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POLICY ISSUE
(Information)

January 17, 1984

SECY-84-17

FOR: The Commissioners

FROM: William J. Dircks
Executive Director for Operations

SUBJECT: NRC REVIEW AND COMMENT ON THE DOE CIVILIAN RADIOACTIVE WASTE MANAGEMENT PROGRAM MISSION PLAN

PURPOSE: To inform the Commission of ongoing and proposed staff actions and the schedule to review and comment on the DOE Mission Plan.

ISSUE: In accordance with Section 301(b) of the Nuclear Waste Policy Act of 1982, (Public Law 97-425), the Secretary, DOE, shall submit a draft Mission Plan to the Commission for comment not later than April 7, 1984, in advance of its submittal to Congress. The Act specifies that the Mission Plan will 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. The Act also requires that in preparing comments on the Mission Plan, the Commission specify with precision any objections concerning the plan.

DISCUSSION: On December 23, 1983, NRC received the preliminary draft of Volume I of the Mission Plan from DOE with a request for NRC review and comment by January 31, 1984. Volume I

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provides the Department's plan for conducting the civilian radioactive waste management program. This plan discusses the program policies, strategies and schedules for development of spent fuel and high-level waste repositories, interim storage, monitored retrievable storage and transportation. The preliminary draft has been distributed to involved NRC offices for review which will be completed by January 31, 1984. In view of the preliminary nature of this request, the NRC staff plans to send its comments directly to DOE. An Information Paper will be sent to the Commission informing you of staff comments. Volume II of the Mission Plan will be made available to NRC for review no later than April 7, 1984. This volume will include more detailed information to address the eleven items specifically required by Section 301(a) of the Act shown in Enclosure 2.

DOE is required under Section 301(b) of the NWPA to submit a formal draft Mission Plan to NRC for comment by April 7, 1984, in advance of its submittal to Congress. We anticipate that formal drafts of both Volume I and Volume II will be submitted to NRC for review by the required date. On completion of that review, formal NRC staff comments will be forwarded in a Negative Consent Paper to the Commission for its consideration.

William J. Dircks
Executive Director for Operations

Enclosures: - IN BP.
1. DOE, Civilian Radioactive Waste Management Program Mission Plan, Volume I, Overview on Current Program Plans, December 20, 1983 - Commissioners, SECY, OGC & OPE only.
2. Section 301(a) (1) through (11)

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MISSION PLAN

SEC. 301. (a) CONTENTS OF MISSION PLAN.—The Secretary shall prepare a comprehensive report, to be known as the mission plan, 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. The mission plan shall include— 42 USC 10221.

(1) an identification of the primary scientific, engineering, and technical information, including any necessary demonstration of engineering or systems integration, with respect to the siting and construction of a test and evaluation facility and repositories;

(2) an identification of any information described in paragraph (1) that is not available because of any unresolved scientific, engineering, or technical questions, or undemonstrated engineering or systems integration, a schedule including specific major milestones for the research, development, and technology demonstration program required under this Act and any additional activities to be undertaken to provide such information, a schedule for the activities necessary to achieve important programmatic milestones, and an estimate of the costs required to carry out such research, development, and demonstration programs;

(3) an evaluation of financial, political, legal, or institutional problems that may impede the implementation of this Act, the plans of the Secretary to resolve such problems, and recommendations for any necessary legislation to resolve such problems;

(4) any comments of the Secretary with respect to the purpose and program of the test and evaluation facility;

(5) a discussion of the significant results of research and development programs conducted and the implications for each of the different geologic media under consideration for the siting of repositories, and, on the basis of such information, a comparison of the advantages and disadvantages associated with the use of such media for repository sites;

(6) the guidelines issued under section 112(a);

(7) a description of known sites at which site characterization activities should be undertaken, a description of such siting characterization activities, including the extent of planned excavations, plans for onsite testing with radioactive or nonradioactive material, plans for any investigations activities which may affect the capability of any such site to isolate high-level radioactive waste or spent nuclear fuel, plans to control any adverse, safety-related impacts from such site characterization activities, and plans for the decontamination and decommissioning of such site if it is determined unsuitable for licensing as a repository;

(8) an identification of the process for solidifying high-level radioactive waste or packaging spent nuclear fuel, including a summary and analysis of the data to support the selection of the solidification process and packaging techniques, an analysis of the requirements for the number of solidification packaging facilities needed, a description of the state of the art for the materials proposed to be used in packaging such waste or spent fuel and the availability of such materials including impacts on strategic supplies and any requirements for new or reactivated facilities to produce any such materials needed, and a description of a plan, and the schedule for implementing such plan, for an aggressive research and development program to provide when needed a high-integrity disposal package at a reasonable price;

(9) an estimate of (A) the total repository capacity required to safely accommodate the disposal of all high-level radioactive waste and spent nuclear fuel expected to be generated through December 31, 2020, in the event that no commercial reprocessing of spent nuclear fuel occurs, as well as the repository capacity that will be required if such reprocessing does occur; (B) the number and type of repositories required to be constructed to provide such disposal capacity; (C) a schedule for the construction of such repositories; and (D) an estimate of the period during which each repository listed in such schedule will be accepting high-level radioactive waste or spent nuclear fuel for disposal;

(10) an estimate, on an annual basis, of the costs required (A) to construct and operate the repositories anticipated to be needed under paragraph (9) based on each of the assumptions referred to in such paragraph; (B) to construct and operate a test and evaluation facility, or any other facilities, other than repositories described in subparagraph (A), determined to be necessary; and (C) to carry out any other activities under this Act; and

(11) an identification of the possible adverse economic and other impacts to the State or Indian tribe involved that may arise from the development of a test and evaluation facility or repository at a site.

Exhibit 2.

Part of Secy 84-17, 1/17/84

DRAFT

CIVILIAN RADIOACTIVE WASTE MANAGEMENT PROGRAM MISSION PLAN

VOLUME I

OVERVIEW AND CURRENT PROGRAM PLANS

DECEMBER 20, 1983

U.S. DEPARTMENT OF ENERGY

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

CIVILIAN RADIOACTIVE WASTE MANAGEMENT PROGRAM

MISSION PLAN

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I. INTRODUCTION

It is estimated that, by the turn of the Century, approximately 650,000 cubic feet (50,000 metric tons) of spent nuclear fuel assemblies from civilian power reactors will have accumulated in the United States. These spent fuel assemblies are highly radioactive and must be isolated from the biosphere for an extended period of time (in excess of 10,000 years) to protect the public and the environment.

In response to this situation, President Reagan signed Public Law 97-425, the "Nuclear Waste Policy Act of 1982" on January 7, 1983. The Act requires the Department of Energy to site, license and operate repositories for spent nuclear fuel and high-level radioactive waste.* The program developed by the Department to fulfill the requirements of the Act is described in this Mission Plan.

Every activity specified in the Mission Plan is targeted toward one fundamental objective: to accept commercial high-level radioactive waste for safe management, storage, and permanent disposal on a firm schedule, beginning not later than January 31, 1998. Further, the waste acceptance schedule will, initially, preclude the need for additional at-reactor storage after January 31, 1998 and, utimately, remove from at-reactor storage all waste that is more than 5-years old.

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* High-level radioactive waste is the highly radioactive material resulting from the reprocessing of spent nuclear fuel and other highly radioactive material that the Nuclear Regulatory Commission, consistent with existing law, determines by rule requires permanent isolation. It is often called simply "radioactive waste", a term that is also often applied to spent fuel.

To achieve the above objective in the near term, the Department will pursue four program goals, summarized below:

1. Site, design, construct, and operate a mined geologic repository by January 31, 1998.

2. Design and site an engineered Monitored Retrievable Storage Facility, on a schedule that will permit its timely construction should the Congress so approve.

3. Assist utilities in providing adequate, safe at-reactor storage of spent fuel prior to Federal acceptance and stand ready to deploy limited Federal Government storage to utilities if they are determined qualified by the Nuclear Regulatory Commission.

4. Manage the technical program and the funds collected for disposal and storage services, in an effective and efficient manner.

The Department plans to carry out this program with full adherence to the legislated institutional process, while developing sound technical data needed to support key milestones and decision points.

This Mission Plan has been prepared as a means of both planning the program and demonstrating its conformance to the requirements of the Act. The Mission Plan is presented in two volumes, with Volume I defining the program objective, strategy, and current program plans, and Volume II providing specific details of the repository program as required by Sections 301(a)(1) through 301(a)(11) of the Act. It is the Department's intent to update this Mission Plan periodically as the program progresses.

II. PROGRAM STRATEGY

The objective of the Department's radioactive waste management strategy is to accept high-level radioactive wastes for safe management, storage, and permanent disposal on a firm schedule, beginning not later than January 31, 1998. The Department has executed contracts with all current owners and generators of civilian nuclear wastes specifying the obligations and terms whereby the Department will accept these wastes. The waste materials will be accepted in accordance with a Waste Acceptance Schedule designed to provide an acceptance rate in the first five years such that no utility will have to provide additional storage capacity after January 31, 1998. Subsequently, the acceptance rate will be equal to or greater than the actual discharge rate of spent fuel each year.

The Department does not intend to delay or postpone the acceptance of civilian radioactive wastes even if a permanent geologic repository is not completed by 1998. The planning approach adopted by the Department has been designed to assure that an acceptable facility will be available when needed, as in the case of Federal Interim Storage, or within eight to eleven years after Congressional approval (1993 to 1996) in the case of Monitored Retrievable Storage.

This approach is designed to ensure that all utilities will be able to establish firm planning schedules for the disposition of their radioactive wastes sufficiently early to determine their on-site interim storage needs prior to 1998. Until 1998, each utility will be responsible for providing its own additional on-site interim storage, unless the utility applies for and is certifed for the Federal Interim Storage program.

A. Waste Acceptance Schedule

Based on the criteria described above, the Department has prepared a Waste Acceptance Schedule which specifies, in the aggregate, the quantities of commercial nuclear wastes that the program will accept beginning in 1998. This schedule is presented in Table II-1.

This Waste Acceptance Schedule will serve as a planning base which will be updated annually in response to the latest projections of nuclear power growth. The schedule will eventually be further developed to show not only the aggregate acceptance schedule, but also an acceptance priority ranking by utility and fuel element. Under the terms of the utility contracts for disposal services, an annual capacity report with projected annual receiving capacities and rankings will be issued by the Department for planning purposes, beginning in 1987.

The disposal contracts with the utilities specify that priority will be given to the oldest spent fuel or high-level wastes. In 1991, DOE will begin publishing firm individual utility acceptance schedules in accordance with the contracts, including shipment allocations. The shipment of spent fuel from Federal Interim Storage (if any) will take place on the same schedule as the owners of the fuel would receive if the fuel were still at reactor sites or not later than three years after the initial operation of either a repository or MRS as specified in the Nuclear Waste Policy Act.

While the Department's acceptance rate during the initial five years is set to prevent, in the aggregate, the need for utilities to provide additional on-site storage after 1998, it is possible that an individual utility may face a need for expanded storage due to the timing of its

Table II-1: Waste Acceptance Schedule

Year	Annual Spent Fuel Generation (MTU) (1)	Discharge From Decommissioned Reactors (MTU) (1)	Cumulative Spent Fuel Generation (MTU)	First Repository Acceptance (MTU)	Second Repository Acceptance (MTU)	Cumulative Acceptance (MTU)	Remaining Backlog (MTU) (2)
Pre 1998	-	-	40,809	-	-	-	40,809
1998	2,739	97	43,645	1,800		1,800	41,845
1999	2,865	-	46,510	1,800	-	3,600	42,910
2000	2,682	340	49,532	1,800	-	5,400	44,132
2001	2,887	304	52,724	1,800	-	7,200	45,524
2002	2,763	414	55,901	1,800	-	9,000	46,901
2003	2,718	810	59,430	3,000	1,800	13,800	45,630
2004	2,531	878	62,839	3,000	1,800	18,600	44,239
2005	2,751	1,108	66,697	3,000	1,800	23,400	43,297
2006	3,372	338	70,407	3,000	1,800	28,200	42,207
2007	3,361	591	74,359	3,000	1,800	33,000	41,359
2008	3,561	331	78,251	3,000	3,000	39,000	39,251
2009	3,820	194	82,265	3,000	3,000	45,000	37,265
2010	3,726	-	85,991	3,000	3,000	51,000	34,991
2011	4,111	354	90,456	3,000	3,000	57,000	33,456
2012	3,906	104	94,466	3,000	3,000	63,000	31,466
2013	3,808	654	98,928	3,000	3,000	69,000	29,928
2014	3,871	579	103,379	3,000	3,000	75,000	28,379
2015	3,717	1,366	108,461	3,000	3,000	81,000	27,461
2016	3,809	1,472	113,743	3,000	3,000	86,000	27,743
2017	4,185	355	118,282	3,000	3,000	92,000	26,282
2018	4,487	691	123,460	3,000	3,000	98,000	25,460
2019	4,473	840	128,773	3,000	3,000	104,000	24,773
2020	4,890	112	133,775	3,000	3,000	110,000	23,775
2021	(3)			3,000	3,000	116,000	(3)
2022				2,500	3,000	121,500	
2023				1,500	3,000	126,000	
2024					3,000	129,000	
2025					3,000	132,000	
2026					1,775	133,775	

Notes:
(1) Data from U.S. Energy Information Administration Document EIA/EI-53 of July 26, 1983.
(2) Waste accepted during 1998 through 2002 will come preferentially from those reactors that would otherwise have insufficient on-site storage. The increase in the backlog during these years can be accomodated by limiting the amount of waste accepted from reactors with sufficient storage.
(3) Energy Information Administration Waste Generation Projections only run through 2020. For waste created after 2020, either the capacity of the first two repositories could be increased, or additional repositories could be built.

shipment allocation. The planning basis assumes that, after 1998, individual utilities who actually realize this need will arrange for the right to ship spent fuel to the Department from a utility who is next in the queue in shipment allocation (subject to prior approval by the Department based on submittal of a request no less than six months prior to the scheduled delivery date). The use of such brokering arrangements should prevent the need for any utility to expand on-site storage and minimize transshipments.

B. Defense Nuclear Wastes

The Nuclear Waste Polciy Act of 1982 requires the President to evaluate by January, 1985, the use of commercial disposal capacity for the disposal of defense high-level radioactive wastes. Pending completion of this evaluation and the issuance of the Presidential finding on the defense wastes disposal requirements, the Department is using three principles as a planning basis relative to the Waste Acceptance Schedule:

1. If civilian repositories accept defense wastes, these wastes will be received on a separate, independent schedule and will be stored or disposed of in a manner not to interfere in any way with commercial spent fuel operations;

2. The rate of fuel acceptance from commercial sources will not be altered, i.e., there will be no substitution of defense wastes for civilian spent fuel; and

3. Costs associated with permanent disposal of defense wastes will be paid by the Federal Government into the Nuclear Waste Fund.

C. Facilities Needed in 1998 and Beyond

With the commitment by the Department to accept spent fuel in 1998 and each year afterwards, it is essential that an appropriate facility be available at that time to accomodate the receipt of that fuel. In

addition, other facilities will be needed in the next century for the permanent disposal of more than 110,000 metric tons of spent nuclear fuel or high-level waste that will be discharged from reactors and aged more than five years by the year 2020.

The main plan and primary effort is to have an operating geologic repository in 1998. The utilities will load the spent fuel into government provided transportration containers, transfer title of their spent fuel to the Department, in accordance with the provisions of the disposal contract and the Waste Acceptance Schedule, and the Department will arrange for shipment of the spent fuel to the repository site. At the repository site, the fuel will be temporarily held in a spent fuel receiving facility. The spent fuel will then be emplaced in the geologic repository in accordance with a loading plan which takes into account the Waste Acceptance Schedule and physical constraints on the waste package and its subsequent handling and emplacement.

Although the current repository planning is based on receiving primarily spent nuclear fuel, care is being taken to ensure that the program retains the capability to accept high-level wastes from the reprocessing of spent nuclear fuel. Consistent with the Presidential statement of October 7, 1981 that supports commercial reprocessing, the Department will consider any such proposals from industry to reprocess spent fuel, recover the resources and accept the waste for disposal.

The Nuclear Waste Policy Act of 1982 also requires the Department to initiate the process of selecting a second geologic repository site through the phase of Presidential recommendation to Congress. After identifying a site, and upon Congressional approval, the Department will proceed to license the site and construct a second repository. The Act does require that a second repository be in operation before the loading

of the first repository exceeds 70,000 metric tons of heavy metal in spent nuclear fuel, or the quantity of high-level waste resulting from the reprocessing of such a quantity of spent nuclear fuel. The Department believes that a second repository will be necessary to meet the Waste Acceptance Schedule requirements. The second repository will also provide a backup to the first repository, provide a means of increasing the waste receipt rate thereby allowing the backlog of spent fuel to be more rapidly eliminated, provide an insurance location for disposal if operational problems develop at the first repository, and will provide an opportunity to consider regional distribution in repository siting as required by the Act.

The Department's strategy for the second repository is to recommend sites for characterization by July 1, 1989, as required by the Act and to carry the second repository siting process to the stage where construction approval can be requested. The Department will proceed with a plan to achieve the earliest date attainable for second repository operation consistent with requirements. However, the Department will wait until the 1990's to make a final decision on construction of the second repository. A decision at that time will permit the Department to use the best information available to match the requirements with the construction schedules in order to determine the best date for operational startup. Current estimates indicate that the second repository would begin operation about five years after the first repository if the Department proceeds at best pace.

The two repositories, each with a planned 70,000 metric ton capacity, will accomodate all wastes anticipated to be generated through 2020 (and delivered by 2026). Planning and analysis of additional repositories will be periodically undertaken during the coming years.

Should there be much delay in achieving the desired operational dates for the geologic repositories, and if Congress has not already authorized a monitored retrievable storage facility, it is the Department's intent to request authorization of such a facility to receive wastes starting in 1998.

D. Challenges in the Repository Schedule

In order for the first repository to begin operation by January 31, 1998, a demanding set of technical, regulatory and institutional challenges will have to be met. The schedule leading to the 1998 initial operation date is optimistic as it is based on the assumption that all problems with each of the activities in the schedule will be resolved without impacting the schedule. Although the Department will make every responsible effort to meet the 1998 initial operation date, the potential for further delays must be considered in the program planning.

By the date on which the maximum lead time necessary to construct a Monitored Retrievable Storage (MRS) facility by 1998 is reached, the Department will assess the progress on the first repository. If by this date it is known that the first repository will not be available by January 31, 1998, then the Department will request Congressional authorization to construct a MRS facility to be in operation by January 31, 1998 (if Congress has not already approved such action). Should this plan be executed, the MRS facility may continue to be used to receive and store spent fuel until and concurrent with repository operations, before emplacement of the spent fuel in the repository.

For possible delays in the second repository operation, a similar scheme for triggering construction of a MRS will be developed. The relationship of this MRS to the first repository, the second repository and whether this would be a first or second MRS is an important element of the

overall strategic approach. A MRS may or may not be necessary depending upon the anticipated length of second repository delay, the Waste Acceptance Schedule, and the length of time to approach the first repository loading limitations.

With regard to post-1998 Federal Interim Storage (FIS) facilities, the Act specifies that all spent fuel stored in these facilities shall be removed not later than three years following opening of either a repository or a MRS. Thus, any facilities provided through the FIS program would continue operation beyond 1998 until the fuel is shipped and then would be closed.

E. Pre-1998 Activities Needed to Achieve Facilities for 1998 and Beyond

The strategy to this point has featured the requirements and the facilities needed to accept nuclear wastes beginning in 1998, and to accomodate the wastes with particular types of facilities. In order to have these facilities available as described, it will be necessary for the Department to engage in and to carry out successfully a number of activities between now and 1998. The strategic approach to the activities are presented in this section.

1. Geologic Repository

The process for siting the geologic repositories is very well defined in the Nuclear Waste Policy Act of 1982, including a sequence of steps which forms the basis for the main strategy to achieve operation of a safe and environmentally sound geologic repository by 1998. These activities combine a complex approach involving a technical program, a strong institutional process, and finally selection of the operational site.

The strategy requires the Department to nominate at least five sites (from the nine sites identified as potentially acceptable) for a permanent repository, consistent with the requirements of the siting guidelines. Each site nomination will be accompanied by an environmental assessment, in accordance with the requirements of the Act. The environmental assessments will be issued for public review and comment.

The Department must then recommend three of the nominated sites to the President for extensive site characterization. The Department will recommend only three sites for detailed characterization and fully expects that, at the conclusion of characterization, at least one site will have been shown to be suitable for subsequent recommendation to the Congress for development as the repository. Following Presidential approval of the sites to be characterized, the Department must hold public hearings in the vicinity of each site approved by the President to inform the public of the recommendation and to receive public comments on a site characterization plan.

The Department will then proceed to obtain all technical information from each of the sites to support a licensing application for each site. This activity will include the sinking of exploratory shafts to at-depth disposal locations and any other research and development techniques required to obtain the data specified by the Nuclear Regulatory Commission to support a Construction Authorization Application. In this process the Department will satisfy the Federal-State agreements that are in effect relating to the siting of a repository.

Next, the Department is required to hold a public hearing in the vicinity of each site still under consideration as a site for the first repository and then the Secretary of Energy will make a final recommendation of the first repository site to the President. Finally, the President must submit to the Congress his final selection of a site for the first repository, including a full Environmental Impact Statement.

The Department recognizes that the acquisition of all necessary information and data to support licensing may require additional activities that require more time than is provided in the repository schedule specified in this Mission Plan. In that event, the Department will place priority on the acquisition of technical data and adherence to the institutional process in preference to the repository schedule. In any event, DOE will comply with all steps specified in the Nuclear Waste Policy Act regardless of the time required to develop and present the information necessary to assure all affected parties of the safety of the repository.

The Nuclear Waste Policy Act provides that after the President has recommended a final site, the Governor or state legislature or affected Indian tribe may present a notice of disapproval to the Congress. If this occurs, then a joint resolution of Congress would be needed to override the notice of disapproval. If the Congress overrides the notice of disapproval, the Department will then proceed to file a license application with the Nuclear Regulatory Commission to obtain a construction permit when the site designation becomes effective.

In carrying out the strategy discussed above, the Department will comply fully with the consultation and cooperation requirements specified in the Act. The Act states in Section 111(a)(6) that "State and public participation in the planning and development of repositories is essential in order to promote public confidence in the safety of disposal of such waste and spent fuel ..." The Act further spells out in Section 116, 117, and 118 the minimum requirements for consultation and cooperation with the States and Indian tribes. The Department has and will continue to meet the spirit as well as the letter of the law by providing mechanisms for the following:

a. Full, open, and timely sharing of technical information,
b. Consultation on key draft documents,

c. Negotiation of written agreements,
d. Financial assistance to States and Indian tribes to allow full participation,
e. Establishment of outreach programs as requested by the States for public information,
f. Joint workshops to address key technical and process issues, and
g. Payments in lieu of taxes.

These mechanisms must at all times maintain an unimpeachable level of clarity and credibility and must demonstrate that the Federal Government, States, Indian tribes, and the general public have genuine roles in impacting the policies for nuclear waste management.

2. Test and Evaluation Facility

The Nuclear Waste Policy Act authorizes, but does not require, the Department to provide for the construction, operation, and maintenance of a deep geologic test and evaluation facility. Its purpose is to provide a facility to carry out confirmatory and technology development activities and to provide an integrated demonstration of the technology for deep geologic disposal of nuclear wastes.

The Department has identified certain benefits from continued acquisition of data at the proposed site of the first repository following submission of a license application to NRC. As discussed further in Chapter III, the availability of additional information at the selected repository site will be beneficial. This information will aid in fulfilling the requirements for performance confirmation of the site, aid in design optimization of the repository system, and in testing and demonstrating the technology associated with repository operations.

The preferred strategy is to proceed with a Test and Evaluation Facility (TEF) that is collocated at the designated repository site if a decision is made to process with the test and evaluation facility. In accordance with the Act, underground construction would occur after repository site designation is effective, while TEF permanent surface construction would not begin until after NRC issuance of a construction authorization for the selected repository.

3. Monitored Retrievable Storage

The Nuclear Waste Policy Act requires the Department to complete a study by June 1, 1985 on the need for and feasibility of a Monitored Retrievable Storage facility. The Department must also submit to the Congress a proposal for the construction of one or more such facilities including a siting plan, site-specific designs, specifications, and cost estimates.

Concurrently, the Department will recommend that Congress authorize a process of siting and licensing for a Monitored Retrievable Storage facility. This action could place the Monitored Retrievable Storage concept in a position to be ready for initiation of construction at such time as Congress deems it appropriate and, depending on the data available for characterizing the site selected and the degree of public acceptance, could result in an operational Monitored Retrievable Storage facility within a period of eight to eleven years after Congressional approval to proceed.

The strategic approach is to show that a MRS can be available not later than January 31, 1998. The MRS planning, siting, and licensing activities would proceed from 1985 through the early 1990's to maintain this option.

Site selection activities would take place during the mid-to-late 1980s. Site selection guidelines are currently being prepared to support this activity. Following site selection, a license application would be submitted to NRC. When NRC issues a license for construction and all pre-construction planning activities are complete, the MRS concept would be ready for activation.

4. Transportation

The scope and magnitude of the Department of Energy's responsibility for the transportation of nuclear waste is derived from two key provisions in the Nuclear Waste Policy Act of 1982. In accordance with these provisions, the Department will take title at the reactor or shipment origin and arrange for the transportation of spent nuclear fuel and high-level nuclear waste to storage facilities and to repositories. This places full responsibility for the management of transportation activities with the Department. Thus, the Department will be required to take steps to ensure that all transportation components are in place when needed to support the many requirements of the Act.

The Nuclear Waste Policy Act requires the Department to rely on private industry to the fullest extent possible for the transportation of spent nuclear fuel under the Act; unless the Secretary of Transportation in consultation with the Secretary of Energy, determines that this is not possible at reasonable cost. In any case, the Department will remain responsible for ensuring that safe, timely transportation capabilities are availabe as needed.

A major issue facing the Department is how to insure a sufficient supply of appropriate casks for transport activities under the Act. For near-term requirements the supply of licensed spent fuel casks appears to

be adequate. However, due to the substantial lead time required to develop a new generation of casks, the Department must now direct its attention to the development of casks that will be needed in the long term.

Accordingly, the preferred strategy is to establish availability, terms, and conditions for utilization of existing or currently planned casks with present owners and negotiate standard contracts for near-term (5 to 10 years) requirements. In the long term, the Department will rely, to the extent practical, on private industry to supply transportation services and equipment and will foster this capability by an appropriate mix of information exchanges, cooperative initiatives, incentive packages and other programs to enhance market stability. The Department will develop fleet projections, prepare system specifications, and provide other information to the private sector in a timely manner to allow for the long lead time involved in supplying sophisticated nuclear packaging. Contracts for all services will be placed to the extent possible with private industry according to a plan that would maintain several sources of supply. In any event, the Department is committed to have the necessary transportation capability in place when needed. Where the private sector cannot or will not provide the service required in a timely or cost effective manner, the Department will seek approval to use Government resources.

5. Federal Interim Storage

The Nuclear Waste Policy Act requires that the Department provide Federal Interim Storage (FIS) capacity for not more than 1900 metric tons of spent fuel from domestic civilian nuclear power reactors if and when needed. The need for FIS is to be determined by NRC based upon application made by the utilities. Upon determination of need, the Department must offer to enter into contracts with the utilities for the necessary storage, subject to the 1900 metric ton limit.

The strategic approach is to minimize or preclude the need for or the use of Federal Interim Storage. Accordingly, the Department is conducting an active Federal program to assist utilities in expanding on-site storage capacity to accommodate spent fuel generated through 1998.

As a contingency, as soon as a justifiable request is made to the Nuclear Regulatory Commission, the Department will proceed to identify Federal facilities capable of providing the required storage space.

As a further contingency, the Department will continue to explore the feasibility of a multipurpose storage cask that could be used for the FIS either at commercial reactors or at a Federal site. If feasible, such a cask would be designed so that it could later be used in the repository program, the MRS program, or in the transportation of spent fuel.

6. Systems Integration

Prior to final emplacement in a repository, all wastes will be subject to several packaging, loading, unloading, transportation and storage operations. There is a clear incentive to minimize the total number and length of time that wastes have to be handled to reduce exposure, costs and the potential for accidents.

The Department's strategy in this area is to adopt an approach which coordinates and optimizes the entire system of program activities including consideration of the waste form, cannister designs, handling facilities, and transportation. This approach will assist in standardization of equipment and facilities and help to ensure that any packaging and handling steps taken early in the process will facilitate rather than impede later steps. Central to achieving these goals is an integrated waste packaging and handling system.

As a major feature of this approach, the Department will investigate in depth concepts such as "all purpose" nuclear waste cannisters and disposable self-shielded casks that could be loaded at the source, sealed, stored at the reactor site or transported and stored either at an FIS site, a MRS site or geologic repository without being reopened.

III. PROGRAM PLANS

The Department's program for the management of high-level radioactive waste and spent nuclear fuel has been structured to meet the requirements of the Nuclear Waste Policy Act of 1982 (the Act). Thus, in addition to plans for permanent disposal in geologic repositories, the program contains plans for monitored retrievable storage and interim storage. The sections that follow discuss the major elements of the program--geologic repositories, monitored retrievable storage, transportation, interim storage, and systems integration. Included in the discussions are the current status of the program elements, major objectives and plans for achieving them, and schedules.

A. REPOSITORY

The Department has selected mined geologic repositories as the preferred means for the disposal of commercially generated high-level radioactive waste and spent fuel (46 FR 26677, May 14, 1981). This decision was made after evaluating various alternative means for the disposal of these materials in an environmental impact statement,* which showed that geologic disposal is both safe and environmentally sound. To carry out this decision, the Department has been conducting research and development and performing siting studies as part of the geologic repository program. The decision is supported by the Nuclear Waste Policy Act of 1982 (the Act), which was enacted "to provide for the development of repositories for the disposal of high-level radioactive waste and spent nuclear fuel, to establish a program of research, development, and demonstration regarding the disposal of high-level radioactive waste and spent nuclear fuel, and for other purposes."

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*U.S. Department of Energy, Final Environmental Impact Statement--Management of Commercially Generated Radioactive Waste, DOE/EIS-0046F, October 1980.

1. Brief Description of Geologic Repositories

The principal concept of a geologic repository is to emplace the waste deep below the surface of the earth in a suitable host rock. As shown in Figure 3-A-1, the repository will consist of both surface and underground facilities. The surface facilities will be used only during the active life of the repository, while waste is received, handled, and emplaced in the underground disposal rooms. When the repository has been filled to capacity, the surface facilities will be decommissioned and all points of access to the underground repository (i.e., shafts and boreholes) will be filled and permanently sealed.

To protect the health and safety of the public over the long term, multiple independent barriers, both natural and engineered, will be used. These barriers are designed to provide waste containment and isolation and are of three types (see Figure 3-A-2):

a. Waste package
b. Repository
c. Natural system.

The waste package consists of the waste form and the engineered barriers that separate the waste from the host rock. Depending on the final design, the latter may include a stabilizer, canister, overpack, backfill, and protective sleeves or coatings as appropriate. The waste package contributes to long-term isolation by (1) hindering the dissolution of the waste by any ground water that may reach it and (2) retarding the migration of radionuclides into the host rock.

The repository portion of the total disposal system consists of the underground structures and components, including engineered barriers not associated with the waste package; the host rock that supports them; and the seals on boreholes and shafts. The repository will be designed to

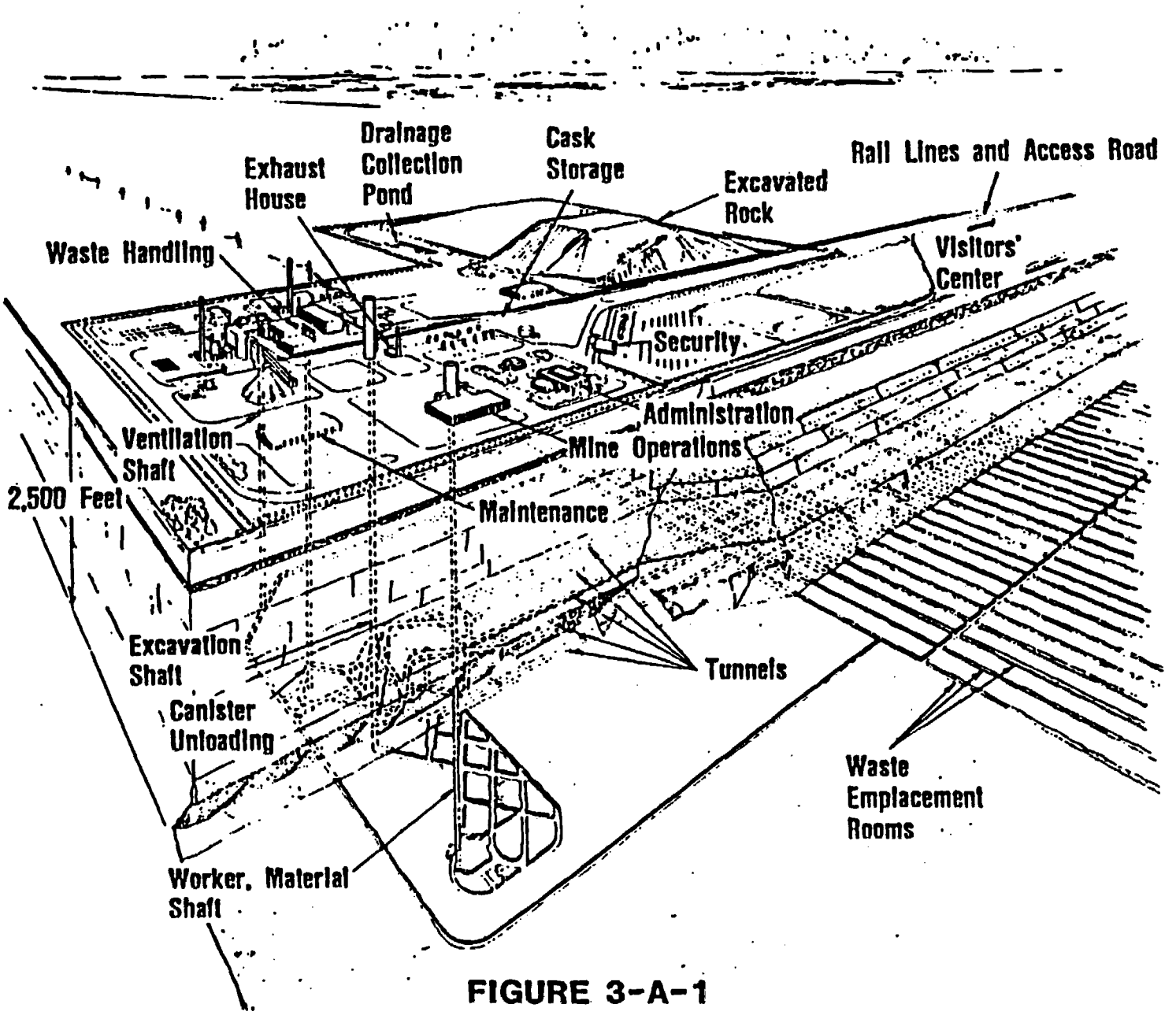
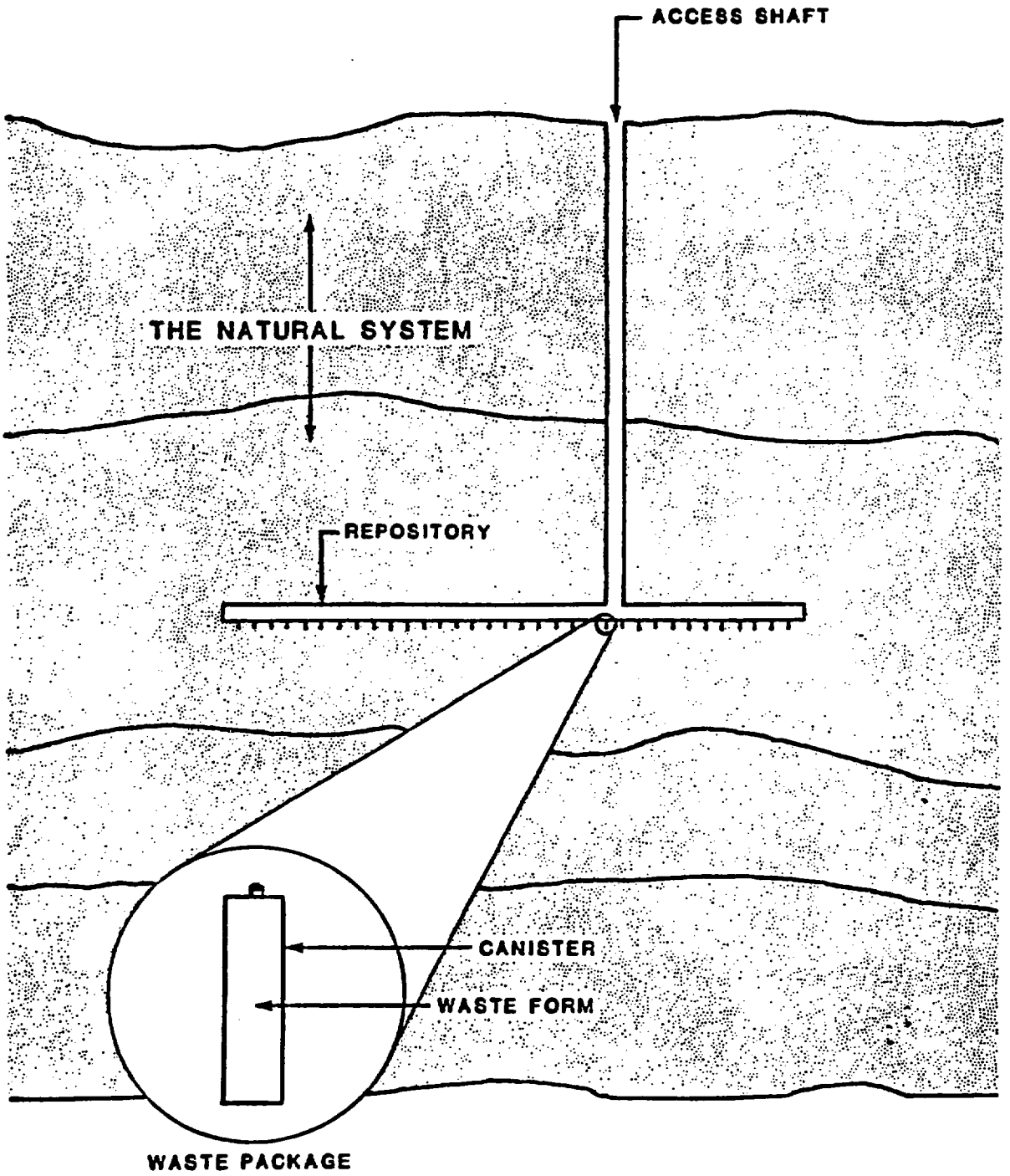


FIGURE 3-A-1

SCHEMATIC OF SURFACE AND UNDERGROUND FACILITIES



THE COMPLETE REPOSITORY SYSTEM

FIGURE 3-A-2
THE ISOLATION SYSTEM

ensure long-term containment and isolation and to mitigate the effects exerted on the natural system by repository construction and waste emplacement.

The natural system will consist of (1) a host rock suitable for repository construction and waste emplacement and (2) the surrounding rock formations. It will include natural barriers that provide containment and isolation by maintaining the waste in its emplaced condition, limiting radionuclide transport through the geohydrologic environment to the biosphere, and providing conditions that will minimize the potential for human intrusion in the future.

As mentioned below under "Regulatory Requirements," the use of multiple barriers is required by both the Nuclear Regulatory Commission (NRC) in 10 CFR Part 60 and the Environmental Protection Agency (EPA) in proposed 40 CFR Part 191. However, the Department intends to place primary importance on the capabilities of the natural system for waste isolation. In evaluating the suitability of sites, therefore, the use of an engineered barrier system will be considered to the extent necessary to meet the performance requirements specified by the NRC and will not be relied on to compensate for significant deficiencies in the capabilities of the natural barriers for waste isolation.

2. Legislative Requirements

The Act requires that, within 90 days after its enactment, the Secretary of Energy identify the States with one or more potentially acceptable sites for a repository and within 180 days issue general guidelines for the recommendation of sites. The first of these steps is complete and the second underway. After issuing the siting guidelines, the Secretary is to nominate at least five sites as suitable for site characterization. Each nomination is to be accompanied by an environmental assessment that evaluates the site in terms of the guidelines.

By no later than January 1, 1985, the Secretary of Energy is to recommend three of the nominated sites to the President for characterization. This process is to be repeated for the second repository, with three sites recommended for characterization no later than July 1, 1989. The President may approve or disapprove the recommendation, permit the characterization to proceed by taking no action within 60 days, or delay the decision for 6 months, if, in his opinion, insufficient information is available.

During site characterization, the Department will collect detailed information about the site, as specified in a site-characterization plan (SCP) that will include criteria, derived directly from the guidelines, for determining the suitability of the site for a repository. This plan is to be submitted for review and comment to the NRC, the State in which the site is located, and the governing body of any affected Indian tribe; it will also be available for public review and comment.

Site characterization will include the construction of an exploratory shaft for tests and studies at repository depth. Before sinking a shaft, the Department is to hold a public hearing in the vicinity of the site to inform the residents of the site-characterization plan and to receive their comments. When the site characterization has been completed, public hearings are to be held to inform the residents of the area that the site is being considered for development as a repository and to obtain their comments. The next step is for the Department to recommend to the President the first site to be developed as a repository. This recommendation is to be accompanied by a final environmental impact statement (EIS) as required by Section 114(f) of the Act. The President is to recommend the first repository site to Congress no later than March 31, 1987, and the second site by March 31, 1990, but these dates can be extended by up to a year.

After a site is recommended for development as a repository, the affected State or Indian tribe may submit, within 60 days, a notice of disapproval to Congress. This disapproval prevents the use of the site for a repository unless Congress passes a joint resolution approving the recommendation. If the notice of disapproval is sustained, the President must recommend another site within 12 months. If there is no notice of disapproval or if the notice of disapproval is overridden, the site becomes "the designated site." When the site designation becomes effective, the Department is to apply for NRC authorization to construct the repository.

The Act also authorizes the Department to develop a test and evaluation facility for research and to demonstrate the integrated technologies needed for geologic repositories. The facility may be located either at the repository site or at some other site. By January 1984, the Department is to report to Congress whether the facility will be located at the repository site.

The Department is to begin taking title to high-level radioactive waste or spent nuclear fuel that is to be disposed of in a repository pursuant to the terms of the disposal contracts by January 31, 1998.

3. Regulatory Requirements

The Act requires the promulgation of regulations by two other Federal agencies--the NRC and the EPA. The EPA is to promulgate generally applicable standards for protecting the public from the radioactive material in repositories. The EPA standards are to be implemented and enforced by the NRC, which was to issue technical criteria for that purpose. Both sets of regulations, in draft (EPA) and in final (NRC) form, were used in developing the DOE siting guidelines, and both will be complied with during repository siting, design, construction, operation, and closure.

The EPA standards were defined in Section 2(a)(6) of the Reorganization Act No. 3 of 1970 as limits on radiation exposures or levels, or concentrations or quantities of radioactive material, in the general environment outside the boundaries of locations under control of persons possessing or using radioactive material. In fulfilling this responsibility, the EPA has proposed, in 40 CFR Part 191, a radiation protection standard for both the management and the disposal of spent nuclear fuel, high-level radioactive waste, and transuranic waste. The key provision is a limit on the amount of radioactivity that may enter the environment for 10,000 years after disposal. The Act requires the final rule to be issued by January 7, 1984.

The NRC regulations in 10 CFR Part 60 consist of a procedural rule and a technical rule. A key provision of the procedural rule is the requirement that the Department is to characterize at least three sites in at least two different geologic media.

The NRC technical criteria were issued on June 21, 1983. Their objective is to provide reasonable assurance that geologic repositories will isolate the waste for at least 10,000 years without posing undue risk to public health and safety. Among the key provisions of the technical criteria are the following:

a. The waste package is to contain the waste for 300 to 1000 years.

b. The rates of radionuclide release from the engineered system are not to exceed one part in 100,000 per year after the containment period for each significant radionuclide.

c. The pre-waste-emplacement ground-water travel times from the repository (more precisely, from the "disturbed zone" around the repository) to the accessible environment are to exceed 1,000 years.

4. Mission and Objectives

The mission of the Department's geologic repository program is to develop mined geologic repositories for the permanent disposal of high-level radioactive waste and spent fuel in a manner that fully protects the health and safety of the public and the quality of the environment and in a time frame responsive to national needs. To meet the requirements of the Act and the technical requirements of developing and licensing the multiple-barrier repository system described in Section III.A.1, the Department has established the following objectives for the repository program:

a. On the basis of available data, nominate at least five sites in a variety of geohydrologic settings as suitable for site characterization for the first repository. Prepare and submit for public review and comment environmental assessments to accompany the nominations. This step will be repeated for the second repository.

b. Recommend at least three sites for site characterization for the first repository (January 1, 1985) and at least three sites for the second repository (July 1, 1989).

c. Establish and maintain effective mechanisms for the involvement of State and local governments or affected Indian tribes in the repository program.

d. Develop through site characterization, including an exploratory shaft and underground rooms, sufficient data and environmental impact statements, so that sites for the first and second repositories can be identified by the Secretary, approved by the President, and accepted by States and affected Indian tribes.

e. Develop the necessary engineering data to complete designs for repositories and waste packages that will meet NRC licensing requirements for a repository at the selected site.

f. Obtain from the NRC, by filing an application within 90 days of repository-site designation, a construction authorization for the repository.

g. After the receipt of a construction authorization, construct the first repository to the approved design in a safe and cost-effective manner.

h. Obtain from the NRC a license to receive and possess radioactive waste at the first repository site by January 31, 1998, to permit waste acceptance and underground emplacement with the capability for retrieval if necessary.

i. Once the repository has been filled to capacity, obtain appropriate NRC licensing amendments, backfill and seal the access shafts and underground workings to ensure waste containment and isolation, and restore the above-ground portion of the repository site to a condition that is safe and suitable for other uses in the future.

Sections III.A.5 and 6 briefly describe the current status of the repository program and discuss the major elements of the approach for meeting the objectives listed above. Section III.A.7 presents the schedule for achieving these objectives.

5. Status of the Program

Before the Act was passed, the Department was searching for sites for geologic repositories, under authority established by the Atomic Energy Act of 1954, the Energy Reorganization Act of 1974, and the appropriation bills passed by Congress from 1975 through 1983. The National Waste Terminal Storage program (the predecessor of the current geologic repository program) was initiated in 1975 with the specific intent to find suitable sites and to develop the technology necessary for repository construction, operation, and closure.

The Act has articulated the nation's policy regarding disposal, identified milestones for achieving the major objectives, and established detailed procedures for moving the program forward. To aid in understanding how the Department will carry out its program, this section summarizes the history and the status of the siting efforts.

a. Siting

The suitability of a site for a geologic repository depends on answers to two basic questions:

- Are the intrinsic geologic and hydrologic characteristics of the site and its environs capable of isolating the waste from the environment in the long term?

- Is it possible to engineer, construct, and operate a major underground facility within that geologic and hydrologic environment so that it will not adversely affect the site's intrinsic geologic and hydrologic environment?

This section describes the approach used by the Department in searching for suitable repository sites and discusses the status of the screening program for the first and second repositories.

(1) Site Screening for the First Repository

Beginning in 1976, the Department (then the Energy Research and Development Administration) started a search for sites with geologic and hydrologic characteristics suitable for long-term isolation and rock characteristics suitable for the construction of a large-scale underground facility. Screening for sites with these characteristics was based on a twofold approach. The first approach focused on a systematic survey of areas underlain by salt, a medium with the acknowledged ability to isolate waste and support the construction of underground facilities. The second approach was to evaluate lands (Hanford and Nevada Test Site) owned by the Department and dedicated to nuclear activities. The Department's lands are underlain by various geologic media potentially suitable for long-term isolation and the construction of underground facilities. This screening approach allowed the Department to consider several sites in several different geologic media, which is required by the NRC procedural rule.

During the screening phase, the Department's studies focus on areas of successively decreasing size to determine whether they contain sites that might be suitable for the development of repositories. The screening phase consists of up to four stages: national or province surveys, regional surveys, area surveys, and location surveys. National or province and regional surveys are based on national maps of faults, earthquake epicenters, land use, recent volcanic activity, locations of potential host rock, and other information available in the open literature. The screening for potential sites in salt began with regional surveys.

Area and location surveys require more thorough examination, including field exploration and testing. Since the area of the Department's lands is small in comparison with a province or a region, the screening of these lands started in the area phase of the process. Typically, the field studies included the drilling of boreholes to investigate the subsurface conditions and to determine whether a potentially suitable host rock occurs at the depths of interest; hydrologic testing in boreholes to estimate the hydrologic parameters of the various subsurface formations; evaluation of aerial photographs and satellite data to help identify faults that might affect repository performance; field mapping; and geochemical analyses of selected formations to establish mineral stability, ground-water chemistry, and the chemistry of the environment that would be in contact with the waste package. Surface and aerial geophysical surveys were used to supplement the geologic field work. These surveys may consist of aeromagnetic, electrical, gravity, and seismic measurements.

The field studies were supported by laboratory studies that focused on the isolation and engineering characteristics of the rock. The properties important to isolation are sorption coefficients, effective porosity, permeability, and mineral composition. The properties important to engineering include confined and unconfined compressive strength, bulk modulus, thermal expansion, and thermal conductivity. Measurements of ground-water characteristics were also made and included the concentration of anions and cations in solution, pH, oxidation-reduction potential, particulate composition, organic constituents, isotopic distribution of selected anions and cations, and variation of composition with location.

When the Act was passed, the Department's program had already progressed to the location phase in five different geohydrologic settings. Field and laboratory testing as described above was under way at nine different

sites, and varying quantities of data had been collected for each site. Preliminary designs for exploratory shafts in all five geohydrologic settings had been completed. The design for each shaft was different because of differences in the geologic and hydrologic conditions. Also in progress were systems analysis, waste-package development, and repository design efforts. In accordance with Section 116(a) of the Act, the Department formally identified nine sites in the five geohydrologic settings as being potentially acceptable, thus concluding the screening phase for the first repository.

The nine potentially acceptable sites are located in six States (see Figure 3-A-3). Seven of the sites are in salt: two locations in the bedded salt of the Palo Duro Basin in Deaf Smith and Swisher Counties, Texas; two sites in bedded salt in the Gibson Dome (at Davis Canyon and Lavender Canyon) in the Paradox Basin, Utah; and three salt domes in the Gulf Interior region (the Richton and Cyprus Creek domes in Mississippi and the Vacherie dome in Louisiana). The Cold Creek Syncline site in basalt is on the Hanford Site in the Pasco Basin in Washington, and the Yucca Mountain site in tuff is on the boundary of the Nevada Test Site in the Southern Great Basin.

(2) Site Screening for the Second Repository

In 1979, in response to recommendations by the Interagency Review Group* to consider alternative media for geologic repositories, the Department initiated a national survey of crystalline rocks. This survey identified for further study some 220 near-surface and exposed crystalline-rock

*Report to the President by the Interagency Review Group on Nuclear Waste Management, TID-29442, U.S. Department of Energy, Washington, D.C.

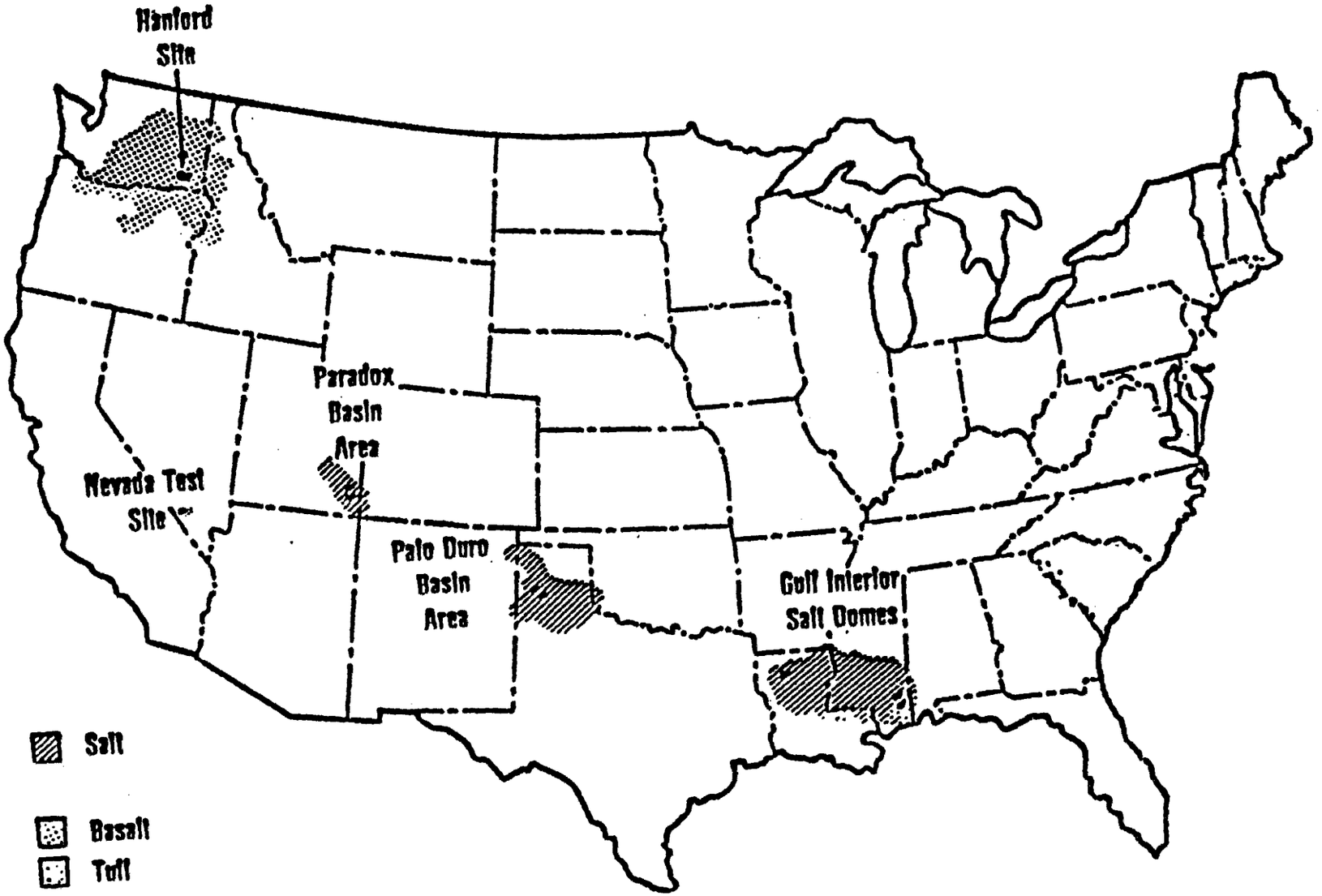


FIGURE 3-A-3

POTENTIALLY ACCEPTABLE SITES FOR THE FIRST REPOSITORY

formations in 17 States. As shown in Figure 3-A-4, these states are divided into three regions: northeastern (Maine, Vermont, New Hampshire, New York, Pennsylvania, Connecticut, Massachusetts, New Jersey, and Rhode Island); north central (Michigan, Minnesota, and Wisconsin); and southeastern (Maryland, Virginia, North Carolina, South Carolina, and Georgia). These states have been notified that the Department is undertaking further study of crystalline-rock formations within their boundaries to evaluate their suitability for repository development. The screening process is currently in the regional phase.

In May of 1983, the Department issued for State review draft regional characterization reports, which compiled open-literature information on the geology, the environment, and other characteristics of the region. The Department had intended to finalize these reports after State review and use them as the basis for recommending areas for field investigations. However, because of comments received on the draft regional characterization reports and comments submitted by the States on the siting guidelines, project activities have been resequenced: the Department will develop a methodology for region-to-area screening (to identify areas for field investigations) before issuing the regional reports in final form. This resequencing of activities allows the review of the regional reports to consider the way in which the Department will use the information presented in the reports. The methodology for region-to-area screening is being developed with extensive involvement of the 17 States.

b. Technology Development

In parallel with the site-selection efforts, an extensive program is under way to develop the site-specific technology for siting, licensing, constructing, operating, and closing a repository. The status of these technology-development activities, broadly grouped into the categories of systems, waste package, and repository, is summarized below.

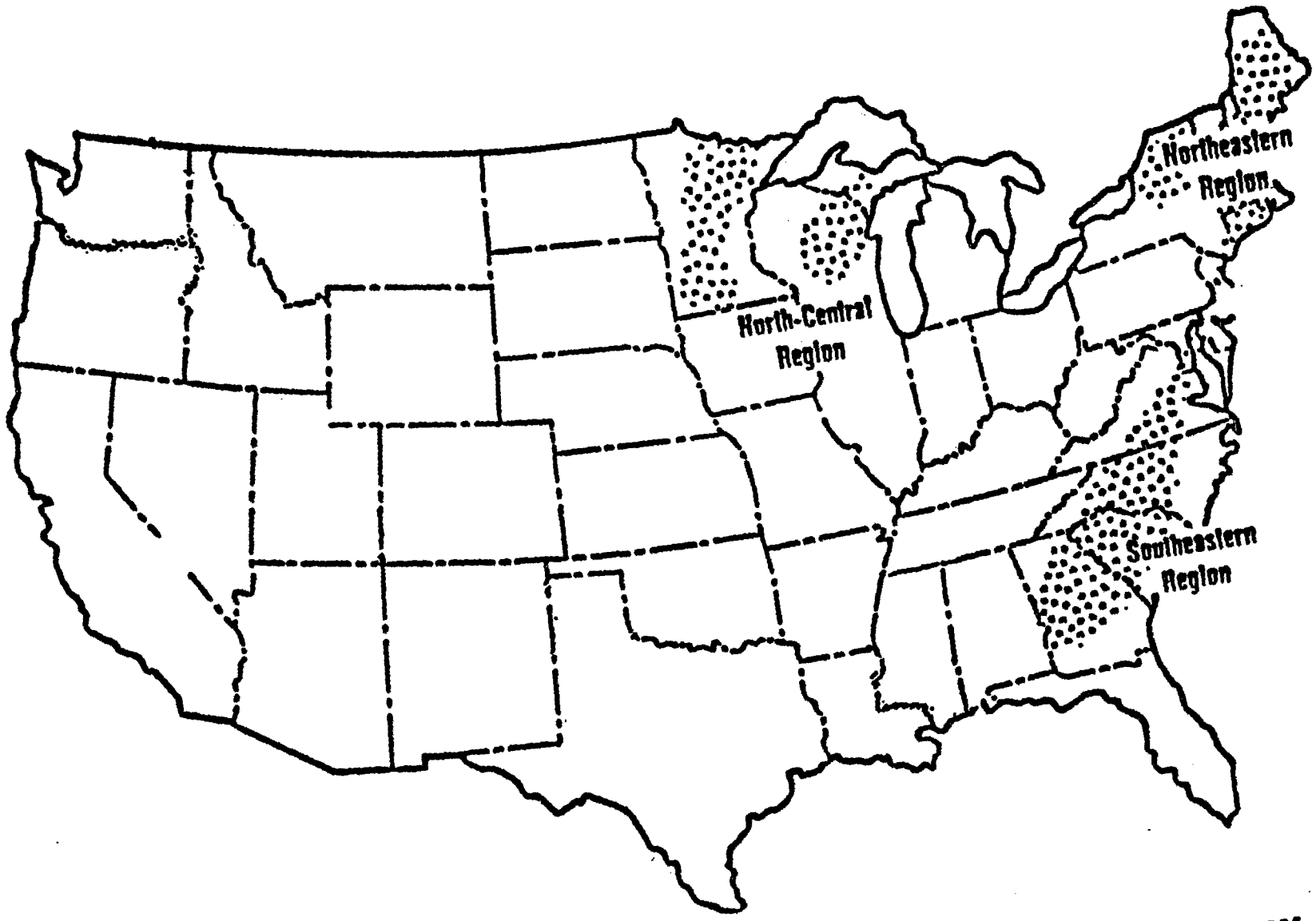


FIGURE 3-A-4
REGIONS BEING CONSIDERED FOR THE SECOND REPOSITORY

(1) Systems

Activities in the systems category are directed at performance assessment--the analytical evaluation of the capability of the overall repository system to contain and isolate the waste. The first-repository program is in the process of identifying and developing the analytic techniques to be used for the evaluations and identifying the procedures for benchmarking and verification of these techniques. The program is also conducting parametric sensitivity analyses, as well as identifying disruptive-event scenarios for performance evaluations, in order to support the plans for site characterization. Also being prepared are site-specific performance-assessment plans that lay out the technical approach, planned activities, and schedule for evaluating both the preclosure and the postclosure phases of the repository. The program is establishing a national peer review panel to examine various aspects (e.g., assessment methods, scenario-development methods) of the performance-assessment efforts in order to strengthen and improve their plans. As a first step toward the application of performance assessment to the siting process, the Department is currently conducting preliminary assessments, based on data available before site characterization, of the potentially acceptable sites for the first repository. The results of these preliminary assessments will be reported in the environmental assessments that will accompany the nomination of candidate sites.

Another key effort in the systems area is system engineering, which is providing a disciplined, systematic approach to planning and analysis. Overall requirements for the mined geologic disposal system are in the final stage of development; these requirements provide top-level design bases, functional requirements, performance measures, and performance criteria for the system. The program is using these overall requirements to develop site-specific system specifications that further define the system components, tailored to the unique characteristics of each site.

(2) Waste Package

As one of the engineered barriers, the waste package is being developed to work in concert with the host rock to ensure adequate radionuclide containment and isolation. Therefore, site-specific waste packages are being developed, with efforts conducted concurrently in two major areas--design development and materials testing. Waste packages are being designed to have the following capabilities: (1) provide containment of radionuclides in accordance with the performance objectives of the NRC regulations in 10 CFR Part 60; (2) limit the rate of radionuclide release to the host rock; (3) provide for safe handling; and (4) preserve the ability to safely retrieve the waste up until repository closure. Conceptual waste-package designs for salt and basalt were completed in 1983; conceptual designs for tuff in the unsaturated zone will be completed by late 1984. As part of the design effort, reference and alternative materials have been chosen for the waste canister, overpack, and packing. Reference materials for the waste canister and/or metal overpack are low-carbon steels for salt and basalt, and stainless steel for tuff. Emplacement-hole packing mixtures of crushed host rock and bentonite clays are being considered for basalt and tuff. Interaction tests are being conducted for various combinations of host rock, ground water, and waste-package materials to determine behavior under expected repository conditions. Other tests will measure the radionuclide-release characteristics of spent fuel and commercial high-level waste. Requirements for the waste form are being developed to establish the acceptance criteria for receipt at the repository.

(3) Repository

Activities in the repository technology area are directed at the development of site-specific conceptual designs, with supporting efforts under way in the development of a repository data base, equipment and

instrumentation, as well as backfills and seals. Preconceptual design studies have been completed for salt, basalt, and tuff. Engineering-feasibility studies are nearing completion for each of the potentially acceptable sites in salt, providing the basis for site-specific conceptual designs. A conceptual design for a basalt repository at the Hanford Site was completed in 1983; present efforts are directed at upgrading this design to reflect site-specific data and design requirements. Conceptual design studies for surface and subsurface facilities in tuff at Yucca Mountain will begin in 1984. These site-specific conceptual designs will be completed in the 1985-1986 time frame to support the site-characterization plans. Along with these conceptual design studies, engineering tradeoff studies are being conducted to analyze key design concepts (e.g., horizontal versus vertical waste-package emplacement) and to upgrade the conceptual design.

A significant portion of the design basis is the host-rock data base, which is the compilation of data on the host-rock properties that affect the structural behavior of the repository. Field and laboratory testing is under way to acquire these data, with plans for in-situ data collection via the exploratory shaft now being formulated. The program is in the early stages of identifying the repository equipment and instrumentation development needs and preparing plans for the needed development. These needs are expected to include supports for underground openings, the drilling and backfilling of waste-emplacement holes, shaft sinking, etc., and are dependent on the specific sites and media under consideration. In parallel with the repository design efforts, work is also proceeding in the area of repository sealing. The approach to the development of permanent seals is similar to that of the waste-package program, with both design development and materials evaluation progressing in parallel. To date, work has concentrated on generic design concepts and a wide range of possible sealing materials, with plans being developed for laboratory and field tests.

The above-described status of technology development applies only to the sites that are candidates for the first repository. Technology development for media under consideration for the second repository is limited at this time to preliminary engineering studies, cooperative international efforts, and monitoring the plans and activities for the first repository.

c. Test and Evaluation Facility

The Department has evaluated the need for continued acquisition of data at the repository site following submittal of the Construction Authorization Application. This evaluation has resulted in the identification of three areas where additional data acquisition would prove beneficial to the repository program: (1) geotechnical data for design verification; (2) engineering data for site performance confirmation, and; (3) development and demonstration of technology for repository operations. The Department has concluded that this information can best be achieved by developing a Test and Evaluation Facility (TEF) colocated at the selected repository site. A basic premise of this conclusion is that underground construction of the TEF can begin once the repository site designation is effective. Any appreciable departure from this premise would reduce the benefits of the TEF to the program.

d. Institutional Relations

A major element in the repository program has been and continues to be that of institutional relations, including interactions with other Federal agencies, with Congress, with States, with affected Indian tribes, and with the public. The program has placed emphasis on an

open two-way flow of information. The governing principles are consultation and cooperation with the States and affected Indian tribes and sensitivity to the social and economic effects of repository siting and development.

(1) Consultation and Cooperation

The Department has conducted information dissemination and exchange activities for 5 years in the States of Louisiana, Mississippi, Texas, and Utah and longer in the States of Washington and Nevada. Initially, these activities supplied information to the States on site screening. However, the Act provided new incentives for State, local, and tribal involvement in reviewing the technical content of the program. The Department has been conducting information-exchange seminars in communities near some of the potential sites. There are repository-information offices in Moab and Monticello, Utah. Other offices in States with potentially acceptable sites will be established in response to State and local requests and needs. The Federal sites maintain information offices for the States of Nevada and Washington, and local and State libraries continue to be involved in extensive information dissemination. The Department also conducts program-progress meetings and technical seminars for representatives from the States. States and Indian tribes are encouraged to participate in the analysis of technical information through assistance in funding technical review programs or through grants that permit the States or tribes to hire their own technical experts. Other financial assistance is made available for funding State library and information-dissemination activities.

The Department has begun to develop written consultation and cooperation agreements with the potential host States and, where appropriate, the affected Indian tribes.

In the 17 States being considered for the second repository, workshops on screening methodology and briefings on siting guidelines have been of major importance. Some typical activities have included all-States meetings on siting guidelines and the region-to-area screening process, and individual State briefings for officials from all 17 States. Funding for reviewing the regional characterization reports and other activities pertinent to the region-to-area screening process has been made available to the States.

(2) Socioeconomic Impacts

The evaluation of social and economic factors has been under way since the inception of the program. Work completed includes the identification and development of appropriate methods for assessing socioeconomic impacts, screening at potential sites against socioeconomic criteria, and the development of uniform data bases for each potential site. There have been investigations of alternative approaches to impact-mitigation measures, such as job training, housing, citizen involvement, and local management and planning techniques. Various documents have been produced to promote understanding among the States, local governments, and the Department concerning potential community-development issues and their resolution. The Department has reviewed the impact-monitoring programs at other large-scale projects to provide input into the design of a program for monitoring repository impacts.

6. Repository-Program Approach

This section describes the approach the Department plans to use in order to achieve the objectives of the repository program. In addition, this section discusses long-range alternatives to the present program--specifically, the concept of subseabed disposal and the use of other geologic media not now being considered for either the first or the second repository.

a. Approach for the First Repository

The approach for the first repository is discussed under two phases: (1) site selection and supporting-technology development and (2) design, construction, operation, and closure. The first phase covers prelicensing activities in siting and technology development through repository-site selection and the submittal of the construction-authorization application to the NRC. The second phase--design, construction, operation, and closure--begins when the application for construction authorization has been submitted and is completed when the repository license has been terminated with the completion of the closure activities. The schedule for these two phases is discussed in Section III.A.7.

(1) Site Selection and Supporting-Technology Development

The activities to be performed in site selection and supporting-technology development are summarized below.

Final design, permitting, site access and preparation work, and long-lead-time procurement will be completed to support the sinking of exploratory shafts. After the completion of shaft sinking and outfitting, and the development of underground test tunnels, in-situ testing will start in accordance with site-specific exploratory-shaft test plans. Surface-based site characterization, such as the drilling of geologic and hydrologic boreholes, geophysical logging, seismic trenching, and environmental monitoring, will be initiated in accordance with additional test plans. The results of the characterization work will be documented in Site Characterization Plan updates, issued every 6 months. Steps will be taken to ensure access and the acquisition of land as necessary to allow these site-characterization activities to be conducted and to preserve the integrity of the candidate sites as future repository locations.

Technology will continue to be developed for each of the three candidate sites. Site-specific conceptual design studies will be completed, and new data acquired from the in-situ testing via the exploratory shaft will be used in the formulation of preliminary design criteria. Waste-package development will continue in parallel. A site-specific conceptual design for the waste package will be completed, and design inputs will be used in the ongoing repository design, performance assessment, and in-situ testing programs. Efforts will continue on barrier-materials testing and analysis as well as the laboratory and engineering-scale testing of packages. The results of these activities will form the basis for the preliminary waste-package design. In the area of performance assessment, computer codes will be developed and tested, disruptive-event scenarios will be postulated and evaluated, and data uncertainties and system sensitivities will be analyzed. The development of repository equipment and instrumentation as well as the testing and evaluation of seal designs and materials will continue, proceeding in accordance with the ongoing repository conceptual designs and ongoing in-situ test program.

Planning and initial design studies will be initiated at each of the three candidate repository sites for a colocated TEF. A memorandum of understanding with the NRC, establishing procedures meeting the requirements of the Act for NRC review of the TEF, will be prepared and signed by both agencies. The completion of site-specific TEF test planning will provide the basis for the design studies. The design efforts will be paced to complete final TEF designs at each of the candidate sites before repository-site designation, so that subsurface construction and testing can begin immediately after such designation.

Near the end of in-situ testing, preliminary and some detailed designs for the repository and preliminary designs for the waste package will be initiated at each of the three candidate sites. The designs will reflect completed efforts in related areas, such as repository sealing and

equipment and instrumentation development. These preliminary designs will support the preparation of the site-selection report, the EIS, and the license application as well as construction efforts under a limited work authorization from the NRC. The preparation of documentation required for the license application, particularly the preliminary safety analysis report, will begin at each candidate site.

In-situ testing and other site-characterization activities will be completed to allow for the determination of site suitability, based on the DOE siting guidelines (10 CFR Part 960), the NRC criteria in 10 CFR Part 60, and the EPA's standards in 40 CFR Part 191, and for the preparation of repository-selection documentation, including the site-selection report and the EIS. The results of these activities will be documented in a final SCP update for each candidate site. Testing in support of the license application may continue at each candidate site.

After public review and comment, the Department will issue the final EIS, and the Secretary of Energy will recommend to the President one site for development as a repository. The recommendation will also include comments from the NRC, the host State, and/or the affected Indian tribes.

(2) Design, Construction, Operation, and Closure

This part of the program will involve the systematic use of the knowledge and understanding gained from the previous phase to achieve the detailed design, construction, operation, and closure of the repository. Significant activities in this phase are summarized below.

The Department will begin the TEF testing program at the selected repository site and any required subsurface construction to permit other planned tests. Long-term tests initiated during site characterization

will continue in the TEF. The results of these tests will provide confirmation of the final design of the repository, input for and confirmation of repository-construction methods, input for the preparation and NRC review of the operating-license application, and input for the repository operating procedures.

The final repository design will be completed, including design specifications and construction drawings. This design will provide the basis for construction and the application for the operating license. Final waste-package designs will be included as part of the final repository design and will be based on data from tests conducted on the preliminary waste-package design.

After a limited work authorization from the NRC is received, the construction of the repository will commence. After site preparation (access roads, utilities, grading, etc.), critical activities will include the construction of the men-and-materials shaft and the construction of the waste-receiving building, as well as some limited underground construction. After the construction authorization is received, the remainder of construction activities will be initiated, including any surface-facility construction in support of the TEF in accordance with Section 305 of the Act.

In order for the Department to begin receiving waste by the date specified in the Act, all repository construction, checkout, and licensing must be completed by January 31, 1998.

Operational activities will include waste receipt, inspection, overpacking (if required to convert the received waste into the emplacement package), handling, and emplacement; continued underground construction of the waste-emplacement rooms and supporting services (ventilation, power, etc.); storage of mined rock for later use as repository backfill material; conduct of a performance-confirmation program throughout the operational period in accordance with 10 CFR Part 60; other support services (quality assurance, security, administration); and the possible retrieval of waste packages, as required. The TEF operation will be terminated within 5 years of the start of repository operations.

After the repository has been filled to capacity and the performance-confirmation program has been completed to the satisfaction of the NRC, an application for a closure amendment to the license will be prepared and submitted to the NRC. After NRC approval, the Department will begin sealing the repository and decommissioning the surface facilities. Repository shafts will be sealed, surface facilities decontaminated and dismantled, mined rock (not used in backfilling) stabilized or moved off the site, the surface area returned to its original natural condition to the extent feasible, permanent markers erected, and postclosure monitoring or surveillance installed as necessary. The last step is the termination of the repository license.

b. Approach for the Second Repository

The Department will proceed actively to site the second repository and to request approval for its construction. The activities described in the preceding section for the first repository, with respect to site selection, supporting-technology development, design, construction,

operation, and closure, will be similar for the second repository. The strategy for identifying sites for nomination and recommendation for characterization is discussed below. The Act requires that such factors as regional distribution be considered in siting the second repository.

After revising the draft regional characterization reports (see Section III.A.5) and receiving comments from the States, the Department will issue final reports. A draft area recommendation report containing the results of the region-to-area screening will then be prepared; this report will identify areas within the 17 States where the Department plans to conduct more-detailed studies, including field investigations. Both the draft area recommendation report and the area characterization plan will be issued for State comment. The area characterization plan will describe the activities the Department will undertake during the area phase to evaluate site suitability for nomination and recommendation for site characterization. The final area recommendation report and area characterization plan will be issued after the consideration of State comments.

Areas identified for further study will be considered by the Department as "potentially acceptable sites" as defined by Section 116 of the Act. States with potentially acceptable sites within their borders will be formally notified as required by the Act after the issuance of the final area recommendation report. After the activities described in the area characterization plan, the process of site nomination and recommendation will be similar to that used for the first repository.

The Act permits sites characterized for the first repository site, but not selected, to be considered for the second repository. Since salt, tuff, and basalt may be among the first-repository sites recommended for detailed site characterization, it is possible that as many as two

different media now considered for the first repository may be nominated for the second repository. The Department will consider at least two different media for the second repository.

In addition to the sites carried over from the site selection for the first repository and the screening of exposed crystalline-rock formations in 17 States, the Department is considering two other media for the second repository--namely, Silurian age salt beds in the Michigan and Appalachian basins (Salina basin) and buried plutons. No decision has yet been made on proceeding with either medium.

c. Long-Range Alternatives

(1) Alternative Media

To maximize the possibility of identifying geologic environments that are suitable for long-term isolation, the Department's site-exploration program has and will continue to consider a wide variety of rock types. Literature studies of alternative media are being conducted as long-range geologic alternatives to be considered if more than two repositories are needed.

A literature study of argillaceous and sedimentary rocks other than salt is currently under way. This study will be completed in the first quarter of fiscal year 1985, when a decision will be made on the feasibility of using these rock types as a future repository-siting alternative.

The U.S. Geological Survey (USGS) has undertaken a study that entails a nationwide literature search and will produce a computerized data base suitable for use in parametric analyses. It is expected that the results of the USGS study will be available to the Department for evaluating other repository-siting alternatives.

(2) Subseabed Disposal

Section 222 of the Act states that--

> The Secretary shall continue and accelerate a program of research, development and investigation of alternative means and technologies for the permanent disposal of high-level radioactive waste from civilian nuclear activities and Federal research and development activities except that funding shall be made from amounts appropriated to the Secretary for purposes of carrying out this section. Such program shall include examination of various waste disposal options.

Subseabed disposal is the only alternative to mined repositories currently funded by the Department. The primary mission of the subseabed-disposal program is to assess the feasibility of isolating radioactive waste within the stable sedimentary formations of the deep ocean floor so as to provide alternative means and technologies for the permanent disposal of radioactive waste. If proved to be feasible, subseabed disposal could provide a backup alternative to mined repositories in the United States or could serve as an international repository.

The objectives for continuing the subseabed-disposal program are (1) to fund research and development so as to report on the feasibility of subseabed disposal in 1990; (2) to continue with site characterizations leading to the ability to recommend a subseabed repository site in 1994 as a backup to mined repositories, if the concept proves feasible; (3) to continue participation in the international Seabed Working Group (Nuclear Energy Agency of the Organization for Economic Cooperation and Development) and in multinationally funded field experiments with the objective of increasing contributions by other countries while reducing

the percentage of U.S. funding for deep-ocean experiments; and (4) to continue to participate in interagency and international meetings on subseabed disposal with the intent of keeping the option open until at least the second mined repository is approved.

d. Institutional Strategy

The institutional strategy is to take maximum advantage of existing and future mechanisms for communication, consultation, and cooperation. Institutional issues will affect all major stages of repository development. Such issues can be anticipated most clearly during the early stages, such as the issuance of siting guidelines, negotiations for consultation and cooperation agreements, and siting decisions by the President and Congress. Other issues will undoubtedly arise, and the institutional strategy must be flexible enough so that these issues can be addressed in a comprehensive and timely fashion.

(1) Consultation and Cooperation

In developing mechanisms for consultation and cooperation, the Department will support both the letter and the spirit of the Act.

Specific plans include the following:

(a) Negotiation and signing of written agreements as required by the Act.

(b) Public review of, and comment on, the environmental assessments accompanying the nominations.

(c) Consultation on the decision process for recommending sites for detailed characterization.

(d) Establishment of mechanisms to provide licensing and technical data on a timely basis.

(e) Development of mechanisms for the resolution of objections raised during the planning, siting, development, construction, operation, and closure of the repository.

(2) Socioeconomic Impacts

The socioeconomic work that is needed to meet the requirements of the Act falls into three general categories: (1) site screening and impact assessment, (2) impact mitigation and community development, and (3) impact monitoring. Site-screening and impact-assessment activities occur throughout the siting process and will end once a site is selected. Impact-mitigation and community-development plans will be initiated during the siting process and will be implemented during repository development. Monitoring activities will begin with site characterization and will continue throughout repository construction and operation.

The design of a monitoring program will involve the States and affected communities. The factors to be monitored will include the number of in-migrating repository workers and their families, the number of local hires, the location of new residents, the number of indirect in-migrants, changes in the school-age population, the occurrence of social problems, and an analysis of the effectiveness of current mitigation measures.

The States, local communities, and the Department will be using the Act as the framework from which the impact assistance will be negotiated. Discussions are planned to define (1) the role of each party, (2) the

makeup of impact-management committee or committees, (3) the provisions of the Act concerning front-end financing and jurisdictional allocation, (4) methods for conflict resolution, and (5) mitigation measures such as long-distance commuting, project schedule changes, local hiring, local business development, and housing.

7. Repository Schedule

a. Reference Schedule

The process and schedule established to achieve the objectives of the repository program are shown in Figures 3-A-5 and 3-A-6 for the first and the second repository, respectively. These schedules were developed to be responsive to the Act and to be consistent with the Department's strategy of ensuring the quality and sufficiency of information used to support program decisions. The major decision points in the program are the following:

Decision	Date
Recommendation of three sites for characterization for the first repository	January 1985
Identification of potentially acceptable sites for the second repository	August 1985
Recommendation of sites for characterization for the second repository	July 1989
Recommendation of first repository site to Congress by the President	December 1990

FIGURE 3-A-5
SCHEDULE FOR FIRST GEOLOGIC REPOSITORY

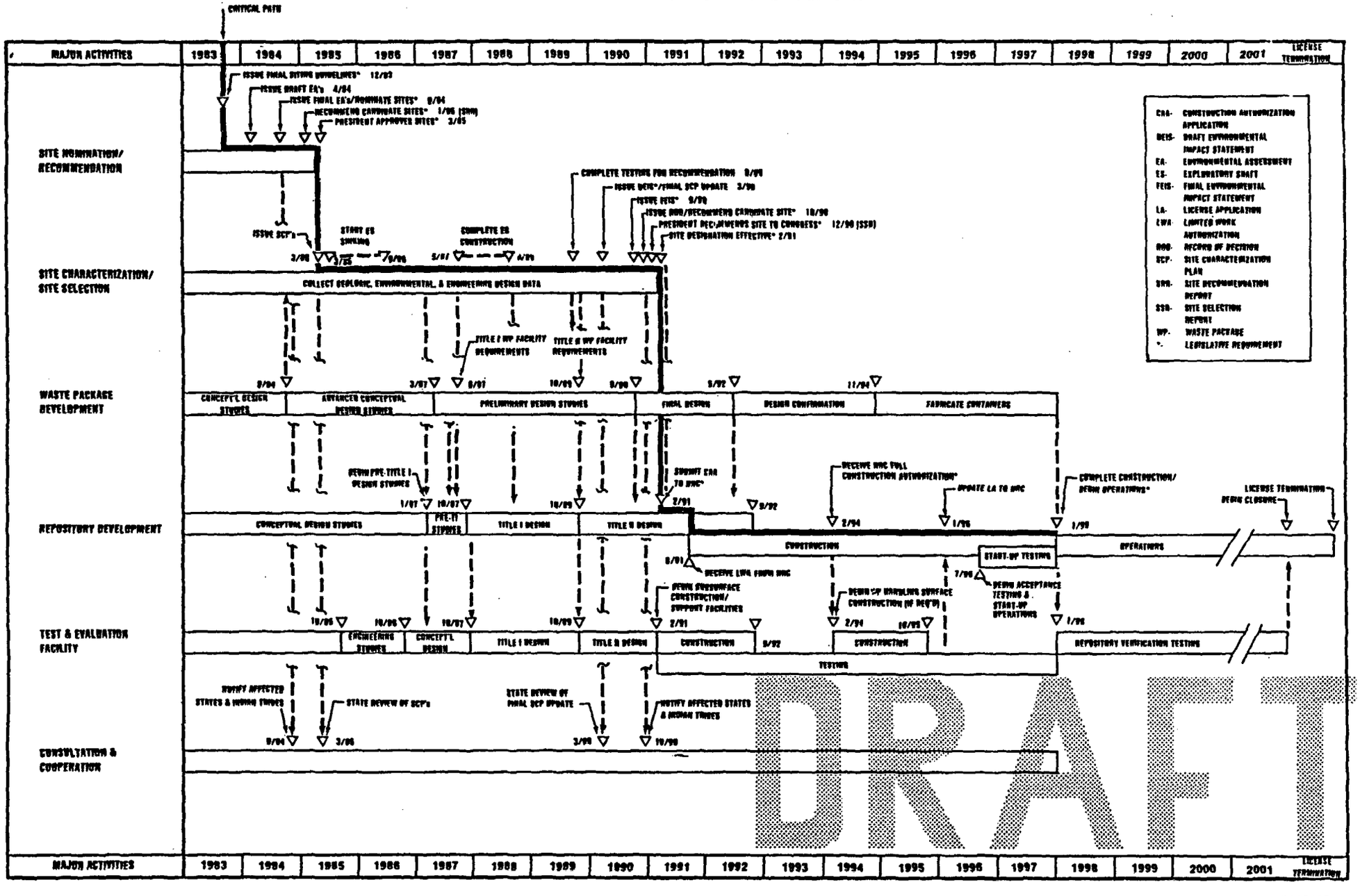
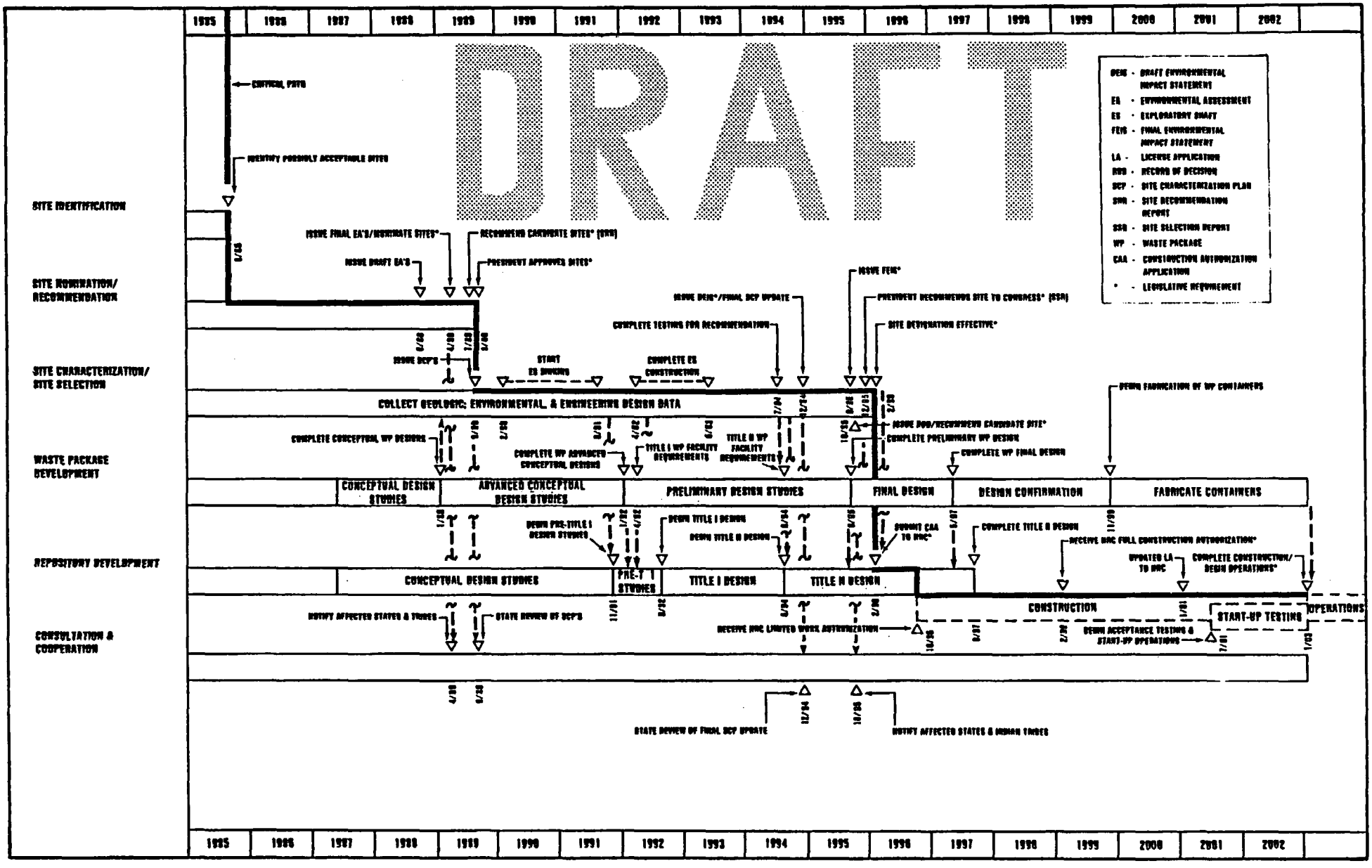


FIGURE 3-A-6
SCHEDULE FOR SECOND GEOLOGIC REPOSITORY



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The projected earliest possible date for starting disposal operations (i.e., the underground emplacement of waste) at the first repository is January 31, 1998. The sequence of activities leading to this date is described below. For many items, the assumed durations are the minimum allowed by the Act and could possibly be longer. Some examples are a 3-year license review by the NRC and 2 months between the Presidential recommendation of the repository site and the submittal of a license application to the NRC.

It is expected that the final siting guidelines (10 CFR Part 960) will be issued near the end of January 1984, depending on the time required for NRC concurrence review. Draft environmental assessments (EAs), which will be based on the guidelines, will be available in April 1984 for review and comment. The final EAs will be issued in September 1984.

The Department will use the siting guidelines, the EAs and any significant comments on the EAs, and any new data that the Secretary identifies as being required to make the first major program decision--the recommendation of three sites for characterization. This decision is planned for January 1985, as required by the Act. In scheduling the remainder of the program activities, it was assumed that the President will approve the recommended sites within the 60 days allowed by the Act--that is, by March 1985. Site-characterization plans, required before the sinking of exploratory shafts, will be issued for comment after the approval of sites by the President.

The sinking of exploratory shafts will begin between March 1985 and late 1986. The actual dates will depend on the sites recommended and approved, the land access and permitting requirements, and the duration of site preparation.

The estimated time for in-situ testing in basalt, salt, and tuff to provide data for the selection of the first repository site ranges from 8 months to 27 months. The specific tests for each rock type will be discussed in detail in the site-characterization plans. The 8-month estimate is for salt, for which a large amount of information is already available. By September 1989, the Department will have done adequate testing to support the subsequent issuance of a draft EIS that identifies the site the Department intends to recommend for repository development.

The final EIS is scheduled to be issued in September 1990. The Department will issue a Record of Decision on the site to be recommended, prepare a site-selection report (SSR), and submit the recommendation to the President in October 1990. It is expected that the President will submit the site recommendation to Congress within 60 days of receiving it, or in December 1990. If no notice of disapproval is filed, site designation will become effective and the Department will apply to the Nuclear Regulatory Commission for both a limited work authorization and a full construction authorization by February 1991. This will complete the prelicensing phase of the repository program. Underground construction for the test and evaluation facility will commence when the site designation becomes effective.

The reference repository schedule assumes that a limited work authorization is received in August 1991 and a full construction authorization is received no later than February 1994. Final repository design, final waste-package design, and the construction of TEF subsurface facilities will continue during the NRC review of the application and will be completed by the time the full construction authorization is issued.

If the limited work authorization and full construction authorization are received on the dates noted, then the repository could begin operations on January 31, 1998, as required in the Act.

The duration of repository operation and thus the dates for final closure and license termination will depend on the rate of waste receipt at the repository and the final capacity of the repository.

The siting process for the second repository is presently in the regional characterization phase. Revised draft and final regional characterization reports describing the crystalline-rock formations of interest will be issued in 1984 and will be accompanied by the methodology for region-to-area screening. Draft area recommendation reports (ARRs) will be submitted to the States for review in early 1985. The first major decision point for the Department on the second repository program will occur in August 1985, when potentially acceptable sites will be identified on the basis of the final ARR.

Field investigations in the recommended areas will begin in October 1985 and progress according to area characterization plans reviewed by the States. Field investigations will be completed in the summer of 1987, and candidate sites for nomination will be identified in the summer of 1988.

At this point, the process of siting and developing the second repository will be very similar to that of the first and will proceed on the following time table:

Milestone	Date
Issue draft EAs	September 1988
Issue final EAs	March 1989
Nominate sites	April 1989
Recommend sites for characterization	July 1989
President recommends site for repository to Congress (pending Congressional authorization)	July 1995

As discussed earlier, no decision has been made on when to construct and begin operating the second repository. The startup date of 2003 in the waste-acceptance schedule in Section I reflects the approach to meeting currently identified needs for spent-fuel disposal. Alternative approaches, such as higher annual repository receipt rates, could produce different startup dates and will be considered before the Department makes final decisions on the timing of the second repository. Achievement of the 2003 startup date will require the same type of licensing action as for the first repository, such as a limited work authorization.

Waste-package and repository designs for the second repository will incorporate much of the knowledge gained during the licensing and development of the first repository. Preliminary waste-package designs will be initiated in March 1994 and completed 2 years later, by March 1996.

b. Significant Assumptions Affecting Schedule

As mentioned in the preceding discussion, the reference schedule is based on all activities being accomplished in the allotted time frame; there is little leeway to accommodate delays. The Department is committed to making every responsible effort to achieve the January 31, 1998 date for the initial operation of the repository and will provide appropriate resources necessary to meet the various milestones. Nevertheless, it is possible to foresee certain events that may have a bearing on the schedule of specific activities. Because many of the activities must be performed in a certain sequence, a delay in meeting one milestone may delay the start of a subsequent activity. This section describes several factors that provide challenges which must be met to achieve the Department's repository schedule.

(1) Suitability of Sites for Detailed Site Characterization

The Act requires the Department to have three candidate sites that are considered to be suitable for a repository before detailed site characterization. The Department considers that, if during or after site characterization a site is found to be unsuitable for further consideration, the Department can nonetheless proceed with a recommendation to the President of one of the other two sites as the proposed repository site. Failure to uphold this interpretation would mean that if three sites must be suitable following detailed site characterization and one of the original sites is found to unsuitable, the program could be delayed by 3 to 5 years while a replacement site is selected and characterized, depending on the replacement geologic medium.

(2) State Permits

The repository program is committed to complying with applicable State and local regulations, and the initiation of various site-characterization activities will depend on the receipt of State and/or local permits. These activities include boreholes and other surface-disturbing explorations, the construction of engineered structures like meteorological towers and seismic stations, and the drilling of wells for surface water testing.

The Act specifically calls for the Federal Government and the States to enter into agreements that would specify procedures intended to facilitate the process of obtaining permits. The reference repository schedule assumes that permits will be received on a timely basis (i.e., the State and local permit process will take as long as that experienced in permit applications for similar conventional activities). Delays may occur if there is State and local opposition to the program. Current estimates are that a delay of 1 or 2 years might be incurred if the applicability and the intent of State and local laws must be tested.

(3) Disapproval of Site by Affected State and/or Affected Indian Tribe

The Act allows an affected State and/or an affected Indian tribe to file a notice of disapproval for a site recommended to Congress for repository development. If Congress does not override the disapproval by a joint resolution, the disapproval stands and the President must recommend another site not later than 1 year after the disapproval. The reference schedule does not account for the delay (up to one year) associated with a sustained notice of disapproval.

(4) In-Situ Testing

Although considerable at surface testing will be performed during site characterization, the consensus within the technical community is that detailed in-situ (at-depth) testing will also be necessary to properly qualify a site for the permanent emplacement of waste, before a selection is made among the three sites recommended for detailed site characterization. The Department has estimated that in-situ testing may range from a low of 8 months in salt to a high of 27 months in tuff. Some estimates from outside the Department indicate that 4 years or more will be needed for at-depth testing.

The Department will continue to work with the Nuclear Regulatory Commission, the U.S. Geological Survey, and other experts in the technical community, to identify in-situ testing requirements (for incorporation into the site characterization plan) and the duration and scope of the test data needed to support the site selection decision and the construction-authorization application (CAA). Necessary schedule revisions, if needed, will be identified through this process.

(5) Limited Work Authorization

The NRC regulations in 10 CFR Part 60 provide no specifics as to whether or not the NRC would accept an application for a limited work authorization (LWA). Previous discussions with the NRC staff on this matter were not encouraging because of its timing relative to the staff's review of the CAA; an LWA request would be submitted as part of the CAA.

Previous analyses of schedules have indicated that for dome salt the construction period could range from 69 to 99 months. Hard-rock media, such as granite or basalt, could require 1 to 2 years longer. In order to start repository operations by January 31, 1998, construction must start before the issuance of a full construction authorization. Some limited surface and underground construction must be initiated no more than about 1 year after the CAA is docketed in order to meet the 1998 date. This limited authorization will be discussed with the Nuclear Regulatory Commission staff to identify this potential schedule issue.

(6) Licensing

In order to facilitate the NRC licensing process, the Department has planned a significant amount of interaction with the NRC before requesting a construction authorization. In addition to the NRC concurrence on the siting guidelines, which is required by the Act, the prelicensing interaction with the NRC will be concerned with the site-characterization plans and their implementation to provide data for the recommendation of a site for repository development and subsequently for the construction-authorization application. The Department's approach to licensing reflects an overriding commitment to safeguarding public health and safety and protecting the quality of the environment; the Department also seeks an open two-way communication with the NRC before submitting a license application. It is hoped that this approach will allow technical issues to be identified in the prelicensing phase;

the issues can then be either resolved without delay or activities leading to a resolution can be instituted. Because of its prelicensing interaction with the NRC, the Department assumed a 3-year licensing period, as specified by the Act, and a limited work authorization in the reference repository schedule. The Act does provide for a 1-year extension of the licensing period at the discretion of the NRC.

(7) National Environmental Policy Act

The Act requires environmental assessments (EAs) to accompany each site nomination under Section 112(b)(1)(E) and specifies items that are to be included in the EAs. The Act also specifies, in Section 112(b)(1)(F), that such EAs shall be considered a final agency action and limits any judicial review to a determination of the sufficiency of the EA with respect to the items specified in Section 112(b)(1)(E). Congress has thus decided that the site nominations are not a major Federal action and that such decisions by the Department do not require an environmental impact statement (EIS). A final EIS is required by Subsection 114(f) to support the Department's recommendation for a repository site to the President.

Factors that could affect the schedule for the final EAs and EISs are mainly the following:

(a) Unexpectedly voluminous or complex comments on the draft EAs and EISs, requiring extensive modifications of the documents.

(b) Judicial reviews of the sufficiency of the documents in response to potential litigation.

B. Monitored Retrievable Storage

Although the principal goal of the civilian radioactive waste management program is to develop and safely operate one or more mined geologic repositories, since such a repository has never been built, it is possible that problems may arise that could delay the current plans for repository deployment. Even a delay of a few years could pose a problem due to the limited on site storage capacity at the commercial nuclear power plants and the limitation in the Act that restricts the size of Federal Interim Storage program to no more than 1900 metric tons total capacity.

Monitored Retrievable Storage (MRS) is pertinent to this potential problem because a MRS system provides a mechanism through which the Federal government would be able to accept spent fuel or high-level waste as early as 1993-1996 if needed, or starting in 1998 if the repository is delayed. This potential mission for the MRS will be proposed to Congress in response to Subtitle C of the Nuclear Waste Policy Act of 1982 which requires the Department to conduct a detailed study of the need for and feasibility of monitored retrievable storage facilities.

As defined in the Act, Monitored Retrievable Storage is an option for the safe and reliable long-term storage of high-level radioactive waste and spent fuel for as long as may be necessary. This storage would be in engineered facilities that allow continuous monitoring and ready retrieval of the stored material.

Detailed plans for deployment of an MRS system are to be provided for Congressional consideration by June 1985. Specifically, the Department is to complete a detailed study of the need and feasibility of construction of an MRS and submit a proposal to Congress for the

construction of one or more Monitored Retrievable Storage facilities. The proposal is to include establishment of a program for the siting, development, construction and operation of Monitored Retrievable Storage facilities, alternative site-specific designs for these facilities, and other information that would allow Congressional authorization of the proposal and subsequent development and operation of the facilities to proceed as soon as practicable. A comprehensive environmental assessment of the proposal is to accompany the proposal.

Submission of this proposal will occur at approximately the same time that the Nation is considering specific geologic disposal sites, thereby allowing consideration of Monitored Retrievable Storage facilities on a schedule parallel to that of the repositories and on the basis of comparable information. As indicated, implementation of a Monitored Retrievable Storage proposal will be particularly important if the geologic repository program encounters signficant unanticipated delays due to technical or institutional problems. For such a case, Monitored Retrievable Storage deployment would be critical as an interim measure to allow the Federal government to begin accepting spent fuel by January 31, 1998 pending availability of a geologic repository. Alternatively, availability of Monitored Retrievable Storage facilities could allow the Department to begin accepting spent nuclear fuel or high-level waste for Federal disposal prior to 1998, if required.

If authorized, a Monitored Retrievable Storage facility would basically consist of a spent fuel receiving and handling area or facility similar to that planned for a repository, an area or facility for any packaging that would be appropriate, and a storage area or facility that would occupy the most significant portion of the Monitored Retrievable Storage facility site.

These facilities would be designed to allow acceptance, processing and storage of spent fuel at basically the same rate as would be accomplished if the repository were not delayed. The Monitored Retrievable Storage facility total storage capacity would be a function of the repository slippage; the longer the delay, the more capacity would be needed and constructed. Monitored Retrievable Storage facilities have been estimated to cost from $300 million to $2 billion depending on the concept selected and storage capacity required. Similarly, the estimated time required to deploy the Monitored Retrievable Storage system, eight to eleven years following Congressional approval, is dependent on the concept selected, capacity and siting plan.

The specific storage concept that will be proposed to Congress in 1985 has not been selected at this time. There are several important considerations in making this selection. The spent fuel must be contained, shielded, isolated, safeguarded and monitored. A modular storage system is desired to accommodate capacity uncertainties in a cost-effective manner. Passive, dry storage technologies are preferred for such long term storage applications because they would not require any mechanical assistance, such as blowers or pumps, or external power to provide cooling, containment or radiation shielding. In addition, the concept should provide as much siting flexibility as possible to preserve siting options and minimize the amount of site specific information needed to design, license and safely operate an MRS facility.

1. Plan for Proposal Development

The specific items to be included in the proposal to Congress consist basically of plans and designs. It was previously concluded in a June 1983 Report to Congress (DOE/S-0021) that no research and development activities were needed. With the exception of architect engineering services, the basic resources needed by the Department to prepare the proposal to Congress were in place through its field office and contractor structure prior to passage of the Act. Actions to secure

architect engineering services have now been completed. Thus the remaining major planning actions leading to the proposal to Congress consist of normal management practices such as; delineating work packages, assigning responsibilities, setting internal schedules, identifying needed interactions and arranging appropriate reviews of the written materials or designs resulting from these efforts.

A summary description of plans and activities being conducted to develop the major deliverables for the proposal to Congress is discussed below and shown in Figure III-B-1:

a. Concept Selection

The initial activity undertaken was to select the appropriate storage concepts for further design. During the last few years, four different storage concepts have been studied by various organizations. These concepts are briefly described below before discussing the approach for selecting which concepts will be recommended to Congress. Representative drawings of these options are shown in Figure III-B-2.

(1) Metal Casks: Metal casks are essentially enlarged versions of proven spent fuel transportation cask designs. These casks are constructed of lead and steel or ductile iron; water or other materials provide additional radiation shielding. Cooling is provided by conduction of heat through the metal walls and natural convection to the atmosphere. Dual purpose transport and storage casks are being utilized in Europe, but none have yet been licensed for use in the U.S.

(2) Concrete Casks: Concrete casks (silos) are similar to metal casks, although the designs differ because of the different materials of construction. The cask-in-trench (or berm) concept is an adaptation of the basic above-ground silo design where earth is used to provide additional radiation shielding and physical protection.

FIGURE III-B-1

MONITORED RETRIEVABLE STORAGE PROGRAM

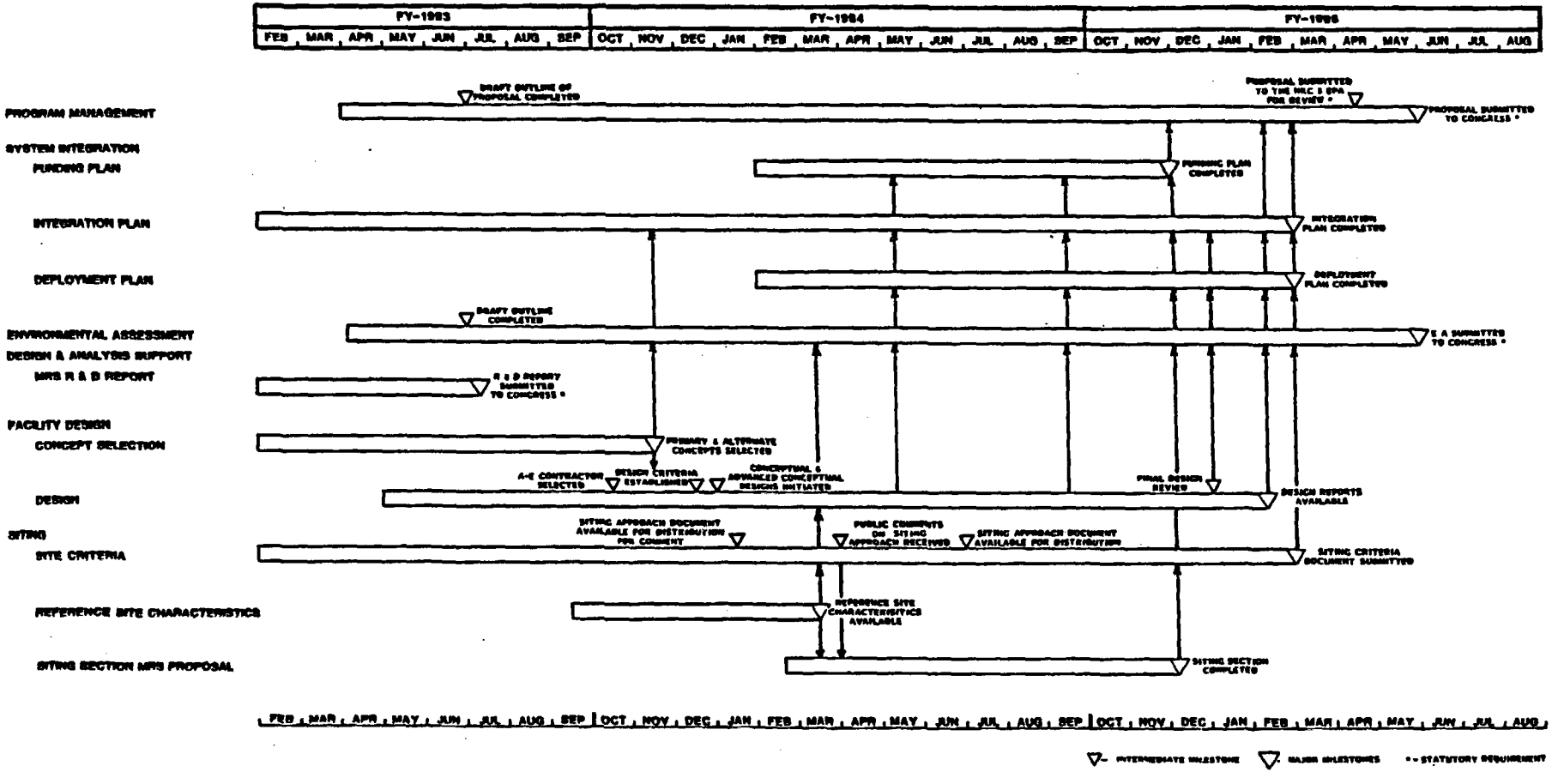


FIGURE III-B-2

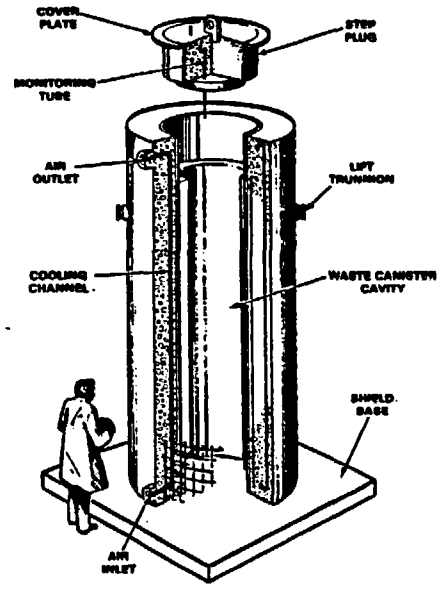


Illustration of the Concrete Cask or Silo MRS Concept (ventilated design)

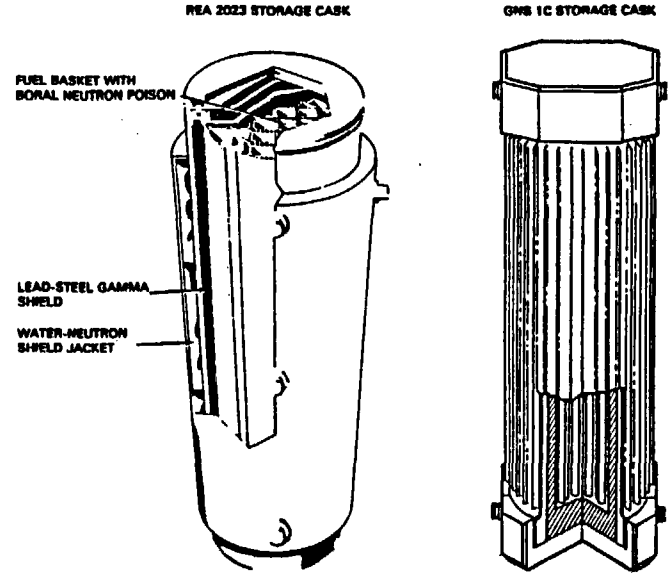


Illustration of Metal Storage Cask Designs

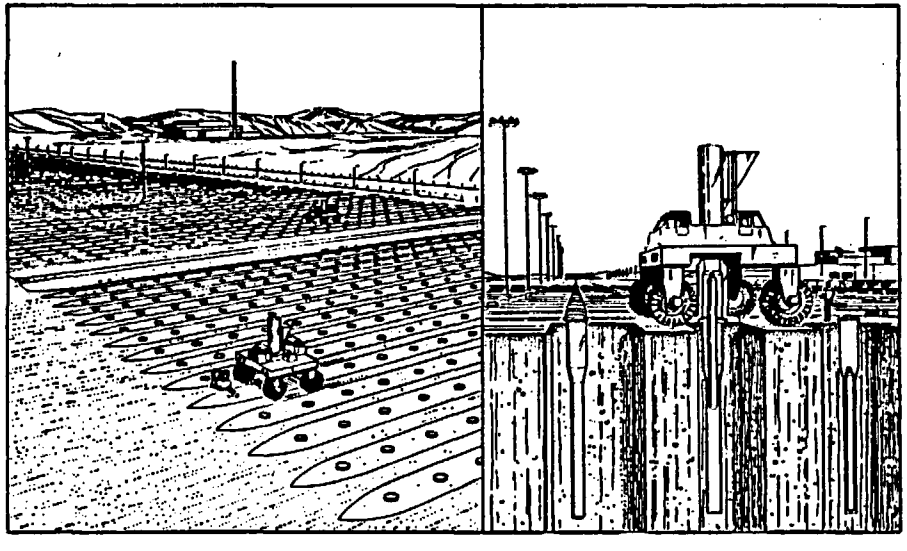


Illustration of a Field Drywell MRS System

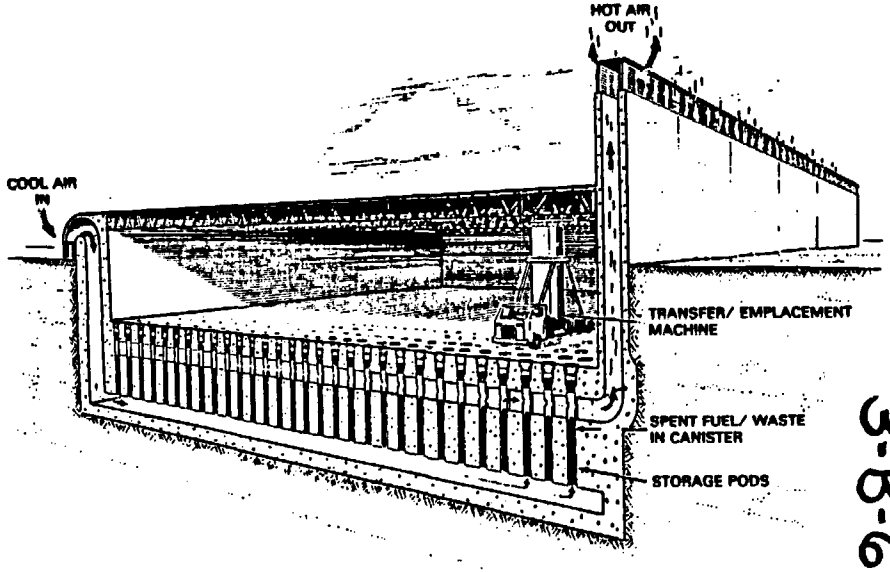


Illustration of a Typical Open-Cycle MRS Vault Concept

(3) Drywells: Drywells are excavated cavities into which sealed metal canisters containing spent fuel or high-level waste are placed. There are two variations of this concept: field drywells where the canisters are inserted into sealed metal containers in the ground, and tunnel drywells in which the entire installation is in mined tunnels. Radiation shielding and a heat transfer medium are provided by the surrounding overpack material and the earth.

(4) Vaults: Vaults are large structures (or caverns) where spent fuel packages are stored and cooled by various means. There are many different types of vault designs for spent fuel and high-level waste storage. In an open cycle surface vault design, canisters of spent fuel or reprocessing waste are stored in large, shielded warehouse-type structures through which cooling air circulates by natural convection. In a closed cycle surface vault design, spent fuel or high-level waste canisters are cooled by a passive, secondary heat transfer mechanism. A "tunnel rack" design is considered an underground open cycle vault. In this design large, open racks of spent fuel or reprocessed waste canisters are stored in tunnels using remotely controlled emplacement equipment. Cooling is by natural convection, and radiation shielding is provided by the surrounding media.

To facilitate an equitable comparison of the concepts, a conceptual design analysis or normalization was performed for each concept by major engineering firms familiar with that concept. A common set of design requirements for storage of spent fuel was specified to facilitate this analysis. The principal requirements used for purpose of comparison were:

(1) 15,000 MTU storage capacity;

(2) 1,800 MTU/yr throughput rate;

(3) Consolidation of spent fuel at the MRS facility prior to storage;

(4) Throughput rate expandable to 3,000 MTU/yr; and,

(5) Storage capacity expandable to 72,000 MTU.

The storage of equivalent quantities of high-level waste and its associated transuranic waste from spent fuel reprocessing was also used to compare concepts.

With the normalization completed all the concepts are now being compared on the basis of their relative performance on each of seven criteria: safety and licensing, environmental impacts, flexibility, cost, concept maturity, socioeconomic impacts, and siting requirements. These criteria were developed through consideration of the desired MRS facility characteristics, and are considered to be a sound basis for selecting a primary and alternate MRS concept to satisfy the MRS mission requirements.

This evaluation is being subjected to internal Department of Energy reviews by senior personnel familiar with the nuclear waste systems. In addition, the Department has secured the services of nationally recognized representatives from the scientific community, utility industry, State government organizations, and Congressional research staff to independently review and critique the selection. These individuals will also be requested to assist the Department in this review capacity throughout the development of the MRS Proposal.

In parallel to the concept selection effort, Monitored Retrievable Storage facility functional design criteria have been developed to define the performance baseline for the Monitored Retrievable Storage facility and govern the archietect engineer design effort. These functional design criteria include such items as: the applicable federal, state and building codes and standards, facility scope and purpose, reference transportation interface requirements, design requirements for natural phenomena, receiving and handling facility design requirements, heat loads, throughputs, mechanical and electrical systems needs, storage facility performance requirements, support facility requirements, site improvements and utility requirements.

The functional design criteria have already been provided to the architect engineer. The information on the selected concepts and guidance regarding the use of site information will be provided to the architect engineer in January 1984. The architect engineer will in turn prepare the five required Monitored Retrievable Storage facility designs, specifications and cost estimates, including one design developed to a Title I design level of detail.

b. Siting

Establishment of the siting program to be included in the proposal to Congress involves several activities. The Department plans to publish by February 1984 draft MRS siting criteria describing qualifying conditions, disqualifying conditions and favorable attributes for potential Monitored Retrievable Storage facility sites. It is expected that technically acceptable MRS sites could be found in each of the contiguous 48 states. These siting criteria would be accompanied by a description of the planned siting approaches.

For purposes of proceeding with development of site-specific designs prior to selection of an actual site, generic descriptions of three potential site-types, (an arid site, a wet warm site and a wet cold site) will be prepared and provided as interim guidance for the architect engineer. The architect engineer will then prepare the designs in such a way as to allow a substitution of specific site data two to three months prior to submission of the proposal to Congress.

The siting plan, which is to be included as part of the proposal to Congress, is also being developed. This plan will delineate the activities and schedule for implementing the formal requirements applicable to potentially affected Indian tribes and local governments in the MRS program; these requirements apply to any MRS authorized by Congress.

c. Environmental Assessment

The Department is preparing an environmental assessment which is to accompany the MRS proposal to Congress. The environmental assessment is to include a full analysis of the relative advantages and disadvantages of all five alternative combinations of sites and proposed facility designs, and is to be based on available information regarding alternative technologies for the storage of spent fuel and high level radioactive waste. The appropriate design and site related data for the environmental assessment are being identified early in the program to allow the assessment to be completed for submission to Congress with the proposal. The environmental assessment, like the facility designs, is being developed using the generic site characteristics so it can be readily modified for actual locations.

If Congress should approve a MRS facility the Department will prepare a full Environmental Impact Statement for the facility.

d. Other

In addition to the designs and the plan for siting, constructing and operating MRS facilities, Section 141 of the Act also requires that the proposal include two additional specific products.

> "[A] plan for the funding of the construction and operation of such facilities, which plan shall provide that the costs of such activities shall be borne by the generators and owners of the high-level radioactive waste and spent nuclear fuel to be stored in such facilities"; and,

> "[A] plan for integrating facilities constructed pursuant to this section with other storage and disposal facilities authorized in this Act."

These plans are being developed in parallel with the facility designs and in cooperation with and consistent with the repository planning efforts.

In addition, safety assessments and a plan for licensing the MRS will be prepared to accompany the proposal.

As previously indicated, all of the above activities will contribute to, and be the basis for, the proposal to be submitted to Congress by June 1, 1985. In addition, liaison with the Nuclear Regulatory Commission and Environmental Protection Agency will be maintained throughout the conduct of the program so that their advice and concerns can be factored into the proposal and to facilitate their final comments which will accompany the proposal.

2. Post-Proposal Plan

If Congress approves proceeding with a monitored retrievable storage system, the activities discussed below and shown in Figure III-B-3 would be implemented to have a facility available to accept waste.

a. Siting

Implementation of the siting program authorized by Congress would be immediately initiated. Siting activities would be expected to include interactions with potentially affected States, local government and Indian tribes, identification, characterization and evaluation of the planned site, and institution of agreements with the States for consultation and cooperation and impact aid as authorized in the Act. An MRS Environmental Impact Statement would be prepared and approved.

b. Licensing

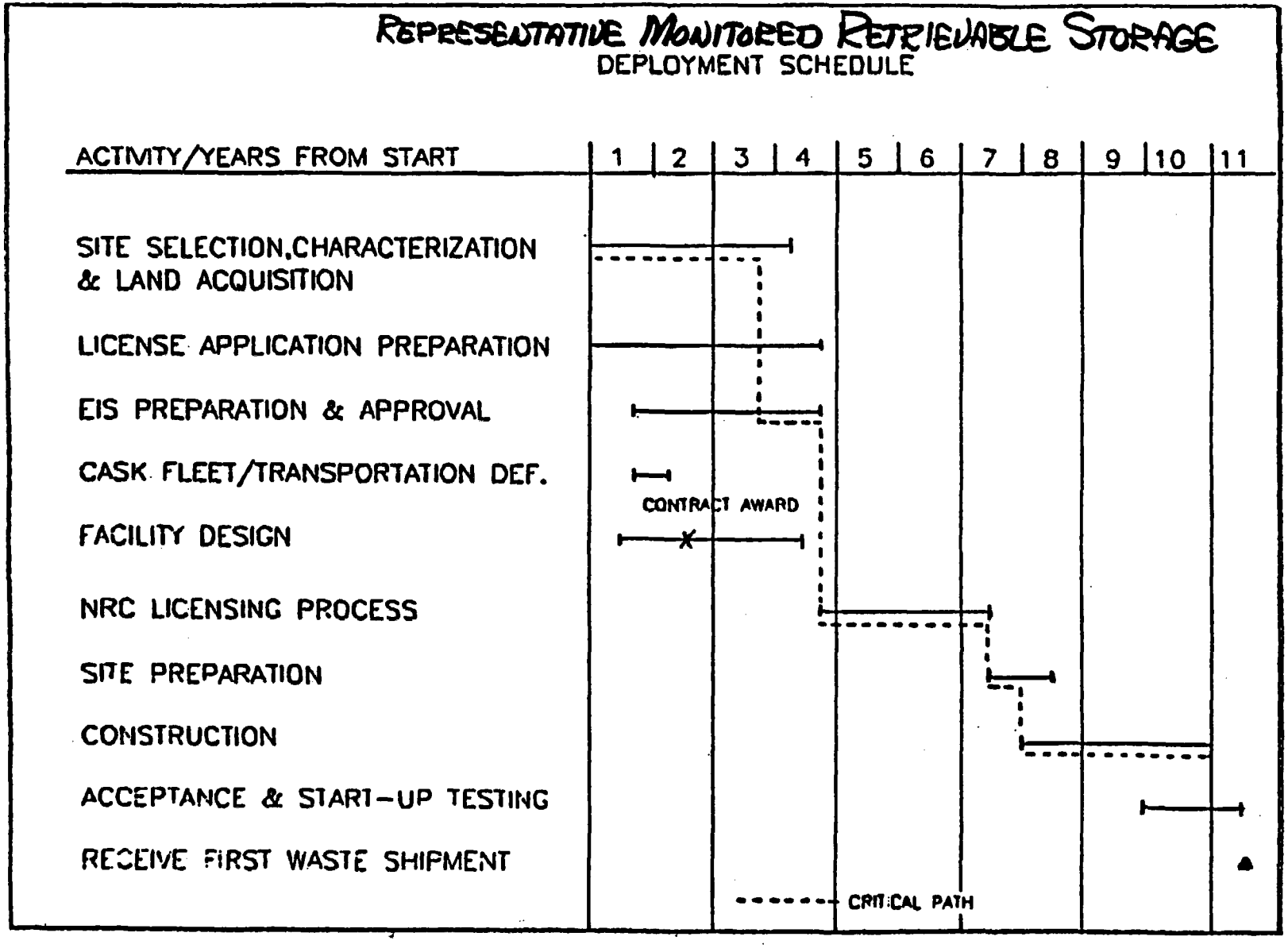
The specific information required to license the Monitored Retrievable Storage facility under the applicable Nuclear Regulatory Commission regulations would be developed and submitted. It has been estimated that the Nuclear Regulatory Commission would require two and a half years to review a Monitored Retrievable Storage facility licensing appplication.

c. Final Design and Construction

Since the proposal to be submitted to Congress in 1985 includes designs equivalent to Title I, only the Title II design activities would be required prior to facility construction. This detailed design information would be available for the safety analysis in support of the Nuclear Regulatory Commission licensing. After issuance of the Nuclear Regulatory Commission license, it is anticipated that it would require approximately four years to construct the initial increment of a large, centralized Monitored Retrievable Storage facility.

FIGURE III-B-3

REPRESENTATIVE MONITORED RETRIEVABLE STORAGE
DEPLOYMENT SCHEDULE



Depending on the siting activities, the licensing schedule, and the concept selected, the overall process from Congressional authorization to initial receipt of fuel could take anywhere from eight to eleven years.

The detailed plan and schedule for MRS implementation, including operation and decontamination, will be part of the June 1985 proposal.

C. Transportation

The ability to transport nuclear materials safely is critical to implementation of the Nuclear Waste Policy Act. The Department must ensure that a safe and economical transportation system is available to support each of the program activities under the Nuclear Waste Policy Act. The scope and magnitude of the Department's responsibility for the transportation of nuclear waste is derived from two key provisions in the Nuclear Waste Policy Act (Sections 136 and 302). Pursuant to these provisions, the Department will take title at the reactor or shipment origin and arrange for the transportation of spent nuclear fuel to interim storage facilities and of high-level nuclear waste and spent nuclear fuel to repositories. This represents a significant expansion of the Department's responsibilities for the transportation of commercial nuclear material and will require a substantial and comprehensive planning effort to ensure that all transportation components are in place when needed to support the many Civilian Radioactive Waste Management program activities. Furthermore, the Act requires that these transportation activites be performed by private industry to the fullest extent possible and, for transportation activities done as part of the Federal Interim Storage program, be subject to regulation by the Federal government.

The basic transportation mission under the Act is to assure that a safe, environmentally acceptable, and cost-effective transportation system is in place and available when needed to support each of the Nuclear Waste Policy Act programs. This section of the Mission Plan presents the plans and underlying strategy of the Department of Energy to fulfill this basic mission.

1. Current Situation and Major Issues

In its future role under the Act as the primary shipper of commerical spent nuclear fuel and high level waste, the Department must ensure the availability of all necessary transportation components to serve a

variety of program needs: Federal interim storage (FIS) and spent fuel research and development activities in the near term, and repository and Monitored Retrievable Storage (MRS) in the long term. Necessary transportation components include equipment, especially casks; on-site services at reactors and storage or disposal facilities; and actual transportation or carriage.

Of utmost concern to the Department are the shipping casks that will be needed for program operations. Because of the limited availability of existing casks and the long lead time required to bring new ones on line, this matter deserves special attention. The background information that follows is provided to help understand the Department's planning efforts in this area.

Currently there are limited types and quantities of shipping casks capable of transporting spent fuel or high-level waste. Most of these casks were designed to ship spent fuel to reprocessing plants shortly (within 6 months to a year) after discharge from the reactor. Thus they were designed to ship fuel that is considerably "hotter", both in terms of heat and radiation, than fuel that has been stored for over 5 years following reactor discharge as would be typical of fuel shipped to a repository or Monitored Retrievable Storage facility. This makes current cask designs inefficient for serving repository or Monitored Retrievable Storage facilities compared to new designs that would be capable of transporting significantly more fuel per unit of cask weight thus reducing the number of shipments required and costs accordingly.

Considerable time and effort is required to develop, test and license a new cask. For example, the most recent rail cask design certified, the NLI 10/24, took 5 years in the design and certification process alone. Further, the regulations governing cask design have continued to evolve and become more stringent over the years. There is sufficient time to develop and license a new generation of casks to serve repository or Monitored Retrievable Storage facilities, but a lack of demand for these

casks has provided little incentive for the private sector to invest funds in developing new, more cost effective designs without Federal involvement. Because the Department will in all probability be the only major customer for shipping casks and transport services in the future, it follows that some Federal involvement or incentives will be required. In fact, the availability of equipment and services in the long-term will depend heavily on the Department's near-term contracting strategy with private industry suppliers.

In selecting its contracting strategy, the Department must be mindful of the need to maintain market competition and assure several reliable sources of supply in the future. Conditions could exist where the only surviving private sector suppliers will be those under direct or indirect control of the Department in serving both its commercial and defense needs. In addition, issues of cask ownership must be resolved, and sufficient lead time for cask certification must be allowed.

In addition to these contracting complexities, there remains considerable uncertainty as to the appropriate technical requirements or specifications for a new generation of casks. Should they be dual purpose casks capable of storing fuel economically as well as shipping it? Considering the significant differences in interface requirements among various reactor sites, what should be the cask interface requirements? Should they be designed for consolidated or unconsolidated fuel? What would be an appropriate mix of rail and truck casks?

To meet near-term civilian radioactive waste management program transportation needs, time is not available to design and certify new equipment. However, the amount of spent fuel that will be transported by the Department to support the near-term needs associated with Federal Interim Storage and spent fuel research and development programs is projected to be relatively small. Projections of the types and

quantities of spent fuel have been compared to the number and types of casks available, and it is believed that sufficient transportation capabilities exist to support near-term needs. An unexpected loss of equipment or unexpected private sector demand for this equipment (e.g., for transhipments or serving the West Valley, New York, or Morris, Illinois, facilities) could, however, require the Department to compete for cask availability. In addition, there are demand uncertainties associated with Federal Interim Storage or research and development needs. These uncertainties create problems relative to the time and costs required to make shipping arrangements once a clear demand arises. For example, how much funding and effort should the Department expend to pre-arrange shipping capabilities for Federal Interim Storage when it is not clear that there will be any utilities desiring or eligible for Federal Interim Storage services? It should be noted that once a utility is deemed eligible, the Department is required by the Act to accept the fuel in very short order.

In addition to issues involving cask availability and design, the Department is confronted with several "institutional" problems. The last ten years have seen a growth in institutional resistance to the transportation of all kinds of radioactive materials, despite an excellent safety record. The Department has experienced increasing difficulty as a shipper, not only for controversial nuclear spent fuel shipments, but even for vitally needed radioisotopes shipped for medical and research purposes. It is anticipated that institutional impediments will continue to confront the Department in its new role under the Nuclear Waste Policy Act as the primary shipper of high level wastes and spent nuclear fuel. Of particular concern to the Department is the growing number of State and local regulations governing nuclear transportation that often conflict with one another and with Federal requirements.

The institiutional impediments discussed above, however, are only manifestations of underlying public concerns that must be better understood and addressed. Perhaps the greatest public concern is that nuclear transportation be conducted in the safest possible manner to minimize impacts to public health, safety and the environment. The risks and environmental and economic impacts of transportation activities must continue to be minimized, and these efforts must also be objectively documented in a manner that is understandable by the general public. In addition, transportation factors must be considered in the siting and design of waste management facilities; the levels of protection and safety provided by stringent packaging standards and other transportation safety requirements already promulgated by NRC and DOT under existing law need to be better explained; and there must be publicly acceptable assurances that these standards and safety requirements will be met.

The strategy for achieving the transportation mission consists of making the above issues focal points of programmatic efforts. It follows that these efforts be initiated in four areas with objectives as follows: (1) provide for adequate equipment and service availability in the near-term; (2) plan for and develop a waste transportation capability for the long-term; (3) continue to minimize the safety risks, and the environmental and economic impacts of transportation; and, (4) identify and resolve serious institutional impediments. Program planning in these areas is still underway, but key elements in the planning that has taken place to date are summarized below.

2. Plans and Major Activities

a. Near-Term Transportation Plans

To meet near-term transportation needs (for the spent fuel research and development, Federal Interim Storage and Test and Evaluation Facility activities) the Department plans to rely on existing privately owned

casks, owner-provided support services, and commercial carriers. These casks are listed in Table 3-C-1. The characteristics and quantities of existing, licensed, privately owned spent fuel casks appear to be adequate. The next step is to better establish the near-term Civilian Radioactive Waste Management program demand and the availability of these casks to meet that demand. As previously stated, the key near term consideration is the development of a specific contracting plan to ensure the Department's access to existing equipment and services in a timely manner. Consequently, the terms and conditions for use of the casks under various scenarios will be ascertained, and firm or contingent contracts will be negotiated. Such contracts will provide for cask supply, servicing, maintenance, compliance testing, operating procedures, and facility interface and personnel training services.

b. Long-Term Transportation Plans

To meet the longer term needs (for the repository and Monitored Retrievable Storage activities) the Department plans to focus first on two major items: 1) A contracting or business strategy; and 2) Definition of the technical characteristics that are desired in a new generation of casks. The business strategy will provide for timely interaction and communication with the private sector on both our contracting plans and equipment requirements. This will include information on the timing and scope of major procurement actions and an indication of the plans for cask ownership, maintenance and transport. A draft business strategy will be available in the spring of 1984 and finalized by the end of the year. This early sharing of information along with the Department's willingness to make firm commitments sufficiently in advance of transportation needs should allow adequate lead-time for engineering, licensing and construction of required equipment and development of servicing capabilities, while maximizing private sector involvement.

Table 3-C-1

EXISTING CASK FLEET CAPACITY

Cask Type	Capacities Assemblies	Capacities Avg MTU(1)	No. of (2) Casks	Round Trips(3) Per Year	Fleet Capacity MTU/Year
NAC/NFS	1PWR/2BWR	.42	6(4)	45	113
NLI 1/2	1PWR/2BWR	.42	5	45	95
FSV-(5)	1PWR/3BWR	.5	3	45	67
TN-8	3PWR	1.26	2	30	75
TN-9	7BWR	1.30	2	30	78
IF-300	7PWR/18BWR	3.0	4	9	108
NLI-10/24	10PWR/24BWR	4.2	2(6)	9	75
				Total	611

(1) Average of existing early reactor discharges.

(2) Total of units in the U.S.; availability from present owners for FIS service must be confirmed.

(3) Allowance for periodic maintenance and compliance inspection/test; 1 month-truck, two months-rail per year.

(4) Seven units exist; however, one may be destructively tested to resolve certificate renewal questions.

(5) Ft. St. Vrain casks can handle LWR fuel with neutron shield addition.

(6) No PWR/BWR baskets available; allow 18-24 months lead time to provide.

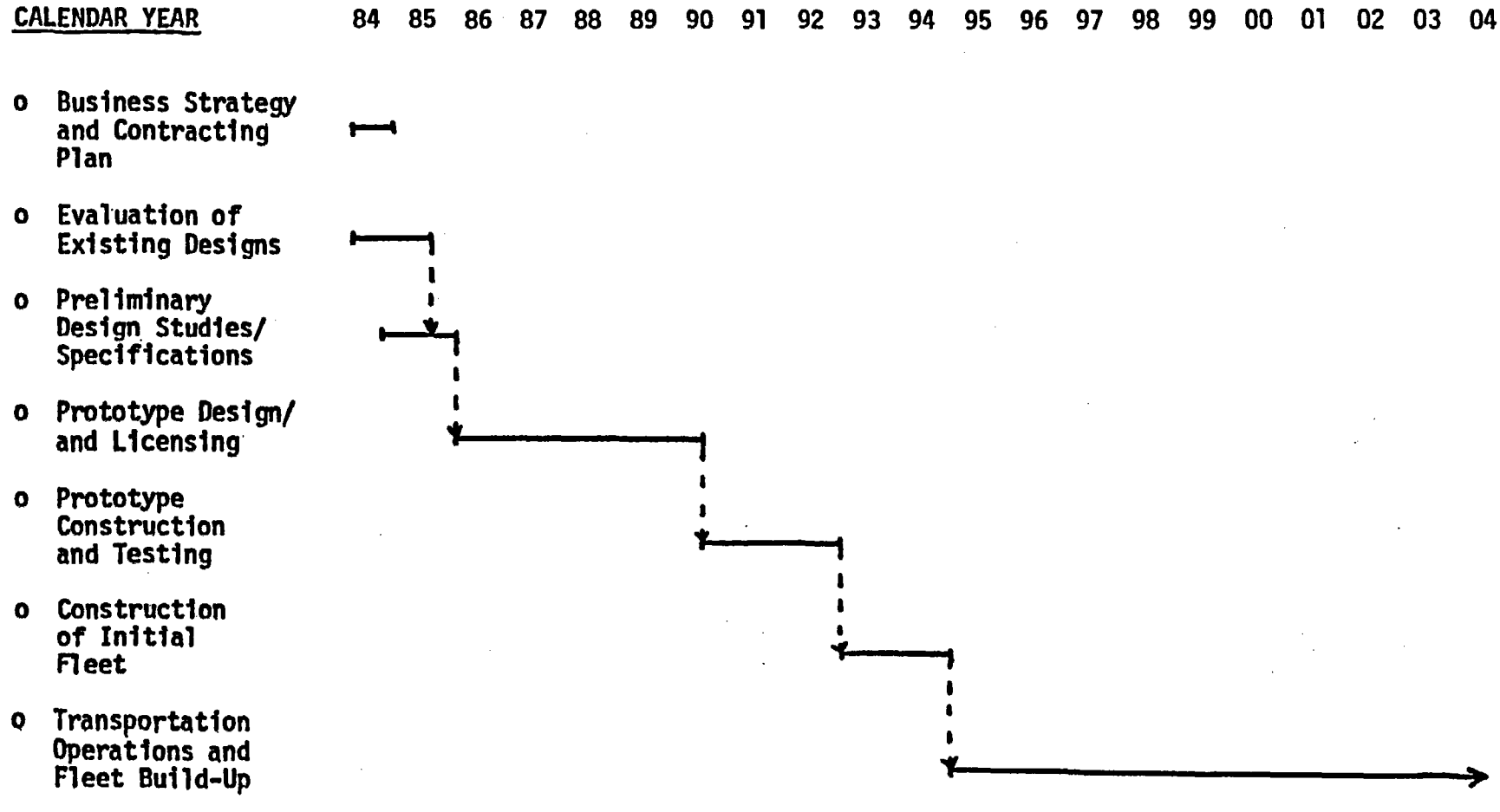
The technical descriptions, including specifications for interfaces, capacities, weight limits, cost and exposure goals, tie down designs, etc., will be developed through an interactive process. The Department will propose specifications in the Spring of 1984 and review them in workshops with repository and Monitored Retrievable Storage facility designers, utilities, cask designers, special interest groups and other entities desiring to review and comment on these plans.

This will also allow sufficient opportunity to address many of the important cask-related issues previously identified: the need for more cost-effective cask designs; the feasibility of a multiple purpose cask that can be used for transportation; the appropriate mix of rail and highway casks; and the need for standardized cask interface requirements. The Department desires to initiate design activities by 1988 in order to assure an adequate supply of transportation equipment by the late 1990's. A detailed estimate is being developed in cooperation with the private sector to establish time spans for major activities and related milestone dates.

To assist in the development of the business strategy, private sector willingness and capability to provide adequate transportation services will be assessed in parallel. Their views on alternative mutually acceptable contracting options and mechanisms will be duly noted and incorporated into the business strategy as appropriate. The publication of the business strategy in conjunction with comprehensive information on future requirements should provide industry and the public with a clearer understanding of future market potential and Federal government intentions. Following industry and public reaction, the Department will initiate cooperative efforts and procurement actions to assure the timely design, testing and licensing of transportation equipment and the timely availabilty of carrier and operator services. Obstacles to private sector participation in the transportation functions will be identified and resolved on an ongoing basis. The Department will also constantly

TABLE III-C-2

MAJOR EFFORTS AND ESTIMATED SCHEDULES
LONG-TERM TRANSPORTATION EQUIPMENT SUPPLY



monitor any independent private sector development of transportation capabilities with the objective of minimizing Federal interference or duplication of private sector efforts and encouraging industry initiative and creativity. Table 3-C-2 summarizes major efforts and related schedules leading to an adequate supply of equipment and transportation operations.

Plans for conducting actual transportation operations, traffic management, and providing on-site services at facilities will be based on expansion of the Department's existing capabilities and many years of experience along with utilization of commercial carriers. For providing on-site services, due to the variety of equipment types and large volume of shipments anticipated, a specially trained crew, working closely with staff at the receiving facility (Repository or Monitored Retrievable Storage) appears to be a viable option for further consideration and development.

Pending completion of current planning efforts, certain transportation activities initiated over the last several years will be continued. These activities include estimating the number and types (rail or truck) of casks that will be needed to serve storage and disposal facilities under various scenarios; conceptualizing the key features desired in a possible new generation of shipping casks; identifying the current transportation interfaces at the various reactor sites; standardization of transportation risk assessment methodologies; evaluating current and new materials for cask shells and shielding; and testing and evaluating old and current cask designs under very severe accident conditions.

As can be seen, considerable attention is being given to maximizing private sector involvement in providing for the transportation needs of the program. It should be equally clear, however, that the Department takes its primary transportation responsibility under the act very seriously. Where the private sector cannot or will not provide the required services in a timely or cost effective manner, the Department

will promptly seek approval from the Secretary of Transportation to use its own resources to ensure that a safe, reliable transportation system will be available when needed.

c. Plans For Safety, Environmental And Economic Impact Analyses

To ensure that transportation activities are conducted in a safe, environmentally acceptable and cost-effective manner, the Department will continually assess the impacts of its transportation plans and activities. This will include generic analyses of the safety risks, environmental impacts, and costs of transportation associated with various storage and disposal facility siting options. Because of the large number of assessments to be conducted, standardized methods of assessing the transport impacts associated with these options will be used as much as possible. Because generic assessments alone will not be sufficient, transportation impacts will also be analyzed on a site-specific basis for each prospective site. Specific environmental analyses that will incorporate assessments of transportation impacts include the following:

(1) Environmental assessments (EA) for each repository site nomination, for site recommendations for MRS facility, for TEF site nominations, and for Federal interim storage facilities of less than 300 metric ton capacity.

(2) Environmental Impact Statements (EIS) for first repository site recommendations, for Federal interim storage facility of 300 or more metric ton capacity, and for MRS site recommendations.

(3) Site Characterizations Plans for each repository site recommended for characterization.

The Department will ensure that the safety, environmental and economic analyses discussed above are readily available and understandable to the public. This will also contribute significantly to the Department's efforts to address the concerns of state and local officials and the general public as discussed below.

d. Plans For Resolving Institutional Impediments

Institutional impediments in nuclear waste transportation will be identified and resolved in three specific areas: Federal regulation; State and local regulation; and public attitudes and perceptions.

At the Federal level, the Department will strengthen its coordination activities with the Department of Transportation, Nuclear Regulatory Commission and Federal Emergency Management Administration, to eliminate regulatory gaps, avoid duplication of effort, and identify and resolve, as early as possible, any regulatory issues that could be impediments to accomplishing the civilian radioactive waste management program's transportation mission. A first step in this area has been taken recently through completion of a Memorandum of Understanding on packaging certification between the Department and the Nuclear Regulatory Commission. Similar efforts may be undertaken with the Department of Transportation and Federal Emergency Management Agency. In addition, joint research and development projects may be implemented to resolve common issues of concern.

Since the Department's role as a major shipper of nuclear waste will be expanded tremendously by the Nuclear Waste Policy Act, the Department will be directly faced with the growing myriad of State and local government laws and ordinances that are often different from one another and from Federal regulations. The Department cannot directly resolve these jurisdictional conflicts; that is the role of the regulatory agencies, the Department of Transportation and Nuclear Regulatory

Commission, and perhaps the courts. However, the Department can take the initiative to identify and resolve the concerns of State and local officials which give rise to regulatory inconsistencies. The major actions envisioned by the Department to accomplish this are to develop materials and provide forums for information exchange, and carefully consider and respond to legitimate concerns as appropriate. Since public concern and perceptions very often underly state and local regulatory actions, these efforts will be directed to the general public, as well as state and local officials. Another forum for addressing concerns of state and local officials is the formalized consultation and cooperation (C&C) procedure established by the Act. This procedure is required for facility host states, and asimilar process can be used to address the transportation concerns of adjacent access states. The Department will also support the efforts of the regulatory agencies to resolve the legal and regulatory conflicts through their administrative processes and, if necessary, through litigation.

As previously noted, the Department plans to develop materials and provide forums for information exchange on nuclear waste transportation. These efforts will consist of information development and dissemination to the general public, State and local officials, the media and other interested parties. Some specific activities envisioned include the development and maintenance of a nuclear transportation data base for access by the public; development of a speakers bureau as a resource for public meetings; and the development of an information network drawing upon the expertise and knowledge of individuals from government, industry and the general public. These efforts will also include the solicitation of public and State/local official comments on the Department's civilian nuclear waste transportation program in order to identify real or perceived program weaknesses or information gaps that need to be addressed.

Development of more detailed program plans leading to accomplishment of the overall transportation mission is underway. These program plans will focus on detailed task descriptions, deliverables and major milestones required to provide for both near and long term transportation needs. In view of the Act's emphasis on maximum private sector performance of the transportation function, drafts of these program plans will be made available to private industry and the public for review and comment prior to final implementation.

D. Interim Storage

Although the Nuclear Waste Policy Act of 1982 requires the Federal Government to ultimately provide a permanent repository for spent nuclear fuel and high-level radioactive waste, it also recognizes that approximately sixteen years will have elapsed between passage of the Act and the availability of alternative storage or disposal options and that the spent fuel inventories at many domestic commercial nuclear power plants will exceed the projected on-site spent fuel storage capabilities beginning in the mid-1980's. The Act addresses this problem by providing for research to expand existing on-site storage and by providing the Federal Interim Storage needed before utilities can implement on-site storage expansion programs.

Specifically, the Act provides that:

(1) Reactor operators have the primary responsibility for storage of their fuel and the effective utilization of storage that exists or may be added;

(2) The Federal Government is required to provide the utilities with assistance in the efficient use and expansion of on-site storage; and,

(3) If these efforts prove insufficient, the Federal Government must provide not more than 1900 metric tons of interim storage capacity for spent fuel where this is necessary to assure continued orderly reactor operation.

To understand the problems or issues involved in discharging these reponsibilities, hence the basis for current Departmental planning in this area, the current at-reactor storage situtation is described in more detail below.

1. Current Situation/Issues

The Department has published a report annually over the last several years analyzing in detail the current spent fuel storage situation in the U.S. The most recent report, Spent Fuel Storage Requirements, DOE/RL 83-1, January 1983 describes on a reactor by reactor basis projected spent fuel discharges over the next couple of decades, current reactor storage capacities, and the potential for increasing these capacities through existing, licensable technologies, namely by reracking of pools to the maximum extent practical and through transshipments. This most recent analysis shows that the storage needs of some utilities could exceed their capacities as early as 1984. Further, the report shows that even if all utilities are able to rerack and transship to the maximum extent practical, there will be a storage problem requiring the use of new technologies that are not fully developed, licensed or demonstrated to date.

Fulfillment of the Act's requirements, particularly the Department's responsibility to encourage and expedite efficient use of on-site storage capacity, therefore involves, identifying through the utilities the most promising technologies for solving these storage problems in a timely fashion, understanding the impediments to their utilization, including licensing, and working with utilities to resolve these impediments through the means authorized or directed in the Act (primarily research and development and cooperative demonstrations at reactor sites and at Federal sites).

In the event that these impediments cannot be overcome soon enough, the Department must be in a position to accept up to 1900 MT of spent fuel from those utilities which are in dire need despite their best efforts to increase at-reactor storage capacity. The major problem here is that, if

the impediments alluded to above can be resolved soon enough, there should be no demand for Federal storage. The Department is therefore reluctant to expend funds to deploy Federal capacity because the Act requires that these expenditures be fully recovered by fees charged to customers and there may in fact be no customers. Yet, if demand arises, it will likely be on short notice and the Department is required to accept fuel on demand once a utility has been certified eligible and has entered into a contract with the Department.

The sections that follow describe the Department's objectives and plans responsive to the responsibilities and associated problems described above.

These Federal responsibilities are being discharged through a joint spent nuclear fuel research and development program with the utilities to develop techniques for increasing the effective capacity at reactors and through planning for the provision of Federal Interim Storage if it is needed.

a. Spent Nuclear Fuel Research and Development

The objectives of the Department's program efforts in this area are quite simply to utilize all means directed or available through the Act or other authority to encourage and expedite the most efficient use of existing storage facilities and the addition of new capacity in a timely fashion. The primary means for accomplishing this under the Act are:

(1) A cooperative demonstration program with the private sector to develop dry storage technologies that the Nuclear Regulatory Commission can generically approve (Section 218(a)).

(2) Assist commercial reactors with demonstration of spent nuclear fuel storage casks, caissons or silos at their sites (Section 218 (a)).

(3) Provide consultative and technical assistance on a cost shared basis for design and licensing documentation for NRC licensing of on-site storage technologies (Section 218(b)(2)).

(4) Perform generic research and development to supplement utility sponsored work (Section 218(b)).

(5) Establish a cost-shared research and development program at Federal facilities for not more than 300 MT of spent fuel to collect necessary licensing data (Section 218(c)(1)).

(6) A cooperative program with the private sector to demonstrate spent fuel rod consolidation in an existing water basin (Section 218(a)).

Plans for further development of rod consolidation and dry storage through these means are summarized below.

(1) Spent Nuclear Fuel Rod Consolidation

Rod consolidation involves the dismantling of the fuel assembly and rearranging the spent fuel rods into a more compact array. It represents a cost-effective method for signficantly increasing the capacity of storage pools that have sufficient structural strength to safely support the added weight.

The Department began its research on rod consolidation in 1980 when it contracted for the design and fabrication of PWR rod consolidation equipment. In 1981, the Department successfully completed a cold demonstration of this equipment using a dummy assembly. This equipment was then modified to handle BWR spent fuel for use in a cooperative demonstration program with the Tennessee Valley Authority (TVA). This demonstration has just been completed, and it involved the disassembly and consolidation of 12 BWR assemblies located in the Browns Ferry Storage pool. A final report of this demonstration will be issued in 1984.

In May 1983, the Department issued a solicitation for cooperative agreement proposals (SCAP) for licensed in-basin rod consolidation demonstrations. One proposal was received and negotiations are underway. Completion of negotiations and finalization of a contract are expected by January 1984. The actual schedule for the demonstration will depend on the negotiated scope of work. This new agreement will supplement the rod consolidation demonstration at TVA.

An objective of these demonstrations is to make use of and demonstrate the 10 CFR 50 licensing process. Another specific objective of the new rod consolidation demonstrations is to demonstrate the feasibility of the proposed rod consolidation storage system including an assessment of the performance characteristics and cost effectiveness. After completion of these demonstrations, the Department expects that an adequate data base will have been assembled to allow licensing of rod consolidation for commercial use. It is expected that significant quantities of spent fuel will be consolidated and that this will result in a substantial increase in storage capacity at the reactor sites.

(2) Dry Storage

Dry storage systems provide an alternative for additional spent fuel storage at nuclear power plants that cannot accommodate reracking or rod consolidation because of seismic or structural constraints. Systems for dry storage include casks, drywells, silos, or vaults. The cask dry storage system is passive, modular, and low in maintenance. The modular aspect offers the economic advantage of adding storage in small increments, thereby avoiding large initial capital outlays.

The Department has over 20 years experience with dry storage technologies. Drywell, silo and vault storage have been demonstrated at the Department's facilities in Nevada. Dry storage of light water reactor spent fuel, however, has never been licensed in the United States. To address this, the Department entered into a cooperative agreement with TVA in 1982 to demonstrate the licensed storage of BWR spent fuel in two prototype dry storage casks. These casks are the REA-2023 and the CASTOR-1C. The REA cask is designed to store 52 BWR assemblies and the CASTOR cask is designed to store 16 BWR assemblies. The REA cask is owned by the Department and is being loaned to TVA. This demonstration will exercise the licensing process, including involvement of the public, as required by 10 CFR 72. A license application will be submitted to the NRC in 1984. The casks will be loaded with fuel following NRC's approval of the license application, which could be in 1986 or 1987. Fuel will be stored at conservative conditions for about two years at which time the fuel will be returned to the storage pool.

In addition, a solicitation for cooperative agreement proposals for dry storage demonstrations was issued in May 1983. Two proposals were received and accepted as the basis for negotiations. It is expected that agreements will be in place by the spring of 1984. Actual schedules for the demonstrations will depend on the negotiated scope of work. New dry storage demonstrations will seek to expand the data base available for licensing of this storage method, and will build upon previous demonstrations such as the one with TVA. It is expected that these demonstrations will include tests, some at Federal sites, that will address storage under conditions approaching the bounding parameters and limiting conditions of the dry storage equipment. Performance characteristics and cost effectiveness of the dry storage equipment will be assessed. The 10 CFR 72 licensing process will be demonstrated.

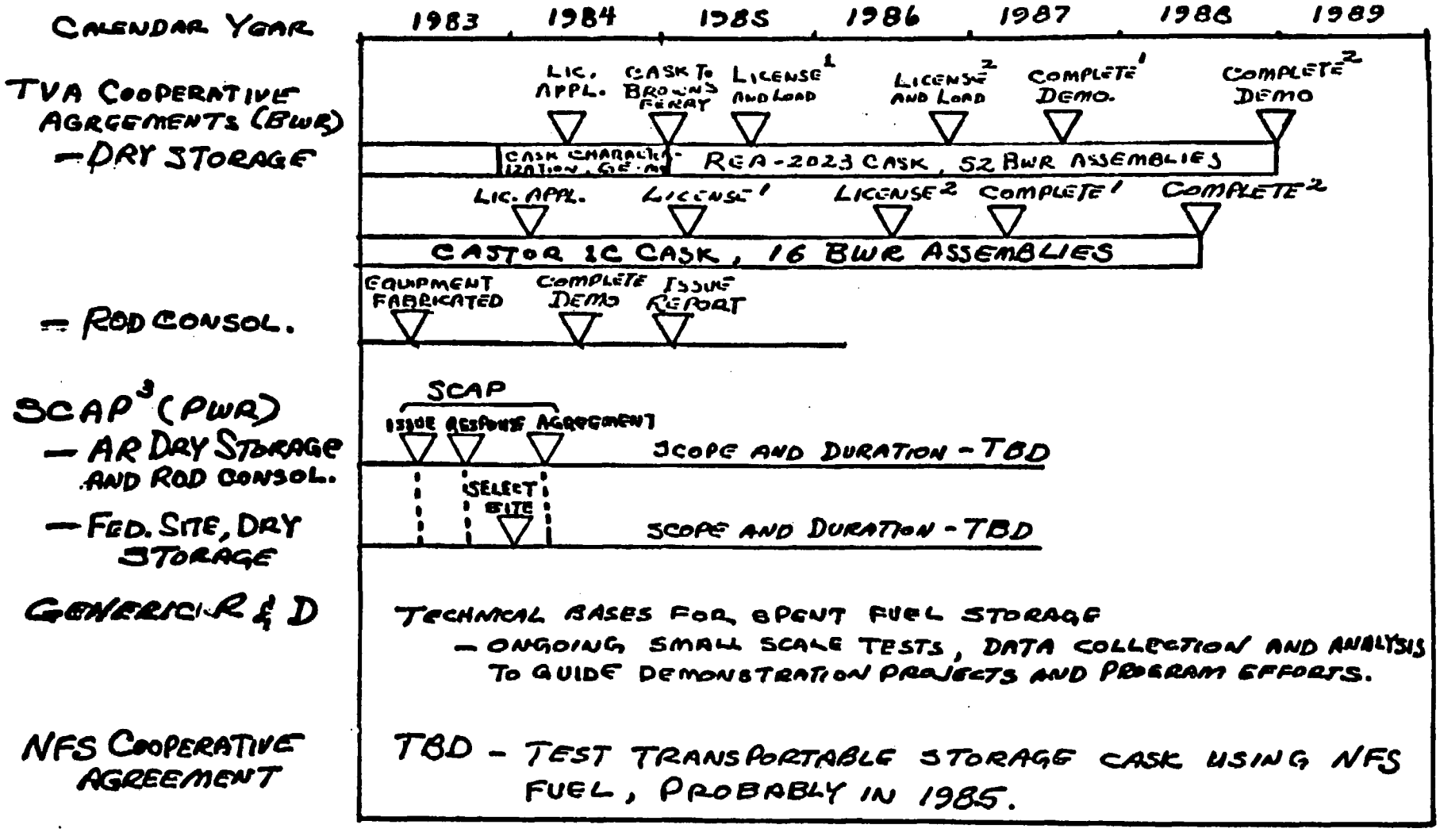
After completion of these demonstrations, the Department expects that an adequate data base will have been assembled to allow licensing of the dry storage processes tested.

The schedule for completion of both the rod consolidation and dry storage demonstrations is summarized in Figure III-D-1.

b. Federal Interim Storage

The Department expects the increased efficiency of on-site spent fuel storage, that is expected to result from successful completion of the fuel rod consolidation and dry storage demonstrations discussed in the previous section, to be sufficient to preclude the need for Federal Interim Storage. However, in compliance with the Nuclear Waste Policy Act of 1982 and as a prudent backup in case unexpected problems arise during the rod consolidation and dry storage demonstrations, the

FIGURE III.-D-1
SUMMARY SCHEDULE FOR SPENT FUEL R AND D



1. WITH NO INTERVENTION DURING LICENSING.
2. WITH INTERVENTION.
3. SCAP - SOLICITATION FOR COOPERATIVE AGREEMENT PROPOSAL

Department has developed a plan to provide Federal Interim Storage if any utility requests it and the Nuclear Regulatory Commission determines that it is eligible under 10 CFR 53.

The specific site and type of storage to be used will not be determined until there are clear indications that Federal Interim Storage services will be required. This will allow the Department to tailor the site and method selected to provide the best solution available at the time the need is identified. The Department has identified several storage techniques for consideration. They are:

(1) Metal storage casks;

(2) Drywells (caissons below grade);

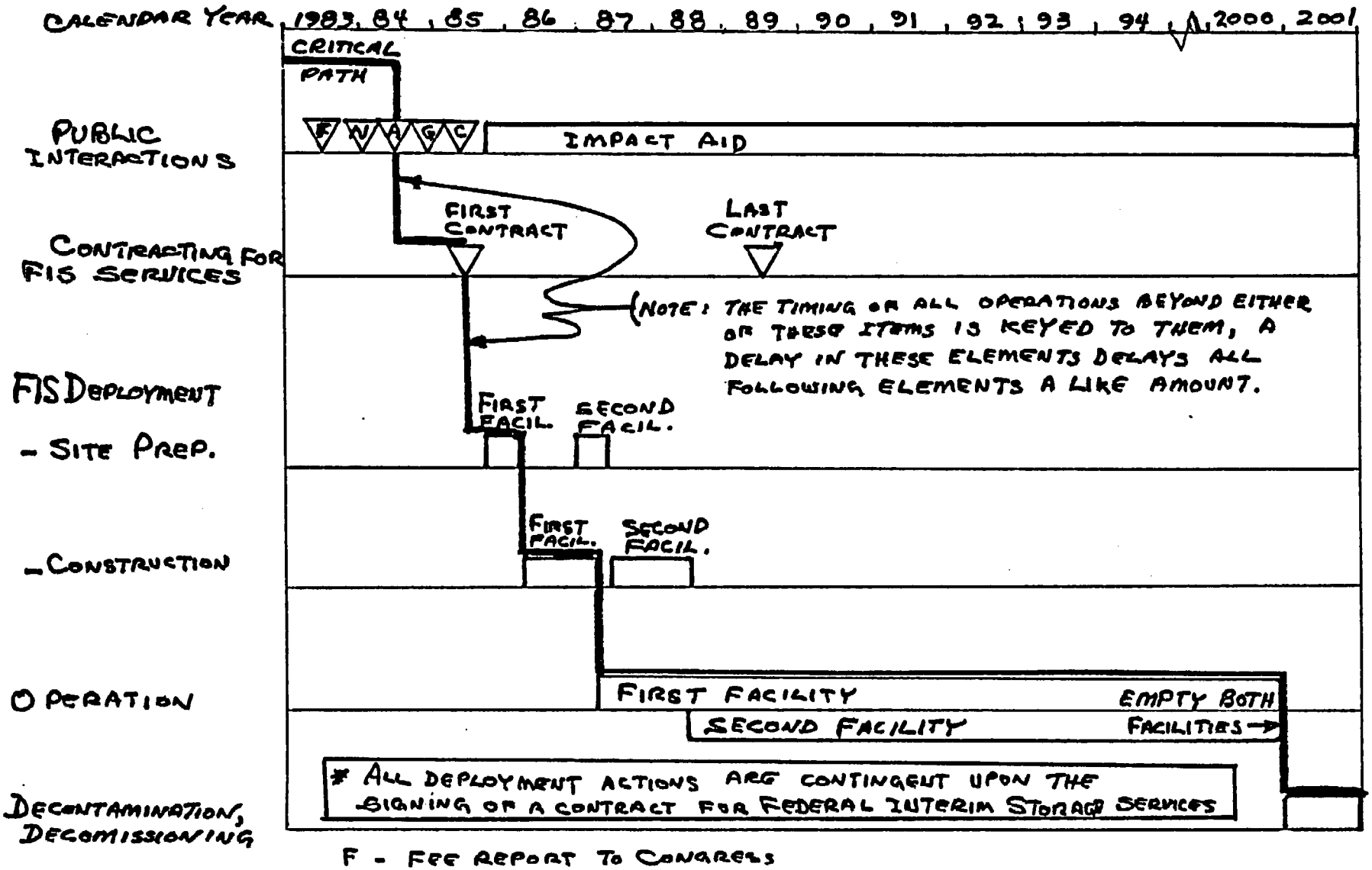
(3) Silos (concrete caissons above grade); and,

(4) Existing water basin storage at Government sites.

Options (1), (2) and (3) above are modular, passively cooled, dry storage methods that are currently being developed as described in the previous section on spent fuel research. The last option, existing Federal water basins, is a currently licensed storage method requiring no further development.

Since there is no firm indication when Federal Interim Storage will be required, if ever, there is no fixed timetable for its deployment. The schedule shown in Figure III-D-2 describes the earliest feasible deployment schedule if an application is made for Nuclear Regulatory Commission eligibility determination in February 1984. The schedule may be slipped to conform to the actual start date which is signalled by the

CONTINGENCY* SCHEDULE FOR FEDERAL INTERIM STORAGE



F - FEE REPORT TO CONGRESS
N - EFFECTIVE DATE OF NRC RULE 10CFR53, FIS ELIGIBILITY CRITERIA
A - FIRST APPLICATION BY A UTILITY FOR NRC ELIGIBILITY DETERMINATION
G - NOTIFICATION TO GOVERNORS, STATE LEGIS. AND TRIBAL COUNCILS OF POTENTIALLY ACCEPTABLE FIS SITES.
C - NEGOTIATE COOPERATIVE AGREEMENT WITH STATE OR COUNCIL FOR CONSULT. & COOP.

filing of such a request, however an examination of the request by the Department must find the applicant's case convincing before funds will be expended in advance of contract signing. The schedule calls for completion of design, licensing (where applicable) and construction of Federal Interim Storage facilities within a 2-1/2 year period, followed by the receipt and storage of spent nuclear fuel until a permanent repository or MRS facility begins operation. The Federal Interim Storage facility would then transfer its stored fuel to the repository or MRS facility within the ensuing three years. Decontamination and decommissioning would then be conducted, taking approximately one year, after which the Federal Interim Storage process would be finished.

The Nuclear Waste Policy Act of 1982 requires that if a Federal Interim Storage program is established, it must be handled as a stand alone, full cost recovery program, separate from the permanent disposal program established by the Act. The Act specifies that a separate fund (the Interim Storage Fund) shall be established to receive the fees charged to recipients of Federal Interim Storage services, and from which the costs of establishing and operating the Federal Interim Storage program shall be paid. The Act also requires the Department to establish, and update annually, a schedule of the fees which will be charged for Federal Interim Storage services if they are required and to publish them in the Federal Register. The Department is carrying out these requirements as specified.

The funding plan for Federal Interim Storage services has been developed to distribute the costs of the service equitably among all users on a pro rata basis. Furthermore, the payment structure has been designed as a three step process to provide the resources required for the Federal Interim Storage program when they are needed. The first step is an Initial Payment, due at contract signing to cover pre-operational costs including capital, development and administrative costs and impact aid.

Excess funds from this payment will be refunded with interest if additional contracts are signed, resulting in a lower unit cost for the service. The second step is a Delivery Payment, due soon after each shipment is made, to cover any outstanding adjustments in the Initial Payment and all storage module costs and operating and decommissioning costs. Transportation costs will also be billed to the utility as soon as they are known. Finally, at the conclusion of the Federal Interim Storage Program, a reconciliation of all costs and revenues, including interest earned on advance payments, will be made to determine what adjustments are needed (in the form of a Final Payment or Final Credit) to ensure that each Federal Interim Storage user has provided his pro rata share of costs, but no more.

E. Systems Integration

The management of nuclear waste from the source (reactor site or reprocessing plant) to the final repository will involve major resource investments in facilities and equipment, construction and operations and an as yet undetermined number of discrete packaging, handling and shipping operations. Each of these operations involves health, safety and licensing issues. It is to the advantage of the Federal Government, the States, the utilities and the general public to minimize the total number of operations required and to make sure that early operations facilitate rather than impede subsequent operations. This will reduce overall risks, costs and exposures.

It follows that an approach that coordinates and optimizes the entire system of program activities, including waste packaging, handling, transportation, storage and disposal is highly desirable. Key to accomplishing this is development of an overall civilian radioactive waste management program System Design Description (SDD) that clearly identifies the boundaries, interfaces and requirements for the overall system and each of the subsystems, and that provides a baseline description of the system and subsystems. The Department has not yet completed planning for the development of this SDD but certain activities leading its development have been initiated and are described below.

1. Strategy and Planned Activities

As a first step, the Department is initiating waste management systems studies that focus upon alternatives for a safe, efficient and economical nuclear waste packaging and handling system from the source of the waste to the final repository and any intermediate stops in between, such as at

an MRS or interim storage. Several utilities and design/engineering firms (including cask designers and manufacturers) have expressed an interest in contributing and developing institutional and technical designs in this area, and the Department has initiated a formal procurement action to allow this participation to occur.

Numerous technical and institutional factors need to be considered. Various waste forms have unique considerations that must be factored into the design of waste canisters. Transportation has its own unique set of design considerations as does Storage, either at reactor or at Federal facilities. Each geological formation being considered for the repository has its own characteristics that will influence the design of the emplacement package. All of these requirements will be factored into the design of an overall system. An example of the type of waste packaging, handling and transportation system that might be considered in such an overall system is an "all purpose" nuclear waste canister and disposable self-shielded cask that would together form a waste package. The canister could theoretically be loaded and sealed at the source then permanently emplaced in the cask and stored at the reactor site or transported and stored either at a Monitored Retrievable Storage (MRS) or repository facility without being reopened. The Department might provide the canister and cask. Handling and transportation equipment could then be simplified and standardized at most locations.

While such a system may not be practical because of technical or institutional reasons, some derivation of it could be. For example, it may be more practical to have a standard waste canister which is then stored and shipped in reuseable "dual purpose" casks. The canister could then be overpacked for final repository emplacement. Waste canisters and transportable storage casks may be provided to the utilities that may

also be used to help solve near-term storage problems and minimize additional utility costs. This approach could be developed as an option avaliable to reactor operators that desire it.

The vehicle nominally selected for soliciting ideas from industry and the utilities is a Program Research and Development Announcement (PRDA), which is a competitive procurement. The specific purpose of the PRDA will be to identify and develop technical and institutional alternatives for the near-term and long-term handling, packaging, shipping, and storing of spent fuel in ways that can facilitate and/or minimize handling and packaging for final disposal. Thus, the time, effort, exposure and costs throughout the back-end of the fuel cycle may be minimized while possibly providing near-term benefits to the utilities in solving storage problems in the process. Concepts for standardization of interfaces and equipment for packaging, handling and transportation operations that can lead to additional economies will be identified, to the maximum extent practical. Once the various alternatives are identified and developed to a comparable state, they can be evaluated on common health, safety, environmental, technical, and economic grounds. The best concepts, or selected features from the various concepts, can then be further developed and incorporated into technical program planning as apropriate.

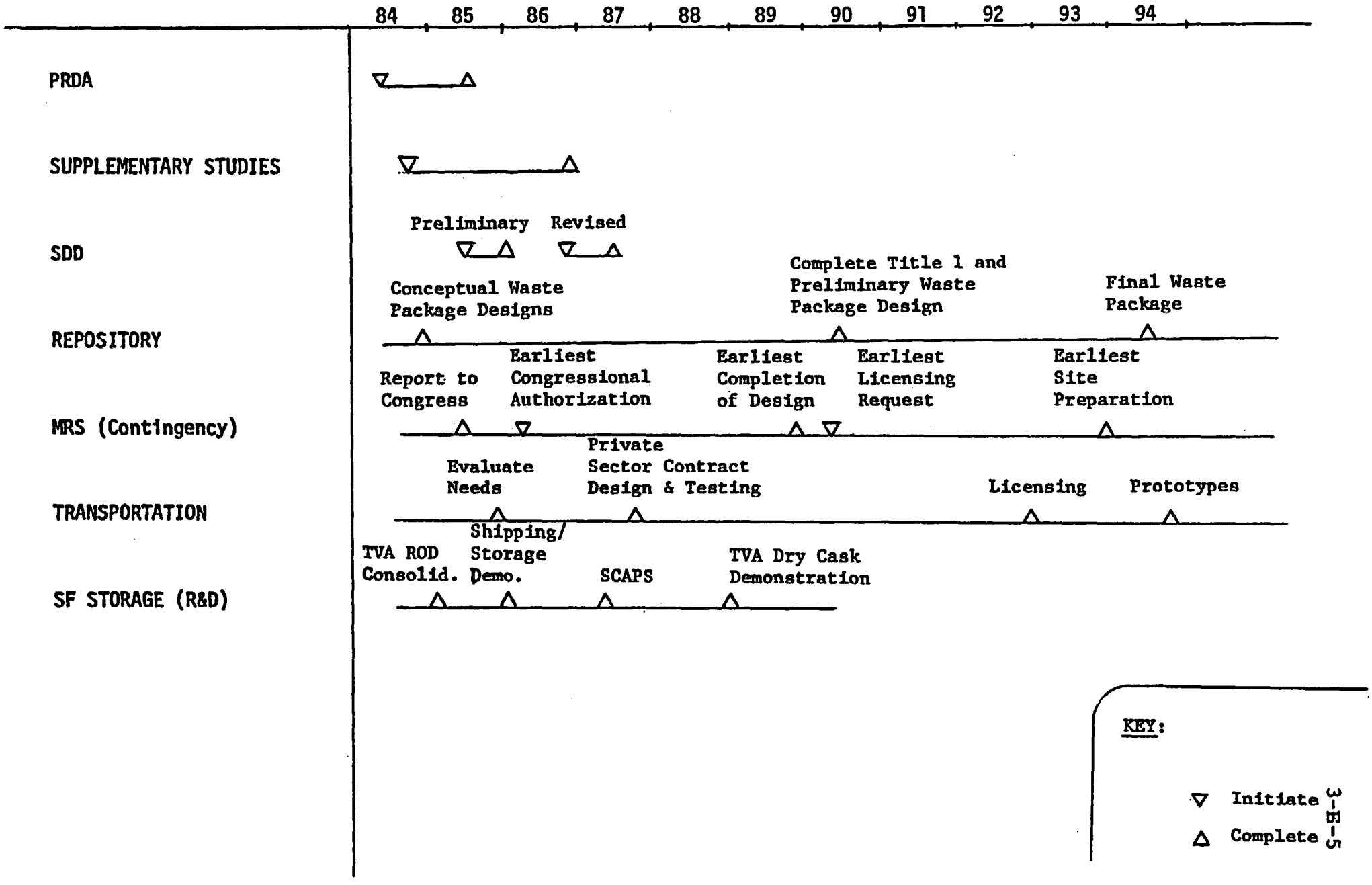
In addition to the solicitation, the Department will inititate additional studies as necessary to cover any systems concepts not addressed through the PRDA studies.

2. Integration of Results with Other Programs

While these system studies are being conducted, existing design efforts in the various program areas (repository, monitored retrievable storage, transportation, etc.) will continue. When the results of the system studies are available, they will be evaluated along with the existing design data and used in preparing the overall SDD. The SDD will then serve as a technical baseline for the overall waste management system. Any changes to the SDD will be carefully controlled and approved changes widely distributed to all program participants. The SDD can then also be used by the individual programs to redirect, if necessary, current design efforts.

Figure 3-E-1 represents a tentative schedule for the systems integration activities (the PRDA, Supplementary Studies and SDD) and shows how these activities correspond to key activities of other program areas (repository, monitored retrievable storage, transportation and spent fuel storage research and development.

Rigure III-E-1
SYSTEMS INTEGRATION



IV. Program Management

Successful and cost effective execution of the civilian radioactive waste management program will require management at all levels and throughout the organization to pay particularly close attention to systematic planning and program control. The most notable characteristics of the program that affect planning and control are summarized below:

a. The program has a specific, predetermined objective as defined by the Act and the contracts between the Department and the owners and generators of radioactive waste materials;

b. The program is a high-risk undertaking given the first of a kind nature of both its technical and institutional components;

c. The program must operate on the basis of full cost recovery, i.e. it is to be self-supporting in that the fees paid by the owners and generators of the radioactive wastes handled by the program must pay for all program activities;

d. Due to the size of the program and the pre-existing management structure of the Department, the program will be largely executed through a decentralized network of field offices and contractors; and

e. The program scheduling and management tasks are complicated by the institutional process that the program is required to follow, including the requirements for consultation with the affected States and Indian tribes.

These characteristics set the civilian radioactive waste management program apart from most Federal activities and require a coordinated, program wide approach to problem resolution.

1. Program Management Goals

The goal of the program management activity is to ensure that the goals of the program as a whole are clearly enunciated, to ensure that workable plans are developed and maintained for achievement of the program's goals, to establish mechanisms to measure actual program performance against the plans and identify any areas requiring management action, and finally to provide sound management of the program's funds.

Recognizing that the civilian radioactive waste management program operates as a subdivision of an existing Federal agency, namely the Department of Energy, the program management goal will be pursued through four principal activities:

a. A program wide planning and control system will be designed and implemented to provide a means through which to establish a baseline of program technical characteristics, costs and schedules against which program performance will be measured.

b. A fund management system will be designed and implemented, covering revenue collection, borrowing and investing, and expenditure control.

c. Administrative services (i.e. personnel, facility and equipment management, travel control, etc.) will be provided, in conjunction with the Department's established support functions and procedures.

d. Organizational concepts, other than the present arrangement within the Department of Energy, will be assessed to determine if they hold more promise as means of successfully completing the program's mission.

2. Planning and Control

Assuring acceptable completion of the program mission - with respect to achievement of the program's technical goals within the cost and schedule constraints - must begin with systematic planning. The program must first specify detailed performance objectives in each area (technical goals, cost, schedule), then measure actual accomplishments against these prespecified objectives, and finally provide for incentives or corrective action, or (where necessary) re-planning where deviations from the intended plan are discovered.

This Mission Plan is an early and fundamental step towards an integrated planning and control system. It establishes the basic framework for the program goal, cost and schedule baseline against which performance will be judged (see Figure IV-1). Using the approved Mission Plan as a foundation, the Department will formulate more detailed plans for each major element of the total program.

Standard program control mechanisms (such as establishment of a program wide work breakdown system, critical path scheduling and periodic performance reviews) will be used. Where possible, the existing project control mechanisms for the repository projects that existed before passage of the Nuclear Waste Policy Act will be incorporated into the control system for the entire civilian radioactive waste management program. Where necessary, the project control systems will be modified as necessary to ensure that they are compatible with the rest of the program.

FIGURE IV-1

PROGRAM COST REVIEW & CONTROL SCHEDULE

WMS/JM - 6/6/72

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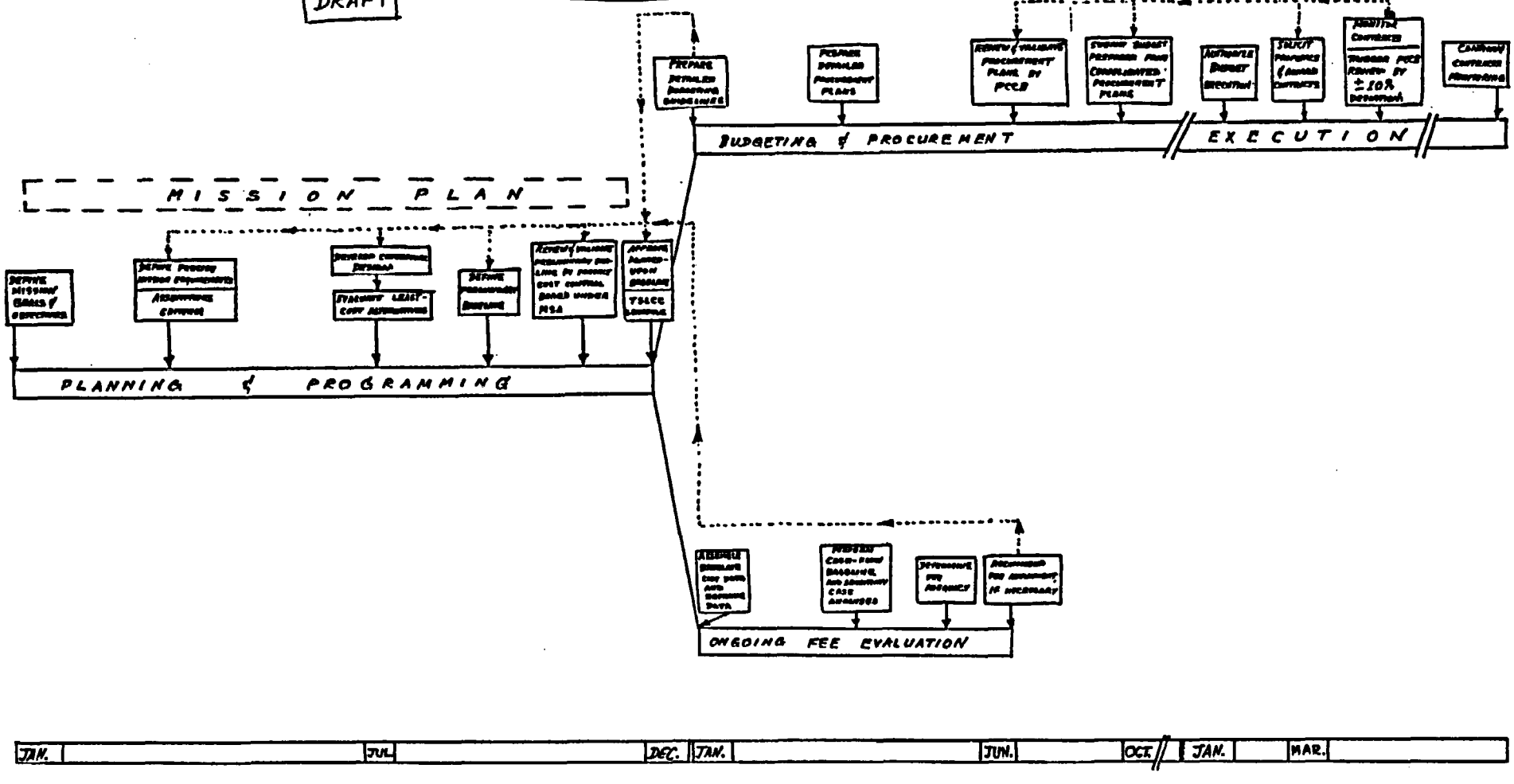


Since the program control system will contain detailed performance specifications (product, cost, schedule) associated with accountable managers for individual work elements, and will be used for both budgeting and performance reviews; management from throughout the program must be involved in initially establishing and updating as necessary the work breakdown system used to define the program structure and the product, cost and schedule baselines that go with it. This is particularly true because of the extensive involvement of the Department's field offices. There must be a single, integrated program control system covering all major elements of the program, but the field offices must retain operational discretion for detailed program implementation.

These two needs can only be met by joint field/headquarters planning, by joint performance reviews and by jointly establishing a set of ground rules for controlling "change orders," i.e. respecifying individual work elements. Many types of changes will be controlled by the field offices; other, more fundamental types, will be controlled ultimately by headquarters, in consultation with the field.

3. Fund Management

Although the Nuclear Waste Policy Act of 1982 established the civilian radioactive waste management program as a self-financed entity, it is nonetheless subject to review and approval through the usual Federal appropriations channels. The program is to be funded by a special assessment on nuclear waste owners and generators, rather than out of taxpayer-funded general revenues, but it is also subject to the Executive Branch and Congressional budgetary processes. Moreover, the General Accounting Office is specifically required to conduct an annual audit of the program and submit its report to the Congress.

In some respects, then, financial management of the civilian radioactive waste management program must meet the same standards as a private business. In other respects, it must accommodate the fiscal objectives that shape all Federal programs. The system of interactions which the Department is establishing to account for this situation is shown in Figure IV-2 and discussed below.

The Department must ensure that waste fund revenues are adequate, that the integrity of the fund(s) is protected, that expenditures are justifiable and appropriately documented, and that the total program is credible to the members of Congress, who must approve both the rate/amount of revenues (the fee) and the rate/amount of costs (obligations and outlays). The program must also be credible to those whom the Congress represents, particularly the States, the waste generators, and the public.

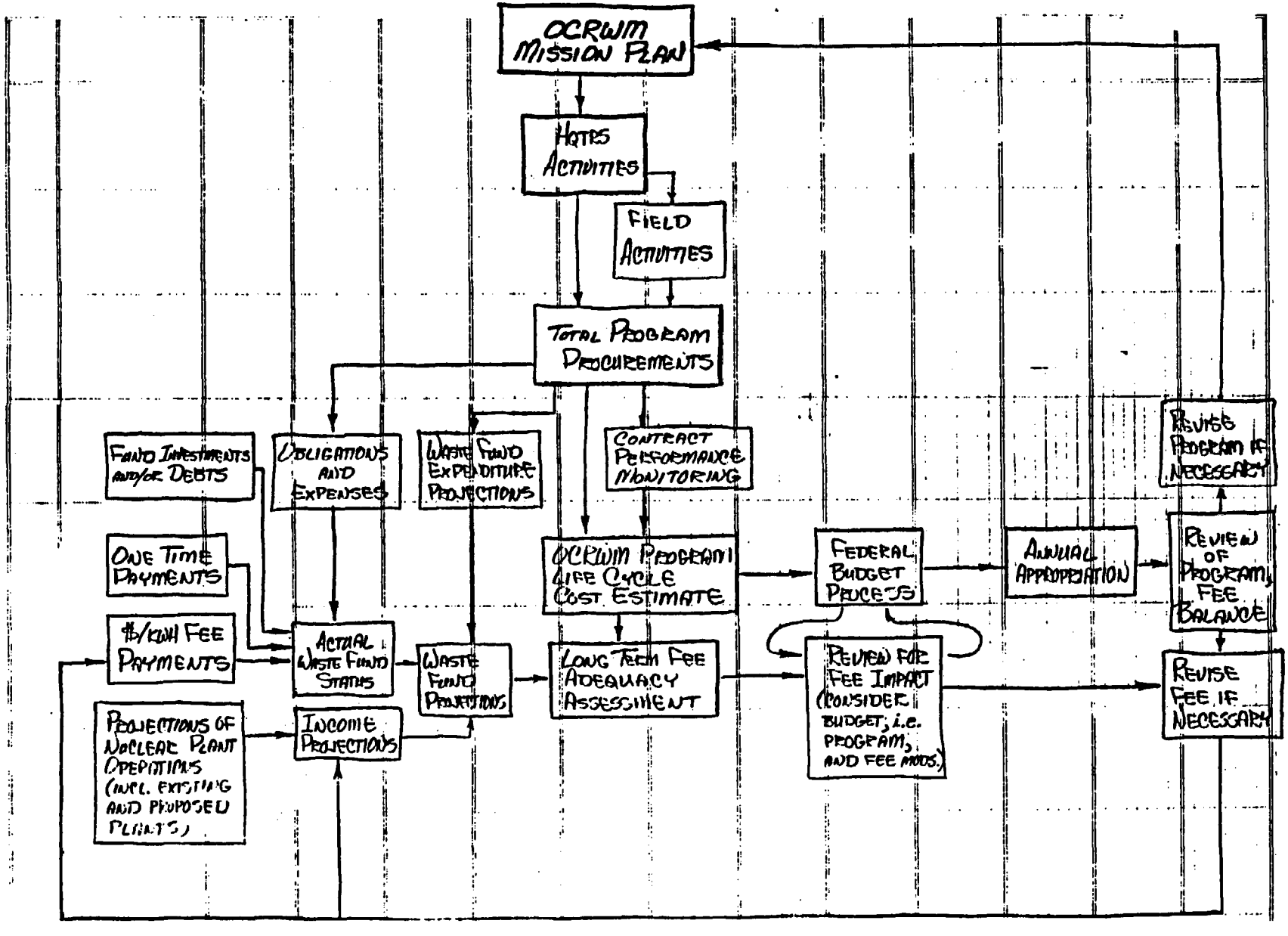
The Department must manage the program within the framework of established support functions and their rules and procedures. Although this is particularly true of budget formulation and budget execution, including accounting and procurement, there are a number of unusual financial features in the program.

In brief, these are:

a. The Department has entered into <u>binding contracts</u> with electric utilities (and other nuclear waste owners and generators), specifying both fees and services to be provided;

b. The Department will annually assess the need for <u>fee structure adjustment</u>, based on the best available projections of revenues and costs (including, eventually, a detailed lifecycle cost estimate for the total program);

FIGURE III-2
REPOSITORY PROGRAM FUND MANAGEMENT



c. The Department, in conjuction with the Treasury Department, will (when possible) invest any temporarily-excessive revenues in Federally-generated funds, or (when necessary) borrow from general revenues to supplement any temporarily-deficient revenues;

d. The Department will separately account for all costs attributable to the civilian radioactive waste management program, including such administrative support costs as a prorated portion of facilities and equipment rentals; and

e. The Department will contract with a commercial accounting firm to provide an independent annual audit of both program revenues and expenditures.

By integrating these provisions with the planning and control system previously described, the Department will be able to manage the fund(s) in accordance with both business and government standards.

4. Administrative Services

Logistic support is essential to program success. The program cannot attain its objectives without adequate personnel, facilities, equipment, mail handling, travel, procurement, printing, records, and other support services.

There is no need for a detailed presentation of administrative services in this Mission Plan. However, it is important to emphasize that these services are being provided within the context of an established organization. The success of the program will hinge on the continued priority support from the Department's staff offices.

5. Organizational Alternatives

The legislative history of the Nuclear Waste Policy Act of 1982 includes extensive discussion of alternative organizational configurations. Some legislators advocated a separate agency within the Executive Branch, others an independent agency, and still others a Federally-chartered corporation. The configuration specifically required by the Act is a sub-unit of the Department of Energy reporting directly to the Secretary.

At the same time, however, the Act also requires the Secretary to study alternative organizational approaches to the siting, construction and generation of nuclear waste facilities. The statutory deadline for submitting this study to the Congress is January 7, 1984. The Department will not be able to meet this deadline, the Secretary having decided that the study demands a level of excellence that is incompatible with the original schedule.

Accordingly, the Secretary has established a Special Advisory Panel on Alternative Means of Financing and Managing Radioactive Waste Facilities (AMFM). The AMFM panel will operate under the Federal Advisory Committee Act, and will be given sufficient time and resources to thoroughly consider the issue of long-term corporate structure. The panel will provide an objective perspective from a balanced range of disciplines and interest.

The AMFM panel is to submit its report to the Secretary no later than September 30, 1984. He will take this report into consideration, and consult with both the Director of the Office of Management and Budget and the Chairman of the Nuclear Regulatory Commission (as required by the Act), in preparing his own response to the Congress. Both the panel's report and the Secretary's response to the Congress will be provided to interested organizations and made available for public review.