC-1*, February 1984, (SD-BWI-TI-188).

Rockwell Hanford Operations, *Hydrologic Test Results Upper Cohassett Flow Interior Borehole DC-16A*, August 1984, (D-BWI-TI-166).

Rockwell Hanford Operations, *Large Shaft Development Test Plan, Volume I, Blind Shaft Drilling*, April 1984, (D-BWI-TP-032).

Rockwell Hanford Operations, *Large Shaft Development Test Plan, Volume II, Liner*, April 1984, (BD-BWI-TP-033).

Rockwell Hanford Operations, *Report on Status of Hydrothermal Testing Fully Radioactive Waste Forms Basalt Repository Waste Package*, November 1984, (BD-BWI-TI-253).

Rockwell Hanford Operations, *Repository Horizon Identification Report Draft*, 2 Volumes, January 1984, (SD-BWI-TY-001).

Rockwell Hanford Operations, *Shaft Seal Design Concepts For a Nuclear Waste Repository in Basalt*, March 1984, (BD-BWI-TI-174).

Rockwell Hanford Operations, *Water Level Data Borehole Description For Monitoring Wells Used By the Basalt Waste Isolation Project*, December 1984, (BD-BWI-DP-042).

First Repository: Salt

Battelle Memorial Institute, Office of Nuclear Waste Isolation, *Assessment of Crushed Salt Consolidation and Fracture Healing Processes in a Nuclear Waste Repository in Salt*, November 1984 (BMI/ONWI-509).

U.S. Department of Energy, Chicago Operations Office, *Identification of Sites Within the Palo Duro Basin: Volume 1 – Palo Duro Location A*, November 1984 (DOE/CH-10(1)).

U.S. Department of Energy, Chicago Operations Office, *Identification of Sites Within the Palo Duro Basin: Volume 2 – Palo Duro Location B*, November 1984, (DOE/CH-10(2)).

U.S. Department of Energy, Chicago Operations Office, *Identification of Sites Within the Palo Duro Basin: Volume 3 – Responses to Comments*, November 1984, (DOE/CH-10(3)).

First Repository: Tuff

Los Alamos National Laboratories, *Groundwater Chemistry Along Flow Paths Between a Proposed Repository Site and the Accessible Environment*, November 1984 (LA-10188-MS).

Los Alamos National Laboratories, *Mineralogy and Petrology of Drill Core USW – G3/G3, Yucca Mountain, Nevada, With Emphasis on Authigenic Features*, 1984, (LA-9707).

Los Alamos National Laboratories, *Petrography and Mineral Chemistry of Units of the Topopah Spring, Calico Hues, and Crater Flat Tuffs, and Older Volcanic Units with Emphasis on Samples from Drill Holes USW-G1, Yucca Mountain, Nevada Test Site*, 1984, (LA-10003).

Los Alamos National Laboratories, *Revised Volcanic Stratigraphy of Drill Hole J-13, Forty Mile Wash, Nevada, Based on Petrographic Modes and the Chemistry of Phenocupts*, 1984, (LA-9652-MS).

Los Alamos National Laboratories, *Solubility Limits on Radionuclide Dissolution at a Yucca Mountain Repository*, 1984, (LA-9995-MS).

Los Alamos National Laboratories, *TRACR3 R: A Model of Flow and Transport in Porous Fractured Media*, 1984, (LA-9667).

Sandia National Laboratories, *Living Considerations For a Circular Vertical Shaft in Generic Tuff*, December 1984, (SAND83-7068).

Sandia National Laboratories, *Meteorological Design Parameters for the Candidate Site of a Radioactive Waste Repository at Yucca Mountain, Nevada*, December 1984, (SAND84-0440-2).

Sandia National Laboratories, *Preliminary Assessment Study For the Conceptual Design of a Repository in Tuff at Yucca Mountain*, December 1984, (SAND83-1504).

Sandia National Laboratories, *Two-Stage Repository Development at Yucca Mountain: An Engineering Feasibility Study*, December 1984, (SAND84-1351).

Crystalline Repository Project

U.S. Department of Energy, Chicago Operations Office, *Draft Region-to-Area Screening Methodology for the Crystalline Repository Project*, August 1984, (DOE/CH/10139-1).

U.S. Department of Energy, Chicago Operations Office, *Response to State Comments on the Draft Regional Characterization Reports for the Crystalline Repository Project*, November 1984, (DOE/CH-2).

U.S. Department of Energy, Chicago Operations Office, *Revised Draft North Central Regional Environmental Characterization Report: Volumes 1 and 2*, November 1984, (DOE/CH-5(1) and (2)).

U.S. Department of Energy, Chicago Operations Office, *Revised Draft Northeastern Regional Environmental Characterization Report: Volumes 1 and 2*, November 1984, (DOE/CH-4(1) and (2)).

U.S. Department of Energy, Chicago Operations Office, *Revised Draft Southeastern Regional Environmental Characterization Report: Volumes 1 and 2*, November 1984, (DOE/CH-3(1) and (2)).

U.S. Department of Energy, Chicago Operations Office, *Revised Draft North Central Regional Geologic Characterization Report: Volumes 1 through 3*, November 1984, (DOE/CH-8(1), (2), and (3)).

U.S. Department of Energy, Chicago Operations Office, *Revised Draft Northeastern Regional Geologic Characterization Report: Volumes 1 through 3*, November 1984, (DOE/CH-7(1), (2), and (3)).

U.S. Department of Energy, Chicago Operations Office, *Revised Draft Southeastern Regional Geologic Characterization Report: Volumes 1 and 2*, November 1984, (DOE/CH-6(1) and (2)).

Subseabed Disposal Program

Gomez, L.S. et al., *U.S. Subseabed Disposal Program Radioecological Data Base: Summaries of Available Radionuclide Concentration Factors and Biological Half-Lives*, Presented at the VIIth Workshop on Marine Pollution of the Mediterranean in Lucerne, Switzerland, October 11-13, 1984.

Sandia National Laboratories, *Analysis of Slope Stability, Wilmington to Lindenkohl Canyons, U.S. Mid-Atlantic Margin*, Presented at IUTAM Conference of Soil Mechanics, Austin, TX, (SAND84-1015C).

Sandia National Laboratories, *Circulation Modeling for Seabed Disposal of Nuclear Wastes: Status, Progress, and Intercomparisons. Report of the Interim Meeting of the SWG POIG, Cambridge, U.K. 31 August – 3 September 1982*, 1984, (SAND83-1808).

Sandia National Laboratories, *Preliminary Post-Emplacement Safety Analysis of the Subseabed Disposal of High-Level Nuclear Waste, 1984*, (SAND83-7106).

Sandia National Laboratories, *Subseabed Disposal Program Annual Report, Geotechnical Laboratory and Modeling Studies October 1981 to September 1982*, 1984, (SAND82-2714).

Sandia National Laboratories, *Subseabed Disposal Program Report, Thermal Response October 1981 through September 1982*, 1984, (SAND82-2717).

Sandia National Laboratories, *User's Guide to MARINRAD: Model for Assessing the Consequences of Release of Radioactive Material into the Oceans*, 1984, (SAND83-7104).

STORAGE AND TRANSPORTATION SYSTEMS

Boeing Engineering Company, *Monitored Retrievable Storage Conceptual System Study: Cask In-Trench*, Seattle, Washington, 1983, (BEC-MRS-3303).

Boeing Engineering Company, *Monitored Retrievable Storage Conceptual System Study: Concrete Storage Casks*, Seattle, Washington, 1983, (BEC-MRS-3302).

Boeing Engineering Company, *Monitored Retrievable Storage Conceptual System Study: Open Cycle Vault*, Seattle, Washington, 1983, (BEC-MRS-3304).

Department of Energy, Richland Operations Office, *Selection of Concepts for Monitored Retrievable Storage of Spent Fuel and High-Level Radioactive Waste*, Richland, Washington, April 1984, (DOE/RL-84-2).

GA Technologies, Inc., *Monitored Retrievable Storage Conceptual System Study: Closed-Cycle Vault*, San Diego, California, 1984, (GA-A17322).

GA Technologies, Inc., *Monitored Retrievable Storage Conceptual System Study: Tunnel-Rack Vault*, San Diego, California, 1984, (GA-A17323).

Oak Ridge National Laboratory, *Highway A Transportation Routing Model: Program Description and Revised Users Manual*, (ORNL/TM 8759).

Oak Ridge National Laboratory, *Logistics Models for the Transportation of Radioactive Waste and Spent-Fuel*, (ORNL/TM-6192).

Pacific Northwest Laboratory, *Conceptual Design Report for a Remotely-Operated Cask Handling System*, (PNL-7376).

Pacific Northwest Laboratory, *Evaluation of Concepts for Monitored Retrievable Storage of Spent Nuclear Fuel and High-Level Radioactive Waste*, Richland, Washington, April 1984, (PNL-5176).

Pacific Northwest Laboratory, *Near-Term Commercial Spent Fuel Cask Requirements*, November 1984, (PNL-5284/UC-85).

Pacific Northwest Laboratory, *Spent Fuel Shipping Casks Handling Capability Assessment of 27 Selected Light Water Reactors*, (PNL-5636/UC-85).

Raymond Kaiser Engineers, Inc., *Monitored Retrievable Storage Conceptual System Study: Dry Receiving and Handling Facility*, Issued by Kaiser Engineers Hanford Company, Richland, Washington, 1984, (KEHR-83-96).

Sandia National Laboratories, *A Preliminary Cost and Cask Analysis for Transporting Spent Fuel and High-Level Waste to Repository Sites*, (SAND 84-1795).

Sandia National Laboratories, *RADTRAN-II: Revised Computer Code to Analyze Transportation Radioactive Material*, (SAND 80-1943).

Westinghouse Electric Corporation, *Monitored Retrievable Storage Conceptual System Study: Metal Storage Casks*, Pittsburgh, Pennsylvania, 1983, (WTSD-TME-010).

Westinghouse Electric Corporation, *Monitored Retrievable Storage Conceptual System Study: Open Field Drywells*, Pittsburgh, Pennsylvania, 1983, (WTSD-TME-011).

Westinghouse Electric Corporation, *Monitored Retrievable Storage Conceptual System Study: Transportable Storage Casks*, Pittsburgh, Pennsylvania, 1983, (WTSD-TME-013).

Westinghouse Electric Corporation, *Monitored Retrievable Storage Conceptual System Study: Tunnel Drywells*, Pittsburgh, Pennsylvania, 1983, (WTSD-TME-012).

POLICY, INTEGRATION AND OUTREACH

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, Preliminary Draft, *Project Decision Schedule*, January 1985, (DOE/RW-0018).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, *Proceedings of the 1983 Civilian Radioactive Waste Management Information Meeting*, February 1984, (CONF-831217).

U.S. Department of Energy, Office of Civilian Radioactive Waste Management, Draft: *Mission Plan for the Civilian Radioactive Waste Management Program*, April 1984, (DOE/RW-0005).

* U.S. GOVERNMENT PRINTING OFFICE: 1985-461-208:20045

UNITED STATES
DEPARTMENT OF ENERGY
WASHINGTON, D.C. 20585

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF ENERGY
DOE 350

NRC FORM 20A (2 82)

U.S. Nuclear Regulatory Commission

Requisition for Copying Services

(To be used for Copying Requirements from Quick Copy Center, 50 copies or less) JOB NO. (Leave Blank) _____

REQUESTING OFFICE Appropriate block must be checked before request will be started.

Office	OCM	ASLBP	ASLAP	ACRS	OIA	PE	GC	SECY	PA	CA	EDO	ADM	ELD	CON	EEO	MPA	IP	SP	AEOD	NMSS	NRR	RES	IE	SDBU
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Requester	Phone	Mail Station

Title of Job	Date	Date and Time Required (not ASAP)

NO. OF PAGES (*Please Estimate*)	NO. OF COPIES	PUNCHING			DELIVERY
		No. of Holes	Diameter	Spacing	☐ Call, will pick up ☐ Return by mail

SPECIFICATIONS

Size: ☐ Same Size ☐ Other (*Specify*)

CLASSIFICATION

☐ Unclassified ☐ Other (*Specify*)

Assemble: ☐ Yes (*Same as Original*) ☐ No ☐ Other (*Specify*)

Staple: ☐ Yes (*Same as Original*) ☐ No ☐ Other (*Specify*)

DO NOT WRITE HERE

COPY CENTER LOCATION

☐ Willste Bldg. ☐ 9400
☐ NL Bldg. ☐ 3600
☐ Phillips Bldg. ☐ 7000

MACHINE

☐ 9200 ☐ IBM III ☐ KODAK

OPERATOR'S SIGNATURE

Begin Meter Read _____
End Meter Read _____
Total Copies _____
Estimated Cost _____

SPECIAL INSTRUCTIONS

MATERIAL SUBMITTED BY

_____ Signature _____ Date

_____ Material received by _____ Date

Copyrighted Materials: If copyrighted material is involved, the file should indicate that permission to use that material has been obtained from the copyright owner. Please sign below to indicate that you have received such permission.

_____ Administrative Officer _____ Date

NRC Form 20A (2 82) Supersedes Previous Editions

NRC FORM 20A (2-82)

U.S. Nuclear Regulatory Commission

Requisition for Copying Services

(To be used for Copying Requirements from Quick Copy Center, 50 copies or less) JOB NO. (Leave Blank) _____

REQUESTING OFFICE Appropriate block must be checked before request will be started.

Office	OCM	ASLBP	ASLAP	ACRS	OIA	PE	GC	SECY	PA	CA	EDO	ADM	ELD	CON	EEO	MPA	IP	SP	AEOD	NMSS	NRR	RES	IE	SDBU
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Requester	Phone	Mail Station

Title of Job	Date	Date and Time Required (not ASAP)

NO. OF PAGES (*Please Estimate*)	NO. OF COPIES	PUNCHING			DELIVERY
		No. of Holes	Diameter	Spacing	☐ Call, will pick up ☐ Return by mail

SPECIFICATIONS

Size: ☐ Same Size ☐ Other (*Specify*)

CLASSIFICATION

☐ Unclassified ☐ Other (*Specify*)

Assemble: ☐ Yes (*Same as Original*) ☐ No ☐ Other (*Specify*)

Staple: ☐ Yes (*Same as Original*) ☐ No ☐ Other (*Specify*)

DO NOT WRITE HERE

COPY CENTER LOCATION

☐ Willste Bldg. ☐ 9400
☐ NL Bldg. ☐ 3600
☐ Phillips Bldg. ☐ 7000

MACHINE

☐ 9200 ☐ IBM III
☐ KODAK

OPERATOR'S SIGNATURE

Begin Meter Read _____
End Meter Read _____
Total Copies _____
Estimated Cost _____

SPECIAL INSTRUCTIONS

MATERIAL SUBMITTED BY

_____ Signature _____ Date

_____ Material received by _____ Date

Copyrighted Materials: If copyrighted material is involved, the file should indicate that permission to use that material has been obtained from the copyright owner. Please sign below to indicate that you have received such permission.

_____ Administrative Officer _____ Date

REVISION
7/8/85

DRAFT - REGULATORY GUIDE APPLICABILITY REPORT

1.1 INTRODUCTION/SUMMARY

In developing the nuclear power industry, a large body of information regarding nuclear safety design, accident prevention and protection of public health and safety have been generated. This information represents the results of years of license application reviews, reactor operating experience, onsite inspections and lessons learned from dealing directly with the Pull Spectrum of engineering design and safety issues. They also reflect the state of the art techniques in demonstrating regulatory compliance. Most of this information is "timeless" (i.e., does not become obsolete over time) and is "non-unique" (i.e., can be applied to any other nuclear facilities).

In the past, one of the difficulties associated with the preparation of the license application was to be able to demonstrate to the public and the NRC that the plant design is safe and technically sound and is in compliance with the regulations. Some methodologies were accepted by the NRC and compliance with the regulation was recognized. However, there were methodologies and solutions used by the applicant to demonstrate compliance which were rejected by the NRC. Also, there were times that the NRC have agreed with methodologies used by the applicant, but requested verification. The verification process can take years and has the potential to significantly delay the application review process. As more nuclear power plants were being built over the years, and more applications were being reviewed by the NRC, the NRC made decisions regarding which methodologies or solution were acceptable to the NRC for demonstrating compliance with the regulation on specific issues. These decisions were embodied in the Regulatory Guides.

For an Independent Spent Fuel Storage Installation (ISFSI) and particularly a Monitored Retrievable Storage facility (MRS), with functional characteristics different from those of a nuclear power plant or other fuel cycle facilities, the engineering principles and basic practices that are required to assure safety design and to demonstrate regulatory compliance

remain unchanged from those utilized for the other nuclear facilities. The fundamentals in design for building a nuclear facility have long been established in the nuclear power industry. Many of the solutions and methodologies recommended in the regulatory guides are basic and fundamental enough to help direct the start of detailed design work for the MRS.

10 CFR 72, Licensing Requirements for the Storage at Spent Fuel in an Independent Spent Fuel Storage Installation (ISFSI), provide for a one-step ISFSI licensing process. This, in turn, requires a degree of design completeness and documentation in the ISFSI or MRS license application comparable to that of a nuclear power plant Final Safety Analysis Report. In order to ensure the timely production and review of such an application DOE should to the extent practicable utilize in the MRS design solutions and methods which have been previously endorsed by the NRC.

From the overall MRS program viewpoint, review of the existing NRC positions adds confidence to future planning efforts, improves public relations, and provides added assurance for the expedited licensability of the MRS.

However, the mere thought of utilizing nuclear power plant regulatory technology for the MRS arouses strong and negative reactions. The initial response to this concept is that we are planning an MRS, not a nuclear power plant. It is a different facility; it does not have the dynamic characteristics of a nuclear power plant. This type of response is not surprising, because after having dealt with high energy and rapid response systems in a nuclear power plant for so many years, one tends to associate every design in the nuclear power plant with high energy or rapid response systems. However, there are segments of nuclear power plant design which are generic in nature and can be applied to any other nuclear facilities.

In this report, the entire body of current US Nuclear Regulatory Commission Regulatory Guides is reviewed to determine which ones are potentially adaptable or applicable as is to the MRS.

The first step of the review involves the conducting of a screening based on Regulatory Guide titles to eliminate those regulatory guides that are unique and specific to reactor systems or otherwise obviously not applicable to the MRS.

The philosophy used in this screening process is to retain as many regulatory guides as possible based on currently available information and knowledge about the MRS. Whenever there is doubt as to the usefulness of the content in a regulatory guide for applicability ~~on~~ to ISFSI, the guide is retained in this initial screening. Regulatory Guides are eliminated from further consideration only if there is sufficient confidence that the design or operating conditions described in the regulatory guide are not in any way similar to the design or operating condition expected at the MRS.

The regulatory guides selected from this initial title screening are considered to be "potentially adaptable." This term is used to indicate that a determination has not yet been made if such regulatory guide has any direct relevance to an ISFSI.

After the initial title screening phase, the remaining regulatory guides are categorized into various engineering subjects, with each subject representing a generic engineering discipline or a specific study area.

The contents of these regulatory guides are reviewed and each regulatory position, whether "potentially adaptable" or "not adaptable", is accompanied with a discussion of the rationale or technical basis for rejecting or accepting a position.

This set of "potentially adaptable" guides can be used at the current stage of MRS development as follows:

(1) The set of "potentially adaptable" regulatory guides can be used as reference documents for the designers to alert them to avoid specific problem areas; and to follow certain procedures during design or data analysis prior to proceeding with a design. For example, in the electrical area, design and qualification requirements for an emergency diesel generator can not be determined until MRS emergency conditions are defined. Effort must be initiated to analyze the needs for emergency power supply during emergency conditions.

(2) Some of the regulatory guides also provide methods and data that are not available elsewhere. For certain analyses perhaps the data available in the guide may be reactor specific, but such data is likely to be the best or the only data available, e.g., data on release fractions of the source terms, Regulatory Guides 1.25, 1.98, 1.111, 1.112 etc.

(3) For safety design review, reviewers will have a set of reference material to make a judgment on the appropriateness of the design, or if the design has taken into consideration generic NRC concerns. Safety design review should be conducted at all development phases, including conceptual design.

(4) This review process provides an opportunity for engineers and designers to give opinions and to resolve conflicting opinions as to which guides are applicable. Examples of some of the regulatory guides which may require such discussions include:

- Design basis for natural events - should the same methodology recommended in the guides for other facilities be used for the MRS such as Regulatory Guides 1.76, 1.117, etc.

- The single failure criterion - do 10CFR72 regulations imply the application of the single failure criterion the same as that for a nuclear power plant, such as Regulatory Guides 1.6, 1.53 etc.

1.2 PURPOSE

The purpose of this report is to review and identify appropriate NRC positions or technical analyses contained in previously published non-MRS related US NRC Regulatory Guides for adaptation to the siting, design, construction, operation, safety analysis, licensing and decommissioning of an MRS. Each Regulatory Guide considered adaptable will be supported by a discussion of its technical basis and the degree of its adaptability. Adapting these NRC endorsed approaches and methodologies appropriately may lead to a more efficient and effective licensing effort for the MRS by eliminating to the extent practical the use of untried and untested solutions to typical regulatory issues.

1.3 SCOPE

This report covers the review of all non-ISFSI related Regulatory Guides (Division 1 through 10) published through May of 1985.

This report assumes that the MRS will receive (1) irradiated reactor fuel, and (2) wastes resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated wastes from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuel, which have been converted into solid form. In the report, the irradiated reactor fuel will be addressed as "spent fuel assemblies", and other waste as "solidified high-level waste".

2 NRC DOCUMENTS AND REVIEW METHODOLOGY

2.1 US NRC REGULATORY GUIDES

The U.S. Nuclear Regulatory Commission (NRC) has published various guidance and technical documents. The guidance documents are intended to present to license applicants positions on acceptable methods and solutions that may be used in the license application to demonstrate regulatory compliance. Other technical documents are NRC sponsored research and investigations which reflect NRC thinking and their concern on particular subjects (NUREGs).

In the licensing process, the NRC requires applicants for a permit or license to provide assurances that the proposed activities to be conducted under the permit or license will not present undue risks to the health and safety of the public. The applicants are required to submit information to demonstrate compliance with the requirements set forth in the NRC 10 CFR regulations. In many areas, the regulations are broad and general, and do not provide specific details as to the acceptable methods which may be used to demonstrate compliance. Through the review of individual license applications, the NRC has developed positions on acceptable methods and solutions which may be used to demonstrate compliance with the regulations.

Regulatory guides are one of the NRC publications which describe and make available to the public these methods and solutions acceptable to the NRC. In some cases, the regulatory guides also delineate techniques that are used by the NRC to evaluate specific problems or postulate accidents. The regulatory guides also indicate the data and information that will be needed by the NRC to review the application. They were originally issued as "safety guides" but as the scope of the "safety guides" expanded to include other subjects, they were changed later on to "regulatory guides".

Regulatory guides are not substitutes for regulations, and compliance with the regulatory guides is theoretically not required. Methods and solutions different from those set out in regulatory guides are acceptable to the NRC if sufficient basis and information are provided to demonstrate their compliance with the regulations. For each of the methods or solutions presented in regulatory guides, the NRC has spent substantial time and effort in the review and evaluation of these methods and solutions. NRC's acceptance of these methods and solutions are established through years of licensing review, comparative studies and questionings. License applications which use solutions and methods other than those recommended in the regulatory guide, will require equal, or longer NRC review time and questioning periods. License applications which use the solution and methodology recommended in the Regulatory Guides, generally, will not encounter as lengthy a review and question period. Therefore in reactor licensing, except under unusual circumstances, license applicants often adopt the methods and solutions recommended in the guides.

There are 352 published regulatory guides in ten divisions (of which, there are 338 regulatory guides in Division 1 through 8) covering the design and engineering of power reactors, test reactors, environmental and safety matters, accountability of special nuclear material, safeguard and security, and antitrust matters. The subjects of the ten divisions are:

Division 1 - Power Reactors
Division 2 - Research and Test Reactors
Division 3 - Fuels and Material Facilities
Division 4 - Environmental and Siting
Division 5 - Materials and Plant Protection
Division 6 - Products
Division 7 - Transportation
Division 8 - Occupational Health
Division 9 - Antitrust and Financial Review
Division 10 - General

In general regulatory guides contains four parts; Part A - Introduction, Part B - Discussion, Part C - Regulatory Positions, and Part D - Implementation. The "Introduction" section, cites the pertinent regulations governing the subject matter addressed in the guide. The "Discussion" section provides a background of the problems encountered in the review of the license application regarding the subject. The "Regulatory Positions" section states the NRC recommended approaches or solutions. The "Implementation" section provides information regarding NRC staff's plan for using the guide. If more detailed information is needed regarding NRC's plan for using the guide, such information may be obtained from the NRC's office of Nuclear Reactor Regulation or the office of Nuclear Material Safety and Safeguards.

2.2 REVIEW METHODOLOGY

The first phase of the review is to conduct a screening by document title to eliminate those Regulatory Guides that are beyond the scope of this report such as environmental related, or subjects unique to nuclear reactor design or operations (e.g., reactor vessels, emergency core cooling systems, etc). The purpose of this screening process is to select a set of potentially adaptable Regulatory Guides for technical review. The title screen was conducted based on the information available as it appears on the title of the Regulatory Guide. The philosophy used in this screening process is to retain as many regulatory guides as possible based on currently available information and knowledge about the MRS and the content of the Regulatory Guides as understood from its title. When there is doubt as to the usefulness of the content in the regulatory guide for application to an ASFSI in general or the MRS in particular, the guide is retained in this screening process for further analysis. Each Regulatory Guide is judged against the conceptual design and plausible operations at the MRS.

Each regulatory guide that is eliminated is done so on the basis that there is sufficient confidence that the design or operation conditions described in the regulatory guide are in no way similar to the design or operating conditions expected at the MRS.

Appendix A summarizes the result of the screening process. Those guides that were determined not potentially adaptable are indicated with a "Not Applicable" with an explanation provided in the "Remarks" column. Those that

were judged potentially adaptable are indicated with subsection numbers to show where the technical review can be found. The regulatory guides determined not potentially adaptable were eliminated, in general, for the following reasons:

(1) It is environmentally related
(2) It is transportation related
(3) Subjects related exclusively to reactor design and operations, or nuclear power plant components and supporting equipment not representative of those expected to be found at the MRS.
(4) Subjects related to nuclear materials of the type or in the form which is not expected at the MRS.
(5) Subjects related exclusively to specific design and operation of other nuclear fuel cycle facilities, such as a fuel fabrication plant or uranium mill, or such facilities' plant components and supporting equipment not representative of those expected to be found at the MRS.

After the initial screening phase, the remaining ___ regulatory guides were categorized into 25 engineering subjects. Each subject represents a generic engineering discipline or a specific study area. These 25 subjects are listed in Table 2-1. Each remaining regulatory guide was the reviewed for all of its contents. Each regulatory position, whether "potentially adaptable" or "not adaptable", is accompanied with a discussion of the rationale or technical basis used for the determination. Wherever appropriate, the discussion also indicates if the solution recommended by the guide can be adapted in whole or in part.

TABLE 2-1

LIST OF REGULATORY GUIDE REVIEW SUBJECTS

	Subject (Numbers of Potentially Adaptable Regulatory Guides)		Report Section No.
1	Civil, Structural and Site	(8)	3.2.1
2	Electrical and Power Supply Systems	(14)	3.2.2
3	Instrumentation and Controls (I&C)	(6)	3.2.3
4	Mechanical Systems/Components	(9)	3.2.4
5	Storage and Handling	(5)	3.2.5
6	Ventilation	(5)	3.2.6
7	Fire Protection	(3)	3.2.7
8	Inservice Inspection	(2)	3.2.8
9	Materials	(11)	3.2.9
10	Accident Prevention and Analysis	(5)	3.2.10
11	Radiological Assessment	(32)	3.2.11
12	Criticality	(4)	3.2.12
13	Shielding	(2)	3.2.13
14	Meteorology	(1)	3.2.14
15	Flood Protection	(3)	3.2.15
16	Tornado	(2)	3.2.16
17	Seismic Design	(10)	3.2.17
18	Transport and Dispersion	(4)	3.2.18
19	Safeguard and Security	(15)	3.2.19
20	Material Accounting	(11)	3.2.20
21	Emergency Planning	(2)	3.2.21
22	Personnel Training	(3)	3.2.22
23	Quality Assurance	(14)	3.2.23
24	Transportation Interfer	(3)	3.2.24
25	General	(1)	3.2.25

3 REVIEW OF REGULATORY GUIDES

This chapter provides the technical review of the potentially adaptable regulatory guides. Section 3.1 is a summary of the review, while review discussion for each regulatory guide is provided in Section 3.2.

3.1 REVIEW SUMMARY

Of the 352 regulatory guides screened by title in Appendix A, ___ were considered potentially adaptable. Table 3-1 provides a summary of the technical review of these ___ Regulatory Guides as to their adaptability.

3.2 TECHNICAL REVIEW

This technical review covers all four parts of a Regulatory Guide i.e. Introduction, Discussion, Regulatory Position and Implementation. For each regulatory guide, results of the review is presented in two parts. Part I, "Recommendation" tabulates the result of the review in two columns. The first column, "Regulatory Position", states the title of the regulatory position. The second column, "Recommendation", states whether the position is considered "Adaptable", has "Limited Adaptability" or is "not adaptable".

Part II, "Technical Discussion" presents a succint discussion of the background information on the issue addressed by the guide, the intent of the guide and the rationale or technical basis supporting the recommendations.

It is the intent of this report at this stage to adopt a conservative approach so as to retain as many regulatory positions as possible to assure that all previously acceptable regulatory guidance is made available to desingers/engineers until such time that evolving MRS design details can be used to justify their deletion.

3.2.1 Civil, Structural and Site

While the operating environment and conditions found in a reactor containment are unique, many of the operating and loading conditions typical of the nuclear power plant and other fuel cycle facility structures are expected to be similar at the ISFSI. Similarly, the geochemical data and procedures necessary for the engineering analysis, and design of the nuclear power plant foundation are also expected to be essential to engineering of the ISFSI. This subsection provides a technical review of regulatory guides related to civil, structural or site aspects of nuclear power plants which may be adapted to an ISFSI. These regulatory guides are 1.125, 1.132, 1.136, 1.138, and 1.142.

3.2.1.1 Regulatory Guide 1.125

PHYSICAL MODELS FOR DESIGN AND OPERATION OF HYDRAULIC STRUCTURES AND SYSTEMS FOR NUCLEAR POWER PLANTS (Rev 1, 10/78)

I. Recommendations

Regulatory Positions		Recommendations
1	Submittal of Information	Limited adaptability
2	NRC Participation	Limited adaptability
3	Documentation	Limited adaptability
4	Comparison with Fullscale Structures	Limited adaptability
5	Design Changes	Limited adaptability
6	Test Report	Limited adaptability

II. Technical Discussion

This guide addresses the use of physical hydraulic model testing for predicting the action and interaction of surface waters with features located outside of a reactor containment. Nuclear power plants need continuous water supply for their circulating water system (CWS), the core emergency cooling system and other inplant services. For this reason, nuclear power plants are located along coastal areas, lakes and river estuaries, and equipped with large hydraulic structures for water intake and discharge. An ISFSI is not

expected to require a water supply of such magnitude. Therefore, large hydraulic structures and systems of this type will not be needed at the ISFSI. However, the entire Regulatory position may be useful for the ISFSI designers in demonstructing the adequacy of structures for prevention and mitigation of accidents during such hydraulic loadings as wave runup. Therefore, the Regulation Guide is considered to have Limited Adaptability to the ISFSI.

3.2.1.2 Regulatory Guide 1.132
SITE INVESTIGATIONS FOR FOUNDATIONS OF NUCLEAR POWER PLANTS
(Rev 1, 3/79)

I. Recommendations

Regulatory Positions		Recommendations
1	General Site Investigation	Potentially adaptable
2	Logs of Subsurface Investigations	Potentially adaptable
3	Groundwater Investigations	Potentially adaptable
4	Procedures for Subsurface	Potentially adaptable
5	Spacing and Depth of Subsurface Investigations	Potentially adaptable
6	Sampling	Potentially adaptable
7	Retention of Samples, Rock Core, and Records	Potentially adaptable

II. Technical Discussion

This guide describes programs of site investigations required to evaluate geotechnical parameters needed for engineering analysis and design of building foundations for nuclear power plants. While, in general, the analysis of foundations and surface structures at a ISFSI is not expected to be as rigorous as for nuclear power plants, the site information called for in the regulatory positions of this guide would nevertheless be needed for the analysis and design of ISFSI supporting structures important to safety. These data requirements are not seen as being unique to nuclear power plants.

3.2.1.3 Regulatory Guide 1.136

MATERIALS, CONSTRUCTION, AND TESTING OF CONCRETE CONTAINMENTS (ARTICLES CC-1000, -2000, AND -4000 THROUGH -6000 OF THE "CODE FOR CONCRETE REACTOR VESSELS AND CONTAINMENTS") (Rev 2, 6/81)

I. Recommendations

Regulatory Positions		Recommendations
1	Strength Tests	Limited adaptability
2	Cement Grout for Grouted Tendon Systems	Limited adaptability
3	Acceptance Standards	Limited adaptability
4	Protection of Prestressing Materials for Low-Temperature Effects	Limited adaptability
5	Tendon Ducts, Channels, Trumpets, and Transition Cones	Limited adaptability
6	Static Tensile Test	Limited adaptability
7	Curing	Limited adaptability
8	Splice Samples	Limited adaptability
9	Splices	Limited adaptability
10	Procedure	Limited adaptability
11	Tolerances for Liner Shells and Heads	Limited adaptability
12	General	Limited adaptability
13	Retest	Limited adaptability

II. Technical

This guide describes the bases for implementing the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ASME-ACI 359-80), with regard to the materials, construction, and testing of concrete containments. The positions of this guide are not adaptable to an ISFSI in general as the Code was specifically written to cover pressure retaining

structures, such as containments. However, portions may be considered potentially adaptable for the concrete storage casks that may be used at the MRS and future ISFSIs. Other codes, such as ACI 318-77, "Building Code Requirements for Reinforced Concrete", ACI 349-76, "Code Requirements for Nuclear Safety-Related Concrete Structures", and ACI 308-71, "Recommended Practice for Curing Concrete", are more amenable to the needs of ISFSI structures in general, and considered potentially adaptable. While some of the positions in this guide (e.g., 1, 7, and 9) are based on these codes, they have been merged with the ASME-ACI 359-80 requirements. Since the materials, construction, and testing of concrete structures are adequately covered by ACI 318-77, 349-76, and 308-71, it is suggested that these codes, instead of this Regulatory Guide, be considered and reviewed for adaptability.

3.2.1.4 Regulatory Guide 1.138
LABORATORY INVESTIGATIONS OF SOILS FOR ENGINEERING ANALYSIS AND DESIGN OF NUCLEAR POWER PLANTS (4/78)

I. Recommendations

Regulatory Positions		Recommendations
1	General Requirements for a Laboratory Testing Program	Potentially adaptable
2	Handling and Storage of Samples	Potentially adaptable
3	Selection and Preparation of Test Specimens	Potentially adaptable
4	Criteria for Testing Procedures	Potentially adaptable
5	Documentation of Test Results	Potentially adaptable

II. Technical Discussion

This guide describes laboratory investigations and testing practices acceptable for determining soil and rock properties and characteristics needed for engineering analysis and design for foundations and earthworks for nuclear power plants. These laboratory investigations, however, are not unique to nuclear power plants and would be needed for the analysis and design of ISFSIs.

3.2.1.5 Regulatory Guide 1.142

SAFETY-RELATED CONCRETE STRUCTURES FOR NUCLEAR POWER PLANTS (OTHER THAN REACTOR VESSELS AND CONTAINMENTS) (Rev 1, 10/81)

I. Recommendations

Regulatory Positions		Recommendations
1	Pressure Retaining Structures	Not adaptable
2	Radiation Shielding	Potentially adaptable
3	Ductility	Potentially adaptable
4	Examiner Qualifications	Potentially adaptable
5	Compressive Strength	Potentially adaptable
6	Load Factors	Potentially adaptable
7	Groundwater Pressure Loads	Potentially adaptable
8	Differential Settlements	Potentially adaptable
9	Pool Dynamics	Not adaptable
10	Section Strengths	Potentially adaptable
11	Other Section Strengths	Potentially adaptable
12	Thermal Considerations	Potentially adaptable

II. Technical Discussion

This guide endorses the procedures and requirements of ACI 349-76, "Code Requirements for Nuclear Safety-Related Concrete Structures" as adequate in complying with the NRC regulations in the design and construction of safety-related concrete structures other than reactor vessels and containments, supplemented with the above positions. The design and construction requirements of ISFSI structures important to safety are expected to be similar to those at a nuclear power plant. The NRC-endorsed ACI code along with the supplemental positions provide the necessary guidance as to the design and construction of the ISFSI structures important to safety. Positions 1 and 9 are not adaptable because they are related to pressure resisting structures and pool dynamics in a pressure suppression containment.

The other positions deal with conditions and loadings that are expected to exist at an ISFSI.

3.2.2 Electrical Systems

The electrical systems of a nuclear power plant may be divided into two subsystems: power supply and related instrumentation and control. This section reviews the regulatory guides that are related to the power supply systems of nuclear power plants. Section 3.2.3 discusses instrumentation and control.

During normal operation of a nuclear power plant, plant auxiliary systems are supported by power generated on site. However, during plant start-up, shutdown or emergency conditions, station auxiliary systems are supported by power taken from offsite sources. As a backup in the event of an emergency, when power supply from offsite sources are not available, the plant is equipped with emergency diesel generators and uninterruptable power supply (UPS). Storage batteries are also kept ready to supply DC power directly or through DC-AC inverter to safety-related instrumentation.

ISFSI electrical systems would normally be supported by offsite power sources, including during emergency conditions. ISFSI emergency power supply requirements for occasions when offsite power sources are unavailable depend on the design basis for emergency operations at the ISFSI as well as the reliability of the offsite power source. Examples of major systems important to safety that may require continuous power supply are: many of the HVAC systems within the receiving and handling facilities, radiological monitoring systems, etc. If uninterrupted power supplies for both normal and accident conditions are required, it is necessary that the design of the ISFSI include emergency power supply systems.

The Institute of Electrical and Electronic Engineers (IEEE) has established standards for the design of power plant electrical systems. Most of the regulatory guides reviewed in this section address the independence and redundancy requirements of the standby emergency power system at nuclear power plants by endorsing the appropriate Sections of IEEE Standards as acceptable methods to demonstrate compliance with the 10 CFR 50 regulations. The same design principles recommended in these guides can be adapted to the power supply systems at the ISFSI.

The potentially adaptable regulatory guides reviewed in this section are: RG 1.6, 1.9, 1.32, 1.41, 1.75, 1.89, 1.93, 1.106, 1.108, 1.118, 1.128, 1.129, 1.131.

The design principle for redundant and independent systems is also applicable to controls and instrumentations which are discussed in Section 3.2.3.

3.2.2.1 Regulatory Guide 1.6

INDEPENDENCE BETWEEN REDUNDANT STANDBY (ONSITE) POWER SOURCES AND BETWEEN THEIR DISTRIBUTION SYSTEMS (3/71)

I. Recommendations

Regulatory Positions	Recommendations
1. Establishment of Redundant Load Groups	Potentially adaptable
2. Independence of Redundant a-c Systems	Potentially adaptable
3. Arrangement and Independence of Redundant d-c Systems	Potentially adaptable
4. Independence of Redundant Standby Sources and Loads	Potentially adaptable
5. Prime Movers	Potentially adaptable

II Technical Discussion

This regulatory guide describes the degree of independence necessary between redundant standby (onsite) power sources and between their distribution systems to be acceptable to the NRC. The intent of this guide is to assure that onsite electrical power systems will continue to supply power to safety-related equipment, assuming a single failure. Application of single failure criterion is discussed in Subsection 3.2.3.3. The design of the ISFSI is likely to include redundant utility services and distribution that are important to safety as required in 10 CFR 72.72(k) (1). It is suggested that the redundant standby power sources and their distribution systems be operated independently, as recommended in this guide. As a precautionary measure, if manual connection of redundant load groups is determined warranted, interlocks should be provided to prevent simultaneous operation of redundant power sources, and appropriate operating procedures regarding manual connection of redundant load groups should be prepared and implemented.

3.2.2.2 Regulatory Guide 1.9

SELECTION, DESIGN, AND QUALIFICATION OF DIESEL-GENERATOR UNITS USED AS STANDBY (ON SITE) ELECTRIC POWER SYSTEMS AT NUCLEAR POWER PLANTS (Rev 2, 12/79)

I. Recommendations

Regulatory Positions	Recommendations	Section of 10CFR Regulation Addressed
1. Load Rating	Potentially adaptable	60.131(b)(5)(ii)
2. Short-time Rating	Potentially adaptable	60.131(b)(5)(ii)
3. Physical Independence	Potentially adaptable	60.131(b)(5)(ii)
4. Starting and Loading Requirements	Potentially adaptable	60.131(b)(5)(ii)
5. Qualification and Testing Requirements	Potentially adaptable	60.131(b)(5)(ii)
6. Testability	Potentially adaptable	60.131(b)(5)(ii)
7. Automatic Control	Potentially adaptable	60.131(b)(5)(ii)
8. Surveillance Systems	Potentially adaptable	60.131(b)(5)(ii)
9. Seismic Qualification	Potentially adaptable	60.131(b)(5)(ii)
10. Validity of Tests	Potentially adaptable	60.131(b)(5)(ii)
11. Site Acceptance Testing, Periodic Testing	Potentially adaptable	60.131(b)(5)(ii)
12. Applicability of Referenced Standards	Potentially adaptable	60.131(b)(5)(ii)
13. Test Requirements Supplement	Potentially adaptable	60.131(b)(5)(ii)
14. Load Capability Qualification	Potentially adaptable	60.131(b)(5)(ii)

II Technical Discussion

The NRC, through this regulatory guide, accepts the requirements of IEEE Standard 387-1977, "IEEE Standard Criteria for Diesel-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations" as adequate for meeting the NRC requirements for diesel-generator units for nuclear power

plants, subject to several supplementary requirements. This guide assures that the onsite standby electric power system will have sufficient capacity and capability to maintain the vital functions of systems important to safety in the event of a Loss of Offsite Power (LOOP).

The design of the ISFSI may have to incorporate sufficient capability and capacity to supply power to the systems important to safety during an emergency. If diesel generators are used to supply emergency A/C loads, the regulatory positions of this guide may be appropriate. Therefore the positions described in this guide can be considered potentially adaptable to the design of the ISFSI.

However, some of the positions recommended in this guide may appear to be too restrictive. Some factors which may allow the adaptation of less restrictive positions are:

(1) Equipment load ratings at an ISFSI can be more accurately assessed because of less complex design and operating conditions than those for a nuclear power plant.

(2) The availability requirements of systems for normal and accident conditions need not be as stringent as those for a nuclear power plant because of lower heat generation rate and radioactivity release potential for an accident at the ISFSI.

(3) The response time and load sequence intervals of the diesel generator unit will also be less demanding for the ISFSI.

3.2.2.3 Regulatory Guide 1.32
CRITERIA FOR SAFETY-RELATED ELECTRIC POWER SYSTEM FOR NUCLEAR POWER PLANTS (Rev 2, 2/77)

I. Recommendations

Regulatory Positions		Recommendations
1a	Availability of Off-Site Power	Potentially adaptable
1b	Battery Charge Supply	Potentially adaptable

I. Recommendations

Regulatory Positions		Recommendations
1c	Battery Performance Discharge Tests	Potentially adaptable
1d	Independence of Redundant Standby Redundant Standby Sources	Potentially adaptable
1e	Connection of Non-Class 1E Equipment to Class IE	Potentially adaptable
1f	Selection of Diesel-Generator Capacity	Potentially adaptable
2a	Shared Systems	Not Adaptable
2b	Power Availability	Potentially adaptable

II Technical Discussion

The NRC endorses, in general, IEEE Standard 308-1974, "Criteria for Class 1E Power Systems for Nuclear Power Generating Stations" as acceptable for meeting the design, operation, and testing requirements of electric power systems for a nuclear power plant, except those that were in conflict with Criterion 17 of 10CFR Part 50. The electrical system which supports equipment important to safety in an ISFSI may be similar to that of a nuclear power plant. The requirements in IEEE Standard 308-1974 are considered potentially adaptable for the design and engineering of electrical systems important to safety in the ISFSI. However, since the ISFSI has less restrictive emergency situations compared to power reactors, certain NRC positions on the ISFSI safety-related electric power system performance characteristics (such as acceptable time lapse for increased access to offsite power) should be re-established based on analyses performed on postulated ISFSI accident scenarios and power demand for accident mitigation.

Position 2a is considered not adaptable, because it addresses electrical systems shared among multiple reactor units at a nuclear power generating station.

3.2.2.4 Regulatory Guide 1.41

PREOPERATIONAL TESTING OF REDUNDANT ON-SITE ELECTRIC POWER SYSTEMS TO VERIFY PROPER LOAD GROUP ASSIGNMENTS (3/73)

I. Recommendations

Regulatory Positions	Recommendations
Test Procedures	Potentially adaptable

II Technical Discussion

The guide provides specific instructions for testing the plant electric distribution system and verifies proper assignment of load groups to the redundant on-site sources before plant operations.

As discussed in Subsections 3.2.2.1 thru 3.2.2.3, if the ISFSI is equipped with redundant on-site electric power systems, such systems will require functional tests and an established preoperational program as described in this guide. It is, therefore, suggested that before the test procedures recommended in this guide is adapted to the ISFSI design, the nature of the emergency power needs be established.

3.2.2.5 Regulatory guide 1.75

PHYSICAL INDEPENDENCE OF ELECTRICAL SYSTEMS (Rev 2, 9/78)

I. Recommendations

Regulatory Positions	Recommendations
IEEE Standard 384-1974	Potentially adaptable

II Technical Discussion

This guide endorses IEEE Standard 384-1974, "Criteria for Independence of Class 1E Equipment and Circuits", as an acceptable method for complying with the requirements that on-site electrical distribution systems and the related protection systems are designed with sufficient physical independence, supplemented with clarifications. IEEE Standard 384-1974 presents the criteria for the physical separation of redundant circuits and equipment, and

tests and analysis for determining flame-retardant characteristics of proposed cable installations. These criteria are applicable to any electrical systems important to safety independent of the type of facility. The purpose of these criteria is to ensure that redundant electrical systems can not be impaired by a common cause. There may be redundant electrical systems at an ISFSI as required by 10 CFR 72.72(k)(1). These electrical systems can similarly be protected by applying the same design criteria recommended in this guide.

3.2.2.6 Regulatory Guide 1.89
QUALIFICATION OF CLASS 1E EQUIPMENT FOR NUCLEAR POWER PLANTS (11/74)

I. Recommendations

Regulatory Positions	Recommendations	Section of 10CFR Regulation Addressed
1. IEEE Std 323-1974	Potentially adaptable	60.131(b)
2. Radiological Source Term	Potentially adaptable	60.131(b)

II. Technical Discussion

This regulatory guide endorses the method described in IEEE Standard 323-1974, "Qualifying Class 1E Equipment for Nuclear-Power Generating Stations", to qualify electrical equipment for service in nuclear power plants. The referenced IEEE Standard delineates the principles, procedures and "method of qualification" which, when satisfied, will confirm the adequacy of the equipment design for performing its safety function under normal, abnormal and accident events. It is expected that the electrical equipment operating in the ISFSI will also be subject to a similar qualification test to confirm their capability to perform functions important to safety under normal, abnormal, and accident conditions. Test parameters associated with the operating environments at the ISFSI are expected to be much less severe than those at a nuclear power plant. Therefore, while the principle of performing environmental qualification tests on ISFSI electric equipment is considered potentially adaptable, it is suggested that the criteria and test procedures be established independently to suit ISFSI operating conditions.

3.2.2.7 Regulatory Guide 1.93

AVAILABILITY OF ELECTRIC POWER SOURCES (11/74)

I. Recommendations

Regulatory Positions	Recommendations
1. Available AC Sources Are One Less Than The LCO	Potentially adaptable
2. Available Off-site Sources Are Two Than The LCO	Potentially adaptable
3. Available On-Site and Off-Site AC Sources Are One Less Than The LCO	Potentially adaptable
4. Available On-Site AC Power Sources Are Two Less Than The LCO	Potentially adaptable
5. Available On-Site DC Supplies Are One Less Than The LCO	Potentially adaptable

II Technical Discussion

This guide provides guidance as to the time limit for continuing normal operation at the nuclear power plant with one or two of the electric power sources not available. The five positions in the guide present the five possible combinations of offsite AC and onsite DC power supply, with one or two of these sources not available. The design of the HLW ISFSI power supply system may include on-site and off-site power sources similar to those at a nuclear power plant. Similar analysis regarding the impact of temporary outage of one or two of the power sources, on the ISFSI's safety performance capability should be performed. The time limits given in this guide are determined for nuclear power plants. A set of more appropriate time limits specific to the operational characteristics of the ISFSI should be derived based on analysis of the safety performance requirements and radiological conditions of the ISFSI during an accident. The five decision flow diagrams presented in the guide provide examples of the type of logic sequences which is likely to be needed to assess power source availability.

REVISION 7/8/85

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 1 (Power Reactors) Regulatory Guides			
1.1	Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal System Pumps (12/70)	Not Applicable	-	Reactor Design Specific
1.2	Thermal Shock to Reactor Pressure Vessels (12/70)	Not Applicable	-	Reactor Design Specific
1.3	Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Boiling Water Reactors (Revision 2, 6/74)	Not Applicable	-	Reactor Design Specific
1.4	Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Pressurized Water Reactors (Revision 2, 6/74)	Not Applicable	-	Reactor Design Specific
1.5	Assumptions Used for Evaluating the Potential Radiological Consequences of a Steam Line Break Accident for Boiling Water Reactors (Safety Guide 5, 3/71)	Not Applicable	-	Reactor Design Specific
1.6	Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems (Safety Guide 6, 3/71)	3.2.2.1	Electrical and Power Supply Systems	-
1.7	Control of Combustible Gas Concentrations in Containment Following a Loss of Coolant Accident (Revision 2, 11/78)	Not Applicable	-	Reactor Design Specific
1.8	Personnel Selection and Training (Revision I-R, 5/77)	3.2.22.1	Personnel Training	-
1.9	Selection, Design, and Qualification of Diesel-Generator Units Used as Standby (Onsite) Electric Power Systems at Nuclear Power Plants (Revision 2, 12/79)	3.2.2.2	Electrical and Power Supply Systems	-
1.10	Withdrawn-See 46 FR 37579, 7/21/81	Not Applicable	-	Reactor Design Specific/Withdrawal
1.11	Instrument Lines Penetrating Primary Reactor Containment (2/72)	Not Applicable	-	Reactor Design Specific
1.12	Instrumentation for Earthquakes (Revision 1, 4/74)	3.2.17.1	Seismic Design	-
1.13	Spent Fuel Storage Facility Design Basis (Revision 1, 12/75)	3.2.5.1	Storage and Handling	-
1.14	Reactor Coolant Pump Flywheel Integrity (Revision 1, 8/75)	Not Applicable	-	Reactor Design Specific
1.15	Withdrawn-See 46 FR 37579, 7/21/81	Not Applicable	-	Withdrawn
1.16	Reporting of Operating Information - Appendix A Technical Specifications (Revision 4, 8/75)	3.2.10.1	Accidents	-
1.17	Protection of Nuclear Power Plants Against Industrial Sabotage (Revision 1, 6/73)	3.2.19.1	Safeguard and Security	-

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 1 (Power Reactors) Regulatory Guides			
1.18	Withdrawn-See 46 FR 37579, 7/21/81	Not Applicable	-	Withdrawn
1.19	Withdrawn-See 46 FR 37579, 7/21/81	Not Applicable	-	Withdrawn
1.20	Comprehensive Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing (Revision 2, 5/76)	Not Applicable	-	Reactor Design Specific
1.21	Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants (Revision 1, 6/74)	3.2.11.1	Radiological Assessment	-
1.22	Periodic Testing of Protection System Actuation Functions (Safety Guide 22, 2/72)	3.2.3.1	Instrumentation and Control	-
1.23	Onsite Meteorological Programs (2/72)	3.2.14.1	Meteorology	-
1.24	Assumptions Used for Evaluating the Potential Radiological Consequences of a Pressurized Water Reactor Radioactive Gas Storage Tank Failure (Safety Guide 24, 3/72)	Not Applicable	-	Reactor Design Specific
1.25	Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors (Safety Guide 25, 3/72)	3.2.11.2	Radiological Assessment	-
1.26	Quality Group Classifications and Standards for Water-,Steam-, and Radioactive Waste-Containing Components of Nuclear Power Plants (Revision 3, 2/76)	3.2.4.1	Mechanical Systems/ Components	-
1.27	Ultimate Heat Sink for Nuclear Power Plants (Revision 2, 1/76)	Not Applicable	-	Reactor Design Specific
1.28	Quality Assurance Program Requirements (Design and Construction) (Revision 2, 2/79)	3.2.23.1	Quality Assurance	-
1.29	Seismic Design Classification (Revision 3, 9/78)	3.2.17.2	Seismic Design	-
1.30	Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment (Safety Guide 30, 8/72)	3.2.23.2	Quality Assurance	-
1.31	Control of Ferrite Content in Stainless Steel Weld Metal (Revision 3, 4/78)	3.2.9.1	Materials	-
1.32	Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants (Revision 2, 2/77)	3.2.2.3	Electrical and Power Supply Systems	-
1.33	Quality Assurance Program Requirements (Operation) (Revision 2, 2/78)	3.2.23.3	Quality Assurance	-

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 1 (Power Reactors) Regulatory Guides			
1.34	Control of Electroslag Weld Properties (12/72)	3.2.9.2	Materials	-
1.35	Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containment Structures (Revision 2, 1/76)	Not Applicable	-	Reactor Design Specific
1.36	Nonmetallic Thermal Insulation for Austenitic Stainless Steel (2/73)	Not Applicable	-	Reactor Design Specific
1.37	Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants (3/73)	Not Applicable	-	Reactor Design Specific
1.38	Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage and Handling of Items for Water-Cooled Nuclear Power Plants (Revision 2, 5/77)	3.2.23.4	Quality Assurance	-
1.39	Housekeeping Requirements for Water-Cooled Nuclear Power Plants (Revision 2, 9/77)	3.2.10.2	Accidents	-
1.40	Qualification Tests of Continuous-Duty Motors Installed Inside the Containment of Water-Cooled Nuclear Power Plants (3/73)	Not Applicable	-	Reactor Design Specific
1.41	Preoperational Testing of Redundant On-Site Electric Power Systems to Verify Proper Load Group Assignments (3/73)	3.2.2.4	Electrical and Power Supply Systems	-
1.42	Withdrawn-See 41 FR 11891, 3/22/76	Not Applicable	-	Withdrawn
1.43	Control of Stainless Steel Weld Cladding of Low-Alloy Steel Components (5/73)	3.2.9.3	Materials	-
1.44	Control of the Use of Sensitized Stainless Steel (5/73)	3.2.9.4	Materials	-
1.45	Reactor Coolant Pressure Boundary Leakage Detection Systems (5/73)	Not Applicable	-	Reactor Design Specific
1.46	Protection Against Pipe Whip Inside Containment (5/73) (Withdrawn, 3/85)	Not Applicable	-	Reactor Design Specific/Withdrawn
1.47	Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems (5/73)	3.2.3.2	Instrumentation and Control	-
1.48	Design Limits and Loading Combinations for Seismic Category I Fluid System Components (5/73) (Withdrawn, 3/85)	Not Applicable	-	Withdrawn
1.49	Power Levels of Nuclear Power Plants (Revision 1, 12/73)	Not Applicable	-	Reactor Design Specific
1.50	Control of Preheat Temperature for Welding of Low-Alloy Steel (5/73)	3.2.9.5	Materials	
1.51	Withdrawn-See 40 FR 30510, 7/21/75	Not Applicable	-	Withdrawn

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 1 (Power Reactors) Regulatory Guides			
1.52	Design, Testing, and Maintenance Criteria for Post Accident Engineered-Safety-Feature Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants (Revision 2, 3/78)	3.2.6.1	Ventilation	-
1.53	Application of the Single-Failure Criterion to Nuclear Power Plant Protection Systems (6/73)	3.2.3.3	Instrumentation and Control	-
1.54	Quality Assurance Requirements for Protective Coatings Applied to Water-Cooled Nuclear Power Plants (6/73)	3.2.23.5	Quality Assurance	-
1.55	Withdrawn-See 46 FR 37579, 7/21/81	Not Applicable	-	Withdrawn
1.56	Maintenance of Water Purity in Boiling Water Reactors (Revision 1, 7/78)	Not Applicable	-	Reactor Design Specific
1.57	Design Limits and Loading Combinations for Metal Primary Reactor Containment System Components (6/73)	Not Applicable	-	Reactor Design Specific
1.58	Qualification of Nuclear Power Plant Inspection, Examination, and Testing Personnel (Revision 1, 9/80)	3.2.22.2	Personnel Training	-
1.59	Design Basis Floods for Nuclear Power Plants (Revision 2, 8/77)	3.2.15.1	Flood Protection	-
1.60	Design Response Spectra for Seismic Design of Nuclear Power Plants (Revision 1, 12/73)	3.2.17.4	Seismic Design	-
1.61	Damping Values for Seismic Design of Nuclear Power Plants (10/73)	3.2.17.5	Seismic Design	-
1.62	Manual Initiation of Protective Actions (10/73)	3.2.3.4	Instrumentation and Control	-
1.63	Electric Penetration Assemblies in Containment Structures for Light-Water-Cooled Nuclear Power Plants (Revision 2, 7/78)	Not Applicable	-	Reactor Design Specific
1.64	Quality Assurance Requirements for the Design of Nuclear Power Plants (Revision 2, 6/76)	3.2.23.6	Quality Assurance	-
1.65	Materials and Inspections for Reactor Vessel Closure Studs (10/73)	Not Applicable	-	Reactor Design Specific
1.66	Withdrawn-See 42 FR 54478, 10/6/77	Not Applicable	-	Withdrawn
1.67	Withdrawn, 4/83	Not Applicable	-	Withdrawn

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 1 (Power Reactors) Regulatory Guides			
1.68	Initial Test Programs for Water-Cooled Reactor Power Plants (Revision 2, 8/78)	Not Applicable	-	Reactor Design Specific
1.68.1	Preoperational and Initial Startup Testing of Feedwater and Condensate Systems for Boiling Water Reactor Power Plants (Revision 1, 1/77)	Not Applicable	-	Reactor Design Specific
1.68.2	Initial Startup Test Program to Demonstrate Remote Shutdown Capability for Water-Cooled Nuclear Power Plants (Revision 1, 7/78)	Not Applicable	-	Reactor Design Specific
1.68.3	Preoperational Testing of Instrument and Control Air Systems (4/82)	Not Applicable	-	Reactor Design Specific
1.69	Concrete Radiation Shields for Nuclear Power Plants (12/73)	3.2.13.1	Shielding	-
1.70	Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (Revision 3, 11/78)	Not Applicable	-	Reactor Design Specific
1.71	Welder Qualification for Areas of Limited Accessibility (12/73)	3.2.9.6	Materials	-
1.72	Spray Pond Piping Made from Fiberglass-Reinforced Thermosetting Resin (Revision 2, 11/78)	Not Applicable	-	Reactor Design Specific
1.73	Qualification Tests of Electric Valve Operators Installed Inside the Containment of Nuclear Power Plants (1/74)	Not Applicable	-	Reactor Design Specific
1.74	Quality Assurance Terms and Definitions (2/74)	3.2.23.7	Quality Assurance	-
1.75	Physical Independence of Electric Systems (Revision 2, 9/78)	3.2.2.6	Electrical and Power Supply Systems	-
1.76	Design Basis Tornado for Nuclear Power Plants (4/74)	3.2.16.1	Tornado	-
1.77	Asumptions Used for Evaluating a Control Rod Ejection Accident For Pressurized Water Reactors (5/74)	Not Applicable	-	Reactor Design Specific
1.78	Assumptions for Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release (6/74)	3.2.10.3	Accidents	-
1.79	Preoperational Testing of Emergency Core Cooling Systems for Pressurized Water Reactors (Revision 1, 9/75)	Not Applicable	-	Reactor Design Specific
1.80	(Withdrawn-See 47 FR 192.8 5/4/82) Reissued as Regulatory Guide 1.68.3, a renumbered revision to this guide with an expanded scope that addresses control air systems (4/82)	Not Applicable	-	Withdrawn

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability Technical Review Section	Categorized Subject	Remarks
	Division 1 (Power Reactors) Regulatory Guides			
1.81	Shared Emergency and Shutdown Electric Systems for Multi-unit Power Plants (Revision 1, 1/75)	Not Applicable	-	Reactor Design Specific
1.82	Sumps for Emergency Core Cooling and Containment Spray Systems (6/74)	Not Applicable	-	Reactor Design Specific
1.83	Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes (Revision 1, 7/75)	Not Applicable	-	Reactor Design Specific
1.84	Design and Fabrication Code Case Acceptability-ASME Section III, Division 1. (Revision 22, 7/84)	Not Applicable	-	Reactor Design Specific
1.85	Materials Code Case Acceptability - ASME Section III, Division 1. (Revision 22, 7/84)	Not Applicable	-	Reactor Design Specific
1.86	Termination of Operating Licenses for Nuclear Reactors (6/74)	Not Applicable	-	Reactor Design Specific
1.87	Guidance for Construction of Class 1 Components in Elevated-Temperature Reactors (Supplement to ASME Section III Code Cases 1592, 1593, 1594, 1595, and 1596) (Revision 1, 6/75)	Not Applicable	-	Reactor Design Specific
1.88	Collection, Storage, and Maintenance of Nuclear Power Plant Quality Assurance Records (Revision 2, 10/76)	3.2.23.8	Quality Assurance	-
1.89	Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants (Revision 1, 6/84)	3.2.2.7	Electrical and Power Supply Systems	-
1.90	Inservice Inspection of Prestressed Concrete Containment Structures with Grouted Tendons (Revision 1, 8/77)	Not Applicable	-	Reactor Design Specific
1.91	Evaluations of Explosions Postulated to Occur on Transportation Routes Near Nuclear Power Plant Sites (Revision 1, 2/78)	3.2.10.4	Accidents	-
1.92	Combining Modal Responses and Spatial Components in Seismic Response Analysis (Revision 1, 2/76)	3.2.17.6	Seismic Design	-
1.93	Availability of Electric Power Sources (12/74)	3.2.2.8	Electrical and Power Supply Systems	-
1.94	Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants (Revision 1, 4/76)	3.2.23.9	Quality Assurance	-
1.95	Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release (Revision 1, 1/77)	3.2.10.5	Accidents	-

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 1 (Power Reactors) Regulatory Guides			
1.96	Design of Main Steam Isolation Valve Leakage Control systems for Boiling Water Reactor Nuclear Power Plants (Revision 1, 6/76)	Not Applicable	-	Reactor Design Specific
1.97	Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident (Revision 3, 5/83)	3.2.3.5	Instrumentation and Control	-
1.98	Assumptions Used for Evaluating the Potential Radiological Consequences of a Radioactive Offgas System Failure in a Boiling Water Reactor (3/76)	3.2.11.3	Radiological Assessment	-
1.99	Effects of Residual Elements on Predicted Radiation Damage to Reactor Vessel Materials (Revision 1, 4/77)	Not Applicable	-	Reactor Design Specific
1.100	Seismic Qualifications of Electric Equipment for Nuclear Power Plants (Revision 1, 8/77)	3.2.17.7	Seismic Design	-
1.101	Emergency Planning and Preparedness for Nuclear Power Reactors (Revision 2, 10/81)	3.2.21.1	Emergency planning	-
1.102	Flood Protection for Nuclear Power Plants (Revision 1, 9/76)	3.2.15.3	Flood Protection	-
1.103	Withdrawn-See 46 FR 37579, 7/21/81	Not Applicable	-	Withdrawn
1.104	(Withdrawn-See 44 FR 49321, 8/22/79) See NUREG-0554, "Single-Failure-Proof Cranes for Nuclear Power Plants."	Not Applicable	-	Withdrawn
1.105	Instrument Setpoints (Revision 1, 11/76)	3.2.3.6	Instrumentation and Control	-
1.106	Thermal Overload Protection for Electric Motors on Motor-Operated Valves (Revision 1, 3/77)	3.2.2.9	Electrical and Power Supply Systems	-
1.107	Qualifications for Cement Grouting for Prestressing Tendons in Containment Structures (Revision 1, 2/77)	Not Applicable		Reactor Design Specific
1.108	Periodic Testing of Diesel Generators Units Used as Onsite Electric Power Systems at Nuclear Power Plants (Revision 1, 8/77)	3.2.2.10	Electrical and Power Supply Systems	-
1.109	Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, I (Revision 1, 10/77)	3.2.11.4	Radiological Assessment	-
1.110	Cost-Benefit Analysis for Radwaste Systems for Light-Water-Cooled Nuclear Power Reactors (3/76)	3.2.11.5	Radiological Assessment	-

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 1 (Power Reactors) Regulatory Guides			
1.111	Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors (Revision 1, 7/77)	3.2.18.1	Transport and Dispersion	-
1.112	Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Power Reactors (Revision 0-R, 5/77)	3.2.18.2	Transport and Dispersion	-
1.113	Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I (Revision 1, 4/77)	3.2.18.3	Transport and Dispersion	-
1.114	Guidance on Being Operator at the Controls of a Nuclear Power Plant (Revision 1, 11/76)	Not Applicable	-	Reactor Design Specific
1.115	Protection Against Low-Trajectory Turbine Missiles (Revision 1, 7/77)	Not Applicable	-	Power Plant Specific
1.116	Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems (Revision 0-R, 5/77)	3.2.23.10	Quality Assurance	-
1.117	Tornado Design Classification (Revision 1, 4/78)	3.2.16.2	Tornado	-
1.118	Periodic Testing of Electric Power and Protection systems (Revision 2, 6/78)	3.2.2.11	Electrical and Power Supply Systems	-
1.119	Withdrawn-See 42 FR 33387, 6/30/77	Not Applicable	-	Withdrawn
1.120	Fire Protection Guidelines for Nuclear Power Plants (Revision 1, 11/77)	3.2.7.1	Fire Protection	-
1.121	Bases for Plugging Degraded PWR Steam Generator Tubes (8/76)	Not Applicable	-	Reactor Design Specific
1.122	Development of Floor Design Response Spectra for Seismic Design of Floor-Supported Equipment or Components (Revision 1, 2/78)	3.2.17.8	Seismic Design	-
1.123	Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants (Revision 1, 7/77)	3.2.23.11	Quality Assurance	-
1.124	Service Limits and Loading Combinations for Class 1 Linear-Type Component Supports (Revision 1, 1/78)	Not Applicable	-	Pressure Boundary Components
1.125	Physical Models for Design and Operation of Hydraulic Structures and Systems for Nuclear Power Plants (Revision 1, 10/78)	3.2.1.4	Civil, Structural and Site	-
1.126	An Acceptable Model and Related Statistical Methods for the Analysis of Fuel Densification (Revision 1, 3/78)	Not Applicable	-	Reactor Design Specific

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 1 (Power Reactors) Regulatory Guides			
1.127	Inspection of Water-Control Structures Associated with Nuclear Power Plants (Revision 1, 3/78)	Not Applicable	-	Power Plant Specific
1.128	Installation Design and Installation of Large Lead Storage Batteries for Nuclear Power Plants (Revision 1, 10/78)	3.2.2.12	Electrical and Power Supply Systems	-
1.129	Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Nuclear Power Plants (Revision 1, 2/78)	3.2.2.13	Electrical and Power Supply Systems	-
1.130	Service Limits and Loading Combinations for Class 1 Plate-and Shell-Type Component Supports (Revision 1, 10/78)	Not Applicable	-	Pressure Boundary Components
1.131	Qualification Tests of Electric Cables, Field Splices, and Connections for Light-Water-Cooled Nuclear Power Plants (8/77)	3.2.2.14	Electrical and Power Supply Systems	-
1.132	Site Investigations for Foundations of Nuclear Power Plants (Revision 1, 3/79)	3.2.1.5	Civil, Structural and Site	-
1.133	Loose-Part Detection Program for the Primary System of Light-Water-Cooled Reactors (Revision 1, 5/81)	Not Applicable	-	Reactor Design Specific
1.134	Medical Evaluation of Nuclear Power Plant Personnel Requiring Operator Licenses (Revision 1, 3/79)	3.2.22.3	Personnel Training	-
1.135	Normal Water Level and Discharge at Nuclear Power Plants (9/77)	Not Applicable	-	Power Plant Specific
1.136	Materials, Construction, and Testing of Concrete Containments (Revision 2, 6/81)	3.2.1.6	Civil, Structural and Site	-
1.137	Fuel-Oil Systems for Standby Diesel Generators (Revision 1, 10/79)	3.2.4.4	Mechanical Systems/ Components	-
1.138	Laboratory Investigations of Soils for Engineering Analysis and Design of Nuclear Power Plants (4/78)	3.2.1.7	Civil Structural and Site	-
1.139	Guidance for Residual Heat Removal (5/78)	Not Applicable	-	Reactor Design Specific
1.140	Design, Testing, and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Adsorption Units of Light-Water-Colled Nuclear Power Plants (Revision 1, 10/79)	3.2.6.2	Ventilation	-
1.141	Containment Isolation Provisions for Fluid Systems (4/78)	Not Applicable	-	Reactor Design Specific
1.142	Safety-Related Concrete Structures for Nuclear Power Plants (Revision 1, 10/81)	3.2.1.8	Civil, Structural and Site	-

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

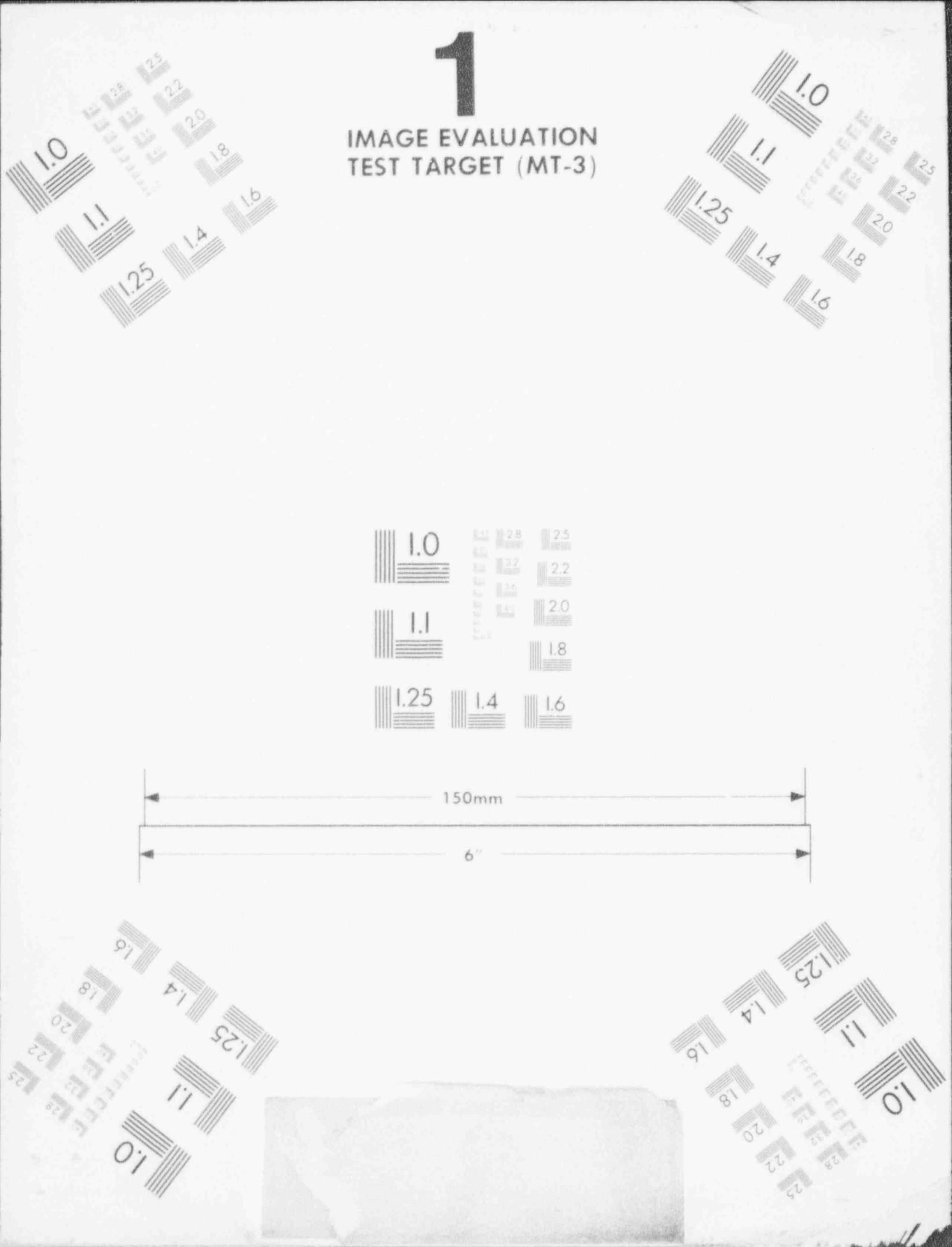
Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 1 (Power Reactors) Regulatory Guides			
1.143	Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants (Revision 1, 10/79)	3.2.4.5	Mechanical Systems/ Components	-
1.144	Auditing of Quality Assurance Programs for Nuclear Power Plants (Revision 1, 9/80)	3.2.23.12	Quality Assurance	-
1.145	Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants (Reissued February 1983)	3.2.18.4	Transport and Dispersion	-
1.146	Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants (8/80)	3.2.23.13	Quality Assurance	-
1.147	Inservice Inspection Code Case Acceptability-ASME Section XI Division 1 (Revision 3, 7/84)	3.2.8.1	Inservice Inspection	-
1.148	Functional Specification for Active Valve Assemblies in Systems Important to Safety in Nuclear Power Plants (3/81)	3.2.4.6	Mechanical Systems/ Components	-
1.149	Nuclear Power Plant Simulators for Use in Operating Training (4/81)	Not Applicable	-	Power Plant Specific
1.150	Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations (Revision 1, 2/83)	3.2.8.2	Inservice Inspection	-
1.151	Instrument Sensing Lines (7/83)	Not Applicable		Reactor Design Specific
	Division 2 (Research and Test Reactors) Regulatory Guides			
2.1	Shield Test Program for Evaluation of Installed Biological Shielding in Research and Training Reactors (5/73)	Not Applicable	-	Reactor Design Specific
2.2	Development of Technical Specifications for Experiments in Research Reactors (11/73)	Not Applicable	-	Reactor Design Specific
2.3	Quality Verification for Plate-Type Uranium-Aluminum Fuel Elements for Use in Research Reactors (Revision 1, 7/76)	Not Applicable	-	Reactor Design Specific
2.4	Review of Experiments for Research Reactors (Revision 0-R, 10/77)	Not Applicable	-	Reactor Design Specific
2.5	Quality Assurance Program Requirements for Research Reactors (Revision 0-R, 10/77)	Not Applicable	-	Reactor Design Specific
2.6	Emergency Planning for Research Reactors (Revision 1, 3/83)	Not Applicable	-	Reactor Design Specific
	Division 3 (Fuels and Materials Facilities) Regulatory Guides			
3.1	Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material (Revision 1, 1/82)	Not Applicable	-	Process Solutions Specific

Appendix A - Summary Table for the Selection of Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 3 (Fuels and Materials Facilities) Regulatory Guides			
3.2	Efficiency Testing of Air-Cleaning Systems Containing Devices for Removal of Particles (1/73)	3.2.6.3	Ventilation	-
3.3	Quality Assurance Program Requirements for Fuel Reprocessing Plants and for Plutonium Processing and Fuel Fabrication Plants (Revision 1, 3/74)	Not Applicable	-	Endorses Nuclear Plant Standard
3.4	Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors (Revision 1-R, 2/78)	3.2.12.1	Criticality	-
3.5	Standard Format and Content of License Applications for Uranium Mills (Revision 1, 11/77)	Not Applicable	-	Mill Tailings Specific
3.6	Content of Technical Specifications for Fuel Reprocessing Plants (4/73)	3.2.25.1	General	
3.7	Monitoring of Combustible Gases and Vapors in Plutonium Processing and Fuel Fabrication Plants (3/73)	Not Applicable	-	Process Plant Specific
3.8	Preparation of Environmental Reports for Uranium Mills (Revision 2, 10/82)	Not Applicable	-	Uranium Mill Specific
3.9	Concrete Radiation Shields (6/73)	3.2.13.2	Shielding	-
3.10	Liquid Waste Treatment System Design Guide for Plutonium Processing and Fuel Fabrication Plants (6/73)	Not Reveiwed	-	Processing Plant Specific
3.11	Design, Construction, and Inspection of Embankment Retention Systems for Uranium Mills (Revision 2, 12/77)	Not Reveiwed	-	Mill Tailings Specific
3.11.1	Operational Inspection and Surveillance of Embankment Retention Systems for Uranium Mill Tailings (Revision 1, 11/80)	Not Applicable	-	Mill Tailings Specific
3.12	General Design Guide for Ventilation Systems of Plutonium Processing and Fuel Fabrication Plants (8/73)	3.2.6.4	Ventilation	-
3.13	Guide for Acceptable Waste Storage Methods at UF_6 Production Plants (10/73)	Not Applicable	-	Production Plant Specific
3.14	Seismic Design Classification for Plutonium Processing and Fuel Fabrication Plants (10/73)	3.2.17.9	Seismic Design	-
3.15	Standard Format and Content of License Applications for Storage Only of Unirradiated Reactor Fuel and Associated Radioactive Material (Revision 1, 4/83)	Not Applicable	-	Unirradiated Fuel Specific
3.16	General Fire Protection Guide for Plutonium Processing and Fuel Fabrication Plants (1/74)	3.2.7.2	Fire Protection	-

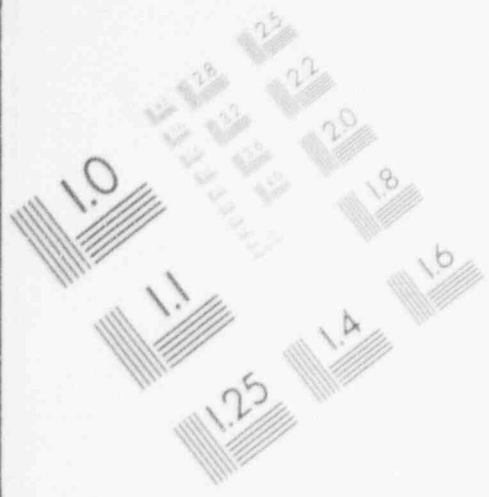
Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

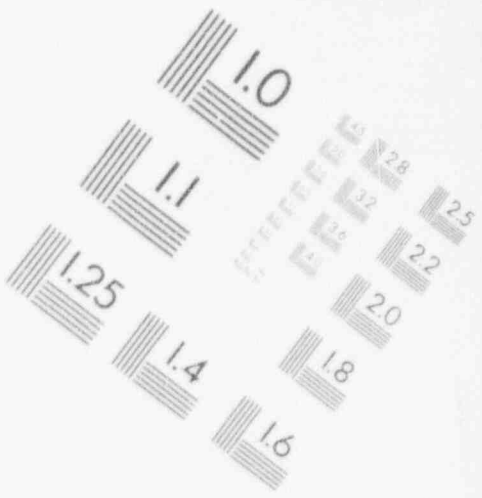
Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 3 (Fuels and Materials Facilities) Regulatory Guides			
3.17	Earthquake Instrumentation for Fuel Reprocessing Plants (2/74)	3.2.17.10	Seismic Design	-
3.18	Confinement Barriers and Systems for Fuel Reprocessing Plants (2/74)	3.2.6.5	Ventilation	-
3.19	Reporting of Operating Information for Fuel Reprocessing Plants (2/74)	3.2.2.5.2	General	-
3.20	Process Offgas Systems for Fuel Reprocessing Plants (2/74)	3.2.4.7	Mechanical Systems/ Components	-
3.21	Quality Assurance Requirements for Protective Coatings Applied to Fuel Reprocessing and to Plutonium Processing and Fuel Fabrication Plants (3/74)	3.2.23.14	Quality Assurance	-
3.22	Periodic Testing of Fuel Reprocessing Plant Protection System Actuation Functions (6/74)	3.2.3.7	Instrumentation and Control	-
3.23	Withdrawn-See 45 FR 71876, 10/30/80	Not Applicable	-	Withdrawn
3.24	Withdrawn-See 46 FR 14507, 2/27/81	Not Applicable	-	Withdrawn
3.25	Standard Format and Content of Safety Analysis Reports for Uranium Facilities (12/74)	Not Applicable	-	Reprocessing Plant Specific
3.26	Standard Format and Content of Safety Analysis Reports for Fuel Reprocessing Plants (2/75)	Not Applicable	-	Reprocessing Plant Specific
3.27	Nondestructive Examination of Welds in the Liners of Concrete Barriers in Fuel Reprocessing Plants (Revision 1, 5/77)	3.2.9.8	Materials	-
3.28	Welder Qualification for Welding in Areas of Limited Accessibility in Fuel Reprocessing Plants and in Plutonium Processing and Fuel Fabrication Plants (5/75)	3.2.9.9	Materials	-
3.29	Preheat and Interpass Temperature Control for the Welding of Low-Alloy Steel for Use in Fuel Reprocessing Plants and in Plutonium Processing and Fuel Fabrication Plants (5/75)	3.2.9.10	Materials	-
3.30	Selection, Application, and Inspection of Protective Coatings (Paints) for Fuel Reprocessing Plants (Revision 0-R, 5/77)	3.2.4.8	Mechanical Systems/ Components	-
3.31	Emergency Water Supply Systems for Fuel Reprocessing Plants (Revision 0-R, 5/77)	3.2.4.9	Mechanical System/ Components	-

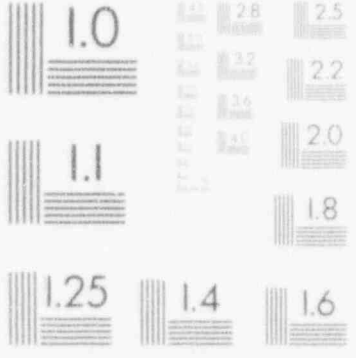

1
IMAGE EVALUATION
TEST TARGET (MT-3)
1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.5
150mm
6"

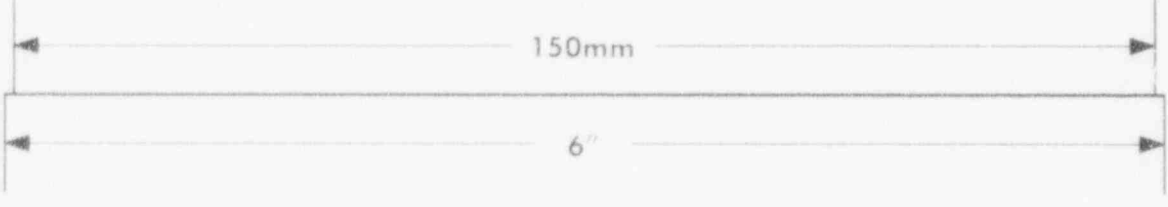
1

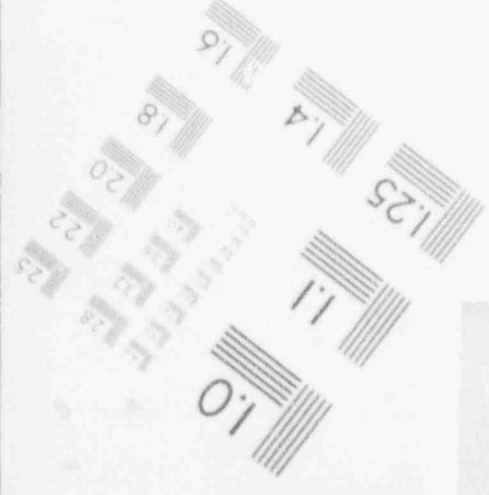
IMAGE EVALUATION TEST TARGET (MT-3)

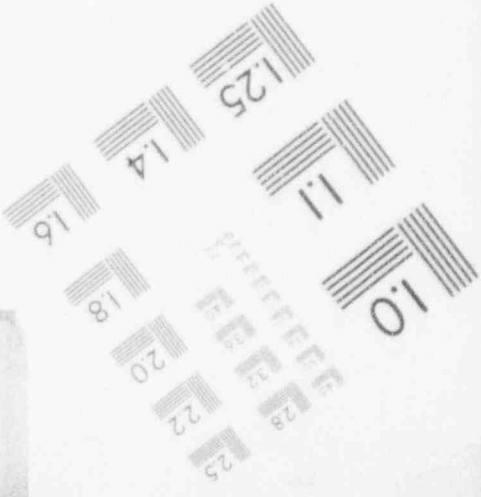






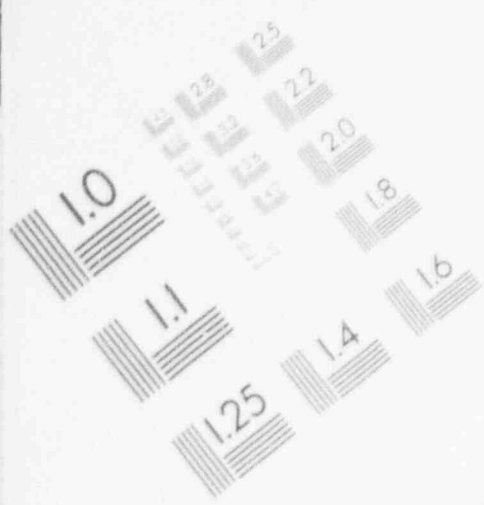


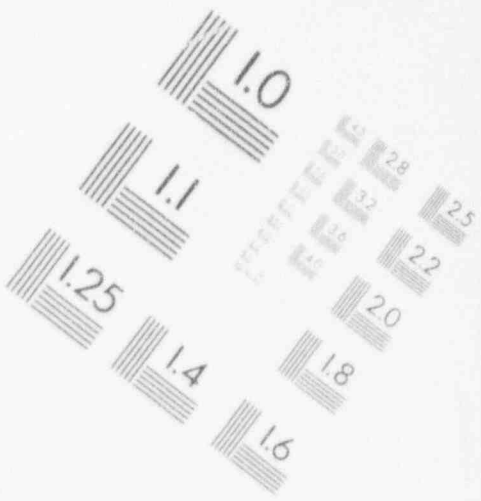


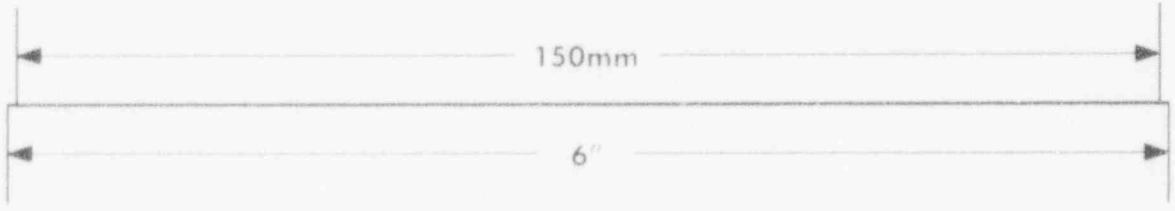


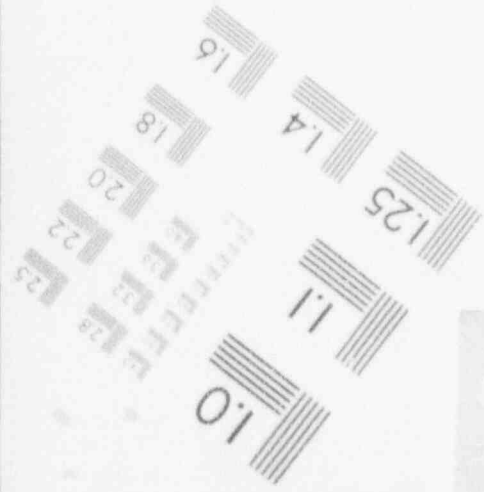
1

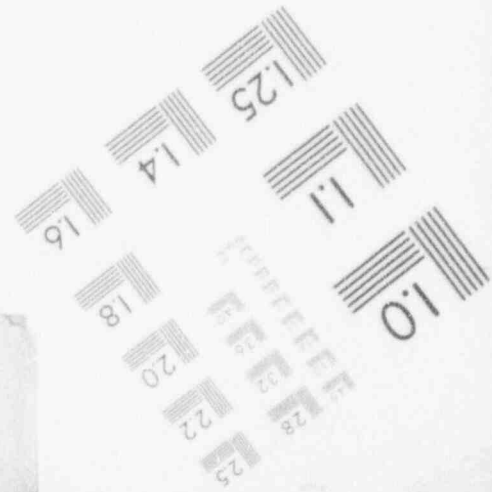
IMAGE EVALUATION TEST TARGET (MT-3)





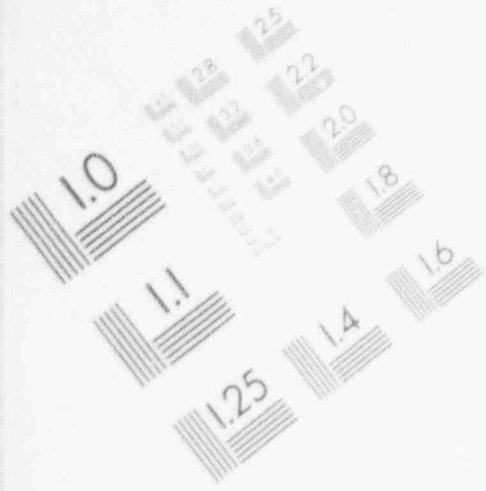


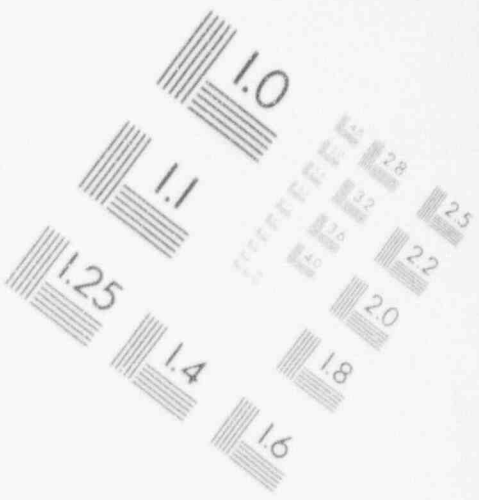


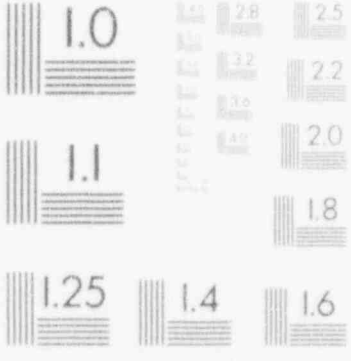


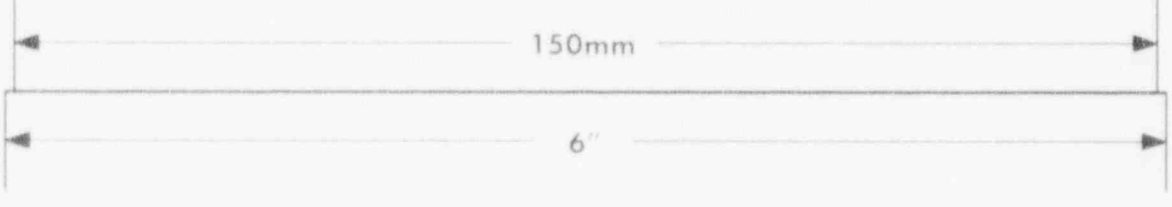
1

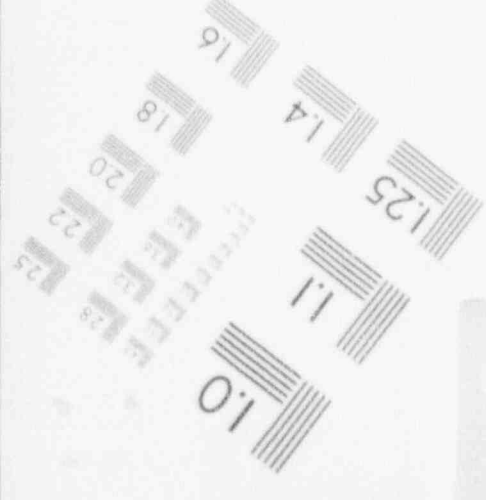
IMAGE EVALUATION TEST TARGET (MT-3)

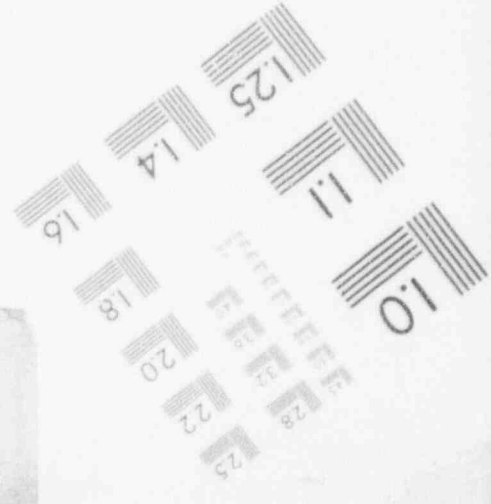












Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 3 (Fuels and Materials Facilities) Regulatory Guides			
3.32	General Design Guide for Ventilation Systems for Fuel Reprocessing Plants (9/75)	3.2.6.6	Ventilation	-
3.33	Assumptions Used for Evaluating the Potential Radiological Consequences of Accidental Nuclear Criticality in a Fuel Reprocessing Plant (4/77)	3.2.12.2	Criticality	-
3.34	Assumptions Used for Evaluating the Potential Radiological Consequences of Accidental Nuclear Criticality in a Uranium Fuel Fabrication Plant (Revision 1, 7/79)	Not Applicable	-	Fabrication Plant Specific
3.35	Assumptions Used for Evaluating the Potential Radiological Consequences of Accidental Nuclear Criticality in a Plutonium Processing and Fuel Fabrication Plant (Revision 1, 7/79)	Not Applicable	-	Plutonium Processing Plant Specific
3.36	Withdrawn - See 44FR 6535, 2/1/79	Not Applicable	-	Withdrawn
3.37	Guidance for Avoiding Intergranular Corrosion and Stress Corrosion in Austenitic Stainless Steel Components of Fuel Reprocessing plants (9/75)	3.2.9.11	Materials	-
3.38	General Fire Protection Guide for Fuel Reprocessing Plants (6/76)	3.2.7.3	Fire Protection	-
3.39	Standard Format and Content of License Applications for Plutonium Processing and Fuel Fabrication Plants (1/76)	Not Applicable	-	Processing Plant Specific
3.40	Design Basis Floods for Fuel Reprocessing Plants and for Plutonium Processing and Fuel Reprocessing Plants (Revision 1, 12/77)	3.2.15.2	Flood Protection	-
3.41	Validation of Calculational Methods for Nuclear Criticality Safety (Revision 1, 5/77)	3.2.12.3	Criticality	-
3.42	Emergency Planning for Fuel Cycle Facilities and Plants Licensed Under 10 CFR 50 and 70 (Revision 1, 9/79)	3.2.21.2	Emergency Planning	-
3.43	Nuclear Criticality Safety in the Storage of Fissile Materials (Revision 1, 4/79)	3.2.12.4	Criticality	-
3.44	Standards Format and Content for the Safety Analysis Report for an Independent Spent Fuel Storage Installation (Water-Basin Type) (Revision 1, 11/80)	Not Reviewed	-	Water - Basin Specific
3.45	Nuclear Criticality Safety for Pipe Intersections Containing Aqueous Solutions of Enriched Uranyl Nitrate (11/80)	Not Applicable	-	Processing Plant Specific
3.46	Standard Format and Content of License Applications, Including Environmental Reports, for In Situ Uranium Solution Mining (6/82)	Not Applicable	-	Uranium Mining Specific
3.47	Nuclear Criticality Control and Safety of Homogeneous Plutonium-Uranium Fuel Mixtures Outside Reactors (7/81)	Not Applicable	-	Material Not Expected
3.48	Standard Format and Content for the Safety Analysis Report for an Independent Spent Fuel Storage Installation (Dry Storage) (10/81)	Not Reviewed		ISFSI Related

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 3 (Fuels and Materials Facilities) Regulatory Guides			
3.49	Design of an Independent Spent Fuel Storage Installation (Water-Basin Type) (12/81)	Not Reviewed	-	ISFSI Related
3.50	Guidance on Preparing a License Application to Store Spent Fuel in an Independent Spent Fuel Storage Installation (1/82)	Not Reviewed	-	ISFSI Related
3.51	Calculational Models for Estimating Radiation Doses to Man from Airborne Radioactive Materials Resulting from Uranium Milling Operations (3/82)	Not Applicable	-	Milling Operations Specific
3.52	Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Fuel Fabrication Plants (7/82)	Not Applicable	-	Fuel Fabrication Specific
3.53	Applicability of Existing Regulatory Guides to the Design and Operation of an Independent Spent Fuel Storage Installation (7/82)	Not Reviewed	-	ISFSI Related
3.54	Spent Fuel Heat Generation in on Independent Spent Fuel Storage Installation (9/84)	Not Reviewed	-	ISFSI Related
3.55	Standard Format and Content for the Health and Safety Section of License Renewal Applications for Uranium Hexafluoride Production (4/85)	Not Applicable	-	Fuel Production Related
	Division 4 (Environmental and Siting) Regulatory Guides			
4.1	Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants (Revision 1, 4/75)	3.2.11.6	Radiological Assessment	-
4.2	Preparation of Environmental Reports for Nuclear Power Stations (Revision 2, 7/76)	Not Applicable	-	Environmentally Related
4.2.1	Additional Guidance - Environmental Data (4/74)	Not Applicable	-	Environmentally Related
4.3	Measurements of Radionuclides in the Environment - Analysis of I-131 in Milk (Withdrawn 12/76)	Not Applicable	-	Withdrawn
4.4	Reporting Procedure for Mathematical Models Selected to Predict Heated Effluent Dispersion in Natural Water Bodies (5/74)	Not Applicable	-	Environmentally Related
4.5	Measurements of Radionuclides in the Environment - Sampling and Analysis of Plutonium in Soil (5/74)	3.2.11.7	Radiological Assessment	-
4.6	Measurements of Radionuclides in the Environment - Strontium-89 and Strontium-90 Analyses (5/74)	3.2.11.8	Radiological	-
4.7	General Site Suitability Criteria for Nuclear Power Stations (Revision 1, 11/75)	Not Applicable	-	Power Plant Specific
4.8	Environmental Technical Specifications for Nuclear Power Plants (12/75)	Not Applicable	-	Environmentally Related

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 4 (Environmental and Siting) Regulatory Guides			
4.9	Preparation of Environmental Reports for Commercial Uranium Enrichment Facilities (Revision 1, 10/75)	Not Applicable	-	Environmentally Related/Enrichment Facilities Specific
4.10	Irreversible and Irretrievable Commitments of Material Resources (Withdrawn 11/17/77)	Not Applicable	-	Withdrawn
4.11	Terrestrial Environmental Studies for Nuclear Power Stations (Revision 1, 8/77)	Not Applicable	- Related	Environmentally
4.12	(Not Issued)			
4.13	Performance, Testing and Procedural Specifications for Thermoluminescence Dosimetry: Environmental Applications (Revision 1, 7/77)	3.2.11.9	Radiological Assessment	-
4.14	Radiological Effluent and Environmental Monitoring at Uranium Mills (Revision 1, 4/80)	Not Applicable	-	Uranium Mill Specific
4.15	Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment (Revision 1, 2/79)	3.2.23.15	Quality Assurance	-
4.16	Measuring, Evaluating, and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Airborne Effluents from Nuclear Fuel Processing and Fabrication Plants (3/78)	3.2.11.10	Radiological Assessment	-
4.17	Standard Format and Content of Site Characterization Reports for High-level-Waste Geologic Repositories (7/82)	Not Applicable	-	Repository Specific
4.18	Standard Format and Content of Environmental Reports for Near-Surface Disposal of Radioactive Waste (6/83)	Not Applicable	-	Low Level Waste Disposal Facility Specific

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 5 (Materials and Plant Protection) Regulatory Guides			
5.1	Serial Numbering of Fuel Assemblies for Light-Water-Cooled Nuclear Power Reactors (12/72)	3.2.20.1	Material Accounting	-
5.2	Withdrawn-See 44 FR 57542, 10/5/79	Not Applicable	-	Withdrawn
5.3	Statistical Terminology and Notation for Special Nuclear Materials Control and Accountability (2/73)	3.2.20.2	Material Accounting	-
5.4	Standard Analytical Methods for the Measurement of Uranium Tetrafluoride (UF_4) and Uranium Hexafluoride (2/73)	Not Applicable	-	UF Specific
5.5	Standard Methods for Chemical, Mass Spectrometric, and Spectrochemical Analysis of Nuclear-Grade Uranium Dioxide Powders and Pellets (2/73)	Not Applicable	-	Operation Not Expected
5.6	Standard Methods for Chemical, Mass Spectrometric, and Spectrochemical Analysis of Nuclear-Grade Plutonium Dioxide Powders and Pellets and Nuclear-Grade Mixed Oxides (5/73)	Not Applicable	-	Operation Not Expected
5.7	Entry/Exit Control for Protected Areas, Vital Areas, and Material Access Areas (Revision 1, 5/80)	3.2.19.2	Safeguard and Security	-
5.8	Design Considerations for Minimizing Residual Holdup of Special Nuclear Material in Drying and Fluidized Bed Operations (Revision 1, 5/74)	Not Applicable	-	Process Operations
5.9	Specifications for Ge(Li) Spectroscopy Systems for Material Protection Measurements (Revision 2, 1/84)	Not Applicable	-	Utilization Not Expected
5.10	Selection and Use of Pressure-Sensitive Seals on Containers for Onsite Storage of Special Nuclear Material (7/73)	3.2.19.3	Safeguard and Security	-
5.11	Nondestructive Assay of Special Nuclear Material Contained in Scrap and Waste (Revision 1, 4/84)	Not Applicable	-	Operation Not Expected
5.12	General Use of Locks in the Protection and Control of Facilities and Special Nuclear Materials (11/73)	3.2.19.4	Safeguard and Security	-
5.13	Conduct of Nuclear Material Physical Inventories (11/73)	3.2.20.3	Material Accounting	-
5.14	Use of Observation (Visual Surveillance) Techniques in Material Access Areas (Revision 1, 5/80)	3.2.19.5	Safeguard and Security	-
5.15	Security Seals for the Protection and Control of Special Nuclear Material (1/74)	3.2.19.6	Safeguard and Security	-
5.16	Standard Methods for Chemical, Mass Spectrometric, Spectrochemical, Nuclear, and Radiochemical Analysis of Nuclear-Grade Plutonium Nitrate Solution and Plutonium Metal (Revision 1, 5/75)	Not Applicable	-	Material Not Expected

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 5 (Materials and Plant Protection) Regulatory Guides			
5.17	Truck Identification Markings (1/74)	3.2.19.7	Safeguard and Security	-
5.18	Limit of Error Concepts and Principles of Calculation in Nuclear Materials Control (1/74)	3.2.20.4	Material Accounting	-
5.19	Methods for the Accountability of Plutonium Nitrate Solutions (1/74)	Not Applicable	-	Material Not Expected
5.20	Training, Equipping, and Qualifying of Guards and Watchmen (1/74)	3.2.19.8	Safeguard and Security	-
5.21	Nondestructive Uranium-235 Enrichment Assay by Gamma-Ray Spectrometry (Revision 1, 1/84)	Not Applicable	-	Utilization Not Expected
5.22	Assessment of the Assumption of Normality (Employing Individual Observed Values) (4/74)	Not Applicable	-	Utilization Not Expected
5.23	In Situ Assay of Plutonium Residual Holdup (Revision 1, 2/84)	Not Applicable	-	Plutonium Inventory Specific
5.24	Analysis and Use of Process Data for the Protection of Special Nuclear Material (6/74)	Not Applicable	-	utilization Not Expected
5.25	Design Considerations for Minimizing Residual Holdup of Special Nuclear Material in Equipment for Wet Process Operations (6/74)	Not Applicable	-	Wet Process Related
5.26	Selection of Material Balance Areas and Item Control Areas (Revision 1, 4/75)	3.2.20.5	Material Accounting	-
5.27	Special Nuclear Material Doorway Monitors (6/74)	3.2.20.6	Material Accounting	-
5.28	Evaluation of Shipper-Receiver Differences in the Transfer of Special Nuclear Materials (6/74)	3.2.20.7	Material Accounting	-
5.29	Nuclear Material Control Systems for Nuclear Power Plants (Revision 1, 6/75)	3.2.20.8	Material Accounting	-
5.30	Materials Protection Contingency Measures for Uranium and Plutonium Fuel Manufacturing Plants (6/74)	Not Applicable	-	Fabrication Plant Related
5.31	Specially Designed Vehicle with Armed Guards for Road Shipment of Special Nuclear Material (Revision 1, 4/75)	Not Applicable	-	Transportation Related

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 5 (Materials and Plant Protection) Regulatory Guides			
5.32	Communication with Transport Vehicles (Revision 1, 5/75)	3.2.19.9	Safeguard and Security	-
5.33	Statistical Evaluation of Material Unaccounted For (6/74)	Not Applicable	-	Utilization Not Expected
5.34	Nondestructive Assay for Plutonium in Scrap Material by Spontaneous Fission Detection (Revision 1, 5/84)	Not Applicable	-	Material Not Expected
5.35	Withdrawn-See 42 FR 41677, 8/18/77	Not Applicable	-	Withdrawn
5.36	Recommended Practice for Dealing with Outlying Observations (6/74)	3.2.20.9	Material Accounting	-
5.37	In Situ Assay of Enriched Uranium Residual Holdup (Revision 1, 10/83)	Not Applicable	-	Process Related
5.38	Nondestructive Assay of High Enrichment Uranium Fuel Plates by Gamma Ray Spectrometry (Revision 1, 10/83)	Not Applicable	-	Material Not Expected
5.39	General Methods for the Analysis of Uranyl Nitrate Solutions for Assay, Isotopic Distribution, and Impurity Determinations (12/74)	Not Applicable	-	Material Not Expected
5.40	Methods for the Accountability of Plutonium Dioxide Powder (12/74)	Not Applicable	-	Material Not Expected
5.41	(Not issued)	Not Applicable	-	Not Issued
5.42	Design Consideratons for Minimizing Residual Holdup of Special Nuclear Material in Equipment for Dry Process Operations (1/75)	Not Applicable	-	Process Operation Not Expected
5.43	Plant Security Force Duties (1/75)	3.2.19.10	Safeguard and Security	-
5.44	Perimeter Intrusion Alarm Systems (Revision 2, 5/80)	3.2.19.11	Safeguard and Security	-
5.45	Standard Format and Content for the Special Nuclear Material Control and Accounting Section of a Special Nuclear Material License Application (12/74)	Not Applicable	-	Not Pertinent
5.46	(Not Issued)	Not Applicable	-	Not Issued
5.47	Control and Accountability of Plutonium in Waste Material (2/75)	Not Applicable	-	Material Not Expected

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 5 (Materials and Plant Protection) Regulatory Guides			
5.48	Design Considerations-Systems for Measuring the Mass of Liquids (2/75)	Not Applicable	-	Material Not Expected
5.49	Internal Transfers of Special Nuclear Material (3/75)	3.2.19.12	Safeguard and Security	-
5.50	(Not issued)	Not Applicable	-	Not Issued
5.51	Management Review of Nuclear Material Control and Accounting Systems (6/75)	3.2.20.10	Material Accounting	-
5.52	Standard Format and Content of a Licensee Physical Protection Plan for Strategic Special Nuclear Material at Fixed Sites (Revision 2, 7/80)	Not Applicable	-	Not Pertient
5.53	Qualification, Calibration, and Error Estimation Methods for Nondestructive Assay (Revision 1, 2/84)	Not Applicable	-	Utilization Not Expected
5.54	Standard Format and Content of Safeguards Contingency Plans for Nuclear Power Plants (3/78)	Not Applicable	-	Nuclear Power Plant Related
5.55	Standard Format and Content of Safeguards Contingency Plans for Fuel Cycle Facilities (3/78)	3.2.19.13	Safeguard and Security	-
5.56	Standard Format and Content of Safeguards Contingency Plans for Transportation (3/78)	Not Applicable	-	Transportation Related
5.57	Shipping and Receiving Control of Strategic Special Nuclear Material (Revision 1, 6/80)	3.2.20.11	Material Accounting	-
5.58	Considerations for Establishing Traceability of Special Nuclear Material Accounting Measurements (Revision 1, 2/80)	Not Applicable	-	Utilization Not Expected
5.59	Standard Format and Content for a Licensee Physical Security Plan for the Protection of Special Nuclear Material of Moderate or Low Strategic Significance (Revision 1, 2/83)	3.2.19.14	Safeguard and Security	-
5.60	Standard Format and Content of a Licensee Physical Protection Plan for Strategic Special Nuclear Material in Transit (4/80)	Not Applicable	-	Transportation Related
5.61	Intent and Scope of the Physical Protection Upgrade Rule Requirements for Fixed Sites (6/80)	3.2.19.15	Safeguard and Security	-
5.62	Reporting of Physical Security Events (2/81)	3.2.19.16	Safeguard and Security	-
5.63	Physical Protection for Transient Shipments (7/82)	Not Applicable	-	Transient Shipments Related

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 6 (Products) Regulatory Guides			
6.1	Leak Testing Radioactive Brachytherapy Sources (Revision 1, 7/74)	Not Applicable	-	Medical Application Related
6.2	Integrity and Test Specifications for Selected Brachytherapy Sources (Revision 1, 7/74)	Not Applicable	-	Medical Application Related
6.3	Design, Construction, and Use of Radioisotopic Power Generators for Certain Land and Sea Applications (3/74)	Not Applicable	-	Radioisotopic Power Generators Related
6.4	Classification of Containment Properties of Sealed Radioactive Sources (Revision 2, 8/80)	Not Applicable	-	Materials Not Expected
6.5	General Safety Standard for Installations Using Nonmedical Sealed Gamma-Ray Sources (6/74)	Not Applicable	-	Materials Not Expected
6.6	Acceptance Sampling Procedures for Exempted and Generally Licensed Items Containing Byproduct Material (6/74)	Not Applicable	-	Byproduct Materials Related
6.7	Preparation of an Environmental Report to Support a Rule Making Petition Seeking an Exemption for a Radionuclide-Containing Product (Revision 1, 6/76)	Not Applicable	-	Environmentally Related
6.8	Identification Plaque for Irretrievable Well-Logging Sources (10/78)	Not Applicable	-	Situation Not Expected
	Division 7 (Transportation) Regulatory Guides			
7.1	Administrative Guide for Packaging and Transporting Radioactive Material (6/74)	Not Applicable	-	Transportation Related
7.2	Packaging and Transportation of Radioactively Contaminated Biological Materials (6/74)	Not Applicable	-	Transportation Related
7.3	Procedures for Picking Up and Receiving Packages of Radioactive Materials (5/75)	3.2.24.1	Transportation Interface	
7.4	Leakage Tests on Packages for Shipment of Radioactive Materials (6/75)	3.2.24.2	Transportation Interface	
7.5	Administrative Guide for Obtaining Exemptions from Certain NRC Requirements over Radioactive Material Shipments (Revision 0-R, 5/77)	Not Applicable	-	Transportation Related
7.6	Design Criteria for the Structural Analysis of Shipping Cask Containment Vessels (Revision 1, 3/78)	Not Applicable	-	Transportation Related

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 7 (Transportation) Regulatory Guides			
7.7	Administrative Guide for Verifying Compliance with Packaging Requirements for Shipments of Radioactive Materials (8/77)	3.2.24.3	Transportation Interface	-
7.8	Load Combinations for the Structural Analysis of Shipping Casks (5/77)	Not Applicable	-	Transportation Related
7.9	Standard Format and Content of Part 71 Applications for Approval of Packaging of Type B, Large Quantity, and Fissile Radioactive Material (Revision 1, 1/80)	Not Applicable	-	Transportation Related
7.10	Establishing Quality Assurance Programs for Packaging Used in the Transport of Radioactive Material (1/83)	Not Applicable	-	Transportation Related
	Division 8 (Occupational Health) Regulatory Guides			
8.1	Radiation Symbol (2/73)	3.2.11.11	Radiological Assessment	-
8.2	Guide for Administrative Practices in Radiation Monitoring (2/73)	3.2.11.12	Radiological Assessment	-
8.3	Film Badge Performance Criteria (2/73)	3.2.11.13	Radiological Assessment	-
8.4	Direct-Reading and Indirect-Reading Pocket Dosimeters (2/73)	3.2.11.14	Radiological Assessment	-
8.5	Criticality and Other Interior Evacuations Signals (Revision 1, 3/81)	3.2.11.15	Radiological Assessment	-
8.6	Standard Test Procedure for Geiger-Miller Counters (5/73)	3.2.11.16	Radiological Assessment	-
8.7	Occupational Radiation Exposure Records Systems (5/73)	3.2.11.17	Radiological Assessment	-
8.8	Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable (Revision 3, 6/78)	3.2.11.18	Radiological Assessment	-
8.9	Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay (9/73)	3.2.11.19	Radiological Assessment	-
8.10	Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable (Revision 1-R, 5/77)	3.2.11.20	Radiological Assessment	-

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 8 (Occupational Health) Regulatory Guides			
8.11	Applications of Bioassay for Uranium (6/74)	3.2.11.21	Radiological Assessment	-
8.12	Criticality Accident Alarm Systems (Revision 1, 1/81)	3.2.11.22	Radiological Assessment	-
8.13	Instruction Concerning Prenatal Radiation Exposure (Revision 1, 11/75)	3.2.11.23	Radiological Assessment	-
8.14	Personnel Neutron Dosimeters (Revision 1, 8/77)	3.2.11.24	Radiological Assessment	-
8.15	Acceptable Programs for Respiratory Protection (10/76)	3.2.11.25	Radiological Assessment	-
8.16	(Not issued)	Not Applicable	-	Not Issued
8.17	(Not issued)	Not Applicable	-	Not Issued
8.18	Information Relevant to Ensuring that Occupational Radiation Exposures at Medical Institutions Will Be As Low As Is Reasonably Achievable (Revision 1, 10/82)	Not Applicable	-	Medical Application Related
8.19	Occupational Radiation Dose Assessment in Light-Water Reactor Power Plants Design Stage Man-Rem Estimates (Revision 1, 6/79)	3.2.11.26	Radiological Assessment	-
8.20	Applications of Bioassay for I-125 and I-131 (Revision 1, 9/79)	3.2.11.25	Radiological Assessment	
8.21	Health Physics Surveys for Byproduct Material at NRC-licensed Processing and Manufacturing Plants (Revision 1, 10/79)	Not Applicable	-	Processing Plant Related
8.22	Bioassay at Uranium Mills (7/78)	Not Applicable	-	Uranium Mills Related
8.23	Radiation Safety Surveys at Medical Institutions (Revision 1, 1/81)	Not Applicable	-	Medical Application Related
8.24	Health Physics Surveys During Enriched Uranium-235 Processing and Fuel Fabrication (Revision 1, 10/79)	Not Applicable	-	Fuel Fabrication Related
8.25	Calibration and Error Limits of Air Sampling Instruments for Total Volume of Air Sampled (8/80)	3.2.11.26	Radiological Assessment	-
8.26	Applications of Bioassay for Fission and Activation Products (9/80)	3.2.11.27	Radiological Assessment	-

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 8 (Occupational Health) Regulatory Guides			
8.27	Radiation Protection Training for Personnel at Light-Water-Cooled Nuclear Power Plants (3/81)	3.2.11.28	Radiological Assessment	-
8.28	Audible-Alarm Dosimeters (8/81)	3.2.11.29	Radiological Assessment	-
8.29	Instruction Concerning Risks from Occupational Radiation Exposure (7/81)	3.2.11.30	Radiological Assessment	-
8.30	Health Physics Surveys in Uranium Mills (6/83)	Not Applicable	-	Uranium Mills Related
8.31	Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Mills Will Be As Low As Is Reasonably Achievable (5/83)	Not Applicable	-	Uranium Mills Related

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 9 (Antitrust Review) Regulatory Guides			
9.1	Regulatory Staff Position Statement on Anti-trust Matters (12/73)	Not Applicable	-	Not Pertinent
9.2	Information needed by the NRC Staff in Connection with its Antitrust Review of Construction Permit Applications for Nuclear Power Plants (Revision 1, 6/76)	Not Applicable	-	Not Pertinent
9.3	Information needed by the AEC Regulatory Staff in Connection with its Antitrust Review of Operating License Applications for Nuclear Power Plants (10/74)	Not Applicable	-	Not Pertinent

Appendix A - Summary Table for the Selection of Potentially Adaptable Regulatory Guides (Listed in Numerical Order) (Cont'd)

Reg Guide No.	Regulatory Guide Title (Issuance/Revision Date)	Applicability/ Technical Review Section	Categorized Subject	Remarks
	Division 10 (General) Regulatory Guides			
10.1	Compilation of Reporting Requirements for Persons Subject to NRC Regulations (Revision 4 10/81)	3.2.25.3	General	-
10.2	Guidance to Academic Institutions Applying for Specific Byproduct Material Licenses of Limited Scope (Revision 1, 12/76)	Not Applicable	-	Not Pertinent
10.3	Guide for the Preparation of Applications for Special Nuclear Material Licenses of Less than Critical Mass Quantities (Revision 1, 4/77)	Not Applicable	-	Not Pertinent
10.4	Guide for the Preparation of Applications for Licenses to Process Source Material (Revision 1, 3/77)	Not Applicable	-	Not Pertinent
10.5	Applications for Type A Licenses of Broad Scope (Revision 1, 12/80)	Not Applicable	-	Not Pertinent
10.6	Guide for the Preparation of Applications for Use of Sealed Sources and Devices for the Performance of Industrial Radiography (Revision 1, 12/81)	Not Applicable	-	Not Pertinent
10.7	Guide for the Preparation of Applications for Licenses for Laboratory Use of Small Quantities of Byproduct Material (Revision 1, 8/79)	Not Applicable	-	Not Pertinent
10.8	Guide for the Preparation of Applications for Medical Programs (Revision 1, 10/80)	Not Applicable	-	Not Pertinent
10.9	Guide for the Preparation of Applications for Licenses for the Use of Gamma Irradiators (4/80)	Not Applicable	-	Not Pertinent

NRC Form 6
(4 83)
NRCM 0240

U.S. NUCLEAR REGULATORY COMMISSION

RECOMMENDED DISTRIBUTION

Office of the Secretary

ORIGINATING OFFICE	CONTACT	EXTENSION
DIVISION OF WASTE MANAGEMENT/NMSS	R. MacDougall	74664

TITLE OF PROPOSED PAPER

DISPOSAL CAPABILITY FOR DECOMMISSIONING WASTES

PAPER TYPE

MEETING | AFFIRMATION | NOTATION | NEGATIVE CONSENT | INFORMATION

DISTRIBUTION (Check box for each recipient)

NO. OF COPIES	RECIPIENT	NO. OF COPIES	RECIPIENT
	1 CHAIRMAN PALLADINO		1 ADMINISTRATION
	1 COMMISSIONER ZECH		3 RESOURCE MANAGEMENT
	1 COMMISSIONER ASSELSTINE		2 EXECUTIVE LEGAL DIRECTOR
	1 COMMISSIONER CARR		
	1 COMMISSIONER ROBERTS		1 EQUAL EMPLOYMENT OPPORTUNITY
			2 STATE PROGRAMS
	1 CONGRESSIONAL AFFAIRS		2 INTERNATIONAL PROGRAMS
	1 PUBLIC AFFAIRS		10 NUCLEAR REACTOR REGULATION
	5 GENERAL COUNSEL		
	1 INSPECTOR & AUDITOR		4 NUCLEAR MATERIAL SAFETY & SAFEGUARDS
	4 POLICY EVALUATION		10 NUCLEAR REGULATORY RESEARCH
	1 SECRETARY		2 ANALYSIS & EVALUATION OF OPERATIONAL DATA
			1 SMALL & DISADVANTAGED BUSINESS UTILIZATION AND CIVIL RIGHTS
	2 DOCUMENT MANAGEMENT BR		10 INSPECTION & ENFORCEMENT
	3 EXECUTIVE DIRECTOR FOR OPERATIONS		REGIONAL OFFICES
	1 DEPUTY DIRECTOR FOR OPERATIONS		1 KING OF PRUSSIA
	1 DEPUTY DIRECTOR FOR REGIONAL OPERATIONS & GENERIC REQ		1 ATLANTA
	10 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS		1 CHICAGO
	2 ATOMIC SAFETY & LICENSING BOARD PANEL		1 DALLAS
	2 ATOMIC SAFETY & LICENSING APPEAL PANEL		1 SAN FRANCISCO
	SUBTOTAL NUMBER OF COPIES		TOTAL NUMBER OF COPIES

REMARKS

RETURN ORIGINAL TO

NAME	ORGANIZATION	MAIL STOP
Document Control Center,	DWM/NMSS	623ss

For: The Commissioners

From: William J. Dircks
Executive Director for Operations

Subject: DISPOSAL CAPABILITY FOR DECOMMISSIONING WASTES

Purpose: To respond to the Commission's question concerning confidence in the availability of disposal capacity for all decommissioning wastes.

Discussion: In his memorandum of January 4, 1985, Acting Commission Secretary John C. Hoyle advised Executive Director for Operations William J. Dircks that the Commission had approved proposed amendments to the technical and financial criteria for decommissioning nuclear facilities subject to, among other things, more specific information from the staff on how the Commission can have confidence that all decommissioning waste will have a place to go for disposal. As we understand it, this is essentially the question Chairman Palladino raised in his notation vote on the staff proposed rule (SECY-84-354). His request for more information followed the Commission's October 10 meeting on the proposed rule, at which the Chairman asked the staff to address three questions:

- "Is there a health and safety problem associated with having licensees with waste material that might not be acceptable at a burial ground?"
- "Do all wastes now have a place to go?"
- "What is the staff doing to ensure that all wastes have a place to go when a site is decommissioned?"

CONTACTS:
R. D. MacDougall, NMSS/WM
42-74664
J. J. Surmeier, NMSS/WM
42-74404

OFC	WMPC	WMPC	WMPC	WM	FC	NMSS	EDO
NAME	RMacDougall	JJSurmeier	JOBunting	REBrowning	RECunningham	JGDavis	WJDircks
DATE	85/02/14						

The Chairman's questions arose from information NRC staff had provided about decommissioning problems with the J.C. Haynes Company in Region III, and other licensees that had been found unable to provide for an adequate decommissioning of their installations. J.C. Haynes, a bankrupt one-man operation, used americium-241, a transuranic material, to irradiate diamonds. According to a February 9, 1981, memorandum from Region III, one of the obstacles to decommissioning it was that no commercial disposal site then accepted americium-241 in concentrations greater than 10 nanocuries per gram (nCi/gm).

A. Summary of Findings

Staff can not assure the Commission at this time that all radioactive wastes from decommissioning NRC-regulated installations will have a place to go for disposal when needed. Current uncertainties concerning regulatory requirements and governmental responsibilities for disposal bear heavily on this problem, and they are elaborated in Enclosure 1. A summary of staff findings on each of the Chairman's three questions are presented below.

1."Is There a Health and Safety Problem Associated with Having Licensees with Material That Might Not Be Acceptable at a Burial Site?"

Provided that the licensees make appropriate storage arrangements, there is no imminent threat to public health and safety from allowing licensees to possess materials on-site that might be unacceptable at currently operating or future LLW disposal sites. Clearly, though, the situation cannot continue indefinitely. There may well be problems if licensees are allowed to reach the point where they had planned to decommission -- or if bankruptcies or accidents force unplanned decommissionings -- and some of their wastes are not acceptable at any disposal site. As the information provided to the Commission on October 9, 1984 shows, bankruptcy is already hampering some decommissionings, not only at the J.C. Haynes site, but several other materials licensee sites.

While some decommissioning wastes can be stored for decay, certain long-lived materials will not decay to safe levels in any reasonable period of extended storage. In these situations, the uncertain availability of disposal capacity makes it

OFC	WMPC	WMPC	WMPC	WM	FC	NMSS	EDO
NAME	RMacDougall	JJSurmeier	JOBunting	REBrowning	RECunningham	JGDavis	WJDircks
DATE	85/02/14						

difficult for NRC or an Agreement State to establish a firm deadline for terminating extended storage to assure adequate protection of public health and safety. Examples of situations where this problem might arise would include sealed source manufacturers using transuranic materials.

NRC has established a classification system in its licensing rule for land disposal of low-level wastes (10 CFR Part 61) designed to assure that the performance objectives for a near-surface disposal facility would be met. Maximum concentration limits are provided under Class C for certain radionuclides, and under Section 61.7(b)(5), "Waste with concentrations above these limits is generally unacceptable for near-surface disposal." This section goes on to say: "There may be some instances where waste with concentrations greater than permitted for Class C would be acceptable for near-surface disposal with special processing or design."

In its studies of the wastes produced from decommissioning reference boiling water and pressurized water reactors the Pacific Northwest Laboratory (PNL) noted that the core shroud and certain other reactor components would generally be unacceptable for routine near-surface disposal under 10 CFR 61. They would therefore have to be stored on-site until a specific determination could be made on their final disposition. "On-site storage of decommissioning waste would prevent termination of the nuclear license and release of the site until the waste was subsequently removed to an offsite disposal facility," PNL observed. "The prospect of onsite storage of nuclear waste for a protracted period could therefore affect the choice of an alternative to decommission the reactor." (See NUREG/CR-0672, p. 7.2, and NUREG/CR-0130, p. 7.2)

2. "Do All Wastes Now Have a Place to Go?"

No. The staff has identified several kinds of decommissioning wastes for which disposal capacity is presently either not available or not assured under the current statutory and/or regulatory framework. These are listed below, and described in more detail in Enclosure 2:

a. Transuranic wastes The transuranic wastes (TRU) affected are those exceeding the limits for near-surface disposal as Class C wastes under the Commission's 10 CFR

OFC	WMPC	WMPC	WMPC	WM	FC	NMSS	EDO
NAME	RMacDougall	JJSurmeier	JOBunting	REBrowning	RECunningham	JGDavis	WJDircks
DATE	85/02/14						

Part 61 regulation for the land disposal of low-level wastes. (For alpha-emitting TRU with half-lives greater than five years, this limit is 100 nCi/gm.)

b. Non-TRU Wastes Exceeding Class C Limits These include certain activation product wastes and certain other materials in higher concentrations than are generally acceptable for near-surface disposal. (For nickel-63 in activated metal, for example, the Class C limit is 7,000 curies per cubic meter (Ci/m^3). The half-life of Ni-63 is 92 years. For nickel-59, with a half-life of 80,000 years, the limit is 220 Ci/m^3. For cesium-137, a material often used in sealed sources, the limit is 4600 Ci/m^3. The half-life of Cs-137 is 30.2 years.)

3. "What is the Staff Doing To Assure That All Wastes Have a Place to Go When a Site is Decommissioned?"

It appears that for TRU waste disposal, staff can do little to provide this assurance in the absence of legislation clarifying governmental disposal responsibilities. As noted in Enclosure 1, the Low-Level Radioactive Waste Policy Act of 1980 (LLRWPA) sets a policy of state responsibility for commercial LLW, but exempts TRU from the definition of LLW. TRU is not defined for this purpose in any federal law. Most proposed interstate compact legislation for LLW disposal defines LLW to conform to Part 61, which permits near-surface disposal of TRU in concentrations up to 100 nCi/gm. No state has offered to accept TRU for disposal in concentrations greater than 100 nCi/gm. TRU will be of primary concern in the decommissioning of certain materials licensees.

It is not clear that the U.S. Department of Energy (DOE) is prepared to accept commercial TRU for disposal. Congressman Manuel Lujan, ranking minority member on the House Committee on Interior and Insular Affairs, has recently asked for a clarification of DOE policy on this point. In a January 3, 1985 letter to former DOE Secretary Donald Hodel, Mr. Lujan pointed out that when the Interior Committee was working on the bill that was to be incorporated into the Nuclear Waste Policy Act of 1982, he had reluctantly agreed to withdraw a provision for DOE disposal of commercially-generated TRU. He said he had based his withdrawal in 1982 on the strength of "a general

OFC	WMPC	WMPC	WMPC	WM	FC	NMSS	EDO
NAME	RMacDougall	JJSurmeier	JOBunting	REBrowning	RECunningham	JGDavis	WJDircks
DATE	85/02/14						

understanding that the DOE would favorably consider proposals by the private sector to decommission unused facilities contaminated by transuranic materials [and give the TRU wastes to DOE for disposal]." (See Enclosure 3.)

In testimony before the Senate Judiciary Committee in March of 1983, however, DOE argued against opening DOE sites for "interim disposal of commercial low-level radioactive waste," implicitly including TRU. "The DOE does not have the authority to routinely accept such waste for disposal," the testimony said. "Even interim storage of the waste at DOE sites poses problems for the Department." (See Enclosure 4, p. 7.) Although DOE did not elaborate on what it meant by "routinely," nor on what wastes it might accept under special circumstances, its testimony leaves room for doubt as to whether DOE can legally accept any NRC-regulated radioactive wastes not defined as "high-level." If this is the case, and all NRC-regulated TRU exceeding 100 nCi/gm is not defined as HLW, none of these wastes would have a place to go without legislative action.

For more than a year, NRC staff has been conducting studies to support a rulemaking to revise the current definition of high-level wastes. Later this year, we expect to submit for Commission review a draft proposal for rulemaking action on the definition of high-level wastes as provided under NWPA. This draft will address the question of how best to ensure that all NRC-licensed radioactive wastes will have a place to go for disposal.

In addition to the problems posed by TRU issues, there are other limits to the NRC's ability to ensure that safe disposal capacity will be available when needed for all categories of decommissioning waste. NRC's responsibility in this area is to regulate the disposal of radioactive waste in order to protect the public health and safety. The NRC is not responsible for promoting the development of LLW sites and cannot compel anyone to open and operate a LLW disposal site. Nor can the NRC prevent a licensed operator from going out of business, subject to appropriate decommissioning/decontamination requirements. Although it would be within the NRC's authority, upon demonstrating the requisite public health and safety rationale, to establish a license condition that a disposal site licensee must accept certain types and amounts of waste, economic factors may be such that no one will be interested in holding a license

OFC	WMPC	WMPC	WMPC	WM	FC	NMSS	EDO
NAME	RMacDougall	JJSurmeier	JOBunting	REBrowning	RECunningham	JGDavis	WJDircks
DATE	85/02/14						

so conditioned. In summary, there is a limit, based on the nature of the NRC's statutory authority and market forces beyond the NRC's control, on the NRC's ability to ensure that there will be sufficient disposal capacity for low-level decommissioning wastes.

As noted above, DOE has said it has no authority to accept routinely LLW that has not been produced from DOE atomic energy defense activities or federal R&D. If a licensed commercial disposal site can not be found for a particular kind of LLW from licensed activities, legislative action would be needed to authorize acceptance of this waste as a federal responsibility before DOE or any other federal agency could begin developing the facilities to receive and dispose of it.

As the Commission is aware, legislation has been proposed in Congress to define state and federal disposal responsibilities. Any Commission action to propose rulemaking in this area would have to take ongoing legislative efforts into consideration.

William J. Dircks
Executive Director for Operations

Enclosures:
1. Background on Uncertainties
   Affecting D&D Waste Disposal
2. Supplemental Information on
   D&D Wastes Affected
3. Ltr from Hon. Manuel Lujan
   dtd 1/3/85
4. DOE Testimony to Senate
   Judiciary Committee
   dtd 3/2/83

NMSS	RES/CEBR	OSP	OELD	WMEG	WMRP	WMGT	WMLU
MAUSSHARDT	CFELDMAN*	SALOMON*	CAMERON	BARRETT*	MILLER*	KNAPP*	HIGGINBO
85/02/	85/02/14	85/02/15	85/02/19	85/02/15	85/02/14	85/02/08	85/02/15

*See previous concurrence

OFC	WMPC	WMPC	WMPC	WM	FC	NMSS	EDO
NAME	RMacDougall*	JJSurmeier*	JOBunting*	REBrowning*	RECunningham*	JGDavis	WJDircks
DATE	85/02/19	85/02/14	85/02/14	85/02/15	85/02/15	85/02/	85/02/

authority in regard to Agreement State licensees. Furthermore, the staff does not presently foresee any circumstances under which the use of such authority in regard to NRC licensees would be necessary. Of course, this does not exclude the possibility of an aggrieved private party with excluded wastes from also attempting to compel a site to accept those wastes on the basis of statutory requirements or that the refusal to accept the waste imposes an unconstitutional restraint on interstate commerce.

As noted above, DOE has said it has no authority to accept routinely LLW that has not been produced from DOE atomic energy defense activities or federal R&D. If a licensed commercial disposal site can not be found for a particular kind of LLW from licensed activities, legislative action would be needed to authorize acceptance of this waste as a federal responsibility before DOE or any other federal agency could begin developing the facilities to receive and dispose of it.

As the Commission is aware, legislation has been proposed in Congress to define state and federal disposal responsibilities. Any Commission action to propose rulemaking in this area would have to take ongoing legislative efforts into consideration.

William J. Dircks
Executive Director for Operations

Enclosures:
1. Background on Uncertainties Affecting D&D Waste Disposal
2. Supplemental Information on D&D Wastes Affected
3. Ltr from Hon. Manuel Lujan Dtd 1/3/85
4. DOE Testimony to Senate Judiciary Committee Dtd 3/2/83

				WMLL			WM
				LHigginbotham			MBell
				85/2/15			85/
NMSS	RES/CEBR	OSP	OELD	WMEG			WMGT
DBMausshardt	CFeldman	Salomon	FXCameron	LHBarrett	HJMiller		MRKnapp
2/ /85	2/14/85	2/15/85	2/15/85	2/15/85	2/14/85		2/08/85

OFC	:WMPC	:WMPC	:WMPC	:WM	:FC	:NMSS	:EDO
NAME	:RMacDougall	:JJSurmeier	:JOBunting	:REBrowning	:RECunningham	:JGDavis	:WJDircks
DATE	:85/02/14	:2/14/85	:2/15/85	:2/15/85	:2/15/85	:	:

BACKGROUND INFORMATION
ON UNCERTAINTIES AFFECTING DISPOSAL
OF CERTAIN DECOMMISSIONING WASTES

Under existing law, responsibilities for high-level and low-level waste disposal are clear. The Nuclear Waste Policy Act of 1982 (NWPA) provides that the federal government is responsible for the disposal of high-level wastes and spent fuel. Under the Low-Level Radioactive Waste Policy Act of 1980 (LLRWPA), each of the states is responsible, either individually or as a member of an interstate compact, for providing for disposal capacity for all low-level wastes generated within its borders -- except those low-level wastes resulting from DOE atomic energy defense activities and federal research and development programs, which remain a federal responsibility.

The classification of wastes into high-level and low-level is not yet complete, however. Under NWPA, high-level waste (HLW) is defined to include: 1) the highly radioactive material resulting from the reprocessing of spent fuel; and 2) "other highly radioactive material" that the Commission determines by rule requires "permanent isolation." Low-level waste (LLW) is defined under the same Act as material that: 1) is not high-level waste, transuranic waste, or the wastes or tailings from processing uranium or thorium ores as source material; and 2) the Commission, consistent with existing law, classifies as LLW. (Significantly, transuranic wastes have not been defined by statute.) NRC has not yet undertaken rulemaking under either of these statutory definitions, although the staff has been developing a proposed rulemaking action to determine what "highly radioactive materials" require "permanent isolation."

NRC and Agreement State licensees are generating a small volume of wastes in relatively high radionuclide concentrations for which disposal requirements and governmental responsibilities have not been clearly determined. NRC's 10 CFR Part 61 licensing rule for the land disposal of low-level wastes sets forth a classification system that limits the nuclide concentrations of wastes that can be disposed of routinely by "near-surface" disposal methods (generally, at depths of 30 meters or less). Wastes falling within Class C, the category with highest concentration limits, must be disposed of with barriers sufficient to protect someone who might inadvertently intrude into the waste (say, by excavating into trenches) 500 years after disposal. Under 10 CFR 61.7(a)(5), wastes with nuclide concentrations exceeding Class C limits are generally unacceptable for routine near-surface disposal, but may be considered for such disposal on a case-by-case basis.

Enclosure 1

Most proposed interstate compact legislation (including legislation enacted in New Jersey) defines LLW in a manner consistent with existing concentration limits in Part 61 for routine near-surface disposal, but there are a few exceptions. One state Governor has asked NRC to re-evaluate its overall waste classification system under Part 61 (letter from New Jersey Governor Thomas H. Kean, August 2, 1984). The proposed Northwest LLW compact would limit disposal of TRU to 10 nCi/gm, although Northwest Compact officials have said they would accept a condition in Congressional consent language effectively requiring the Compact to accept responsibility for disposing of TRU in concentrations of 100 nCi/gm³. Overall, it should be noted that in six of the nine proposed compacts, including the Northwest Compact region, low-level waste would be defined in such a way that state acceptance of disposal responsibility for some or all wastes exceeding Class C concentrations would not be assured. In general, it thus appears safe to say that Class C limits provide the lower bounds for those wastes for which disposal requirements and governmental responsibilities remain to be clarified.

There are currently no upper bounds on nuclide concentrations that can be considered for disposal as low-level wastes. Only spent fuel and the highly radioactive wastes from reprocessing are now classified as high-level wastes by definition. After considering the staff proposal on rulemaking action, however, the Commission could propose to classify some or all of the NRC-regulated wastes exceeding Class C limits as HLW.

SUPPLEMENTAL INFORMATION
ON TYPES OF DECOMMISSIONING WASTES
THAT DO NOT NOW HAVE AN ASSURED PLACE FOR DISPOSAL

I. Background: Typical Reactor Decommissioning Wastes

The decontamination and decommissioning of commercial power reactors, which account for a major share of decommissioning wastes, typically produce three different types of radioactive waste materials: neutron-activated materials, contaminated materials, and the radioactive wastes from facility decontamination.

Neutron-activated wastes include the reactor pressure vessel, the vessel internal components and structures, and the surrounding concrete biological shield.

Contaminated materials include nearly all of the piping and equipment in the reactor containment and the fuel, auxiliary, and control buildings, and many of the concrete surfaces in these buildings in a pressurized water reactor. Boiling water reactors produce contaminated materials in much the same places. These include the piping and equipment in the reactor building/primary containment, the turbine generator building, the radwaste and control building, and many of the concrete surfaces in these buildings.

The radioactive wastes from decontamination include both wet solid wastes from the processing of chemical decontamination solutions and contaminated water, and dry solid wastes such as rags, wipes, plastic sheeting, tools, and anti-contamination clothing.

According to a Pacific Northwest Laboratory (PNL) study, only about 0.7 percent of the volume of these decommissioning wastes from a reference pressurized water reactor (PWR) would be generally unacceptable for disposal as low-level wastes using near-surface disposal methods (see NUREG/CR-130, Addendum 3, p. iii). Adding up PNL's numbers, however, this 0.7 percent by volume accounts for 63 to 97 percent of the total curies in PWR decommissioning wastes, depending on the decommissioning alternative selected. (The higher value applies to the options of DECON, or decontamination to levels for unrestricted use immediately after the useful life of the reactor, and ENTOMB, or entombment of the reactor with decay to urestricted use. The lower value applies to the 100-year SAFSTOR

Enclosure 2

option, under which the reactor is decontaminated to unrestricted use after 100 years of secure storage.) For decommissioning the reference boiling water reactor in a separate PNL study, the estimated 0.2 percent by volume of wastes PNL expected to be generally unacceptable for near-surface disposal (NUREG/CR-0672, p. ix) would account for about 96 percent of the curies associated with the ENTOMB and DECON decommissioning alternatives, and about 71 percent of the curies under the 100-year SAFSTOR alternative.

As noted below, NRC has not done studies in corresponding detail to identify the kinds of wastes that would be produced from the decommissioning of many other licensee installations, particularly those of materials licensees such as the manufacturers and users of sealed sources.

II. Potential Problem Wastes

The staff has identified the following decommissioning wastes for which disposal capacity is presently either not available or not assured under the current regulatory framework:

a. Certain Transuranic Wastes (TRU) Depending on the disposal site regulations, and the terms of the compact legislation in a particular region, disposal of TRU may be prohibited in concentrations greater than the informal past standard of 10 nanocuries per gram (nCi/gm) or the 100 nCi/gm Class C limit for routine shallow-land burial. Of the two principal operating commercial LLW disposal sites, the state-issued license for Barnwell prohibits TRU disposal in concentrations greater than 100 nCi/gm, and the state license for Hanford prohibits concentrations of 10 nCi/gm or more, although limited exemptions can be granted on a case-by-case basis. Neither site is authorized to receive or dispose of "components or equipment contaminated with transuranic nuclides" ("primarily contaminated" in the Barnwell license.) Staff has only rough estimates of the volumes of TRU-contaminated decommissioning wastes, and the radionuclide concentration data needed to classify specific waste streams. Except for the clean-up of accidental contamination at reactors, such as Three-Mile Island Unit 2, TRU-contaminated decommissioning wastes are typically associated with certain materials licensee operations.

b. Certain Activation Products NRC contractor studies have found that some irradiated power reactor components contain enough activated nickel and niobium to make these components "generally unsuitable for near-surface disposal." (NUREG/CR-3474, p. iii. The Class C limits for Ni-59 (half-life 80,000 years) and Ni-63 (half-life 92 years) in activated

metal are 220 and 7,000 curies per cubic meter (Ci/m^3) respectively. The limit for Nb-94 (half-life 20,000 years.) in activated metal is 0.2 Ci/m^3.)

Estimated volumes of these reactor component wastes (133 cubic meters for each pressurized water reactor and 47 cubic meters for each boiling water reactor) are based on reference facility designs, and NRC staff believes they may not accurately indicate total actual volumes. In its study of long-lived activation products in reactor materials, PNL noted "large uncertainty" in the calculation of activation levels, and found that activatable trace levels in some reactor components "vary over more than an order of magnitude for several key trace elements including cobalt and niobium." (NUREG/CR-3474, p. 127.)

The South Carolina Department of Health and Environmental Control, which regulates the disposal of all but special nuclear material at the Barnwell facility, has received numerous requests for variances to permit acceptance of wastes in concentrations exceeding Class C limits. These wastes, according to the state, are "typically irradiated reactor components." The state is deferring all approvals of variance requests until it receives NRC's position on disposal requirements for above-Class-C wastes. (Letter from Mr. Heyward G. Shealey to Mr. Donald A. Nussbaumer, dated October 18, 1984).

c. Other Wastes Exceeding Class C Concentrations No studies corresponding to the reactor decommissioning studies above have been done on other utilization or production facilities or materials licensees (such as the manufacturers of sealed sources), to determine the volumes and activities of non-TRU wastes exceeding Class C limits. An indeterminate volume of wastes unacceptable for routine near-surface disposal will also be produced in the decommissioning of these installations.

d. Wastes Made Unacceptable by Site-Specific Conditions Staff expects that some decommissioning wastes will be unacceptable at some LLW disposal sites, particularly in humid climates, because of site-specific conditions. NRC itself may require disposal of some wastes in an arid climate. Chelate-contaminated wastes from the decontamination of the Dresden-1 reactor must be disposed of at an arid site now, and a similar decontamination process may be used at other reactors. Depending on the licensee, potentially unacceptable D&D materials might also include wastes with especially mobile nuclides such as tritium or carbon-14.

If an alternate disposal site within the compact region were not available for these wastes, their disposal at a site elsewhere would depend on the

willingness of another state or compact to accept them. Under Section 4(a)(2)(B) of the Low-Level Radioactive Waste Policy Act (LLRWPA), an LLW disposal compact to which Congress has granted consent may, after January 1, 1986, restrict the use of regional disposal facilities under the compact to the disposal of waste generated within the region. Thus, if all compacts impose such restrictions, and wastes unacceptable at the regional facility of a particular compact could not be disposed of elsewhere within that region, another compact or state outside the affected region would have to lift its importation restrictions before these wastes would have a place to go for disposal.

MANUEL LUJAN, JR.
1ST DISTRICT, NEW MEXICO

COMMITTEES
INTERIOR AND INSULAR AFFAIRS
SCIENCE AND TECHNOLOGY

Congress of the United States
House of Representatives
Washington, D.C. 20515

January 3, 1985

Hon. Donald Paul Hodel
Secretary
U.S. Department of Energy
Washington, D.C. 20545

Dear Mr. Secretary:

Based on recent information brought to my attention, I am concerned that the U.S. Department of Energy (DOE) may not be giving due consideration to private-sector initiatives to decommission unused facilities contaminated with plutonium and other transuranic (TRU) materials.

During Congressional consideration of the Nuclear Waste Policy Act of 1982 (NWPA), I sponsored a provision that provided for the disposal of commercially-generated transuranic wastes. At the time of its adoption by the House Interior and Energy Committees and still today, there is no available means to dispose of such materials other than at facilities owned and operated by the DOE.

I sponsored this provision because the lack of such facilities to dispose of commercially-generated TRU was impeding efforts by the private-sector to decommission TRU-contaminated facilities that were no longer in use. I believe it to be in the public interest that such unused facilities be dismantled expeditiously so as to prevent any potential health or safety problems from developing in the future. I note that the DOE is currently spending billions of taxpayer dollars to decommission its unused facilities and facilities abandoned by others.

In the interest of expediting passage of the NWPA, I reluctantly agreed to drop this provision based on the general understanding that the DOE would favorably consider proposals by the private-sector to decommission unused facilities contaminated by transuranic materials. As I am sure DOE would acknowledge, such efforts could serve important research and development activities in the areas of decontamination and volume reduction techniques as well as waste immobilization and waste packaging methods.

Enclosure 3

I strongly encourage the DOE to continue to give favorable consideration to private-sector initiatives that serve to eliminate potential health and safety problems arising from unused facilities contaminated with TRU materials.

I would appreciate learning your views on this matter as soon as possible.

Sincerely yours,

MANUEL LUJAN, JR.
Member of Congress

ML:fer

STATEMENT OF FRANKLIN E. COFFMAN

DIRECTOR, OFFICE OF TERMINAL WASTE DISPOSAL

AND REMEDIAL ACTION

U.S. DEPARTMENT OF ENERGY

BEFORE THE

SENATE JUDICIARY COMMITTEE

MARCH 2, 1983

Mr. Chairman and Members of the Committee, I am pleased to appear before you today to discuss the Department of Energy's (DOE) progress and plans with respect to Interstate Commercial Low-Level Radioactive Waste Management Compacts. In my testimony I wish to: (1) reaffirm the Department's support of the letter and intent of the Low-Level Radioactive Waste Policy Act (the Act) of 1980; and (2) discuss the points of Committee concern contained in your letter of invitation.

You will recall, Mr. Chairman, that DOE officials testified at the hearing convened by the Committee in Seattle last November. There, we focused mainly on the Northwest Interstate Compact on Low-Level Radioactive Waste Management. We welcome this opportunity to meet with you once again to consider the broader aspects of the Act.

The status of regional compacts and of States developing low-level radioactive waste disposal sites was reflected in the report we prepared at Senator McClure's request. That report, you may recall, was submitted for the record at the Committee's November hearing. The current situation is as follows:

Enclosure 4

- The Northwest Interstate Compact on Low-Level Radioactive Waste Management has been negotiated among eight States, ratified by [illegible], and is pending before both Houses of Congress.

- The Rocky Mountain Low-Level Radioactive Waste Compact has been negotiated among six States and ratified by one.

- The Midwest Interstate Compact on Low-Level Radioactive Waste has been negotiated among sixteen States and ratified by one.

- The Central Interstate Low-Level Radioactive Waste Compact has been negotiated among ten States and ratified by three.

- The Northeast Interstate Low-Level Radioactive Waste Compact has been negotiated among eleven States and the proposed compact sent to the Governors. Action by State legislatures is expected to begin shortly.

- The Southeast Interstate Low-Level Radioactive Waste Management Compact has been renegotiated among eight States, with Virginia added as an eligible State. It has been ratified by one State and establishes 1992 as the closure date for the Barnwell, South Carolina, low-level radioactive waste disposal site.

One other compact has been negotiated, the Mid-Atlantic Interstate Low-Level Radioactive Waste Compact, but its future is in doubt because the inclusion of Virginia, a pivotal State, in the Southeast Compact.

Several States are listed as eligible States in more than one compact, but will only be allowed membership in one. The sorting out process is now in progress as State legislatures consider the various compacts. Texas and

California are each taking steps to establish independent low-level radioactive waste disposal capacity. West Virginia has not participated in the compact negotiation process but has recently indicated that it will seek membership in the Midwest Compact. Puerto Rico, District of Columbia, Virgin Islands, Guam, Northern Mariana Islands, and American Samoa remain unaffiliated.

Simultaneously, activities are underway to establish new low-level radioactive waste disposal sites. Colorado is farthest along with a potential site identified and currently being characterized. A preliminary schedule calling for licensing of the site by 1986 has been developed. California is defining disposal requirements and developing siting criteria. Texas will be conducting site selection activities this spring and summer. Pennsylvania and Massachusetts are also exploring the process for siting low-level radioactive waste disposal facilities.

In the majority of instances compact language is compatible with the language and intent of the Act. It is our understanding, except in establishing State responsibility and endorsing the formation of regional compacts to carry out this responsibility, it was Congress' intent not to change low-level radioactive waste management practices. However, clarification of this intent would be beneficial in two areas: the definition of low-level radioactive waste and the disposal of Federally-generated low-level radioactive waste.

Differences exist between the language of some compacts and the definition of low-level radioactive waste, primarily due to a recent regulatory revision of the maximum permissible transuranic (TRU) activity allowed for near surface disposal. The Nuclear Regulatory Commission (NRC) published 10 CFR Part 61, on December 21, 1982, which provides the licensing procedures,

performance objectives, and technical requirements for disposal of low-level radioactive waste. In 10 CFR Part 61, the NRC uses the same definition for low-level radioactive waste as the Act and allows for certain waste containing up to 100 nCi/g of TRU activity, previously limited to 10 nCi/g, to be disposed in a near surface disposal facility.

This definition is generally accepted throughout the nuclear community. The DOE is in agreement with the 100 nCi/g limit and we understand that the Environmental Protection Agency is also considering this 100 nCi/g limit. However, the language of the Northwest, Southeast, Rocky Mountain, and Midwest Compacts specify low-level radioactive waste as having a maximum TRU activity level of 10 nCi/g. In our judgement waste between 10 and 100 nCi/g is low-level radioactive waste and is a State responsibility. It should be disposed under the provisions of the Act. We believe that Congress should clarify this important matter in the near future to alleviate potential technical and legal issues.

Disposal of low-level radioactive waste generated by activities of the Federal Government is another issue which needs clarification. The Act excludes waste generated as a result of defense activities of the Secretary of Energy or Federal research and development activities. But, other Federal Government activities, including some facilities of the Defense, Agriculture, Veterans Administration, and Environmental Protection agencies, generate low-level radioactive waste. These facilities have NRC or Agreement State licenses and routinely ship low-level radioactive waste to commercial facilities

for disposal. In our judgement, it was not the intent of the Act to alter this practice. Language in the Northwest and Rocky Mountain Compacts is in conflict with this intent and should be modified. A Congressional statement on this matter would clarify the disposal policy.

As you know, Mr. Chairman, DOE does not regulate any low-level radioactive waste except for the waste it generates. Low-level radioactive waste generated commercially, or by Federal facilities other than the DOE, is regulated by the NRC or Agreement States and the Department of Transportation, and will be addressed by others.

Concerning the legality of a single State excluding waste from outside its borders, the Act encourages States to form compacts and specifically authorizes regional compacts, upon consent of Congress, to exclude disposal of low-level radioactive waste generated outside their regions after January 1, 1986. It does not, however, prohibit a State from pursuing an individual waste management solution and does not address a single State excluding outside waste. Texas and California are not pursuing a regional solution and are working to establish individual low-level radioactive waste disposal facilities. The legal basis for an individual State to exclude waste from outside its borders is ambiguous and subject to several interpretations. In our judgement, Congress should clarify this legal basis and extend the exclusion provision to individual States to ensure equal treatment.

There are both positive and negative impacts associated with banning export of waste to facilities outside a region. Allowance of export bans should stabilize the management of low-level radioactive waste within each individual region. Each region would have direct control over all the waste generated within its borders.

However, competition between regions for waste is removed and may increase and perpetuate imbalances between regions and also reduce competition between generators. Not all regions generate the same amount of low-level radioactive waste. Regions with large volumes should be able to dispose of waste at a lower unit cost than regions with a smaller volume. Banning export of waste prohibits a generator just inside the border of a small waste volume, high cost region, from transporting the waste to a large volume, low cost regional disposal site which may be closer to the waste generation facility. Nonetheless, we believe that the use of export bans should be allowed. Their use must be conditional, so as to strike a balance between regional control, for the benefit of all generators in the region, and the imposition of unnecessarily severe economic burdens on any one generator. Exceptions to export bans could be granted by each regional commission. Each compact should be judged separately as to the desirability of banning the export of waste.

We believe that the 1986 exclusion date should not be extended and that DOE sites should not be made available for the interim disposal of commercially-generated low-level radioactive waste. States have accepted the responsibility for management of their low-level radioactive waste and are

making significant progress in carrying out this responsibility under the conditions set forth in the Act. In our judgement, an extension of the 1986 exclusion date could reduce the pace at which States are proceeding. States and regions are also exploring methods and agreements for inter-regional cooperation. Such inter-regional agreements are the most appropriate way to resolve short term problems with adequate disposal capacity and to establish long term contingency arrangements and should be encouraged.

Opening of the DOE sites for interim disposal of commercial low-level radioactive waste would have the same impact as extension of the 1986 exclusion date. In our view it reinstitutes a Federal solution for commercial low-level radioactive waste management. Additionally, the DOE does not have the authority to routinely accept such waste for disposal. Even interim storage of t waste at DOE sites poses problems for the Department. The report we prepared in response to passage of the Act, and provided as an appendix to our November 9 testimony, provided a detailed analysis of the interim storage option (pages 34-36).

If the DOE had to accept commercial low-level radioactive waste at any of its sites, it would first consult with the State in which the DOE site is located. The major DOE disposal sites are located in Idaho, Nevada, New Mexico, South Carolina, Tennessee, and Washington. As you can see, none of these major DOE sites is located in those parts of the country most likely to have insufficient disposal capacity, the Northeast and Midwest. The DOE sites with the largest capacity are located in Nevada, South Carolina, and Washington and are adjacent to or in close proximity to operating commercial

disposal sites. It was the Governors of these three States who, in 1979, expressed their objections to receiving the Nation's low-level waste and, therefore, started the national debate that culminated in the enactment of the Low-Level Radioactive Waste Policy Act.

I would like to address the impact of the Nuclear Waste Policy Act of 1982 on the development of regional compacts and new low-level radioactive waste disposal sites. Subtitle D of that act should have no adverse impact on the development of new low-level radioactive waste disposal sites. In our judgement, the policy of State responsibility for low-level radioactive waste management has been reaffirmed.

Our preliminary analysis of Subtitle D is that the chance of a new low-level radioactive waste disposal site becoming a financial burden to the host State has been reduced. Additionally, for those low-level radioactive waste disposal sites licensed by the NRC, the law provides that DOE may assume title to these sites if certain conditions are met.

We believe that---in the main---the States are to be commended for exercising the options available to them under the Act in meeting their low-level radioactive waste disposal responsiblities. There is evidence of good progress, and positive momentum appears to be accelerating.

This completes my formal testimony, Mr. Chairman. I shall be pleased to attempt to answer any questions that you or the other Committee members may have at this time.

Tom:

3/15

As promised

Rob

A. T. Clark

MRS STATE AND TRIBAL LIAISON PLAN

PREPARED BY

THE RALPH M. PARSONS COMPANY OF DELAWARE
WESTINGHOUSE ELECTRIC CORPORATION
GOLDER ASSOCIATES, INC.

OBJECTIVE

THE OBJECTIVE OF THE MRS STATE AND TRIBAL LIAISON PLAN IS TO PROVIDE A FRAMEWORK FOR INTERACTION BETWEEN DOE AND THE STATES AND TRIBES IN THE MRS PROGRAM, IN THE EVENT THAT CONGRESS AUTHORIZES THE DEVELOPMENT OF AN MRS FACILITY.

SIGNIFICANT PROVISIONS OF THE NWPA

1) SECTION 141H - MAKES APPLICABLE CERTAIN C AND C PROVISIONS OF NWPA

2) SECTION 115 - CONGRESSIONAL REVIEW OF MRS SITE RECOMMENDATION

3) SECTION 116 - PARTICIPATION OF THE STATES (EXCLUDES 116C - FINANCIAL ASSISTANCE)

4) SECTION 117 - CONSULTATION WITH STATES AND TRIBES

5) SECTION 118 - PARTICIPATION OF INDIAN TRIBES

6) SECTION 141F - IMPACT ASSISTANCE TO UNITS OF GENERAL LOCAL GOVERNMENT

FINANCIAL ASSISTANCE TO STATES

1) SECTION 116C IS SPECIFICALLY OMITTED, THOUGH NOT PROHIBITED, FROM BEING APPLICABLE TO MRS PROGRAM

2) THIS SECTION ALLOWS FINANCIAL ASSISTANCE TO STATES TO:

- REVIEW DOE PROGRAM
- DEVELOP REQUEST FOR IMPACT ASSISTANCE
- ENGAGE IN MONITORING, TESTING OR EVALUATION
- PROVIDE INFORMATION TO RESIDENTS
- REQUEST AND COMMENT ON PROGRAM INFORMATION

3) THIS SECTION MAKES PROVISIONS FOR IMPACT ASSISTANCE TO STATES

4) DOE AWARE OF OMISSION, AND MAY SEEK TO MAKE SUCH PAYMENTS

DOE PROGRAM FOR STATE AND TRIBAL LIAISON IN MRS PROGRAM

1) PROVISION OF INFORMATION

2) CONSULTATION AND COOPERATION

3) WRITTEN AGREEMENTS

4) NOTIFICATION

5) FINANCIAL ASSISTANCE

PROVISION OF INFORMATION

1) SECTION 117A IS KEY PROVISION

2) TIMELY AND COMPLETE INFORMATION DISCLOSURE ON DETERMINATIONS AND PLANS

- SITE CHARACTERIZATION
- SITING
- DEVELOPMENT
- DESIGN
- LICENSING
- CONSTRUCTION
- OPERATION
- REGULATION
- DECOMMISSIONING

3) TIMELY MEANS BEFORE DECISIONS AND PLANS ARE FINALIZED

CONSULTATION AND COOPERATION

1) TIMELY AND COMPLETE DISCLOSURE

2) ATTEMPT TO RESOLVE CONCERNS OF AFFECTED PARTIES ON:

- PUBLIC HEALTH AND SAFETY IMPACTS
- ENVIRONMENTAL IMPACTS
- ECONOMIC IMPACTS

3) TAKE CONCERNS INTO ACCOUNT IN FINAL PROGRAM DECISIONS AND PLANS TO THE MAXIMUM EXTENT FEASIBLE

WRITTEN AGREEMENTS

1) DOE WILL SEEK TO ENTER INTO WRITTEN AGREEMENTS WITH STATES AND AFFECTED TRIBES

2) MINIMUM CONTENTS TO SPECIFY PROCEDURES:

- TO STUDY AND COMMENT ON POSSIBLE IMPACTS
- FOR DOE TO CONSIDER SUCH COMMENTS
- TO PERIODICALLY REVIEW AND MODIFY AGREEMENT
- FOR SUBMISSION OF REQUEST FOR IMPACT ASSISTANCE
- TO RESOLVE CONCERNS ON POSSIBLE IMPACTS
- TO ROUTINELY PROVIDE SIGNIFICANT INFORMATION
- FOR TRANSPORTATION NOTIFICATION
- FOR INDEPENDENT MONITORING AND TESTING
- FOR SHARING INFORMATION
- FOR PUBLIC NOTIFICATION
- FOR RESOLVING OBJECTION

NOTIFICATION

1) 116A IS KEY NWPA PROVISION

2) DOE WILL NOTIFY HOST STATES AND AFFECTED TRIBES OF THE IDENTIFICATION OF POTENTIALLY ACCEPTABLE MRS SITES

FINANCIAL ASSISTANCE

1) 116C, 118B AND 141F ARE KEY NWPA PROVISIONS

2) FINANCIAL ASSISTANCE TO STATES (IF AUTHORIZED)
   - FOR OVERVIEW AND PARTICIPATION
   - IMPACT ASSISTANCE

3) FINANCIAL ASSISTANCE TO TRIBES
   - FOR OVERVIEW AND PARTICIPATION
   - IMPACT ASSISTANCE

4) IMPACT ASSISTANCE TO LOCAL UNITS OF GOVERNMENT

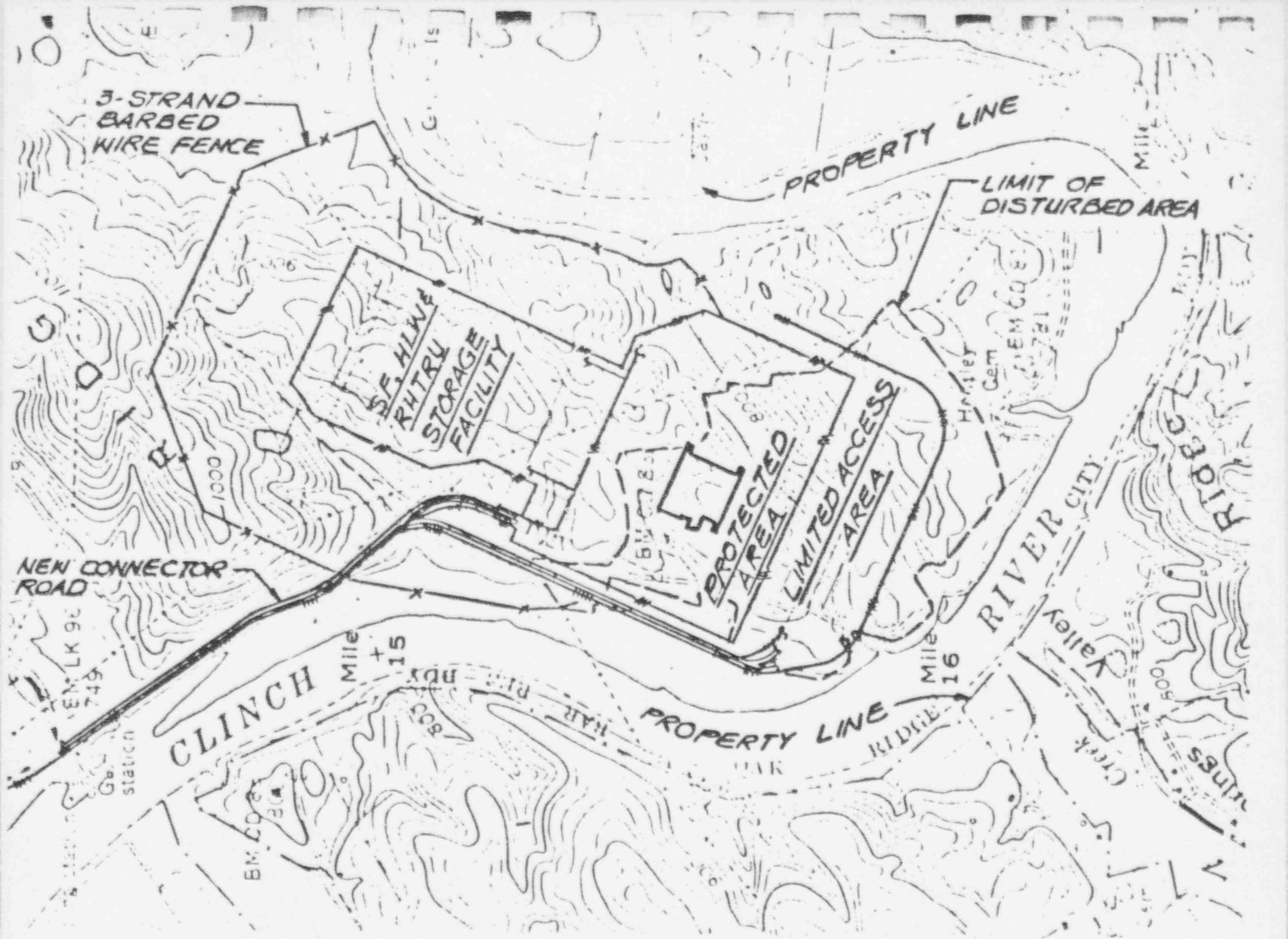
PROGRAM FOR DEVELOPMENT OF STATE AND TRIBAL LIAISON PLAN

1) PLAN CURRENTLY UNDER DEVELOPMENT

2) PEER REVIEW

3) COMMENTS FROM STATES AND TRIBES

4) FINALIZATION OF PLAN


3-STRAND BARBED WIRE FENCE
PROPERTY LINE
LIMIT OF DISTURBED AREA
S.F. HLW & RHTRU STORAGE FACILITY
PROTECTED AREA
LIMITED ACCESS AREA
NEW CONNECTOR ROAD
CLINCH RIVER
PROPERTY LINE
Mile 15
Mile 16
RIDGE
Valley
Creek
Gate
Station
Cem
BM 808
BM 801
BM 803
BM 805
1000
1010
1020
1030
1040
1050
1060
1070
1080
1090
1100
1110
1120
1130
1140
1150
1160
1170
1180
1190
1200
1210
1220
1230
1240
1250
1260
1270
1280
1290
1300
1310
1320
1330
1340
1350
1360
1370
1380
1390
1400
1410
1420
1430
1440
1450
1460
1470
1480
1490
1500
1510
1520
1530
1540
1550
1560
1570
1580
1590
1600
1610
1620
1630
1640
1650
1660
1670
1680
1690
1700
1710
1720
1730
1740
1750
1760
1770
1780
1790
1800
1810
1820
1830
1840
1850
1860
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
2060
2070
2080
2090
2100
2110
2120
2130
2140
2150
2160
2170
2180
2190
2200
2210
2220
2230
2240
2250
2260
2270
2280
2290
2300
2310
2320
2330
2340
2350
2360
2370
2380
2390
2400
2410
2420
2430
2440
2450
2460
2470
2480
2490
2500
2510
2520
2530
2540
2550
2560
2570
2580
2590
2600
2610
2620
2630
2640
2650
2660
2670
2680
2690
2700
2710
2720
2730
2740
2750
2760
2770
2780
2790
2800
2810
2820
2830
2840
2850
2860
2870
2880
2890
2900
2910
2920
2930
2940
2950
2960
2970
2980
2990
3000
3010
3020
3030
3040
3050
3060
3070
3080
3090
3100
3110
3120
3130
3140
3150
3160
3170
3180
3190
3200
3210
3220
3230
3240
3250
3260
3270
3280
3290
3300
3310
3320
3330
3340
3350
3360
3370
3380
3390
3400
3410
3420
3430
3440
3450
3460
3470
3480
3490
3500
3510
3520
3530
3540
3550
3560
3570
3580
3590
3600
3610
3620
3630
3640
3650
3660
3670
3680
3690
3700
3710
3720
3730
3740
3750
3760
3770
3780
3790
3800
3810
3820
3830
3840
3850
3860
3870
3880
3890
3900
3910
3920
3930
3940
3950
3960
3970
3980
3990
4000
4010
4020
4030
4040
4050
4060
4070
4080
4090
4100
4110
4120
4130
4140
4150
4160
4170
4180
4190
4200
4210
4220
4230
4240
4250
4260
4270
4280
4290
4300
4310
4320
4330
4340
4350
4360
4370
4380
4390
4400
4410
4420
4430
4440
4450
4460
4470
4480
4490
4500
4510
4520
4530
4540
4550
4560
4570
4580
4590
4600
4610
4620
4630
4640
4650
4660
4670
4680
4690
4700
4710
4720
4730
4740
4750
4760
4770
4780
4790
4800
4810
4820
4830
4840
4850
4860
4870
4880
4890
4900
4910
4920
4930
4940
4950
4960
4970
4980
4990
5000
5010
5020
5030
5040
5050
5060
5070
5080
5090
5100
5110
5120
5130
5140
5150
5160
5170
5180
5190
5200
5210
5220
5230
5240
5250
5260
5270
5280
5290
5300
5310
5320
5330
5340
5350
5360
5370
5380
5390
5400
5410
5420
5430
5440
5450
5460
5470
5480
5490
5500
5510
5520
5530
5540
5550
5560
5570
5580
5590
5600
5610
5620
5630
5640
5650
5660
5670
5680
5690
5700
5710
5720
5730
5740
5750
5760
5770
5780
5790
5800
5810
5820
5830
5840
5850
5860
5870
5880
5890
5900
5910
5920
5930
5940
5950
5960
5970
5980
5990
6000
6010
6020
6030
6040
6050
6060
6070
6080
6090
6100
6110
6120
6130
6140
6150
6160
6170
6180
6190
6200
6210
6220
6230
6240
6250
6260
6270
6280
6290
6300
6310
6320
6330
6340
6350
6360
6370
6380
6390
6400
6410
6420
6430
6440
6450
6460
6470
6480
6490
6500
6510
6520
6530
6540
6550
6560
6570
6580
6590
6600
6610
6620
6630
6640
6650
6660
6670
6680
6690
6700
6710
6720
6730
6740
6750
6760
6770
6780
6790
6800
6810
6820
6830
6840
6850
6860
6870
6880
6890
6900
6910
6920
6930
6940
6950
6960
6970
6980
6990
7000
7010
7020
7030
7040
7050
7060
7070
7080
7090
7100
7110
7120
7130
7140
7150
7160
7170
7180
7190
7200
7210
7220
7230
7240
7250
7260
7270
7280
7290
7300
7310
7320
7330
7340
7350
7360
7370
7380
7390
7400
7410
7420
7430
7440
7450
7460
7470
7480
7490
7500
7510
7520
7530
7540
7550
7560
7570
7580
7590
7600
7610
7620
7630
7640
7650
7660
7670
7680
7690
7700
7710
7720
7730
7740
7750
7760
7770
7780
7790
7800
7810
7820
7830
7840
7850
7860
7870
7880
7890
7900
7910
7920
7930
7940
7950
7960
7970
7980
7990
8000
8010
8020
8030
8040
8050
8060
8070
8080
8090
8100
8110
8120
8130
8140
8150
8160
8170
8180
8190
8200
8210
8220
8230
8240
8250
8260
8270
8280
8290
8300
8310
8320
8330
8340
8350
8360
8370
8380
8390
8400
8410
8420
8430
8440
8450
8460
8470
8480
8490
8500
8510
8520
8530
8540
8550
8560
8570
8580
8590
8600
8610
8620
8630
8640
8650
8660
8670
8680
8690
8700
8710
8720
8730
8740
8750
8760
8770
8780
8790
8800
8810
8820
8830
8840
8850
8860
8870
8880
8890
8900
8910
8920
8930
8940
8950
8960
8970
8980
8990
9000
9010
9020
9030
9040
9050
9060
9070
9080
9090
9100
9110
9120
9130
9140
9150
9160
9170
9180
9190
9200
9210
9220
9230
9240
9250
9260
9270
9280
9290
9300
9310
9320
9330
9340
9350
9360
9370
9380
9390
9400
9410
9420
9430
9440
9450
9460
9470
9480
9490
9500
9510
9520
9530
9540
9550
9560
9570
9580
9590
9600
9610
9620
9630
9640
9650
9660
9670
9680
9690
9700
9710
9720
9730
9740
9750
9760
9770
9780
9790
9800
9810
9820
9830
9840
9850
9860
9870
9880
9890
9900
9910
9920
9930
9940
9950
9960
9970
9980
9990
10000

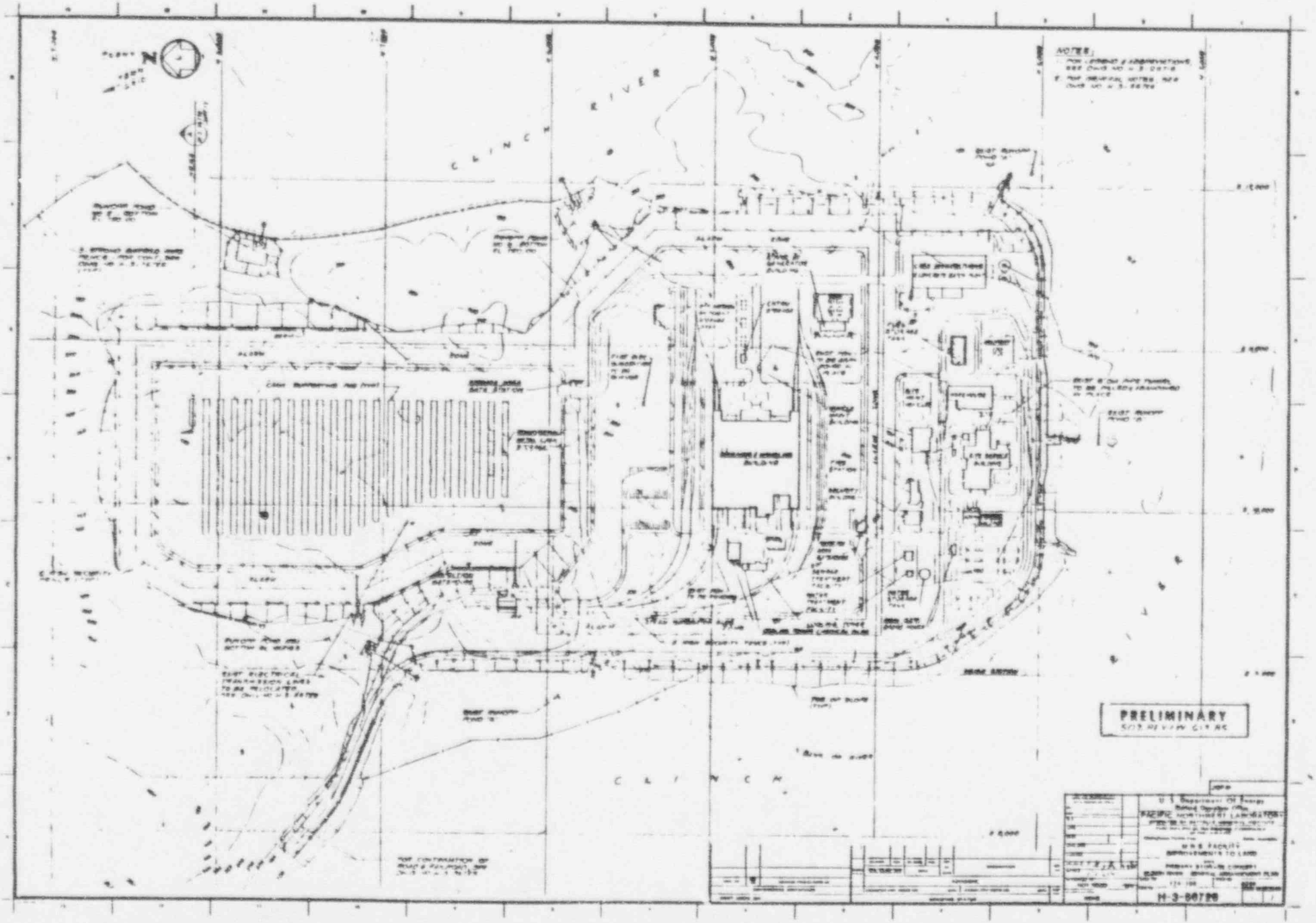
REGULATORY REQUIREMENTS

- 10 CFR 72 — Basic Licensing Requirements
- 10 CFR 73 — Physical Protection of Materials (expanded by DOE 5632 Chapter III)
- 10 CFR 20 — Exposure and Release Limits (expanded by DOE 5480-1A and DOE/EV 1830-T5)
- 10 CFR 70 — Inventory Control
- 10 CFR 50 Appendix B — Quality Assurance (expanded by NQA-1)

MRS THROUGHPUT DATA

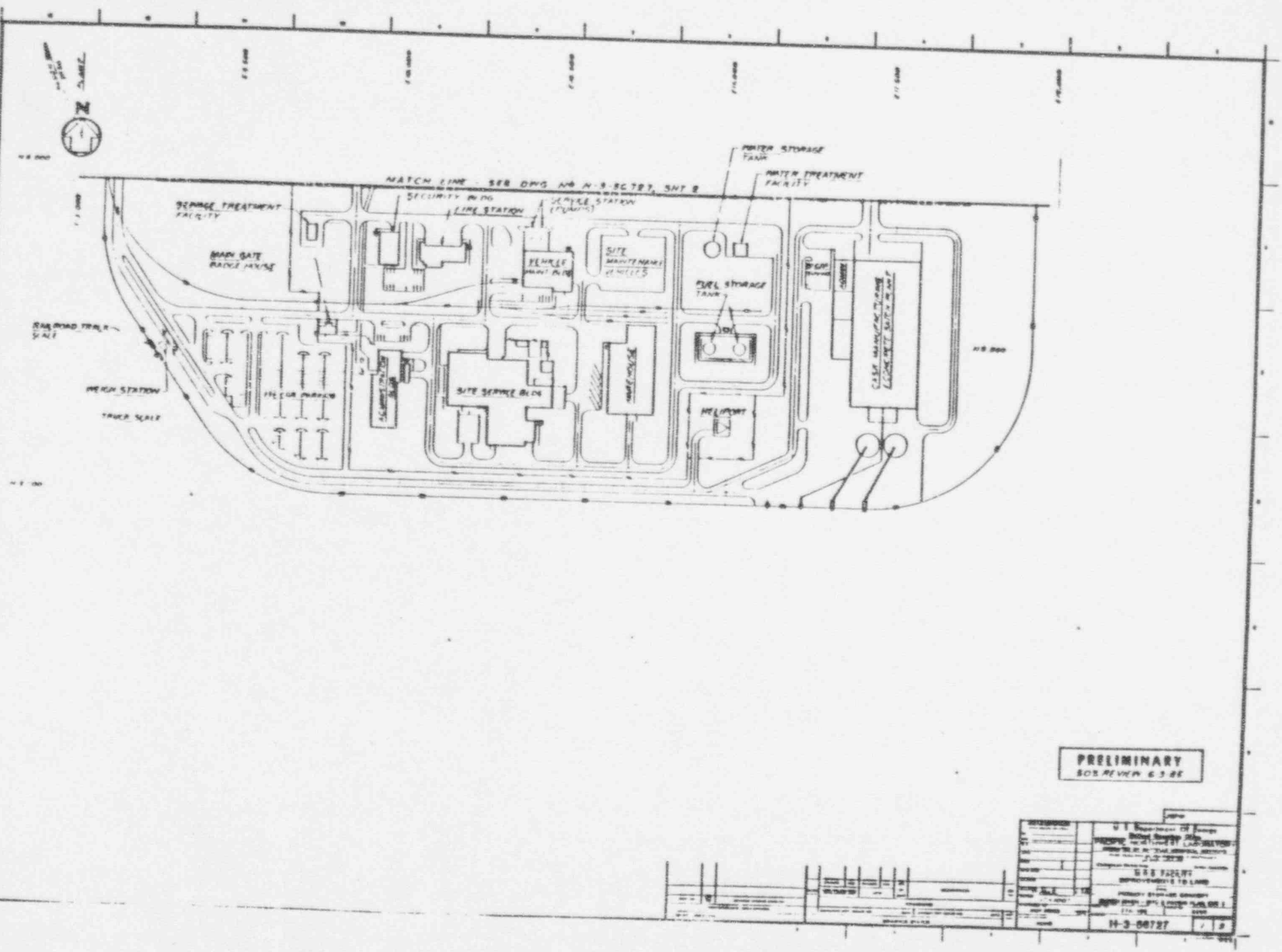
	Integrated MRS 3600 MTU/yr	
PWR spent fuel assemblies	4675/yr 90/wk	2272 MTU 44 MTU
BWR spent fuel assemblies	7742/yr 148/wk	1440 MTU 27 MTU
HLW	8/yr	
RHTRU	- None near term -	
Incoming SF assemblies lag storage	720 PWR 1280 BWR	349 MTU 238 MTU
In-house lag storage Consolidated SF rods (canisters)	433 PWR 307 BWR	631 MTU 399 MTU
55-gal drums Secondary waste (Non fuel bearing)	PWR 10/wk 420/yr BWR 24/wk 1160/yr	(9:1) (6:1)
12-in.-dia canister (Consolidated rods) (10% intact fuel assemblies)	PWR consolidated rods 1402 intact SF 466 BWR consolidated rods 994 intact SF 386	3248/yr
Repository overpack cask		812/yr 16/wk
Truck shipments Rail shipments	12/wk 5/wk	
Concrete storage casks required for 14,000-MTU storage capacity	spent fuel non fuel bearing HLW Onsite generated waste	

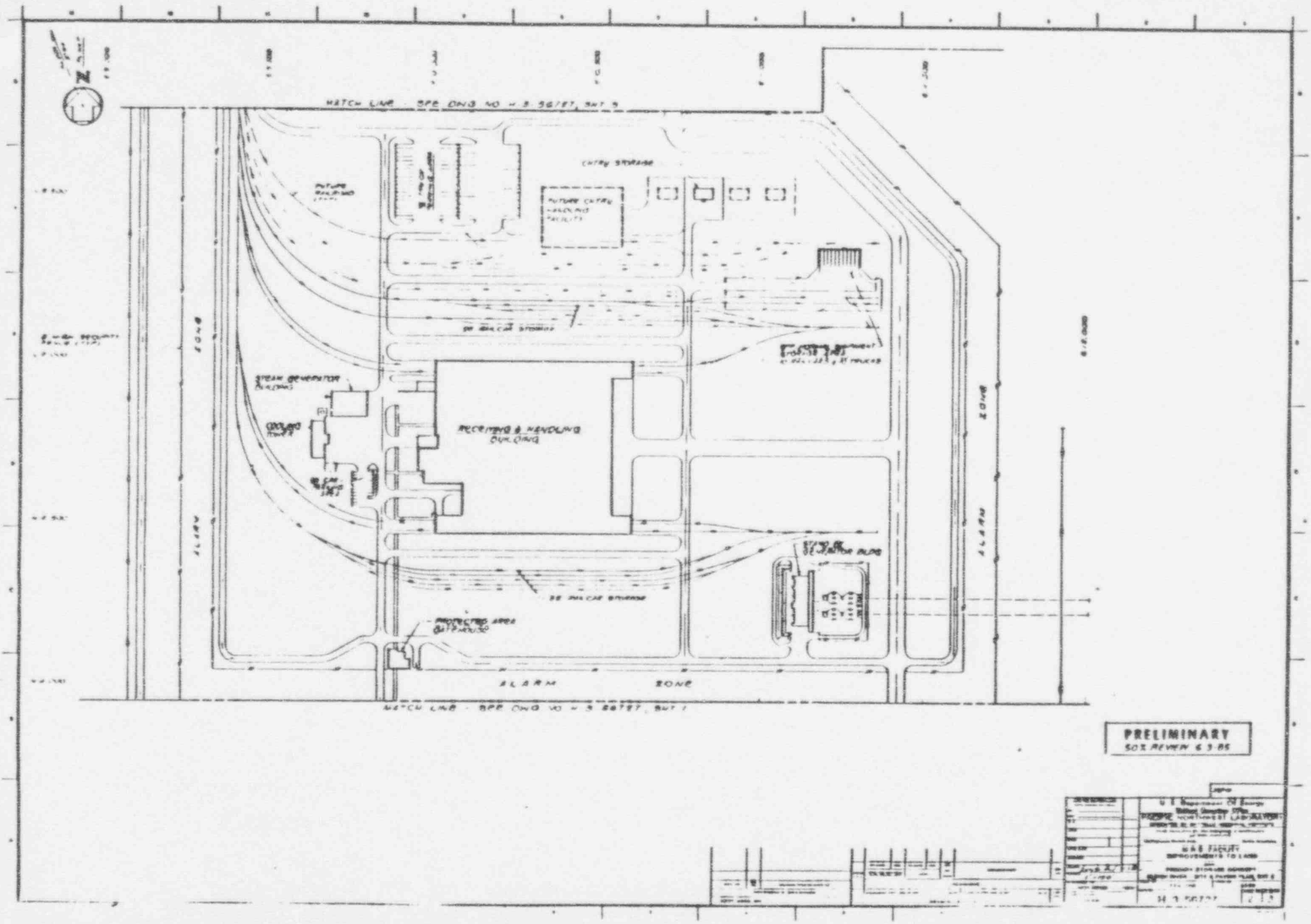
Schedule 20 pipe Stainless Steel

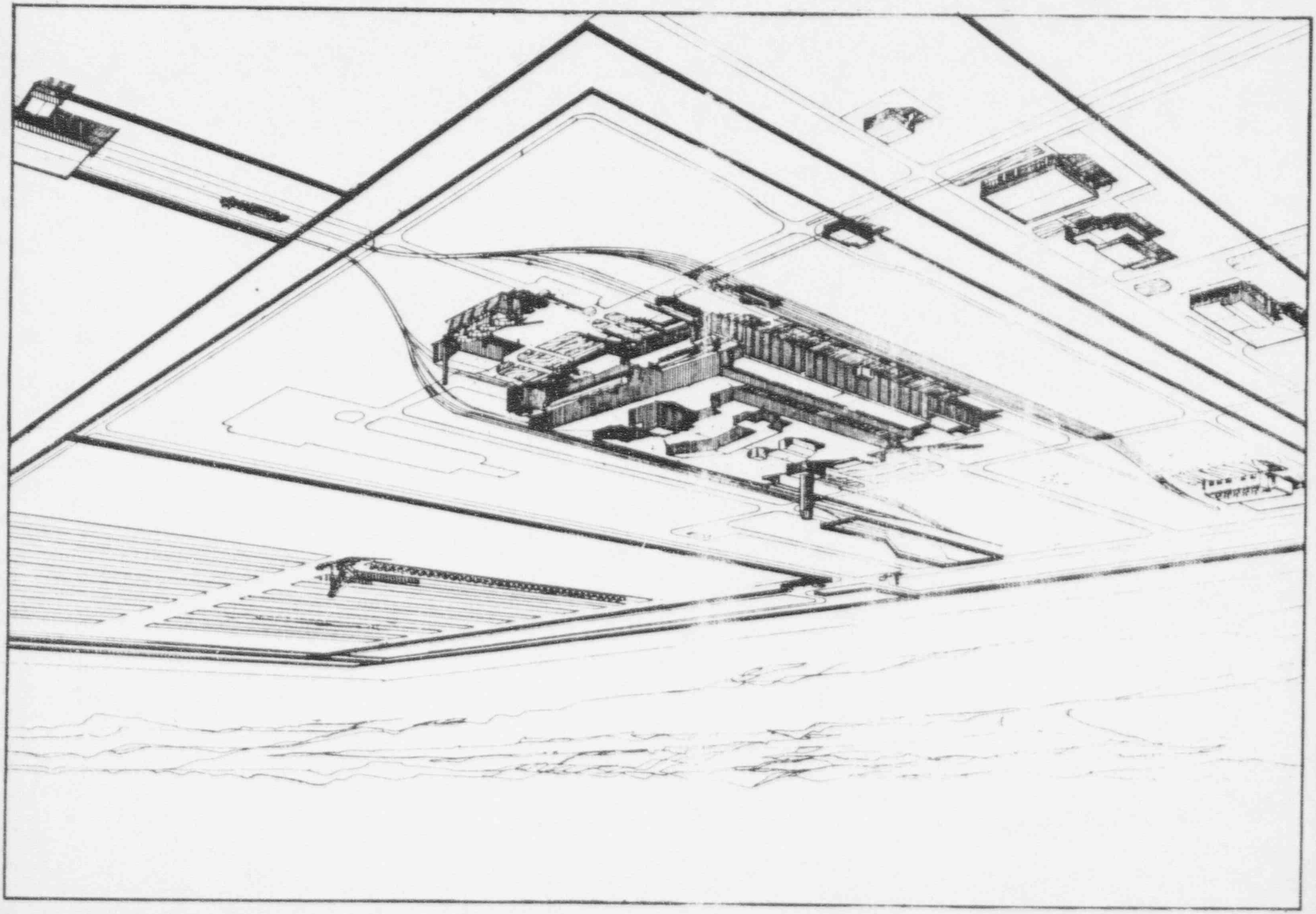

CLINCH RIVER
PRELIMINARY
H-3-88788

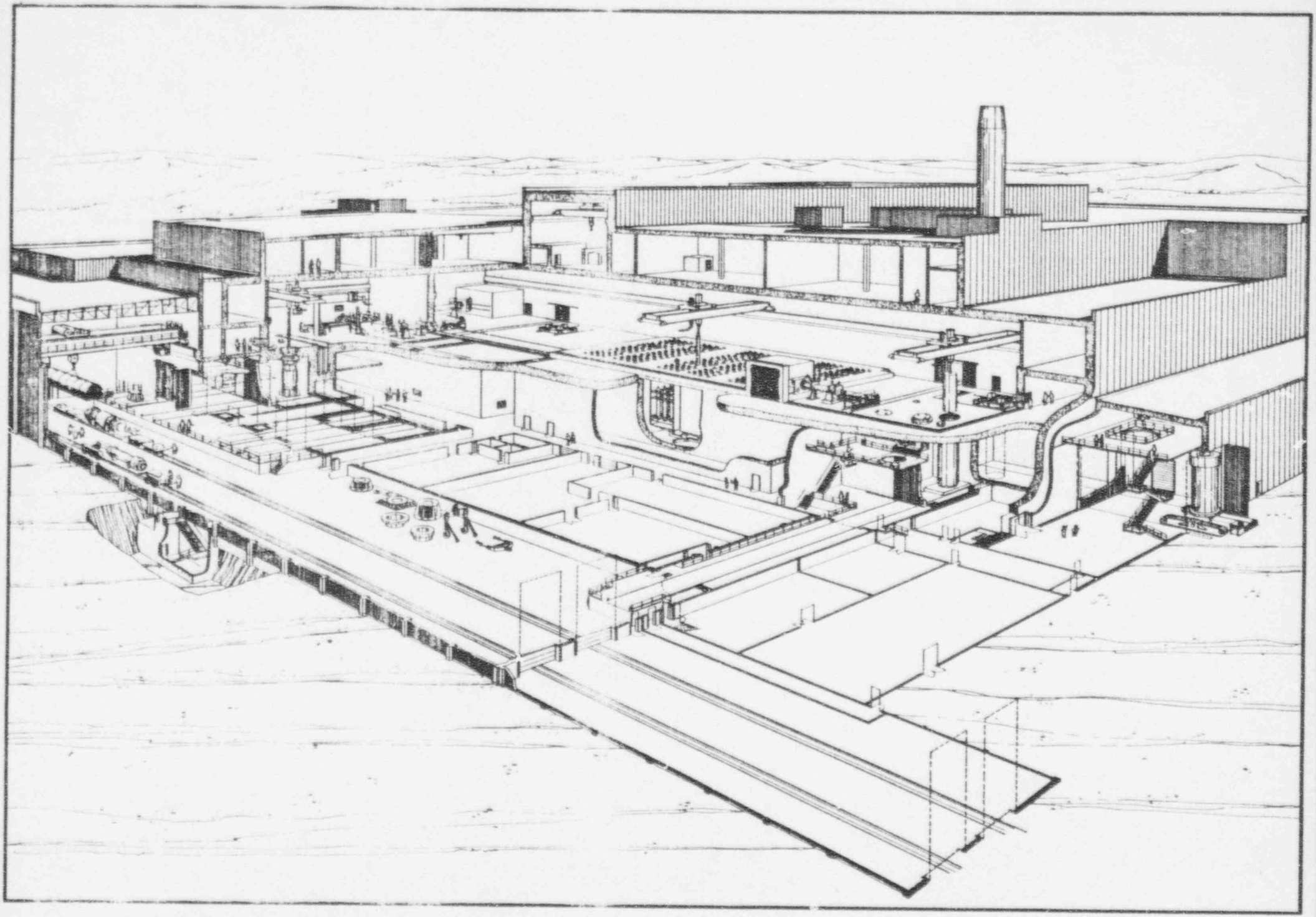
SUPPORT REQUIREMENTS

Function	Facilities Provided
• Administrative	Administration building
• Security	Security building and gatehouses
• Site maintenance	Site service building, vehicle maintenance building
• Utilities	Standby generator building, sewage treatment plant, fuel oil storage, water storage
• Emergency response	Fire station, heliport
• Industrial	Cask manufacturing facility


N
MATCH LINE - SEE DWG NO N-9-SC787, SHT 8
SEWAGE TREATMENT FACILITY
MAIN GATE RANGE HOUSE
SECURITY BLDG
LIFE STATION
VEHICLE MAINT BLDG
SITE MAINTENANCE VEHICLES
WATER STORAGE TANK
WATER TREATMENT FACILITY
FUEL STORAGE TANK
CASE MANUFACTURING CONCRETE SITE MAP
RAILROAD TRACK SCALE
WEIGH STATION
TRUCK SCALE
VEHICLE PARKING
SITE SERVICE BLDG
WAREHOUSE
HELIPORT
PRELIMINARY
SOS REVIEW 6 3 86
N-3-86727


N
MATCH LINE - SEE DWG NO. H-3-56187, SHT 5
ENTRY STORAGE
FUTURE BUILDING
FUTURE ENTRY HANDLING FACILITY
STEAM GENERATOR BUILDING
COOLING TOWER
RECEIVING & HANDLING BUILDING
ALARM ZONE
MATCH LINE - SEE DWG NO. H-3-56187, SHT 1
PRELIMINARY
50% REVIEW 6-3-85

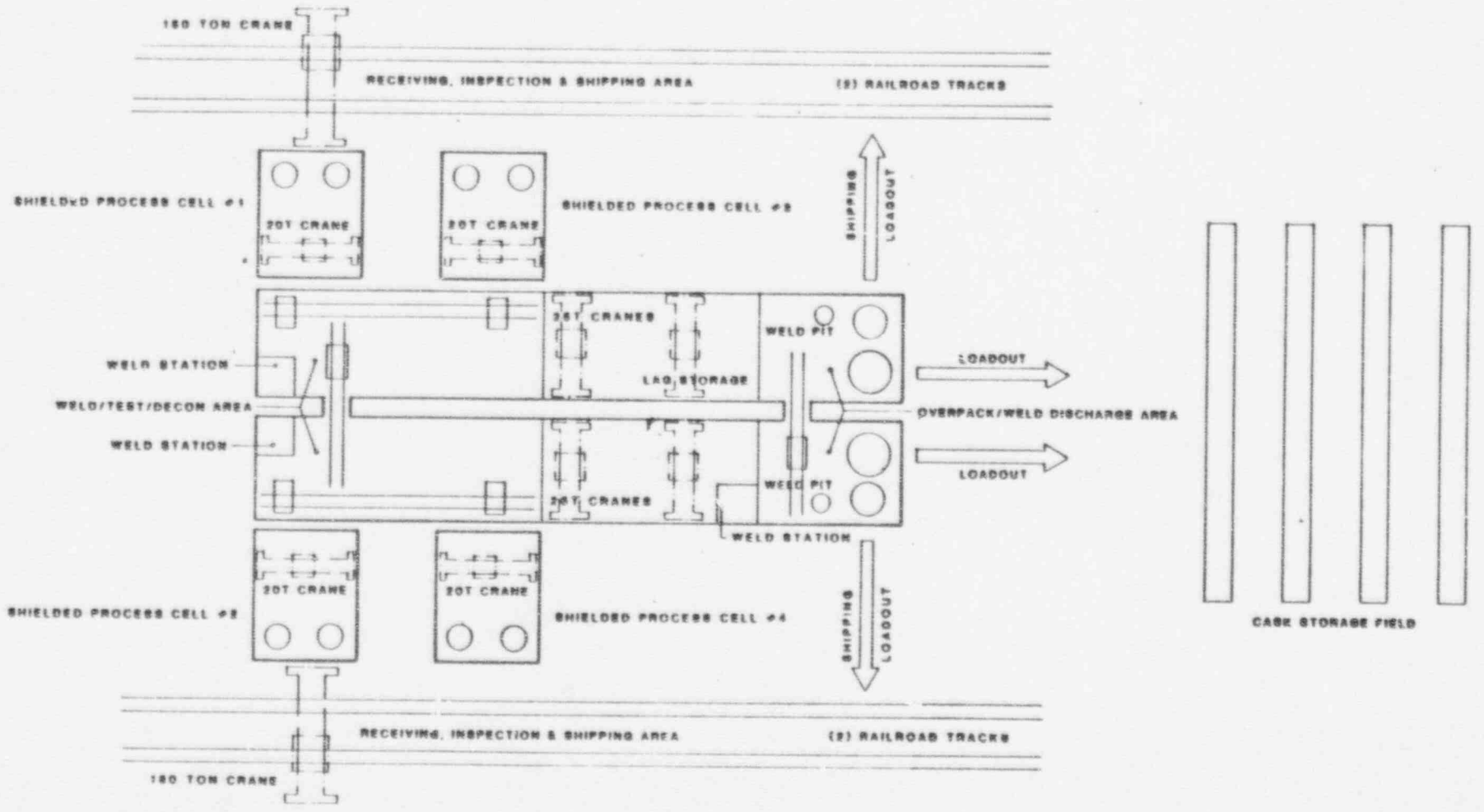




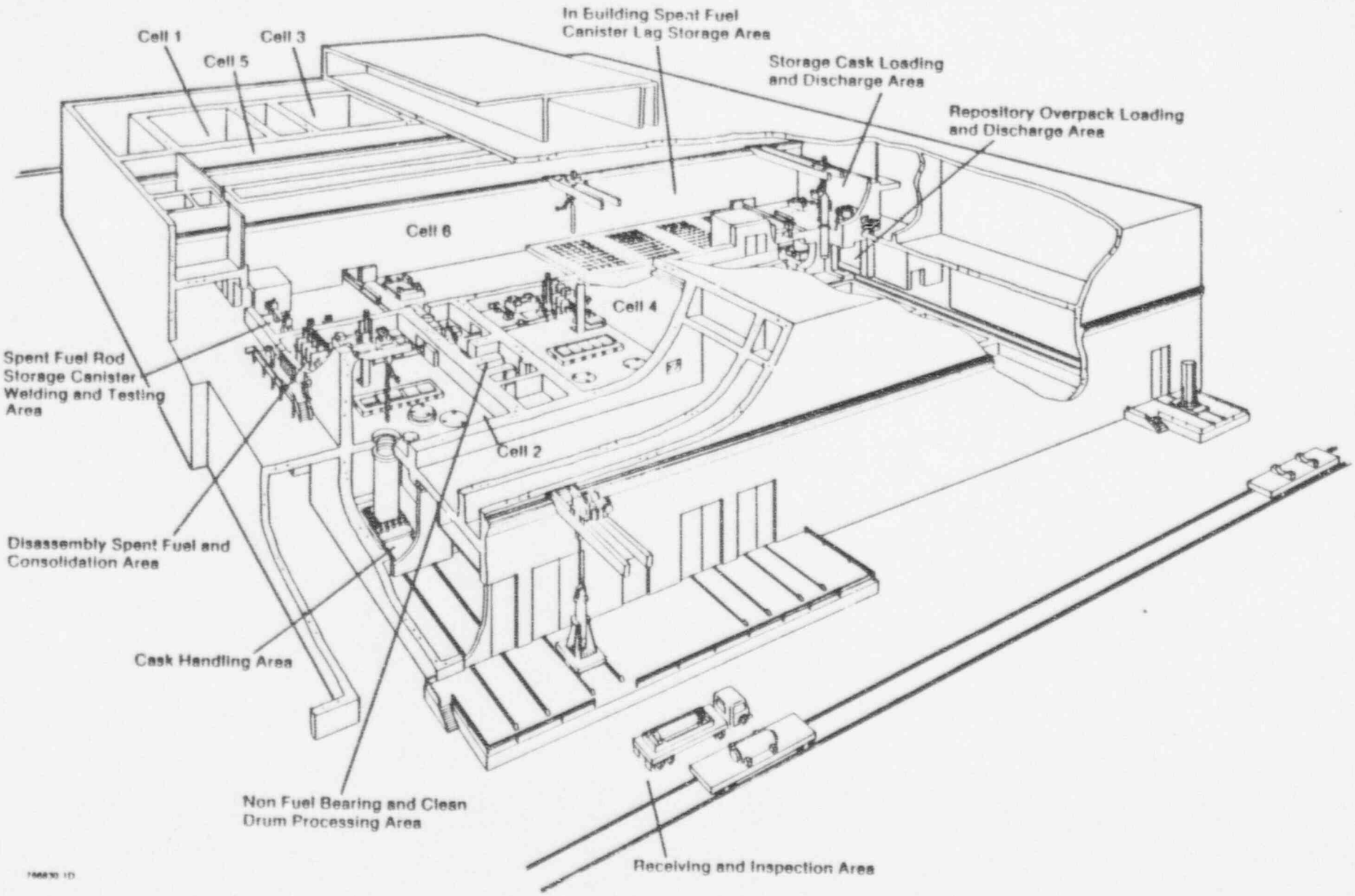
ARRANGEMENT

- Two rail/truck receiving and unloading areas
- Four shielded processing cells with dedicated cask-unloading areas
- Two HLW/RHTRU/repository overpack cells with four cask-loading/unloading areas
- Two canister welding stations
- Two repository overpack welding stations
- One canistered waste storage vault
- One high activity waste treatment area
- One low level waste treatment area
- HVAC equipment areas
- Electrical equipment areas
- Administration and personnel support areas

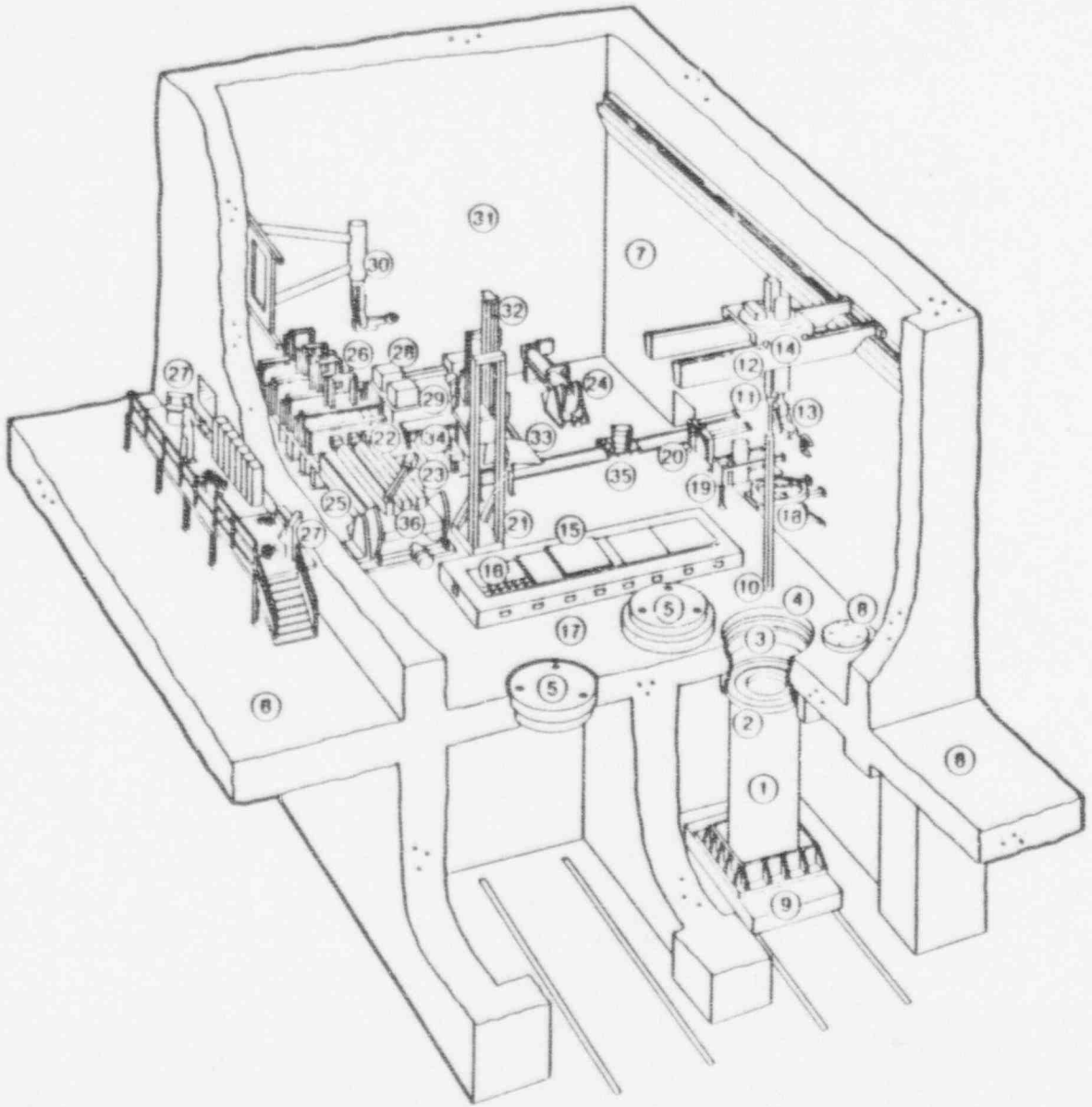
PARSONS


150 TON CRANE
RECEIVING, INSPECTION & SHIPPING AREA
(2) RAILROAD TRACKS
SHIELDED PROCESS CELL #1
20T CRANE
20T CRANE
SHIELDED PROCESS CELL #3
SHIPPING
LOADOUT
20T CRANES
WELD PIT
WELD STATION
LOADOUT
LAG STORAGE
WELD/TEST/DECON AREA
OVERPACK/WELD DISCHARGE AREA
WELD STATION
20T CRANES
WELD PIT
LOADOUT
WELD STATION
SHIELDED PROCESS CELL #2
20T CRANE
20T CRANE
SHIELDED PROCESS CELL #4
SHIPPING
LOADOUT
CASK STORAGE FIELD
RECEIVING, INSPECTION & SHIPPING AREA
(2) RAILROAD TRACKS
150 TON CRANE

MONITORED RETRIEVABLE STORAGE FACILITY
RECEIVING AND HANDLING BUILDING



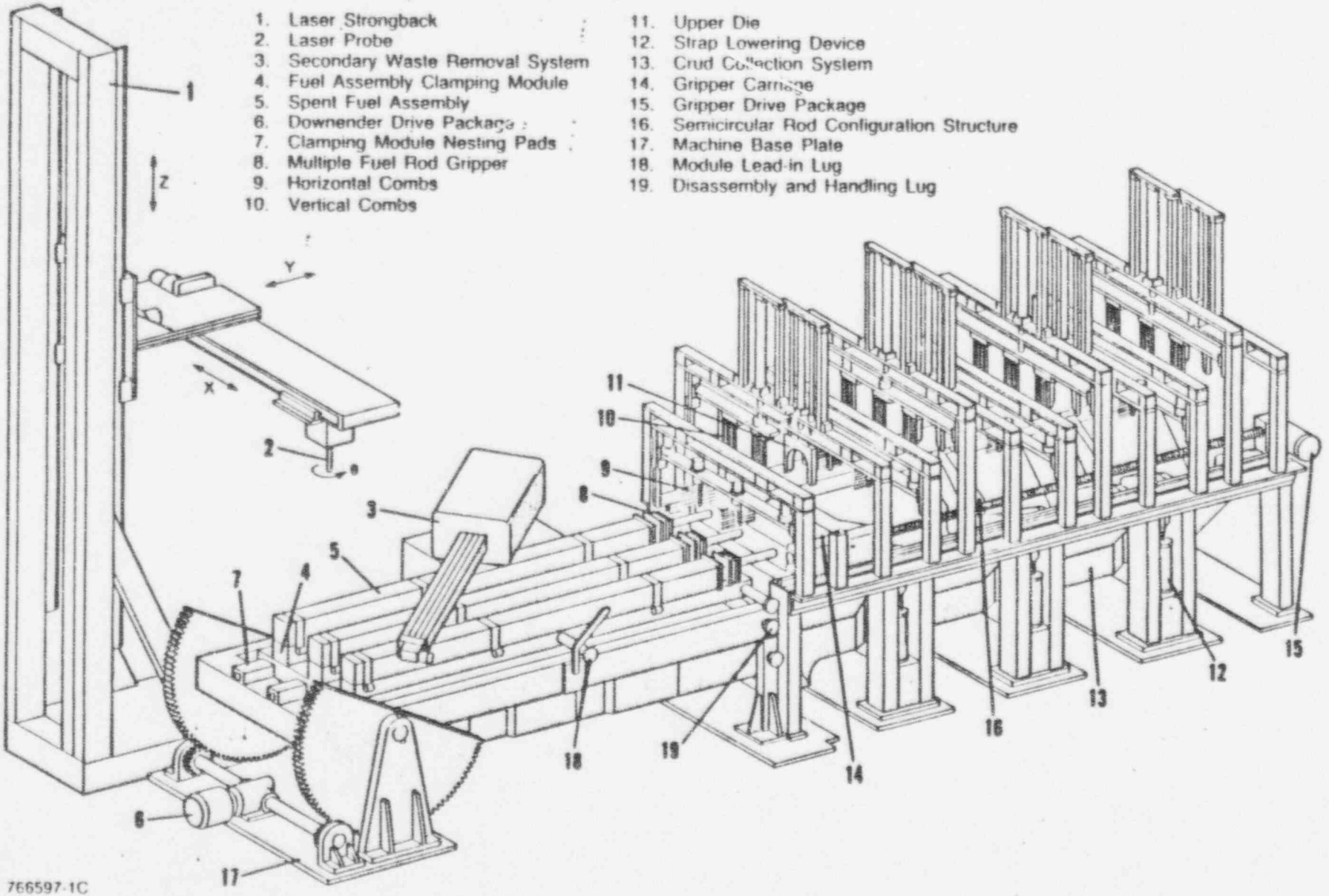
Monitored Retrievable Storage Facility Receiving and Handling Building
SPENT FUEL DISASSEMBLY AND CONSOLIDATION AREA



1. Shipping Casks
2. Cask Adapter for Contamination Barrier
3. Contamination Barrier
4. Entry Port
5. Entry Port Shield Plugs
6. Operating Gallery
7. Shielded Process Cell #2
8. Shipping Cask Cover
9. Cask Cart
10. Spent Fuel Element
11. Spent Fuel Grapple
12. Power Mast
13. Manipulator
14. 20 Ton Hot Cell Crane
15. Log Storage Covers
16. Lag Storage
17. Lag Storage Cooling Ducts
18. Port Grapple
19. Fuel Assembly and Pintle Grapples
20. Module Lifting Yokes
21. Laser Cutting System
22. Laser Cutting Head
23. Robotic (Auxiliary)
24. Intact Fuel Assembly Upender
25. Fuel Disassembly Station
26. Fuel Rod Consolidation Station
27. Process System Control Console
28. Maintenance Hatch Jacking Mechanism
29. Maintenance Hatch
30. Wall Mounted Manipulator
31. Shielded Process Cell Contamination Barrier
32. Secondary Waste Shredding System
33. Drum Lidding Station
34. Grid Infeed Chute
35. Drum/Filter Cart
36. Fuel Disassembly Module

766830-3C

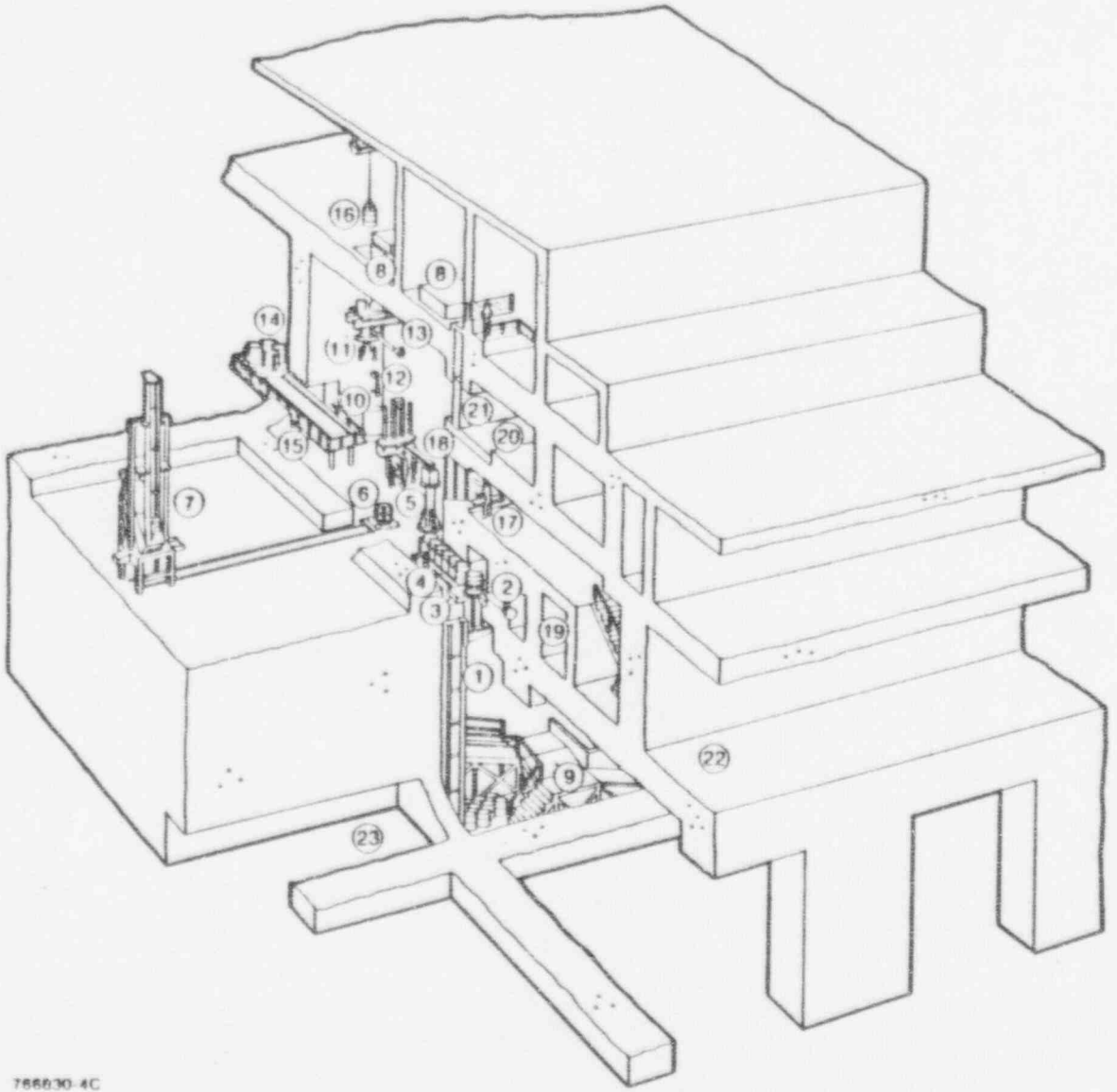
SPENT FUEL CONSOLIDATION SYSTEM
PWR SETUP



766597-1C

Monitored Retrievable Storage Facility Receiving and Handling Building

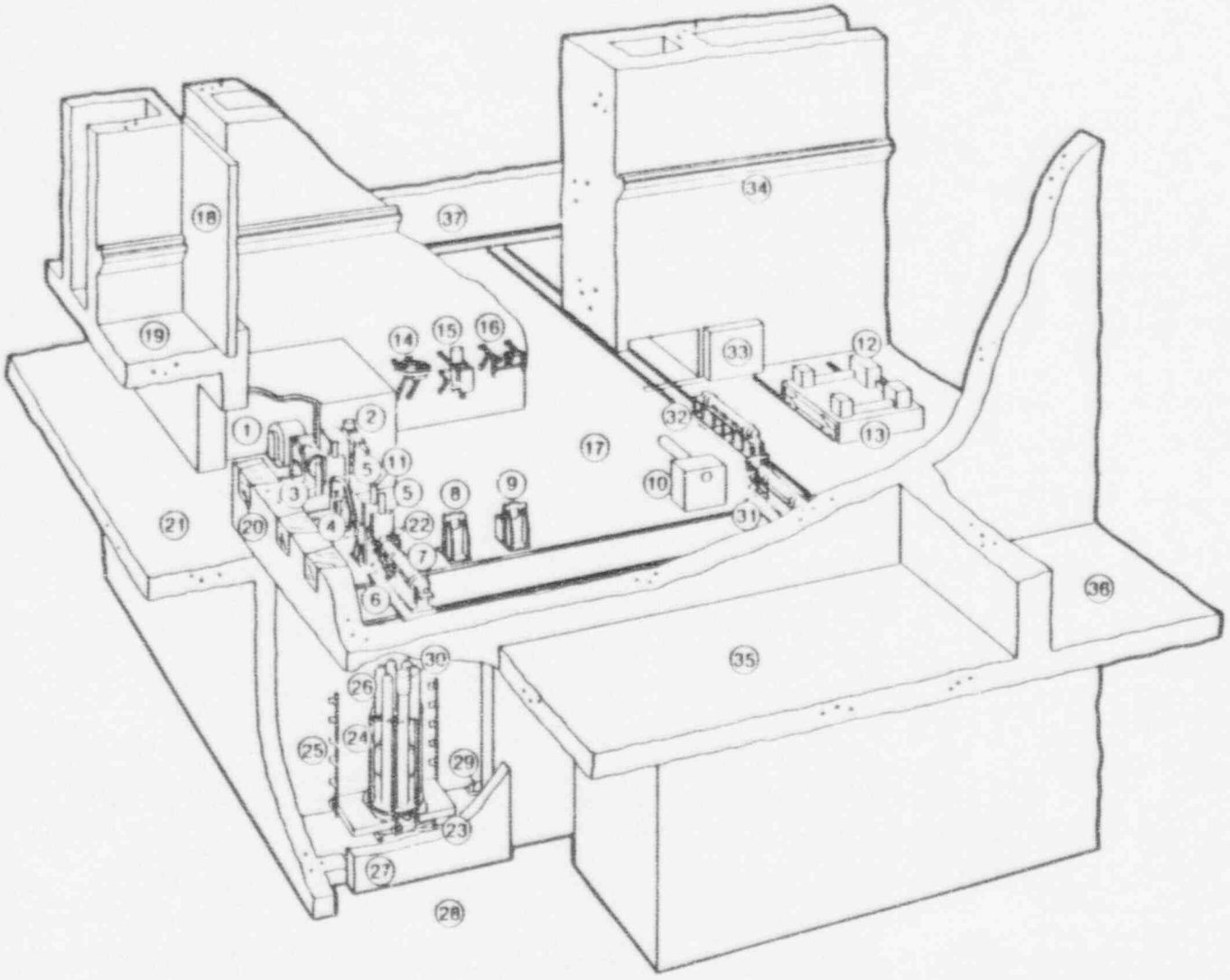
SECONDARY WASTE PROCESSING AND DECON SYSTEM



1. Clean Drum Elevator
2. Drum Push Mechanism
3. Shield Valve
4. Drum Guidance System
5. Jib Crane w/Drum Grapple
6. Drum Transfer Cart
7. Secondary Waste Shredding System
8. Maintenance Hatch
9. Ramp
10. Drum Decontamination Station
11. Drum Grapple w/Decontam. Station Lid
12. Drum Swipe Arm
13. Overhead Crane w/Manipulator
14. Filled Drum Transfer Cart
15. Filled Drum Transfer Platform
16. HVAC Filter Drum
17. Secondary Waste Processing and Decon System Control Station
18. Observation Window
19. Airlock
20. Crane Maintenance Room
21. Crane Maintenance Shield Door
22. Operating Gallery
23. Clean Drum Storage

766630-4C

Monitored Retrievable Storage Facility Receiving and Handling Building
CANISTER LOADING AND WELDING AREA

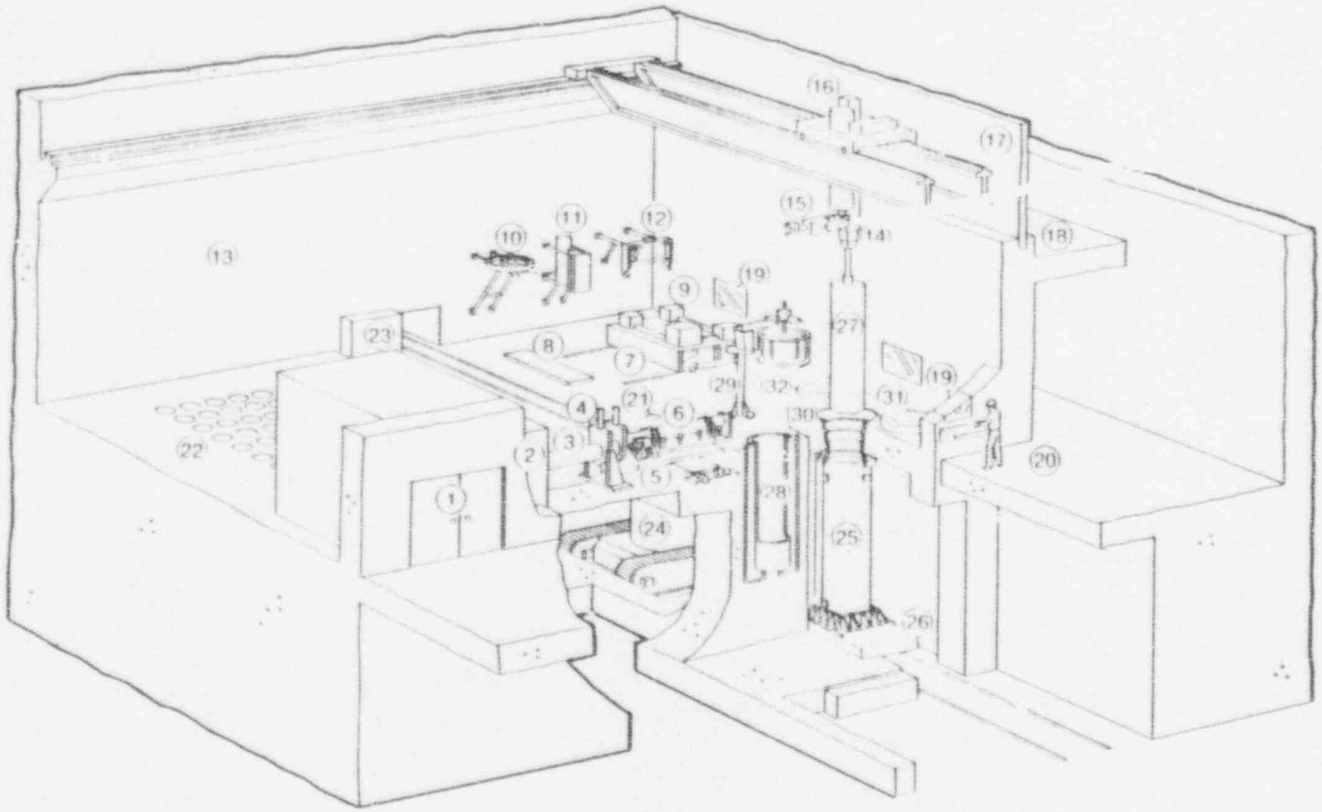


766830-5C

1. Welding Power Generator/Equipment Room
2. Canister Lid Supply System
3. Canister Welding Station
4. Canister Decon/Helium Leak Test Chamber
5. Chamber Isolation Valves
6. Canister Upender No. 1
7. Storage Canister
8. Ultrasonic Test Station
9. Canister Cutting Station
10. Fuel Rod Bundle Push Rod System
11. Forge Press Restraint
12. Maintenance Hatch Jacking Mechanism
13. Maintenance Hatch
14. Plug Grapple
15. Pintle Grapple
16. Equipment Lifting Yoke
17. Shielded Canyon Cell #6
18. Maintenance Area Shield Door
19. Crane Maintenance Room
20. Observation Window
21. Operating Gallery
22. Clean Canister and Lid Supply Port
23. Carousel Lift Mechanism
24. Carousel Canister Rack
25. Guide Rail Lift Mechanism
26. Clean Canisters
27. Shield Door
28. Access Corridor
29. Lift Mechanism Hydraulic Pump System
30. Canister Lid Supply Support Tube
31. Canister Upender No. 2
32. Canister Pass-Thru Cart
33. Canister Pass-Thru Shield Door
34. 35 Ton Crane Rails
35. Shielded Process Cell #2
36. Decon Cell
37. Shielded Canyon Cell #5

Monitored Retrievable Storage Facility Receiving and Handling Building

CANISTER OVERPACK AND REPOSITORY OVERPACK WELDING SYSTEM AND SHIPPING PORT



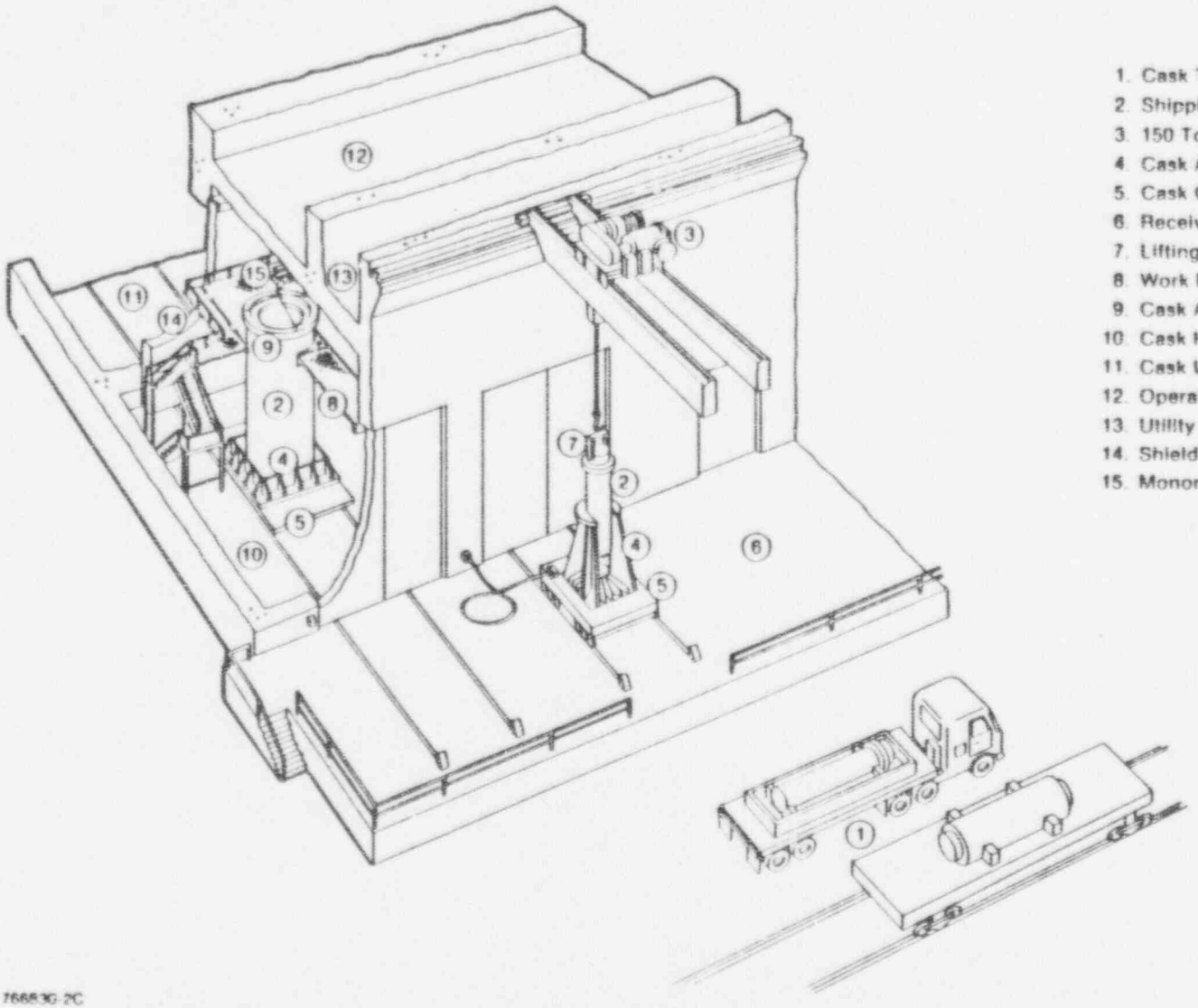
765839-7C

1. Welding Generator/Equipment Room
2. Canister Welding Station
3. Canister Decon/Helium Leak Test Chamber
4. Chamber Isolation Valves
5. Canister Upender
6. Storage Canister
7. Exit Port
8. Lag Storage Cover
9. Exit Port Jacking Mechanism
10. Plug Grapple
11. Pintle Grapple
12. Equipment Lifting Yoke
13. Shielded Canyon Cell #6
14. Power Mast
15. Manipulator
16. 35 Ton Cell Crane
17. Maintenance Area Shield Door
18. Crane Maintenance Room
19. Observation Window
20. Operating Gallery
21. Clean Canister and Lid Supply Port
22. Lag Storage Canyon Vault Area
23. Canister Pass-Thru Shield Door
24. Storage Cask and Transporter
25. Shipping Cask for Repository Overpack
26. Cask Cart
27. Repository Overpack
28. Repository Overpack Welding/Decon Pit
29. Repository Overpack Welding Head and Jib Support Structure
30. Repository Overpack Port
31. Repository Overpack Port Plug
32. Shipping Cask Inner Lid

BUILDING SUPPORT SYSTEMS

- Remote high activity radwaste system
- Low level radwaste system
- Once-through multiple HEPA exhaust system
- Normal, standby, and UPS electrical systems
- Wet pipe, Halon, and dry chemical fire suppression systems
- Remote and contact equipment maintenance systems
- Analytical laboratory
- HP and personnel support systems

Monitored Retrievable Storage Facility Receiving and Handling Building
RECEIVING AND INSPECTION AREA

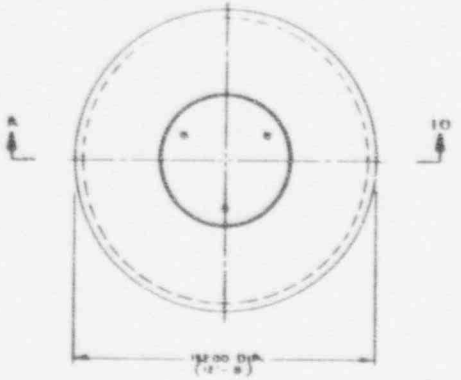


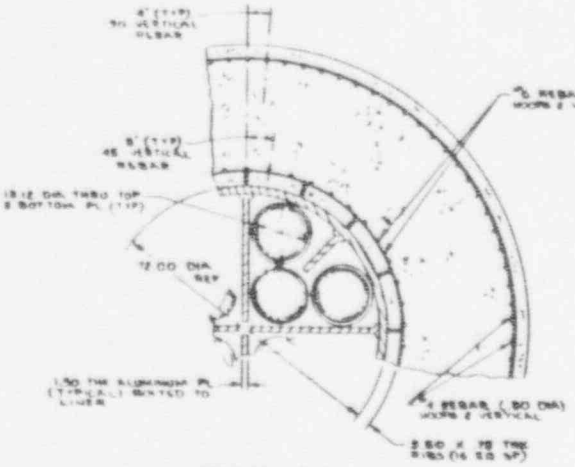
1. Cask Transport Vehicles
2. Shipping Cask
3. 150 Ton Bridge Crane
4. Cask Adapters
5. Cask Cart
6. Receiving and Inspection Area
7. Lifting Yoke
8. Work Platform
9. Cask Adapter for Contamination Barrier
10. Cask Handling and Decon Room
11. Cask Unloading Room
12. Operating Gallery
13. Utility Chase
14. Shield Doors
15. Monorail Crane

766830-2C

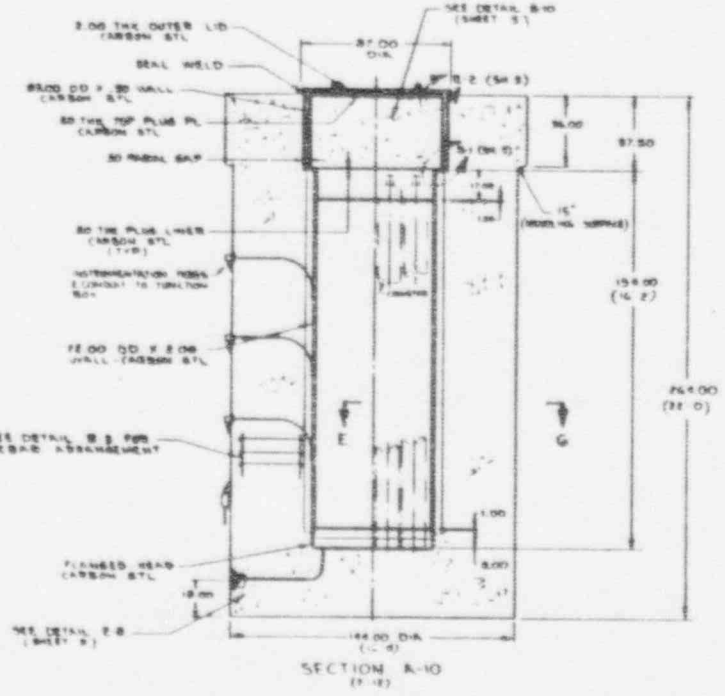
STORAGE SYSTEMS

- **Mode**
  - Primary - sealed storage cask
  - Alternate - drywell
- **Restraints**
  - Cladding temperature $< 375^\circ C$
  - HLW centerline temperature $< 500^\circ C$
  - HLW canister temperature $< 375^\circ C$
  - Category I construction
- **Monitoring**
  - Temperature
  - Interior environment
- **Retrievability**
  - Sealed storage cask
  - Drywell contents
  - Via R&H facility for inventory verification, repair, and/or shipment





SECTION E-G
(B-11)
SCALE 1"=1'-0"



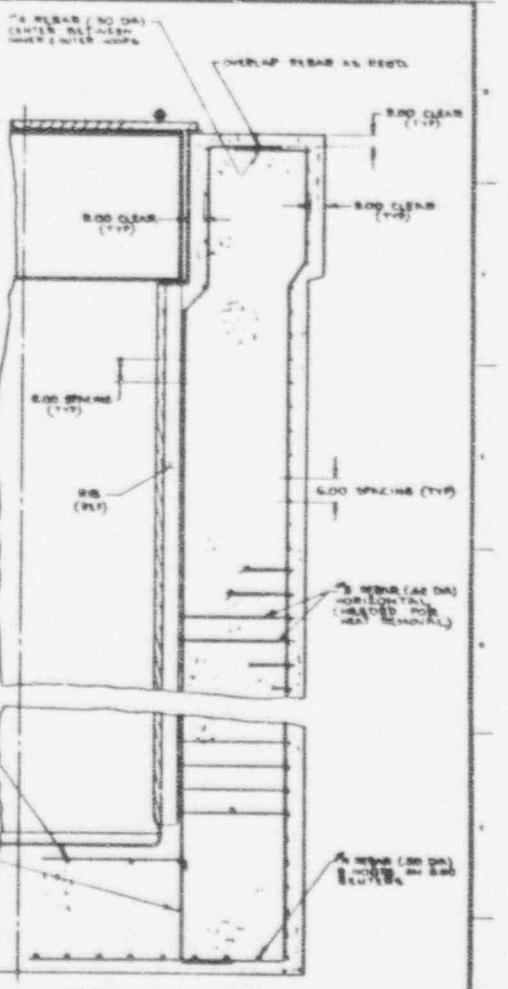
SECTION A-10
(B-11)

SPENT FUEL CONCRETE CASK

TABLE 1

SPENT FUEL CASK DETAIL DRAWINGS

COMPONENTS	DWG & SHEET NO.
ASSEMBLY	H-3-54000
FABRICATION	H-3-54995
LINER	H-3-54996
SHIELD PLUG ASSYS	H-3-54981 (SH 1)
COVER PLATE ASSYS	H-3-54981 (SH 2)
TRUP COVER ASSYS	H-3-54981 (SH 3)
GAS SAMPLING AND THERMOCOUPLE DETAIL	H-3-55008



DETAIL B-3
TYPICAL REBAR ARRANGEMENT
SCALE 1"=1'-0"

ADVANCED CONCEPTUAL DESIGN

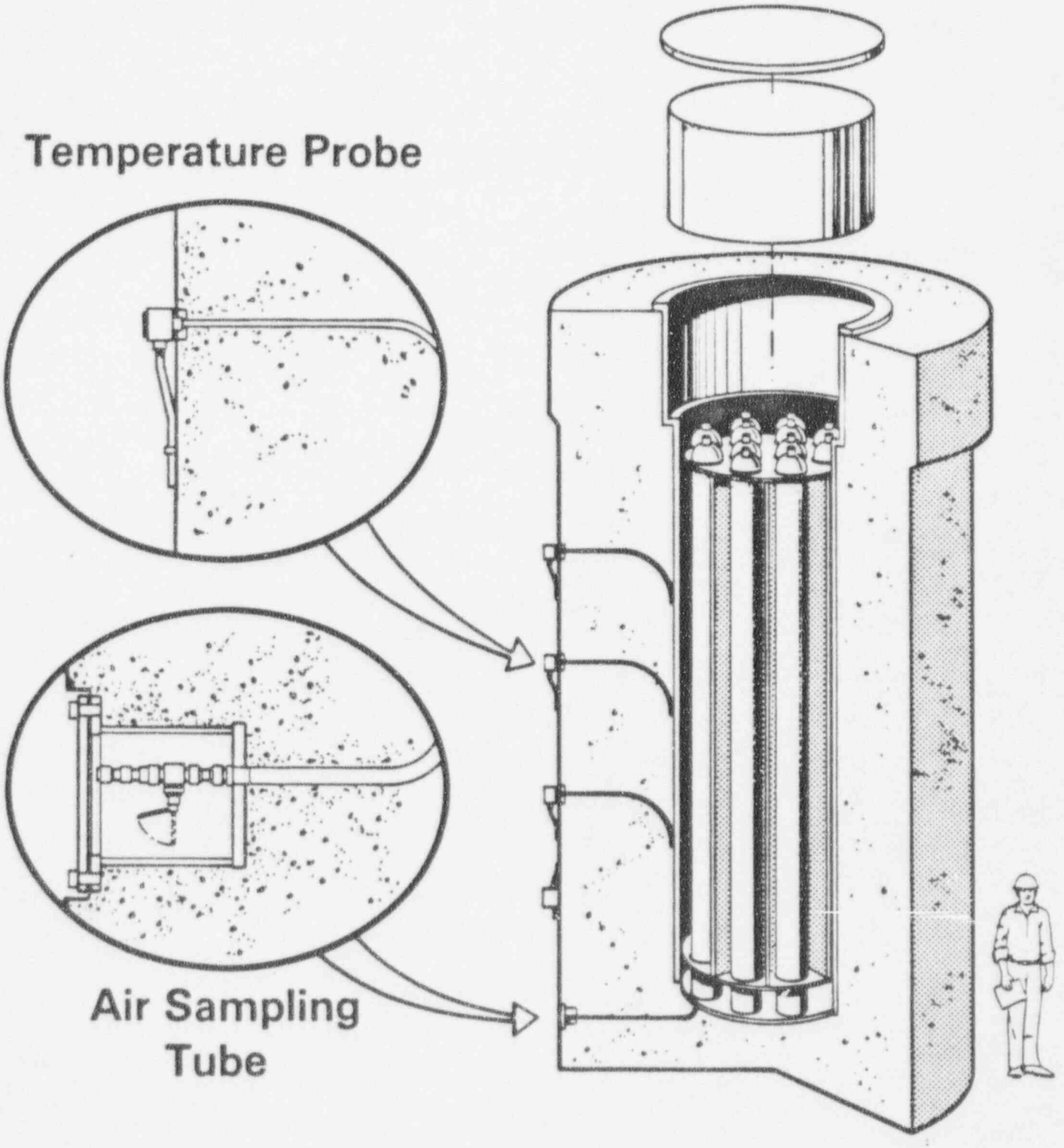
APP NONE

U.S. Department Of Energy
Richland Operations Office
PACIFIC NORTHWEST LABORATORY

SPENT FUEL CONCRETE CASK

H-3-54986

Sealed Storage Cask Monitoring



Tom Clark

Battelle
Pacific Northwest Laboratories

NO. OF EACH	DISTRIBUTION:	ADDRESS
0	RM Gale	
0	RJ Hall	
0	GS Rokkan, DOE-RL	
0	RI Smith	
1	File/LB	

DATE: January 2, 1985

TO: RA Graham, DOE-RL

FROM: DS Jackson, PNL

PROJ. OR SUBJECT: PROJECT D-360 MONITORED RETRIEVABLE STORAGE (MRS) FACILITY
CONTRACT DE-AC06-84-RL-10436

Requested Reports

ATTACHED ARE	THEY ARE TO BE USED FOR	THESE ARE	PLEASE NOTE	PLEASE
___ REQUISITIONS	___ ESTIMATING	___ PRELIMINARY	___ REVISION	___ COMMENT
___ PRINTS	___ ORDERING MAT'L	___ UNCHECKED	___ HOLDS	___ APPROVE
___ PHOTOSTATS	___ SECURING QUOT.	___ CHECKED	___	___
___ SPECIFICATIONS	___ CONSTRUCTION	X FINAL	___	___
___ TRACINGS	X INFORMATION	___	___	___
X Reports/ Meeting Minutes	___	___	___	___

DRAWING NUMBERS, TITLES AND COMMENTS:

Enclosed per your request to Ron Hall on December 20, 1984, are the following reports and documents:

- Laser Disassembly System Assessment for the Waste Technology Service Division
- Consolidation Optimization Study (Draft and comment letter)
  (Final Issue at R. M. Parsons - to PNL about 1/15/85)
- Revised Uranium-Plutonium Cycle PWR and BWR Models for the ORIGEN Computer Code
- R. M. Parsons ALARA Committee Meeting Minutes
- Welding and Waste Reduction Equipment Selection

Tom: This was inadvertently omitted from one and D. Jackson is sending I'll forward.

Other documents requested are not currently available to me. As soon as they are issued, or can be obtained, I'll forward them to you.

I will get a copy of Wendell Bailey's Topical Review of At-Reactor Fuel Consolidation by January 10, and will forward it to you.

The revised Consolidation Optimization Study is currently being reviewed within R. M. Parsons and is expected to be received by PNL about mid-January.

REVISION
7/8/85

DRAFT - REGULATORY GUIDE APPLICABILITY REPORT

1.1 INTRODUCTION/SUMMARY

In developing the nuclear power industry, a large body of information regarding nuclear safety design, accident prevention and protection of public health and safety have been generated. This information represents the results of years of license application reviews, reactor operating experience, onsite inspections and lessons learned from dealing directly with the Pull Spectrum of engineering design and safety issues. They also reflect the state of the art techniques in demonstrating regulatory compliance. Most of this information is "timeless" (i.e., does not become obsolete over time) and is "non-unique" (i.e., can be applied to any other nuclear facilities).

In the past, one of the difficulties associated with the preparation of the license application was to be able to demonstrate to the public and the NRC that the plant design is safe and technically sound and is in compliance with the regulations. Some methodologies were accepted by the NRC and compliance with the regulation was recognized. However, there were methodologies and solutions used by the applicant to demonstrate compliance which were rejected by the NRC. Also, there were times that the NRC have agreed with methodologies used by the applicant, but requested verification. The verification process can take years and has the potential to significantly delay the application review process. As more nuclear power plants were being built over the years, and more applications were being reviewed by the NRC, the NRC made decisions regarding which methodologies or solution were acceptable to the NRC for demonstrating compliance with the regulation on specific issues. These decisions were embodied in the Regulatory Guides.

For an Independent Spent Fuel Storage Installation (ISFSI) and particularly a Monitored Retrievable Storage facility (MRS), with functional characteristics different from those of a nuclear power plant or other fuel cycle facilities, the engineering principles and basic practices that are required to assure safety design and to demonstrate regulatory compliance

remain unchanged from those utilized for the other nuclear facilities. The fundamentals in design for building a nuclear facility have long been established in the nuclear power industry. Many of the solutions and methodologies recommended in the regulatory guides are basic and fundamental enough to help direct the start of detailed design work for the MRS.

10 CFR 72, Licensing Requirements for the Storage at Spent Fuel in an Independent Spent Fuel Storage Installation (ISFSI), provide for a one-step ISFSI licensing process. This, in turn, requires a degree of design completeness and documentation in the ISFSI or MRS license application comparable to that of a nuclear power plant Final Safety Analysis Report. In order to ensure the timely production and review of such an application DOE should to the extent practicable utilize in the MRS design solutions and methods which have been previously endorsed by the NRC.

From the overall MRS program viewpoint, review of the existing NRC positions adds confidence to future planning efforts, improves public relations, and provides added assurance for the expedited licensability of the MRS.

However, the mere thought of utilizing nuclear power plant regulatory technology for the MRS arouses strong and negative reactions. The initial response to this concept is that we are planning an MRS, not a nuclear power plant. It is a different facility; it does not have the dynamic characteristics of a nuclear power plant. This type of response is not surprising, because after having dealt with high energy and rapid response systems in a nuclear power plant for so many years, one tends to associate every design in the nuclear power plant with high energy or rapid response systems. However, there are segments of nuclear power plant design which are generic in nature and can be applied to any other nuclear facilities.

In this report, the entire body of current US Nuclear Regulatory Commission Regulatory Guides is reviewed to determine which ones are potentially adaptable or applicable as is to the MRS.

The first step of the review involves the conducting of a screening based on Regulatory Guide titles to eliminate those regulatory guides that are unique and specific to reactor systems or otherwise obviously not applicable to the MRS.

The philosophy used in this screening process is to retain as many regulatory guides as possible based on currently available information and knowledge about the MRS. Whenever there is doubt as to the usefulness of the content in a regulatory guide for applicability ~~on~~ to ISFSI, the guide is retained in this initial screening. Regulatory Guides are eliminated from further consideration only if there is sufficient confidence that the design or operating conditions described in the regulatory guide are not in any way similar to the design or operating condition expected at the MRS.

The regulatory guides selected from this initial title screening are considered to be "potentially adaptable." This term is used to indicate that a determination has not yet been made if such regulatory guide has any direct relevance to an ISFSI.

After the initial title screening phase, the remaining regulatory guides are categorized into various engineering subjects, with each subject representing a generic engineering discipline or a specific study area.

The contents of these regulatory guides are reviewed and each regulatory position, whether "potentially adaptable" or "not adaptable", is accompanied with a discussion of the ratio · · or technical basis for rejecting or accepting a position.

This set of "potentially adaptable" guides can be used at the current stage of MRS development as follows:

(1) The set of "potentially adaptable" regulatory guides can be used as reference documents for the designers to alert them to avoid specific problem areas; and to follow certain procedures during design or data analysis prior to proceeding with a design. For example, in the electrical area, design and qualification requirements for an emergency diesel generator can not be determined until MRS emergency conditions are defined. Effort must be initiated to analyze the needs for emergency power supply during emergency conditions.

(2) Some of the regulatory guides also provide methods and data that are not available elsewhere. For certain analyses perhaps the data available in the guide may be reactor specific, but such data is likely to be the best or the only data available, e.g., data on release fractions of the source terms, Regulatory Guides 1.25, 1.98, 1.111, 1.112 etc.

(3) For safety design review, reviewers will have a set of reference material to make a judgment on the appropriateness of the design, or if the design has taken into consideration generic NRC concerns. Safety design review should be conducted at all development phases, including conceptual design.

(4) This review process provides an opportunity for engineers and designers to give opinions and to resolve conflicting opinions as to which guides are applicable. Examples of some of the regulatory guides which may require such discussions include:

- Design basis for natural events - should the same methodology recommended in the guides for other facilities be used for the MRS such as Regulatory Guides 1.76, 1.117, etc.

- The single failure criterion - do 10CFR72 regulations imply the application of the single failure criterion the same as that for a nuclear power plant, such as Regulatory Guides 1.6, 1.53 etc.

1.2 PURPOSE

The purpose of this report is to review and identify appropriate NRC positions or technical analyses contained in previously published non-MRS related US NRC Regulatory Guides for adaptation to the siting, design, construction, operation, safety analysis, licensing and decommissioning of an MRS. Each Regulatory Guide considered adaptable will be supported by a discussion of its technical basis and the degree of its adaptability. Adapting these NRC endorsed approaches and methodologies appropriately may lead to a more efficient and effective licensing effort for the MRS by eliminating to the extent practical the use of untried and untested solutions to typical regulatory issues.

1.3 SCOPE

This report covers the review of all non-ISFSI related Regulatory Guides (Division 1 through 10) published through May of 1985.

This report assumes that the MRS will receive (1) irradiated reactor fuel, and (2) wastes resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated wastes from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuel, which have been converted into solid form. In the report, the irradiated reactor fuel will be addressed as "spent fuel assemblies", and other waste as "solidified high-level waste".

2 NRC DOCUMENTS AND REVIEW METHODOLOGY

2.1 US NRC REGULATORY GUIDES

The U.S. Nuclear Regulatory Commission (NRC) has published various guidance and technical documents. The guidance documents are intended to present to license applicants positions on acceptable methods and solutions that may be used in the license application to demonstrate regulatory compliance. Other technical documents are NRC sponsored research and investigations which reflect NRC thinking and their concern on particular subjects (NUREGs).

In the licensing process, the NRC requires applicants for a permit or license to provide assurances that the proposed activities to be conducted under the permit or license will not present undue risks to the health and safety of the public. The applicants are required to submit information to demonstrate compliance with the requirements set forth in the NRC 10 CFR regulations. In many areas, the regulations are broad and general, and do not provide specific details as to the acceptable methods which may be used to demonstrate compliance. Through the review of individual license applications, the NRC has developed positions on acceptable methods and solutions which may be used to demonstrate compliance with the regulations.

Regulatory guides are one of the NRC publications which describe and make available to the public these methods and solutions acceptable to the NRC. In some cases, the regulatory guides also delineate techniques that are used by the NRC to evaluate specific problems or postulate accidents. The regulatory guides also indicate the data and information that will be needed by the NRC to review the application. They were originally issued as "safety guides" but as the scope of the "safety guides" expanded to include other subjects, they were changed later on to "regulatory guides".

Regulatory guides are not substitutes for regulations, and compliance with the regulatory guides is theoretically not required. Methods and solutions different from those set out in regulatory guides are acceptable to the NRC if sufficient basis and information are provided to demonstrate their compliance with the regulations. For each of the methods or solutions presented in regulatory guides, the NRC has spent substantial time and effort in the review and evaluation of these methods and solutions. NRC's acceptance of these methods and solutions are established through years of licensing review, comparative studies and questionings. License applications which use solutions and methods other than those recommended in the regulatory guide, will require equal, or longer NRC review time and questioning periods. License applications which use the solution and methodology recommended in the Regulatory Guides, generally, will not encounter as lengthy a review and question period. Therefore in reactor licensing, except under unusual circumstances, license applicants often adopt the methods and solutions recommended in the guides.

There are 352 published regulatory guides in ten divisions (of which, there are 338 regulatory guides in Division 1 through 8) covering the design and engineering of power reactors, test reactors, environmental and safety matters, accountability of special nuclear material, safeguard and security, and antitrust matters. The subjects of the ten divisions are:

Division 1 - Power Reactors
Division 2 - Research and Test Reactors
Division 3 - Fuels and Material Facilities
Division 4 - Environmental and Siting
Division 5 - Materials and Plant Protection
Division 6 - Products
Division 7 - Transportation
Division 8 - Occupational Health
Division 9 - Antitrust and Financial Review
Division 10 - General

In general regulatory guides contains four parts; Part A - Introduction, Part B - Discussion, Part C - Regulatory Positions, and Part D - Implementation. The "Introduction" section, cites the pertinent regulations governing the subject matter addressed in the guide. The "Discussion" section provides a background of the problems encountered in the review of the license application regarding the subject. The "Regulatory Positions" section states the NRC recommended approaches or solutions. The "Implementation" section provides information regarding NRC staff's plan for using the guide. If more detailed information is needed regarding NRC's plan for using the guide, such informatica may be obtained from the NRC's office of Nuclear Reactor Regulation or the office of Nuclear Material Safety and Safeguards.

2.2 REVIEW METHODOLOGY

The first phase of the review is to conduct a screening by document title to eliminate those Regulatory Guides that are beyond the scope of this report such as environmental related, or subjects unique to nuclear reactor design or operations (e.g., reactor vessels, emergency core cooling systems, etc). The purpose of this screening process is to select a set of potentially adaptable Regulatory Guides for technical review. The title screen was conducted based on the information available as it appears on the title of the Regulatory Guide. The philosophy used in this screening process is to retain as many regulatory guides as possible based on currently available information and knowledge about the MRS and the content of the Regulatory Guides as understood from its title. When there is doubt as to the usefulness of the content in the regulatory guide for application to an ASFSI in general or the MRS in particular, the guide is retained in this screening process for further analysis. Each Regulatory Guide is judged against the conceptual design and plausible operations at the MRS.

Each regulatory guide that is eliminated is done so on the basis that there is sufficient confidence that the design or operation conditions described in the regulatory guide are in no way similar to the design or operating conditions expected at the MRS.

Appendix A summarizes the result of the screening process. Those guides that were determined not potentially adaptable are indicated with a "Not Applicable" with an explanation provided in the "Remarks" column. Those that

were judged potentially adaptable are indicated with subsection numbers to show where the technical review can be found. The regulatory guides determined not potentially adaptable were eliminated, in general, for the following reasons:

(1) It is environmentally related
(2) It is transportation related
(3) Subjects related exclusively to reactor design and operations, or nuclear power plant components and supporting equipment not representative of those expected to be found at the MRS.
(4) Subjects related to nuclear materials of the type or in the form which is not expected at the MRS.
(5) Subjects related exclusively to specific design and operation of other nuclear fuel cycle facilities, such as a fuel fabrication plant or uranium mill, or such facilities' plant components and supporting equipment not representative of those expected to be found at the MRS.

After the initial screening phase, the remaining ___ regulatory guides were categorized into 25 engineering subjects. Each subject represents a generic engineering discipline or a specific study area. These 25 subjects are listed in Table 2-1. Each remaining regulatory guide was the reviewed for all of its contents. Each regulatory position, whether "potentially adaptable" or "not adaptable", is accompanied with a discussion of the rationale or technical basis used for the determination. Wherever appropriate, the discussion also indicates if the solution recommended by the guide can be adapted in whole or in part.

TABLE 2-1

LIST OF REGULATORY GUIDE REVIEW SUBJECTS

	Subject (Numbers of Potentially Adaptable Regulatory Guides)		Report Section No.
1	Civil, Structural and Site	(8)	3.2.1
2	Electrical and Power Supply Systems	(14)	3.2.2
3	Instrumentation and Controls (I&C)	(6)	3.2.3
4	Mechanical Systems/Components	(9)	3.2.4
5	Storage and Handling	(5)	3.2.5
6	Ventilation	(5)	3.2.6
7	Fire Protection	(3)	3.2.7
8	Inservice Inspection	(2)	3.2.8
9	Materials	(11)	3.2.9
10	Accident Prevention and Analysis	(5)	3.2.10
11	Radiological Assessment	(32)	3.2.11
12	Criticality	(4)	3.2.12
13	Shielding	(2)	3.2.13
14	Meteorology	(1)	3.2.14
15	Flood Protection	(3)	3.2.15
16	Tornado	(2)	3.2.16
17	Seismic Design	(10)	3.2.17
18	Transport and Dispersion	(4)	3.2.18
19	Safeguard and Security	(15)	3.2.19
20	Material Accounting	(11)	3.2.20
21	Emergency Planning	(2)	3.2.21
22	Personnel Training	(3)	3.2.22
23	Quality Assurance	(14)	3.2.23
24	Transportation Interfer	(3)	3.2.24
25	General	(1)	3.2.25

3 REVIEW OF REGULATORY GUIDES

This chapter provides the technical review of the potentially adaptable regulatory guides. Section 3.1 is a summary of the review, while review discussion for each regulatory guide is provided in Section 3.2.

3.1 REVIEW SUMMARY

Of the 352 regulatory guides screened by title in Appendix A, ___ were considered potentially adaptable. Table 3-1 provides a summary of the technical review of these ___ Regulatory Guides as to their adaptability.

3.2 TECHNICAL REVIEW

This technical review covers all four parts of a Regulatory Guide i.e. Introduction, Discussion, Regulatory Position and Implementation. For each regulatory guide, results of the review is presented in two parts. Part I, "Recommendation" tabulates the result of the review in two columns. The first column, "Regulatory Position", states the title of the regulatory position. The second column, "Recommendation", states whether the position is considered "Adaptable", has "Limited Adaptability" or is "not adaptable".

Part II, "Technical Discussion" presents a succint discussion of the background information on the issue addressed by the guide, the intent of the guide and the rationale or technical basis supporting the recommendations.

It is the intent of this report at this stage to adopt a conservative approach so as to retain as many regulatory positions as possible to assure that all previously acceptable regulatory guidance is made available to desingers/engineers until such time that evolving MRS design details can be used to justify their deletion.

3.2.1 Civil, Structural and Site

While the operating environment and conditions found in a reactor containment are unique, many of the operating and loading conditions typical of the nuclear power plant and other fuel cycle facility structures are expected to be similar at the ISFSI. Similarly, the geochemical data and procedures necessary for the engineering analysis, and design of the nuclear power plant foundation are also expected to be essential to engineering of the ISFSI. This subsection provides a technical review of regulatory guides related to civil, structural or site aspects of nuclear power plants which may be adapted to an ISFSI. These regulatory guides are 1.125, 1.132, 1.136, 1.138, and 1.142.

3.2.1.1 Regulatory Guide 1.125

PHYSICAL MODELS FOR DESIGN AND OPERATION OF HYDRAULIC STRUCTURES AND SYSTEMS FOR NUCLEAR POWER PLANTS (Rev 1, 10/78)

I. Recommendations

Regulatory Positions		Recommendations
1	Submittal of Information	Limited adaptability
2	NRC Participation	Limited adaptability
3	Documentation	Limited adaptability
4	Comparison with Fullscale Structures	Limited adaptability
5	Design Changes	Limited adaptability
6	Test Report	Limited adaptability

II. Technical Discussion

This guide addresses the use of physical hydraulic model testing for predicting the action and interaction of surface waters with features located outside of a reactor containment. Nuclear power plants need continuous water supply for their circulating water system (CWS), the core emergency cooling system and other inplant services. For this reason, nuclear power plants are located along coastal areas, lakes and river estuaries, and equipped with large hydraulic structures for water intake and discharge. An ISFSI is not

expected to require a water supply of such magnitude. Therefore, large hydraulic structures and systems of this type will not be needed at the ISFSI. However, the entire Regulatory position may be useful for the ISFSI designers in demonstrating the adequacy of structures for prevention and mitigation of accidents during such hydraulic loadings as wave runup. Therefore, the Regulation Guide is considered to have Limited Adaptability to the ISFSI.

3.2.1.2 Regulatory Guide 1.132
SITE INVESTIGATIONS FOR FOUNDATIONS OF NUCLEAR POWER PLANTS
(Rev 1, 3/79)

I. Recommendations

Regulatory Positions		Recommendations
1	General Site Investigation	Potentially adaptable
2	Logs of Subsurface Investigations	Potentially adaptable
3	Groundwater Investigations	Potentially adaptable
4	Procedures for Subsurface	Potentially adaptable
5	Spacing and Depth of Subsurface Investigations	Potentially adaptable
6	Sampling	Potentially adaptable
7	Retention of Samples, Rock Core, and Records	Potentially adaptable

II. Technical Discussion

This guide describes programs of site investigations required to evaluate geotechnical parameters needed for engineering analysis and design of building foundations for nuclear power plants. While, in general, the analysis of foundations and surface structures at a ISFSI is not expected to be as rigorous as for nuclear power plants, the site information called for in the regulatory positions of this guide would nevertheless be needed for the analysis and design of ISFSI supporting structures important to safety. These data requirements are not seen as being unique to nuclear power plants.

3.2.1.3 Regulatory Guide 1.136

MATERIALS, CONSTRUCTION, AND TESTING OF CONCRETE CONTAINMENTS (ARTICLES CC-1000, -2000, AND -4000 THROUGH -6000 OF THE "CODE FOR CONCRETE REACTOR VESSELS AND CONTAINMENTS") (Rev 2, 6/81)

I. Recommendations

Regulatory Positions		Recommendations
1	Strength Tests	Limited adaptability
2	Cement Grout for Grouted Tendon Systems	Limited adaptability
3	Acceptance Standards	Limited adaptability
4	Protection of Prestressing Materials for Low-Temperature Effects	Limited adaptability
5	Tendon Ducts, Channels, Trumpets, and Transition Cones	Limited adaptability
6	Static Tensile Test	Limited adaptability
7	Curing	Limited adaptability
8	Splice Samples	Limited adaptability
9	Splices	Limited adaptability
10	Procedure	Limited adaptability
11	Tolerances for Liner Shells and Heads	Limited adaptability
12	General	Limited adaptability
13	Retest	Limited adaptability

II. Technical

This guide describes the bases for implementing the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ASME-ACI 359-80), with regard to the materials, construction, and testing of concrete containments. The positions of this guide are not adaptable to an ISFSI in general as the Code was specifically written to cover pressure retaining

structures, such as containments. However, portions may be considered potentially adaptable for the concrete storage casks that may be used at the MRS and future ISFSIs. Other codes, such as ACI 318-77, "Building Code Requirements for Reinforced Concrete", ACI 349-76, "Code Requirements for Nuclear Safety-Related Concrete Structures", and ACI 308-71, "Recommended Practice for Curing Concrete", are more amenable to the needs of ISFSI structures in general, and considered potentially adaptable. While some of the positions in this guide (e.g., 1, 7, and 9) are based on these codes, they have been merged with the ASME-ACI 359-80 requirements. Since the materials, construction, and testing of concrete structures are adequately covered by ACI 318-77, 349-76, and 308-71, it is suggested that these codes, instead of this Regulatory Guide, be considered and reviewed for adaptability.

3.2.1.4 Regulatory Guide 1.138
LABORATORY INVESTIGATIONS OF SOILS FOR ENGINEERING ANALYSIS AND DESIGN OF NUCLEAR POWER PLANTS (4/78)

I. Recommendations

Regulatory Positions		Recommendations
1	General Requirements for a Laboratory Testing Program	Potentially adaptable
2	Handling and Storage of Samples	Potentially adaptable
3	Selection and Preparation of Test Specimens	Potentially adaptable
4	Criteria for Testing Procedures	Potentially adaptable
5	Documentation of Test Results	Potentially adaptable

II. Technical Discussion

This guide describes laboratory investigations and testing practices acceptable for determining soil and rock properties and characteristics needed for engineering analysis and design for foundations and earthworks for nuclear power plants. These laboratory investigations, however, are not unique to nuclear power plants and would be needed for the analysis and design of ISFSIs.

3.2.1.5 Regulatory Guide 1.142

SAFETY-RELATED CONCRETE STRUCTURES FOR NUCLEAR POWER PLANTS (OTHER THAN REACTOR VESSELS AND CONTAINMENTS) (Rev 1, 10/81)

I. Recommendations

Regulatory Positions		Recommendations
1	Pressure Retaining Structures	Not adaptable
2	Radiation Shielding	Potentially adaptable
3	Ductility	Potentially adaptable
4	Examiner Qualifications	Potentially adaptable
5	Compressive Strength	Potentially adaptable
6	Load Factors	Potentially adaptable
7	Groundwater Pressure Loads	Potentially adaptable
8	Differential Settlements	Potentially adaptable
9	Pool Dynamics	Not adaptable
10	Section Strengths	Potentially adaptable
11	Other Section Strengths	Potentially adaptable
12	Thermal Considerations	Potentially adaptable

II. Technical Discussion

This guide endorses the procedures and requirements of ACI 349-76, "Code Requirements for Nuclear Safety-Related Concrete Structures" as adequate in complying with the NRC regulations in the design and construction of safety-related concrete structures other than reactor vessels and containments, supplemented with the above positions. The design and construction requirements of ISFSI structures important to safety are expected to be similar to those at a nuclear power plant. The NRC-endorsed ACI code along with the supplemental positions provide the necessary guidance as to the design and construction of the ISFSI structures important to safety. Positions 1 and 9 are not adaptable because they are related to pressure resisting structures and pool dynamics in a pressure suppression containment.

The other positions deal with conditions and loadings that are expected to exist at an ISFSI.

3.2.2 Electrical Systems

The electrical systems of a nuclear power plant may be divided into two subsystems: power supply and related instrumentation and control. This section reviews the regulatory guides that are related to the power supply systems of nuclear power plants. Section 3.2.3 discusses instrumentation and control.

During normal operation of a nuclear power plant, plant auxiliary systems are supported by power generated on site. However, during plant start-up, shutdown or emergency conditions, station auxiliary systems are supported by power taken from offsite sources. As a backup in the event of an emergency, when power supply from offsite sources are not available, the plant is equipped with emergency diesel generators and uninterruptable power supply (UPS). Storage batteries are also kept ready to supply DC power directly or through DC-AC inverter to safety-related instrumentation.

ISFSI electrical systems would normally be supported by offsite power sources, including during emergency conditions. ISFSI emergency power supply requirements for occasions when offsite power sources are unavailable depend on the design basis for emergency operations at the ISFSI as well as the reliability of the offsite power source. Examples of major systems important to safety that may require continuous power supply are: many of the HVAC systems within the receiving and handling facilities, radiological monitoring systems, etc. If uninterrupted power supplies for both normal and accident conditions are required, it is necessary that the design of the ISFSI include emergency power supply systems.

The Institute of Electrical and Electronic Engineers (IEEE) has established standards for the design of power plant electrical systems. Most of the regulatory guides reviewed in this section address the independence and redundancy requirements of the standby emergency power system at nuclear power plants by endorsing the appropriate Sections of IEEE Standards as acceptable methods to demonstrate compliance with the 10 CFR 50 regulations. The same design principles recommended in these guides can be adapted to the power supply systems at the ISFSI.

The potentially adaptable regulatory guides reviewed in this section are: RG 1.6, 1.9, 1.32, 1.41, 1.75, 1.89, 1.93, 1.106, 1.108, 1.118, 1.128, 1.129, 1.131.

The design principle for redundant and independent systems is also applicable to controls and instrumentations which are discussed in Section 3.2.3.

3.2.2.1 Regulatory Guide 1.6

INDEPENDENCE BETWEEN REDUNDANT STANDBY (ONSITE) POWER SOURCES AND BETWEEN THEIR DISTRIBUTION SYSTEMS (3/71)

I. Recommendations

Regulatory Positions	Recommendations
1. Establishment of Redundant Load Groups	Potentially adaptable
2. Independence of Redundant a-c Systems	Potentially adaptable
3. Arrangement and Independence of Redundant d-c Systems	Potentially adaptable
4. Independence of Redundant Standby Sources and Loads	Potentially adaptable
5. Prime Movers	Potentially adaptable

II Technical Discussion

This regulatory guide describes the degree of independence necessary between redundant standby (onsite) power sources and between their distribution systems to be acceptable to the NRC. The intent of this guide is to assure that onsite electrical power systems will continue to supply power to safety-related equipment, assuming a single failure. Application of single failure criterion is discussed in Subsection 3.2.3.3. The design of the ISFSI is likely to include redundant utility services and distribution that are important to safety as required in 10 CFR 72.72(k) (1). It is suggested that the redundant standby power sources and their distribution systems be operated independently, as recommended in this guide. As a precautionary measure, if manual connection of redundant load groups is determined warranted, interlocks should be provided to prevent simultaneous operation of redundant power sources, and appropriate operating procedures regarding manual connection of redundant load groups should be prepared and implemented.

3.2.2.2 Regulatory Guide 1.9

SELECTION, DESIGN, AND QUALIFICATION OF DIESEL-GENERATOR UNITS USED AS STANDBY (ON SITE) ELECTRIC POWER SYSTEMS AT NUCLEAR POWER PLANTS (Rev 2, 12/79)

I. Recommendations

Regulatory Positions	Recommendations	Section of 10CFR Regulation Addressed
1. Load Rating	Potentially adaptable	60.131(b)(5)(ii)
2. Short-time Rating	Potentially adaptable	60.131(b)(5)(ii)
3. Physical Independence	Potentially adaptable	60.131(b)(5)(ii)
4. Starting and Loading Requirements	Potentially adaptable	60.131(b)(5)(ii)
5. Qualification and Testing Requirements	Potentially adaptable	60.131(b)(5)(ii)
6. Testability	Potentially adaptable	60.131(b)(5)(ii)
7. Automatic Control	Potentially adaptable	60.131(b)(5)(ii)
8. Surveillance Systems	Potentially adaptable	60.131(b)(5)(ii)
9. Seismic Qualification	Potentially adaptable	60.131(b)(5)(ii)
10. Validity of Tests	Potentially adaptable	60.131(b)(5)(ii)
11. Site Acceptance Testing, Periodic Testing	Potentially adaptable	60.131(b)(5)(ii)
12. Applicability of Referenced Standards	Potentially adaptable	60.131(b)(5)(ii)
13. Test Requirements Supplement	Potentially adaptable	60.131(b)(5)(ii)
14. Load Capability Qualification	Potentially adaptable	60.131(b)(5)(ii)

II Technical Discussion

The NRC, through this regulatory guide, accepts the requirements of IEEE Standard 387-1977, "IEEE Standard Criteria for Diesel-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations" as adequate for meeting the NRC requirements for diesel-generator units for nuclear power

plants, subject to several supplementary requirements. This guide assures that the onsite standby electric power system will have sufficient capacity and capability to maintain the vital functions of systems important to safety in the event of a Loss of Offsite Power (LOOP).

The design of the ISFSI may have to incorporate sufficient capability and capacity to supply power to the systems important to safety during an emergency. If diesel generators are used to supply emergency A/C loads, the regulatory positions of this guide may be appropriate. Therefore the positions described in this guide can be considered potentially adaptable to the design of the ISFSI.

However, some of the positions recommended in this guide may appear to be too restrictive. Some factors which may allow the adaptation of less restrictive positions are:

(1) Equipment load ratings at an ISFSI can be more accurately assessed because of less complex design and operating conditions than those for a nuclear power plant.

(2) The availability requirements of systems for normal and accident conditions need not be as stringent as those for a nuclear power plant because of lower heat generation rate and radioactivity release potential for an accident at the ISFSI.

(3) The response time and load sequence intervals of the diesel generator unit will also be less demanding for the ISFSI.

3.2.2.3 Regulatory Guide 1.32
CRITERIA FOR SAFETY-RELATED ELECTRIC POWER SYSTEM FOR NUCLEAR POWER PLANTS (Rev 2, 2/77)

I. Recommendations

Regulatory Positions	Recommendations
1a Availability of Off-Site Power	Potentially adaptable
1b Battery Charge Supply	Potentially adaptable

I. Recommendations

Regulatory Positions		Recommendations
1c	Battery Performance Discharge Tests	Potentially adaptable
1d	Independence of Redundant Standby Redundant Standby Sources	Potentially adaptable
1e	Connection of Non-Class 1E Equipment to Class IE	Potentially adaptable
1f	Selection of Diesel-Generator Capacity	Potentially adaptable
2a	Shared Systems	Not Adaptable
2b	Power Availability	Potentially adaptable

II Technical Discussion

The NRC endorses, in general, IEEE Standard 308-1974, "Criteria for Class 1E Power Systems for Nuclear Power Generating Stations" as acceptable for meeting the design, operation, and testing requirements of electric power systems for a nuclear power plant, except those that were in conflict with Criterion 17 of 10CFR Part 50. The electrical system which supports equipment important to safety in an ISFSI may be similar to that of a nuclear power plant. The requirements in IEEE Standard 308-1974 are considered potentially adaptable for the design and engineering of electrical systems important to safety in the ISFSI. However, since the ISFSI has less restrictive emergency situations compared to power reactors, certain NRC positions on the ISFSI safety-related electric power system performance characteristics (such as acceptable time lapse for increased access to offsite power) should be re-established based on analyses performed on postulated ISFSI accident scenarios and power demand for accident mitigation.

Position 2a is considered not adaptable, because it addresses electrical systems shared among multiple reactor units at a nuclear power generating station.

3.2.2.4 Regulatory Guide 1.41

PREOPERATIONAL TESTING OF REDUNDANT ON-SITE ELECTRIC POWER SYSTEMS TO VERIFY PROPER LOAD GROUP ASSIGNMENTS (3/73)

I. Recommendations

Regulatory Positions	Recommendations
Test Procedures	Potentially adaptable

II Technical Discussion

The guide provides specific instructions for testing the plant electric distribution system and verifies proper assignment of load groups to the redundant on-site sources before plant operations.

As discussed in Subsections 3.2.2.1 thru 3.2.2.3, if the ISFSI is equipped with redundant on-site electric power systems, such systems will require functional tests and an established preoperational program as described in this guide. It is, therefore, suggested that before the test procedures recommended in this guide is adapted to the ISFSI design, the nature of the emergency power needs be established.

3.2.2.5 Regulatory guide 1.75

PHYSICAL INDEPENDENCE OF ELECTRICAL SYSTEMS (Rev 2, 9/78)

I. Recommendations

Regulatory Positions	Recommendations
IEEE Standard 384-1974	Potentially adaptable

II Technical Discussion

This guide endorses IEEE Standard 384-1974, "Criteria for Independence of Class 1E Equipment and Circuits", as an acceptable method for complying with the requirements that on-site electrical distribution systems and the related protection systems are designed with sufficient physical independence, supplemented with clarifications. IEEE Standard 384-1974 presents the criteria for the physical separation of redundant circuits and equipment, and

tests and analysis for determining flame-retardant characteristics of proposed cable installations. These criteria are applicable to any electrical systems important to safety independent of the type of facility. The purpose of these criteria is to ensure that redundant electrical systems can not be impaired by a common cause. There may be redundant electrical systems at an ISFSI as required by 10 CFR 72.72(k)(1). These electrical systems can similarly be protected by applying the same design criteria recommended in this guide.

3.2.2.6 Regulatory Guide 1.89
QUALIFICATION OF CLASS 1E EQUIPMENT FOR NUCLEAR POWER PLANTS (11/74)

I. Recommendations

Regulatory Positions	Recommendations	Section of 10CFR Regulation Addressed
1. IEEE Std 323-1974	Potentially adaptable	60.131(b)
2. Radiological Source Term	Potentially adaptable	60.131(b)

II. Technical Discussion

This regulatory guide endorses the method described in IEEE Standard 323-1974, "Qualifying Class 1E Equipment for Nuclear-Power Generating Stations", to qualify electrical equipment for service in nuclear power plants. The referenced IEEE Standard delineates the principles, procedures and "method of qualification" which, when satisfied, will confirm the adequacy of the equipment design for performing its safety function under normal, abnormal and accident events. It is expected that the electrical equipment operating in the ISFSI will also be subject to a similar qualification test to confirm their capability to perform functions important to safety under normal, abnormal, and accident conditions. Test parameters associated with the operating environments at the ISFSI are expected to be much less severe than those at a nuclear power plant. Therefore, while the principle of performing environmental qualification tests on ISFSI electric equipment is considered potentially adaptable, it is suggested that the criteria and test procedures be established independently to suit ISFSI operating conditions.

3.2.2.7 Regulatory Guide 1.93

AVAILABILITY OF ELECTRIC POWER SOURCES (11/74)

I. Recommendations

Regulatory Positions	Recommendations
1. Available AC Sources Are One Less Than The LCO	Potentially adaptable
2. Available Off-site Sources Are Two Than The LCO	Potentially adaptable
3. Available On-Site and Off-Site AC Sources Are One Less Than The LCO	Potentially adaptable
4. Available On-Site AC Power Sources Are Two Less Than The LCO	Potentially adaptable
5. Available On-Site DC Supplies Are One Less Than The LCO	Potentially adaptable

II Technical Discussion

This guide provides guidance as to the time limit for continuing normal operation at the nuclear power plant with one or two of the electric power sources not available. The five positions in the guide present the five possible combinations of offsite AC and onsite DC power supply, with one or two of these sources not available. The design of the HLW ISFSI power supply system may include on-site and off-site power sources similar to those at a nuclear power plant. Similar analysis regarding the impact of temporary outage of one or two of the power sources, on the ISFSI's safety performance capability should be performed. The time limits given in this guide are determined for nuclear power plants. A set of more appropriate time limits specific to the operational characteristics of the ISFSI should be derived based on analysis of the safety performance requirements and radiological conditions of the ISFSI during an accident. The five decision flow diagrams presented in the guide provide examples of the type of logic sequences which is likely to be needed to assess power source availability.

EBASCO SERVICES
INCORPORATED
BOONE BUILDING
2211 WEST MEADOWVIEW
GREENSBORO, N. C. 27407

Mr. Harold Rothstein
Ebasco Services, Inc.
Two World Trade CEnter
89th Floo , ..
New York, NY 10048

Robert Cannon's Photographs of the proposed
Clinch River Breeder Reactor and
Oak Ridge Reservation
MRS Site

July 1995