

A Report to  
The U.S. Secretary of Energy

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**Managing Nuclear Waste  
— A Better Idea**

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Advisory Panel on Alternative  
Means of Financing and Managing  
Radioactive Waste Facilities

Diarmuid F. O'Scanlain, Chairman

December 1984



# ADVISORY PANEL ON ALTERNATIVE MEANS OF FINANCING AND MANAGING RADIOACTIVE WASTE FACILITIES

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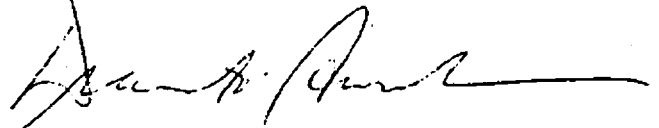
Dear Mr. Secretary:

Your Advisory Panel on Alternative Means of Financing and Managing Radioactive Waste Facilities has worked diligently to carry out the charge which you gave us in December 1983. We have met on a monthly basis and have had spirited discussions. We have examined various waste management facilities in this country and abroad and have met with experts in all aspects of the disposal problem. We have carefully analyzed various alternatives for financing and managing this vital national program. In the course of our study we have sought advice from federal agencies, state and Indian tribal officials, public interest groups, utilities and the general public.

After considering a broad range of alternatives and evaluating them against certain relevant criteria, we have completed our study. We are pleased to provide you with this report, Chapter XII of which contains our conclusions and recommendations. We trust that they will be helpful to you in preparing your report to the Congress under Section 303 of the Nuclear Waste Policy Act of 1982.

Your Panel has enjoyed this opportunity to serve you and the nation on this sensitive and crucial issue. We strongly believe in the objectives of the Act. We trust that our efforts will help to improve and expedite the nuclear waste management program.

Sincerely,



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Throughout the conduct of its study, the Panel received valuable assistance and advice from a large number of government agencies, private organizations, and individuals. The study benefited from their participation, and the Panel is indebted to them for their time and counsel.

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The DOE field organization was also very helpful in arranging Panel meetings and facility inspections. In particular, the DOE Richland, Nevada, Albuquerque and Chicago Operations Offices rendered invaluable assistance.

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The Panel benefited greatly from its contacts with European nuclear waste management entities in April-May 1984. As described in Appendix B, numerous organizations and individuals in six European nations hosted the Panel/DOE delegation and provided valuable insight on their activities. The Panel is very much in their debt. We should also acknowledge the outstanding support rendered by the U.S. Department of State and its embassies in London, Bern, Bonn, Brussels, Paris and Stockholm, as well as the U.S. Mission to the Organization for Economic Cooperation and Development in Paris. And special thanks go to Alex Perge of the DOE Office of Civilian Radioactive Waste Management, who performed yeoman service in managing the itinerary.

Many other organizations and individuals in both the public and private sectors gave generously of their time and expertise in assisting the Panel. We have tried to acknowledge all of these contributors in Appendix F to this report, and we regret any inadvertent omissions.

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PREFACE

When Congress passed the Nuclear Waste Policy Act of 1982, it created the Office of Civilian Radioactive Waste Management within the Department of Energy to spearhead the implementation of this landmark legislation.

In Section 303 of the Act, however, Congress directed the Secretary of Energy to study alternative approaches to managing the radioactive waste program, as follows:

ALTERNATIVE MEANS OF FINANCING

SEC. 303. The Secretary shall undertake a study with respect to alternative approaches to managing the construction and operation of all civilian radioactive waste management facilities, including the feasibility of establishing a private corporation for such purposes. In conducting such study, the Secretary shall consult with the Director of the Office of Management and Budget, the Chairman of the (Nuclear Regulatory) Commission, and such other Federal agency representatives as may be appropriate. Such study shall be completed, and a report containing the results of such study shall be submitted to the Congress, within 1 year after the date of the enactment of this Act.

To conduct the study, the Secretary empaneled 13 citizens from throughout the United States, representing diverse backgrounds. The Advisory Panel on Alternative Means of Financing and Managing Radioactive Waste Facilities was established on December 16, 1983.

This is the report on its study.



CHAPTER I. INTRODUCTION

## A. BACKGROUND

All activities which involve the use of radioactive material inevitably result in nuclear waste as a by-product of their operation. Most of the waste produced by such activities as medical diagnosis and therapy, field and laboratory research, and industrial processes is low-level radioactive waste—primarily small amounts of radioactivity in a large volume of matter.

This report deals essentially with the management and ultimate disposal of high-level radioactive wastes, especially those which are produced by commercial power reactors. A smaller but nevertheless substantial source of high-level waste is that of nuclear weapons activity, which of course originated in World War II. During the past quarter of a century, however, the utility industry has produced the bulk of high-level radioactive wastes and spent nuclear fuel.

In the highly complex nuclear field, there are a multiplicity of definitions for the various types and radioactive levels of nuclear wastes. Some of these definitions are extremely scientific and incomprehensible to the layman. The Panel therefore chose to accept the definitions of high-level radioactive waste and spent nuclear fuel which are cited in the Nuclear Waste Policy Act of 1982. These are:

"The term 'high-level radioactive waste' means—

(A) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentration; and

(B) other highly radioactive material that the Commission, consistent with existing law, determines by rule requires permanent isolation."

"The term 'spent nuclear fuel' means fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing."

Amounts of Waste

In late 1984, there were 79 nuclear powerplants operating in the United States, plus 4 licensed for testing and 40 licensed for construction. In 1983, some 12.6 percent of the nation's electricity came from nuclear powerplants.

Inasmuch as radioactivity is what makes nuclear waste hazardous, it is a very appropriate measure for comparing solid and liquid wastes, and for stating the magnitude of the potential health hazards.

Using the common denominator of radioactivity, there was in 1984 about 500 times more radioactivity in spent fuel than in commercial high-level waste. By the turn of the century, there will be about 2,000 times as much. There now is about 12 times as much radioactivity in spent reactor fuel as in defense high-level waste. By the year 2000, the ratio is expected to be about 20 to 1.

The weight and volume of high-level radioactive wastes are what must be dealt with in geologic repositories. Spent fuel is expected to total about 50,000 metric tons of uranium by the year 2000, and range up to 140,000 metric tons by the year 2020, depending on the level of future nuclear power production. Defense high-level wastes are expected to be equivalent to 10,000 metric tons by 2020. (These estimates are being used by the Department of Energy in its present repository planning.)

### Brief Management History

The history of radioactive waste management organizations dates back to the 1950's, although no special office for waste management was created until 1970. Waste management responsibilities have shifted through three Federal Government agencies: the Atomic Energy Commission (AEC), the Energy Research and Development Administration (ERDA), and the Department of Energy (DOE). In addition to these major transitions from one agency to another, there have been a variety of transfers of responsibilities to different, often newly created, offices and divisions.

Atomic Energy Commission (AEC)--The AEC was created in 1947. For many years waste management received little attention and was not the responsibility of a particular office within AEC. A General Accounting Office (GAO) report in 1969 recommended that AEC establish an office to oversee all waste management programs. A Division of Waste and Scrap Management was established in 1970 and was replaced a year later by the Division of Waste Management and Transportation (WM&T). This Division rested at the fourth level of the AEC organization. It reported to the Assistant General Manager for Environment and Safety, who was responsible also for the Divisions of Environmental Affairs and Operational Safety. Next in line of authority above the Assistant General Manager was the General Manager, who reported directly to the Commission. No other divisions were concerned with waste management, although regional field offices were involved (and have continued to be involved) with technical activities of waste management sites. Thus, radioactive waste management was the responsibility of a single office placed low in the organizational hierarchy whose superiors had responsibility for a variety of other activities.

Energy Research and Development Administration (ERDA)--The second major organizational development was the establishment of ERDA in 1975. The Division of WM&T became the responsibility of the Assistant Administrator for Environment and Safety. This movement shifted the Division up one organizational level, since ERDA did not have a commission as did the AEC. The third transition came with the organization of a Division of Waste Management, Production, and Reprocessing the following year. Responsibility for waste management was simultaneously shifted to the Assistant Administrator for Nuclear Energy. This horizontal shift kept the new division at the same organizational level. This new Assistant Administrator, however, also had



responsibility for four other divisions. Overall, waste management remained at a relatively low organizational level throughout the existence of ERDA. Responsibility was concentrated in a single office, but intervening levels of the organizational structure had responsibilities for a wide range of other programs.

Department of Energy (DOE)--In October 1977 the fourth notable change occurred when DOE was established. The Division of Waste Management, Production, and Reprocessing was transferred over to the Assistant Secretary for Energy Technology (ASET). The ASET supervised several activities besides radioactive waste management. This Division was renamed the Waste Management Division the following month and changed once again to the Office of Nuclear Waste Management a few months later.

In 1979, the new position of Assistant Secretary for Nuclear Energy (ASNE) was created. This fifth major organizational change occurred when the Office of Nuclear Waste Management was transferred to the jurisdiction of the ASNE. This horizontal shift left waste management at the third level of the organization. The ASNE had responsibility for many programs beyond waste management.

A clear separation of responsibilities for the management of defense and commercial nuclear waste marked the sixth important transition. In February 1981, the Nuclear Waste Management Program Office (a new name for the Office of Nuclear Waste Management) was required to report to the Assistant Secretary for Defense Programs (ASDP) and ASNE under their respective areas. This meant that a single third-level office now reported to two second-level officials, and responsibility for the waste management program was divided for the first time. An Office of the Assistant Secretary for Nuclear Waste Management and Fuel Cycle Programs as well as an Office of Defense Waste and By-Products Management were established during the same year to complete the separation of organizational responsibilities for commercial and defense waste. As a result, although waste management activities remained at the third organizational level, now more than one division devoted its efforts to such activities.

The single Office of Nuclear Waste Management and Fuel Cycle Programs was subdivided in 1982. Among the other organizational changes that occurred, ASNE now became responsible for seven major offices, two of which related to waste management: the Office of Terminal Waste Disposal and Remedial Action and the Office of Spent Fuel Management and Reprocessing Systems.

#### B. NUCLEAR WASTE POLICY ACT OF 1982

In 1982, Congress responded to the need for a permanent solution to the waste management problem by passing Public Law 97-425, the Nuclear Waste Policy Act (NWPA), which was signed into law by President Reagan on January 7, 1983.

Besides requiring the Federal Government through DOE to develop and manage at least two deep geologic repositories for the disposal of the nation's commercially-generated radioactive wastes, NWPA requires DOE to site, and operate repositories in a manner that ". . . will provide a reasonable assurance that the public and the environment will be adequately protected."

Another provision of NWPA outlines a procedure for consultation and cooperation with states and affected Indian tribes. It requires that DOE provide funding to these entities for costs incurred by them "in engaging in any monitoring, testing, evaluation, or other consultation and cooperation activity" related to the siting of repositories. NWPA also provides for financial "assistance to mitigate impacts" of repository construction and operation.

NWPA provides that the President shall evaluate, within 2 years of the legislation's enactment, the use of one or both repositories for the disposal of high-level radioactive defense waste. Unless the President decides to the contrary, the same repositories will be used for the disposal of defense waste. Under such an arrangement, the "costs resulting from permanent disposal of high-level radioactive waste from atomic energy defense activities shall be paid by the Federal Government . . . ."

Other financial provisions require the owners and operators of nuclear utilities--and hence their ratepayers--to pay the costs of the (non-defense) program. NWPA levies a fee of 1 mill per kilowatthour on all electricity produced from commercial nuclear plants since April 7, 1983. In addition, it requires a one-time fee on all spent fuel in existence prior to April 7, 1983, to be levied on the utilities. Revenue from these fees is being deposited into a Nuclear Waste Fund (Fund). The Fund is to be used to pay for the research and development, construction, operation, and the ultimate decommissioning of the disposal facilities and their support activities.

#### The Office of Civilian Radioactive Waste Management (OCRWM)

NWPA established a separate office within DOE to manage the federal waste disposal program. It is called the Office of Civilian Radioactive Waste Management (OCRWM) and was formed in September 1983. The Director of the Office is appointed by the President with the consent of the Senate. The Director reports directly to the Secretary of Energy.

OCRWM has primary responsibility for the siting, construction, and operation of the geologic repositories and other necessary facilities in a safe and environmentally acceptable manner. In addition to developing geologic repositories, OCRWM is responsible for waste packaging, handling, transportation, and storage technologies, equipment, and facilities. This includes Federal Interim Storage (FIS) and Monitored Retrievable Storage (MRS) facilities (should they be needed), international cooperation programs, and the operation of low-level waste facilities transferred to DOE.

As developed by OCRWM and presented in its draft "Mission Plan for the Civilian Radioactive Waste Management Program" dated April 1984, the following program objectives have been identified to implement the Nuclear Waste Policy Act.

1. To site, license, construct and operate geologic repositories for the safe, environmentally acceptable disposal of radioactive waste.
2. To submit a proposal to Congress to develop Monitored Retrievable Storage as an available option to geologic repositories should it be needed.

3. To assure acceptance of waste for disposal by January 31, 1998, in accordance with the acceptance schedule provided for in the Department's disposal contracts, and in conformance with the Nuclear Waste Policy Act of 1982.
4. To assist utilities in providing adequate, safe at-reactor storage of spent fuel prior to Federal acceptance and stand ready to provide limited Federal Government storage to any utility determined by the Nuclear Regulatory Commission to be eligible for such service.
5. To manage the technical program and the funds collected for disposal and storage services or otherwise provided through appropriation in an effective, integrated and efficient manner.

Total program cost estimates developed by DOE range upward from \$23 billion (in constant 1984 dollars) for an approximate 50-year period, depending on the rate of future nuclear power growth and other factors. OCRWM's current program includes the development of two repositories, each capable of storing 70,000 metric tons of high-level radioactive waste--approximately the amount projected to be generated by commercial reactors through the year 2020.

#### NWPA Section 303

Although NWPA gives the responsibility for managing the waste program to the Department of Energy, Congress included a section requiring a study to determine whether a different type of organization might be better suited to managing the program. NWPA Section 303, entitled "ALTERNATIVE MEANS OF FINANCING," requires the Secretary of Energy to "undertake a study with respect to alternative approaches to managing the construction and operation of all civilian radioactive waste management facilities, including the feasibility of establishing a private corporation for such purposes . . . ."

#### C. THE ADVISORY PANEL

To conduct the Section 303 study, the Secretary of Energy chose to establish an unpaid advisory body comprised of 13 citizens from throughout the United States, representing various backgrounds. The Advisory Panel on Alternative Means of Financing and Managing Radioactive Waste Facilities was officially appointed on December 16, 1983, and held its first meeting in January 1984.

The members of the Panel are named in the frontispiece and brief biographies of each are presented in Appendix A.

#### Mission Statement

To focus its efforts and to fulfill the intent of this section of NWPA, the Panel early-on adopted the following mission statement:

"The Advisory Panel on Alternative Means of Financing and Managing Radioactive Waste Facilities (Panel) was asked by the Secretary of Energy on December 16, 1983, to conduct a study pursuant to Section 303 of the Nuclear Waste Policy Act of 1982 (Public Law 97-425) (the Act). The

mission of the Panel is to study and report to the Secretary by about October 15, 1984, its findings and recommendations with regard to alternative approaches to financing and managing the construction and operation of civilian radioactive waste management facilities.

"The Panel recognizes that the Act places this program responsibility within the Department of Energy through a specially created Office of Civilian Radioactive Waste Management (OCRWM). The main thrust of the Panel's study is to identify and evaluate alternative organizational structures and financing mechanisms for the safe, long-term isolation of high-level radioactive wastes and spent nuclear fuel with a high degree of public confidence. Consideration shall be given to existing and new federal agencies, special Boards or Commissions, quasi-governmental entities, private corporations or consortiums, and combinations thereof. The Panel's report will include analysis of the advantages and disadvantages of alternative approaches."

### Panel Activities

In order to complete the study, the Panel met approximately once a month from January through November 1984. During the earlier Panel meetings, members received briefings from various staff of the OCRWM on the history and creation of the Office, technical considerations for a repository, reprocessing, and DOE's Mission Plan. The Panel also heard from Congressional staff who discussed the intent of Congress in developing the legislation, from representatives of utilities, states, and Indian tribes on their assessments of the NWPA, and from federal agencies involved in siting and licensing a repository. (See Appendix F for a listing of presentations.)

The Panel toured a number of nuclear waste management facilities and test projects in the Western United States. Panel representatives and DOE officials also met with leaders of waste management programs in six European countries, as well as visiting several waste management sites there. These international contacts are discussed in Appendix B to this report.

To accommodate specific needs and general desires of the Panel, an array of scoping and issue papers were developed. Some of the topics included organization criteria, profiles of various organizational types, and financing scenarios. A detailed listing of these materials, plus other documents reviewed by the Panel, its contractors and staff, are presented in Appendix G.

Panel subcommittees and ad hoc work groups were assigned special projects, which capitalized upon the expertise and various interests of the individual Panel members. Their efforts were supported by a small Panel staff and two contractors.

### Open Public Meetings

Every full Panel meeting and all Panel materials were open and available to the public. Announcements of each meeting were published in the Federal Register, and the agendas for individual meetings were sent to interested parties on the Panel's mailing list. At several of the Panel sessions, individuals and representatives of various organizations made oral presentations to the Panel. Written comments were also accepted.

## General Methodology

In carrying out its mission, the Panel faced two major tasks. The first was to identify a broad range of organizational and financing options in order to ensure that no reasonable alternative was overlooked. The second was to assure that the potential merits and drawbacks of each alternative received full and fair consideration. This required developing an array of analytical tools and organizational criteria.

Identifying alternative organizational structures presented few problems. NWPA had explicitly required an examination of a private corporation alternative. Previous reports and legislative proposals had suggested a variety of other options, including independent federal commissions and Government corporations. The Panel identified still other possibilities through discussions with nuclear authorities, international contacts, and analysis of existing organizations in fields other than waste management. The process eventually led to a list of ten options--OCRWM and nine potential alternatives. From the ten, OCRWM and the potential alternatives were grouped into four categories for closer evaluation.

In assessing and narrowing down the various organizational alternatives, the Panel developed several measuring devices. These included: waste management objectives by program phase; general characteristics of the waste management "business;" 13 organizational "tests" or capabilities against which waste management structures could be gauged; and the perceived advantages and disadvantages of each. Using these analytical tools, the Panel subjected the various structures both to mathematical matrix ranking and to subjective evaluations.

Concurrent with its investigation of organizational alternatives, the Panel also scrutinized the financing mechanisms prescribed by the Nuclear Waste Policy Act. Alternative methods of financing were considered, as were future economic and programmatic uncertainties which could affect the full-cost recovery process provided in the legislation. A more detailed discussion of these financing considerations is presented in the following chapter.



CHAPTER II. FINANCING RADIOACTIVE WASTE MANAGEMENT FACILITIES

- o Underlying Principle: Those who produce the waste should pay for its disposal.
- o Need for Flexibility: Any waste management organization will have difficulty controlling the ebb and flow of costs and revenues.
- o Cost and revenue variables: Financial planning is tenuous at best.
- o Financing Structure: An overview of the financing provisions of the NWPA . . . utility fee structure . . . Waste Fund management . . . the Interim Storage Fund.
- o Financing alternatives and some criteria for evaluating them . . . payment for defense waste . . . borrowing authority.
- o A general conclusion on NWPA financing provisions.

A. GENERAL CONSIDERATIONS

The underlying principle for financing of the nation's high-level radioactive waste program is simple and straightforward: those who produce the wastes should pay for their safe storage and disposal.

That principle is behind the financing sections of the Nuclear Waste Policy Act of 1982 (NWPA), which are described later in this chapter. NWPA establishes two special funds--the Nuclear Waste Fund and the Interim Storage Fund--and prescribes how they are to be used.

Financing Criteria

Following are some key financing criteria by which a waste management organization could be evaluated.

1. Ability to perform systems and economic analyses;
2. Flexibility in allocating and reallocating funds, subject to overall limits;
3. Ability to borrow based upon a prearranged set of criteria negotiated by the Office of Management and Budget (OMB), the fee-paying utilities, and the waste management organization;
4. Capability to make realistic financial projections based on realistic capacity forecasts;

5. Incentives for cost-effectiveness, recognizing the interests of ratepayers;
6. Authority to secure needed revenues, subject to agreed-upon criteria and Congressional oversight; and
7. Designated points of accountability for expenditures.

#### Cost Data

The Panel made an effort to evaluate in-depth the Department of Energy (DOE) cost data base being developed for the program. However, the Panel's review in early 1984 indicated that most of the cost data was either insufficient or outdated. Some detailed engineering studies for repositories were outdated, for example, making any further extrapolations from these data questionable. Other studies have yet to be made.

The possible addition of defense wastes to the commercial repositories makes the need for a fresh look at repository design even more imperative. On the transportation side of the estimates, very detailed transportation models are under development and will permit improved estimates--but not for several months. Furthermore, waste program strategy has been shifting so rapidly that the cost analysts have not been able to keep up with the policy-makers. The data utilized by the Panel is based on the December 1983 draft Mission Plan of the Office of Civilian Radioactive Waste Management (OCRWM), which has been superseded by the April 1984 draft, and which may itself be further revised, rendering current cost estimating efforts out of date.

#### Variables Affecting Costs and Waste Fund Revenues

The Panel reviewed as many of the variables affecting waste program costs and Nuclear Waste Fund revenues as could be readily identified. Some of the major variables are as follows.

1. Number and size of repositories--The current OCRWM program assumes two repositories of equal size, each capable of accommodating 70,000 metric tons of waste.
2. Geological media--The current program includes consideration of salt, basalt, welded volcanic rock (tuff), and granite.
3. Monitored Retrievable Storage (MRS)--This facility could add appreciably to overall program cost.
4. Fee structure alternatives--The single fee on nuclear generated electricity has the advantage of simplicity and ease of administration. It does not differentiate however, between spent fuel discharges that may represent different costs to the overall waste system or give utilities incentives to minimize their costs and hence those of the repository program. Alternative fee approaches could be based on kilograms of fuel transferred, and the distance and number of packages transported. The irradiation history of the fuel element



could also be included in a fee formula. These options would involve more bookkeeping, but could encourage fuel consolidation and/or extended burnup, possibly saving on program costs.

5. Site characterization--The number and level of site characterizations can affect overall program costs in two ways. The more intensive the characterization process, the higher the cost. However, if this yields convincing data in support of a preferred site, it could expedite the costly siting process and help to avoid prolonged opposition and a consequent delay in obtaining construction authorization.
6. Regulatory costs--With a first-of-a-kind facility, the costs of satisfying environmental and regulatory requirements cannot be estimated with any considerable degree of accuracy.
7. Inflation and interest rates--Given the life of the project, present cost estimates are subject to drastic change.
8. Compensation to impacted areas and Indian tribes--Current estimates include \$300 million for compensation. The level of compensation is highly dependent on the site(s) eventually chosen and their socioeconomic effects.
9. Reprocessing--Waste form and quantity could be drastically altered by future developments in reprocessing technology and economics.
10. Defense and other wastes not now slated for the repository--A Presidential determination on co-mingling of defense wastes will impact the waste program, as would decisions on cost allocation between civilian and defense wastes. In addition, there may be other wastes designated by Nuclear Regulatory Commission (NRC) to be treated like spent fuel and these could affect program costs and fee structure.
11. Transportation--mode, routes, security, cask design, and other factors will have significant impacts on program costs.
12. Number of reactors--The current program is predicated on a forecast of substantial increases in the number of reactors now in operation. Experience of the past decade raises serious questions about load forecasts in general and the future of nuclear energy in particular.
13. One-time fee--The NWPA provides for three different payment plans with respect to accumulated wastes. The selection of payment options by the utilities can significantly affect the Nuclear Waste Fund revenue flow, and will not be known until July, 1985.

#### B. UTILITY FEE STRUCTURE

Section 302 of the NWPA establishes the Nuclear Waste Fund in the U.S. Treasury and sets forth provisions for its administration. The Nuclear Waste Fund was activated on the date of enactment of the NWPA by a transfer of applicable unexpended balances from the Energy Supply Research and Development appropriation.

## 1. Contracts

The Secretary is authorized to enter into contracts with any person who generates or holds title to high-level radioactive waste, or spent nuclear fuel, of domestic origin, for the acceptance of title, subsequent transportation, and disposal of such waste or spent fuel. These contracts are to provide for the payment of fees by the generators or owners of the waste and spent fuel sufficient to offset all authorized expenditures from the Nuclear Waste Fund.

Other provisions pertaining to the contracts include the following:

- a. The Department of Energy cannot dispose of any civilian high-level radioactive waste or spent nuclear fuel unless the generator or owner of such spent fuel or waste has entered into a contract with DOE by either June 30, 1983, or by the date on which such generator or owner commences generation of, or takes title to, such spent fuel or waste; and
- b. The Nuclear Regulatory Commission shall not issue or renew a license to any person to use a utilization or production facility under the authority of section 103 or 104 of the Atomic Energy Act of 1954, unless such person has either entered into a contract for disposal with DOE, or the Secretary affirms in writing that the person is actively and in good faith negotiating with DOE for a contract.

## 2. Fees

Section 302(a) of the NWPA specifies two fees that are collected under the terms of the disposal contracts: (1) a one-time charge for spent nuclear fuel or high-level radioactive waste existing prior to April 7, 1983; and (2) a waste generation fee, initially 1.0 mill per kilowatthour, for electricity generated by a civilian nuclear reactor after April 6, 1983.

### a. One-Time Charge

The one-time charge for existing spent nuclear fuel is an amount per kilogram of heavy metal equivalent to an average charge of 1 mill per kilowatthour for electricity generated by the fuel. In paying this fee, the owner or generator of the spent nuclear fuel or high-level radioactive waste will have no further financial obligation to the Federal Government for its long-term storage and permanent disposal.

DOE has established three possible payment schedules for the one-time fee. These are as follows:

- (1) Utilities may make 40 quarterly payments with amortized interest from April 7, 1983. The date for the first payment is open, but all 40 payments must be made before DOE's first scheduled delivery date for spent fuel to the repository. A partial or full lump sum payment may be made with any quarterly payment. In that event, the remaining payments would be reduced accordingly.
- (2) The entire balance of the one-time fee may be paid in the form of a single payment anytime prior to the first delivery, consisting of the fee plus accrued interest on the outstanding balance. Interest is calculated from April 7, 1983.
- (3) The entire balance of the one-time fee may be paid in the form of a single payment prior to June 30, 1985, or prior to two years after DOE and the utility signed their contract, whichever date is later. If paid within this time frame, no interest would be charged.

As of June 30, 1983, DOE had entered into the contracts required by this section of NWPA with all nuclear utilities.

b. Waste Generation Fee

The initial waste generation fee was set at 1.0 mill per kilowatthour of electricity generated by all civilian nuclear power reactors. This fee applies to all nuclear electricity sold on or after 90 days from April 7, 1983.

NWPA mandates an annual review of the 1 mill per kilowatthour fee to evaluate whether it will provide sufficient revenues to offset the costs as defined in the Nuclear Waste Policy Act.. If it is determined that either insufficient or excess revenues are being collected, in order to recover the full program costs incurred by the Federal Government, the Secretary shall propose an adjustment to the fee to ensure full-cost recovery. DOE will report the proposed fee adjustment to Congress, but will delay implementation of the new disposal fee until 90 days of continuous session of Congress have elapsed without Congressional action. <sup>1/</sup>

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<sup>1/</sup> This procedure differs from that prescribed in NWPA because of the Supreme Court decision in *Chadha v. Immigration and Naturalization Service* that declared unconstitutional a veto of Executive Branch actions by one House of Congress.

## C. WASTE FUND MANAGEMENT AND INTERIM STORAGE FUND

The Secretary of the Treasury shall hold the Nuclear Waste Fund and annually report to the Congress, after consultation with the Secretary of Energy, on the financial condition and operations of the Fund during the previous fiscal year.

The budget of the Nuclear Waste Fund shall be submitted to the Office of Management and Budget triennially, along with the budget of the Department of Energy, and shall be included in the Budget of the United States Government. Expenditures from the Nuclear Waste Fund are subject to appropriations which shall remain available until expended.

If the Nuclear Waste Fund contains amounts in excess of current needs, the Secretary of the Treasury may be requested to invest the excess in U.S. Government securities. The maturities of the securities are to be appropriate to the needs of the Nuclear Waste Fund as determined by the Secretary of the Treasury, and are to bear appropriate interest rates taking into account current average market yields on securities with comparable maturities. However, the interest rate on investments shall not exceed the average interest rate applicable to existing borrowings. Receipts, proceeds and recoveries realized, and expenditures from the Nuclear Waste Fund shall be exempt from annual apportionment.

Borrowing, through an agreement between the Secretary of Energy and the Secretary of the Treasury, is authorized if at any time the monies available in the Nuclear Waste Fund are insufficient to enable DOE to discharge its responsibilities under NWSA. However, borrowing shall not exceed amounts provided in the Appropriation Acts.

Any appropriations made available to the Nuclear Waste Fund shall be repaid into the General Fund of the Treasury, together with interest from the date of availability of the appropriations. Interest shall be paid on the cumulative amount of appropriations available, less the average undisbursed cash balance in the Nuclear Waste Fund during the fiscal year involved.

The Nuclear Waste Fund shall consist of:

1. All fee receipts, proceeds and recoveries realized by the Secretary of Energy under NWSA, which shall be deposited in the Nuclear Waste Fund immediately upon their receipt;
2. Any appropriations made by the Congress to the fund; and
3. Any unexpended balances available as of the date of enactment of NWSA for functions or activities necessary or incident to the disposal of civilian high-level radioactive waste or spent nuclear fuel.

Expenditures may be made from the Nuclear Waste Fund only for purposes of radioactive waste disposal activities under Titles I and II of NWSA, including:

1. The identification, development, licensing, construction, operation, decommissioning, and post-decommissioning maintenance and monitoring of any repository, monitored retrievable storage facility, or test and evaluation facility constructed under NWPA;
2. The conduct of nongeneric research, development, and demonstration activities under NWPA;
3. The administrative cost of the radioactive waste disposal program;
4. Any costs that may be incurred by DOE in connection with the transportation, treating, or packaging of spent nuclear fuel or high-level radioactive waste to be disposed of in a repository, to be stored in a monitored retrievable storage site, or to be used in a test and evaluation facility;
5. The costs associated with acquisition, design, modification, replacement, operation, and construction of facilities at a repository site, a monitored retrievable storage site, or a test and evaluation facility site and necessary or incident to such repository, monitored retrievable storage facility, or test and evaluation facility; and
6. The provision of assistance to states, units of general local government, and Indian tribes under Sections 116, 118, and 219 of NWPA.

No amount may be expended from the Nuclear Waste Fund for the construction or expansion of any facility unless such construction or expansion is expressly authorized by the NWPA or subsequent legislation. The construction of one repository and one test and evaluation facility is authorized under Section 302(d) of NWPA.

#### Interim Storage Fund

Section 136 of the NWPA establishes the Interim Storage Fund in the U.S. Treasury and sets forth provisions for the administration of this Fund.

##### 1. Contracts and Fees

During the period beginning with enactment of the NWPA, but not later than January 1, 1990, the Secretary is authorized to enter into contracts with any persons who generate or own spent nuclear fuel resulting from civilian nuclear activities for the storage of such fuel in federal facilities provided under the terms of NWPA. However, this authority to contract is subject to conditions imposed under Section 135 as follows:

- a. There is an aggregate limit of 1900 metric tons of federal capacity;

- b. Contracts are authorized only if NRC determines that adequate storage capacity to ensure the orderly operation of the civilian nuclear power reactors at which such spent nuclear fuel is generated cannot reasonably be provided by the owners or operators of such reactors; and
- c. The owner or operator of the reactor is diligently pursuing licensed alternatives to the use of federal capacity.

The contracts are to provide that the Federal Government will take title to the spent nuclear fuel at the reactor site, transport it to a federally owned and operated facility and store it pending further processing, storage or disposal. Each contract shall provide for the payment of fees and specify the amount of storage capacity to be provided.

NWPA requires an initial study and submission of a report to Congress to establish payment charges for the federal interim storage services. NWPA further mandates that fees be based upon an estimate of the pro rata costs of storage and related services. They are to be published in the Federal Register to be effective for a period of 12 months. The published report shall specify the method and manner of payment and collection.

## 2. Establishment of the Interim Storage Fund

Subsection 136(e) establishes a separate fund, to be known as the Interim Storage Fund, in the U.S. Treasury. It also specifies the sources of monies for the Fund. These are: (1) fees and other charges collected under provisions of NWPA; (2) any appropriation made by Congress; (3) any unexpended balances available on the date of enactment of NWPA; and (4) borrowing and investment income.

There were no unexpended balances transferred into the Interim Storage Fund when the NWPA was enacted. Also, there have been no requests made to NRC for a determination of eligibility for federal interim storage services. Therefore, the Interim Storage Fund has not been activated.

## D. FINANCING ALTERNATIVES AND CRITERIA

Following is a summary of several financing alternatives considered by the Panel, and some basic criteria by which these and other financing options might be assessed. Two related financial issues are then discussed--the implications of including defense wastes in civilian repositories, and OCRWM's present borrowing authority. And finally, there is the Panel's conclusion with respect to the financing provisions of the Nuclear Waste Policy Act.

### Alternative Methods of Cost Recovery

A basic principle of the NWPA is that the full costs of the national high-level radioactive waste management program should be recovered from the generators of the waste. All but one of the alternatives discussed in this

section are consistent with this fundamental principle. In addition, the Panel noted the option of financing the program out of general revenues appropriated by Congress.

A number of alternative cost recovery approaches to financing the waste management program can be developed by considering the basic business principles involved in pricing a service. Fees can be assessed based on costs of providing services to clients. Within the cost-based approach, average cost rates can be distinguished from incremental or marginal cost approaches. Fees can also be assessed based on the value of the service to the client.

Another dimension affecting alternative approaches is the time of payment. Fees can be paid when fuel is irradiated in a reactor. Alternatively, they can be paid when the spent fuel is turned over to the organization running the waste management program (hereafter, the Organization). Under some financing alternatives, they can be paid when costs are realized by the Organization.

Once a fee arrangement is defined, other aspects of program financing can be considered. The temporal flow of fee revenue can be matched to the flow of costs to determine requirements for working capital and long term capital financing of various aspects of the program. These implications of the alternative fee arrangements have not been considered in detail by the Panel. The Panel conducted a review of the available data on program financing which OCRWM has used to support its fee adequacy studies. Many uncertainties affect both costs and revenues. Extrapolating these costs and revenue streams is a very tenuous undertaking. Consequently, serious quantitative analysis of the capital and other financing implications of the fee alternatives is not very useful at this time. The Panel, therefore, decided to focus on alternative fee arrangements, leaving the clearly important derivative work on the financing implications of those alternatives to future analysts.

The basis for fees and time of payment are the dimensions used to define alternative approaches to financing the program in the discussion below. The alternatives include different bases for allocating costs and different degrees of refinement of the cost allocation. All of these options can then be varied along the time dimension, producing another set of financing alternatives. Taxpayer financing of the program through general Federal Government revenues is also considered as a final option. Each of these options is summarized below.

#### 1. Present Fee Arrangement - Mills Per Kilowatthour

The present fee arrangement embodied in the NWA uses kilowatthours (kWh) of power generated by nuclear plants to allocate program costs to the utilities. A fee is set by adding up all estimated program costs, estimating total kWh likely to be generated over the lifetime of the present and possible future nuclear plants, and then setting a kWh fee which would generate sufficient revenue over time to cover all costs.

## 2. Metric Ton Fee Assessment

A cost-based fee could be based on dollars per MTU delivered to the Organization. This alternative cost allocation basis may be a more accurate means of allocating costs than kwh generated because reactors differ in fuel efficiency. More discriminating systems could be developed with explicit adjustments for type of waste (PWR spent fuel, BWR spent fuel, reprocessed waste); age; thermal and radioactive characteristics which imply different handling routines or repository design; distance to the repository; time of delivery of spent fuel relative to the progress of the storage program; and so forth. Incremental cost systems could be considered as well as average cost systems. A cost-based system could be very simple or very complex depending on the desired degree of accuracy in allocating costs to the utilities to reflect their relative contributions to the costs of the program.

## 3. Present System Plus Transportation Fee

A third alternative would be a combination of 1 and 2 above--that is, to retain the mills/kWh fee concept, but add to it a transportation fee. The latter would be based upon MTU's and the distance from the waste source to the repository or interim storage facility. The transportation fee would be computed and payable at the time of transportation. Under this system, utilities would pay mill/kWh fees which are roughly proportional to their use of repository space, but charges to cover transportation, a major variable cost in the program, would be adjusted to take into account the different distances from reactors to the repository or storage site.

## 4. Fee Not Assessed Until Title Shifts

There is significant uncertainty about many of the estimates of program costs and the ultimate number of nuclear reactors which may be built and operated. It may be desirable to avoid over- or under-charging the utilities by assessing them a lump sum fee at the time spent fuel is turned over to the Organization. By this time, many of the uncertainties about both program costs and the number of nuclear reactors may be resolved. If so, the lump sum fee could be set with precision, avoiding overcharging, with its inherent incentives against cost effectiveness, or undercharging, resulting in poor management decisions or a need to drastically increase the fee.

The Organization would borrow money to finance the program until it is in a position to accept title to spent fuel. If the present organizational structure remains in place, borrowed funds could come from the Treasury. Any other Federal Government entity could presumably rely on Treasury loans. On the other hand, non-governmental corporation alternatives might be able to secure debt financing in the private sector.



At the time spent fuel is transferred from utilities to the Organization, utilities would be charged a lump sum fee based on actual costs to date and estimated future costs. The lump sum fee could be based on kWh or MTU, with or without a separate charge for transportation.

The utilities would need to plan for future payments to the Organization, and would perhaps want to set up reserve accounts to cover these future obligations. In this way, current ratepayers could contribute part of their payments to the reserve accounts to cover the future waste disposal obligations of the utility created by current power consumption.

The process of setting up reserve accounts would require state public utility commission (PUC) approval. The PUC approval processes could be facilitated by preparation of periodic fee estimate studies by the Organization. Fee estimate studies would be somewhat analogous to the current fee adequacy studies but would provide the Organization's best current estimate of future obligations of the nuclear utilities to the Organization for waste disposal services. Regulatory action based on these fee estimate studies would be much like that based on the fee adequacy studies except that the PUCs would need to monitor financial transactions involving the reserve accounts.

#### 1. Financing From General Revenues of Federal Government

While the NWPA calls for the utilities and their ratepayers to finance the program through fee payments to the Organization, it is certainly possible to switch the obligation for financing the program to the taxpayers by using appropriations from the general fund of the Federal Government. Waste management programs in this country were financed in this manner until passage of the NWPA, and it is certainly possible through legislative action to go back to that means of financing.

Since the benefits of nuclear power generation are spread rather widely across the country, and the benefits of proper and safe management of spent fuel are of national concern, it is arguable that the taxpayers should be made responsible for financing the program. Furthermore, a number of the major decisions about where to site the repository will be made in effect by the Congress and the President under the siting process outlined in the NWPA. Hence, the major elements affecting program costs will be made by the Federal Government in the end. Financing the program out of general revenues is therefore a logical possibility.

If this alternative were implemented, the budget of the Organization could revert to its former status as a set of line items within the Department of Energy (or other federal agency) budget. There seems to be little reason to make the program an off-budget or special fund item. For program planning purposes, it may be desirable to have multi-year appropriations.

### Criteria for Evaluating Financing Alternatives

As with the array of fee assessment mechanisms, there are various criteria against which such financing alternatives might be judged. Following are six criteria addressed by the Panel.

a. Ease of Administration

Some financing alternatives are easier than others to administer. If only a few factors are considered in setting the fee, and if those factors are easily and non-controversially measured, the fee will be easier to administer than a more complicated fee or one with factors which are hard to measure. For example, the mill per kWh fee structure would rate higher on this criterion than the mill per kWh plus transportation fee structure because more factors are considered in the second alternative, and the transportation fee may be hard to compute or may be disputable in many ways.

b. Flexibility in the Face of Changing Project Economics

Many aspects of the waste storage program are only roughly defined and their costs are only roughly estimated at this time. The cost estimates for these aspects of the program will surely change in the future. Moreover, natural or human events may produce some surprises which will impact program costs in the future no matter how complete the planning process. Given the duration of the program, many surprises await program managers. Whatever fee structure is used must therefore be adjustable to reflect changes in the nature and costs of the program. Applying this criterion suggests that the financing alternatives which postpone collection of fees until title to the spent fuel changes hands would rank higher than alternatives which collect fees when fuel is irradiated because more of the surprises will be over with by the time title changes. The economic risks are more clearly placed in the hands of the utilities by the pay-at-title-change alternatives since they would be accumulating expected storage costs in reserve accounts, but they would have to pay whatever the fee turns out to be at the time of title change.

c. Regulatory Acceptance

Many nuclear utilities are regulated by the Federal Energy Regulatory Commission (FERC) and/or by state Public Utility Commissions (PUCs). Publicly owned utilities such the Sacramento Municipal Utility District may or may not be regulated in the same sense, depending on whether they engage in interstate wholesale power sales and on state law regarding municipal utilities. Regulated utilities will be able to recover their payments to the Organization from ratepayers, and FERC and the PUCs will need to consider whether to allow such costs. Some financing alternatives may be easier for FERC and/or the PUCs to approve than others. For example, payment-upon-title-change structures may be difficult to handle because the utilities will want

to set up reserve funds for future obligations to the waste provider, and each PUC will need to approve estimates of the likely future costs which the reserves must cover.

d. Incentives for Cost-Effective Management

Providing cost-effective management for a program of the size, complexity, and duration of the waste program is a major challenge, particularly given the conflicting interests many parties have in the program and the degree of influence on the program which these parties exercise. Any incentives towards cost-effectiveness provided by the fee structure may be very important to consider since many other elements of the program are likely to divert attention from this important criterion. The financing alternatives defined above probably vary significantly on this criterion. For example, the more complicated, finely differentiated cost-based financing alternatives may tend to make both utilities and the Organization sensitive to the cost implications of their actions.

e. Ease of Transition

Any move from the present financing arrangement to an alternative scheme would require a transition. Unspent balances in the Nuclear Waste Fund and unmet obligations of the Fund would have to be dealt with by returning the balances to the utilities, retiring the obligations, or transferring one or both to the new financial system in some way. Some of the alternatives may accommodate this transition more easily than others. In addition, if an organizational transition is required as a result of the organizational alternative(s) recommended by the Panel, the ease of moving the present financing mechanism or any alternative into the new organization would need to be considered as well.

f. Suitability for Alternative Organizations

A final criterion for evaluating the merits of alternative financing options is their suitability for use in alternative organizational contexts. Some financing alternatives may work better with some of the organizational alternatives considered by the Panel than with others. For example, general fund financing may be impossible with a private corporation alternative.

Additional Financing Issues Considered by Panel

Defense Wastes may be included in a civilian repository. The NWPA states that defense wastes shall be included in the civilian repository program unless the President finds that a separate defense-only repository is required (NWPA, Section 8). A recently released draft study on using the civilian repository program for disposal of defense wastes finds an economic advantage to this option compared to a defense-only option, and no substantial differences between these two options in terms of transportation costs, public

The Panel concludes that the fee structure as constructed by Congress in the NWPA is at present the best possible fee structure under existing conditions.

Unfortunately, an adequate cost data base was not available. DOE attempted to provide cost data. However, the cost data provided to the Panel was either rapidly changing or obsolete. In some cases, data requested did not exist. As evidence of the fluid nature of the cost issue, the Panel has learned of but has not received a recent independent cost review which reportedly indicates that current OCRWM estimates of repository costs may be significantly underestimated. Revenues are hard to project since it is not certain how many nuclear reactors will be on line in either the near or long term. Thus, the Panel did not attempt to make a judgment on the long term adequacy of the fee structure.

CHAPTER III. WASTE MANAGEMENT PHASES AND OBJECTIVES

- o Objectives differ for each of the five phases of waste management program: siting . . . construction . . . operation . . . transportation . . . monitoring after closure.
- o Overriding objective for all phases: safe disposal.
- o Siting phase objectives: meet technical standards . . . gain public acceptance . . . obtain construction authorization.
- o Construction phase objectives: achieve technical excellence . . . obtain stable financing . . . ensure cost efficiency.
- o Operation phase objectives: ensure efficient systems management . . . provide quality assurance.
- o Transportation phase objectives: emphasize safety . . . address public concerns . . . ensure efficient operation.
- o Monitoring phase objectives: provide continuity . . . address public concerns.

From the outset of its study, the Panel recognized that the overall radioactive waste management program comprises five salient phases: (1) siting; (2) construction; (3) operation; (4) transportation; and (5) monitoring after closure.

Each phase involves a different cluster of activities, and the phases are sequential except for transportation. (This does not ignore the potential for overlap with respect to the development of a second repository while the first one is proceeding on its separate track.)

Each of the above program phases has two or more principal objectives against which its implementation can be gauged. This chapter describes each phase of the program and the major objectives of each. It discusses the nature and importance of each objective. It surveys organizations and managerial factors that could facilitate achievement of the objectives. Some of these factors clearly are more important than others, but all are included in order to demonstrate the wide range of issues that affect waste management organizations, and the need for satisfying one set of objectives in order to initiate the next phase.

The objectives and organizational considerations are summarized in Table 3.1 at the end of this chapter.

## A. OBJECTIVES BY PHASE

Overriding Objective

Regardless of the type of organization or the phase of the program, the single overriding objective should be stated at the outset: safe long-term disposal of high-level radioactive waste. The optimal waste management organization--Office of Civilian Radioactive Waste Management (OCRWM) or some alternative--should have this single goal of safe permanent disposal of high level radioactive waste and spent fuel and should not have other unrelated goals or activities, such as production of nuclear fuel. However, flexibility to consider options concerning safe disposal (i.e., retrievability of waste for reprocessing) must exist.

This single-purpose orientation does not necessarily mean that the waste management organization could not be part of a larger entity. It does suggest, however, that the waste management organization should be relatively independent and insulated from competing pressures from other parts of the larger entity.

## SITING PHASE AND ITS OBJECTIVES

The siting phase involves identifying technically acceptable locations for waste disposal facilities and obtaining the approvals needed to begin construction.

Under current law, the siting process requires screening of several possible locations, identifying three potentially acceptable sites, and then conducting detailed underground geologic evaluations. (Somewhat different procedures would be followed for Monitored Retrievable Storage facilities.)

At the conclusion of these evaluations, a site will be recommended by the President, subject to state or tribal veto, and in either case, Congressional review of the veto. If the designated site survives this process, an application will be made to the Nuclear Regulatory Commission (NRC) for a construction authorization. Issuance of the construction authorization will mark the end of the siting phase.

The key objectives of the siting phase are to: (1) achieve technical excellence; (2) gain public acceptance; and (3) obtain the construction authorization. These objectives are discussed below.

1. Achieve technical excellence--A technically sound site is essential to the safe management of radioactive waste. Thus, one of the principal goals of the siting phase will be to ensure that potential sites are carefully and thoroughly evaluated, and that two sites which meet all applicable technical standards are proposed to Congress and the NRC for the first and second repositories. Failure to achieve this objective could lead to rejection of sites, delays in the program, and substantial public distrust.

Many organizational and managerial factors have been identified that will influence the level of technical excellence obtained during the siting phase. The organization must develop internal incentives to encourage careful, thorough technical work while still guaranteeing expeditious progress.

One broad set of factors relevant to these considerations are personnel issues. The organization must be able to attract and retain an adequate number of qualified employees in a wide range of technical disciplines, including geology, mining, hydrology, nuclear chemistry, and materials science. These technical experts must be available not only to prepare plans and carry out complete site studies, but to modify plans in light of any unexpected results obtained during this phase. The organization also must be able to recruit and retain competent managers and other professionals.

Such employees can be attracted by offering competitive salaries, desirable working conditions, and opportunities for advancement. Flexibility in hiring, firing, and promotion practices will generally facilitate technical excellence. Retraining and continuing education programs can be used to disseminate new research results or approaches. Encouraging efforts to develop organizational loyalty, such as promotion and incentive programs, may also improve technical performance.

Beyond these personnel practices, a variety of other factors can be identified that would facilitate achievement of this objective.

The organization should have a substantial capability to conduct required research. Sophisticated equipment and facilities and the funding needed to build and maintain them will be necessary.

The organization should offer incentives for innovation, and should encourage creativity and originality in order to identify faster, less costly, and better solutions to problems. A wide variety of monetary and non-monetary systems can be used to accomplish this.

The organization should require internal and external evaluation of findings and proposals. Research results should be replicated, and information should be systematically exchanged with independent technical experts. The establishment of a separate evaluation unit within the organization should be considered. Individuals and units should be accountable for their actions. Periodic reviews should be conducted to identify areas of strength and weakness, and prompt steps should be taken to alleviate technical and institutional problems.

The organization probably will need to use independent contractors for portions of the work. Technical excellence can be facilitated if contractors are selected through competitive procurement with the goal of finding the most cost-effective proposal, not necessarily the cheapest. The work of contractors should be carefully monitored by the organization and independent technical auditors. Key decisions must be made by officials of the organization rather than by contractors.

2. Gain public acceptance--The second objective during the siting phase must be to provide public acceptability of the site.

Technical excellence alone is not enough. Many public concerns are implicitly or explicitly based on technical factors, such as assuring waste isolation and thereby guaranteeing public health. However, the public also will be sensitive to non-technical issues such as equity and procedural fairness.

Current laws (particularly the Nuclear Waste Policy Act (NWPA)) emphasize public involvement in the waste management process, and give affected states and tribes the right to veto selected sites. While Congress can override such vetoes, the organization can decrease the likelihood of a veto and increase the chance of one being overridden by satisfying public concerns. It may be too much to hope that the public will actively support a site, but the organization can decrease active opposition by being competent and fair and open in all its actions.

Four sets of organizational factors can increase the likelihood of achieving this objective.

First, the organization must be, and be perceived as, objective. It must be concerned with locating a suitable waste disposal site and in exhibiting a strong commitment to addressing environmental and socioeconomic concerns. The organization must be able to respond to legitimate political concerns while having reasonable immunity from political interference. The organization must demonstrate that its programmatic decisions are not made for narrow political reasons. Similarly, the organization should not be viewed as a promoter of nuclear power, but rather as interested only in finding a safe waste disposal system regardless of the future of nuclear power.

The second set of factors revolves around credibility. Information provided by the organization must be accurate, and technical activities must be conducted soundly and thoroughly. Reports and discussions must be understandable to lay audiences. The organization's credibility would be greatly enhanced if its plans and personal representation exhibit stability and continuity over time. The ability to prepare realistic schedules and adhere to them would also increase the organization's credibility.

Third, the organization should be receptive. It should seek to interact with outside groups such as state officials, Indian tribes, environmental groups, and local residents to name a few. Formal and informal procedures should be established to facilitate communication, so that information is exchanged freely. These interactions can be enhanced by building a broad-based constituency by establishing a formal advisory board consisting of representatives from all legitimate stakeholders. The organization should also employ effective methods to encourage meaningful public participation. Pro forma public meetings will not suffice; there must be ample opportunity for two-way communication on an informal as well as procedural basis.



Fourth, the organization must have programmatic authority. It needs to have the authority to make and keep commitments. Furthermore, the need for programmatic authority suggests that the organization should have considerable autonomy if it is part of a larger structure. The organization should be willing and able to negotiate solutions to disagreements at the local level. This involves not only the willingness to compromise, but also the authority to do so. Efficiency and credibility would be enhanced if local officials such as those in field offices of the organization were empowered to negotiate with their local counterparts, rather than requiring all decisions and negotiations to occur at high levels within the organization.

3. Obtain the construction authorization--After the siting process has satisfied an array of interests--states and local communities, Indian tribes, public interest groups, and other concerned parties, and the political process has been completed, the procedure for obtaining the construction authorization will begin. The construction authorization acknowledges the technical excellence of the politically acceptable site. The ability of any organization to obtain the construction authorization is clearly dependent on achieving technical excellence and becoming familiar with the regulatory process.

One managerial factor that will facilitate meeting this objective is experience with Nuclear Regulatory Commission procedures and requirements. Staff members who understand these regulatory patterns will be valuable in preparing applications and providing information. This in turn should increase the likelihood of obtaining the construction authorization and minimize the time required.

In addition, organizational flexibility would be a desirable attribute. The power and ability to interact with regulatory officials about standards and designs should reduce controversy and speed approval. Early prelicensing consultation could eliminate later disputes by establishing lines of communication for exchanging and understanding technical information necessary to meet NRC's criteria.

#### CONSTRUCTION PHASE AND ITS OBJECTIVES

Construction of a waste repository deserves considerable attention because of its "one-of-a-kind" nature and the longevity of the project. Although construction will be essentially a mining operation utilizing conventional technology and waste handling, and deployment may not differ significantly from present practice, the size of the project and the necessity for safe and long-term waste isolation makes its construction phase very important.

Construction activity can begin once a construction authorization is obtained from the NRC. Repository construction is expected to take about 7 years, while storage facilities could probably be built in 5 years or less. The construction phase will culminate in an update of the original license application submitted to the NRC. This update must include information obtained about the site during construction and proof that the facility was constructed in accordance with the original design.

The major objectives of the construction phase will be to: (1) achieve technical excellence; (2) obtain stable financing; and (3) ensure cost efficiency. Each objective is described below.

1. Achieve technical excellence--It is essential that the facility be built in a way that increases the probability of safe long-term isolation of the waste materials. This means that construction must follow the specifications and safeguards built into the design and must comply with all applicable regulations. Thus technical excellence must be the paramount goal of the construction phase.

The organizational and managerial factors that will facilitate the achievement of this objective are similar to those described for the siting organization. In brief, the organization must be able to recruit and retain competent personnel in a variety of fields. Innovation should be encouraged in order to find faster, cheaper, and more efficient ways to construct the facilities. Careful inspection of work by internal and external experts is essential to detect and correct errors. Contractors must be carefully chosen and supervised.

In addition, it will be important for the organization to have or be able to call upon the technical expertise needed to redesign plans to cope with unexpected contingencies. Discoveries may be made during construction that necessitate revisions in plans, and the organization must be able to recognize these problems, develop proposed solutions, and consult with regulators regarding the acceptability of solutions.

2. Obtain stable financing--Constructing a waste management facility will be expensive. Ensuring quality and timeliness in construction will require a stable source of financing. Lacking such financing stability, the schedule is likely to slip and incentives to cut corners will appear. This would lessen public confidence and might threaten the issuance of an operating license. Moreover, delays would probably increase the ultimate cost of the program. Thus, successful construction activities are dependent upon the adequacy and stability of financing.

A variety of factors can influence the likelihood of achieving this objective.

First, the organization should prepare a realistic long-range plan so that it can accurately estimate financing needs at different times during the life of the program. This plan should be based on the principle of full-cost recovery, which presently involves the fee on nuclear-generated electricity. The plan should be submitted periodically to Congress and other reviewers as a check on its accuracy and to ensure fiscal accountability.

Second, the cost estimates should make allowances for contingencies. Construction projects often exceed budget estimates, particularly when estimates are prepared years in advance. And, if defense waste is included, full-cost recovery of these additional expenses must be made to the Nuclear Waste Fund.

Third, the financing plan should be revised periodically to reflect new information or program changes. The annual review of the nuclear waste fee required by Section 302(e) of the NWPA offers a possible model for such revisions.

Fourth, the organization's finances should be dedicated so that they are not subject to diversion for other purposes. Revenue from all sources, such as the fee on nuclear-generated electricity, should go directly into a separate account. Spending from the account should not be subject to the budgetary constraints of a parent organization or other government entity.

A fifth and final important factor affecting stable financing is a mechanism to smooth out imbalances in the cost and revenue streams. Since construction is likely to be the most expensive phase of the waste management program, costs will probably exceed revenues during this period. Thus, the organization needs access to a guaranteed source of capital financing, including borrowing authority.

3. Ensure cost efficiency--The third objective of the construction phase is to spend funds in the most efficient manner possible while still ensuring technical excellence. This will help to ensure the sufficiency of the funding source and will also enhance the organization's reputation and credibility.

There are four obvious organizational factors that can encourage such efficiency.

First, innovation should be supported. Individuals should be encouraged to try new and more efficient approaches to problems, and rewards should be given for successful ideas and performance.

Second, there should be built-in incentives for cost control, as well as periodic budget assessments and internal accountability for overspending.

Third, the organization should be subject to external financial monitoring. This should not entail audits of minutia, but does include the need for periodic budget and financial performance reviews by independent financial analysts.

Fourth, the organization must adopt careful procedures to monitor and audit its contractors. Contractors should be selected on the basis of the anticipated cost-effectiveness of their bids, their work should be inspected by internal and external evaluators, and careful cost accounting should be required.

#### OPERATION PHASE AND ITS OBJECTIVES

The operation phase begins once an operating license has been issued. This phase involves processing, handling, transportation, and disposing of the waste. A waste repository is expected to be in operation for a minimum of 20 years. The key objectives of this phase will be to: (1) ensure efficient systems management; and (2) provide quality assurance. Both are discussed in the following sections.

1. Ensure efficient systems management--Proper operation of a waste disposal facility will require integration of a series of independent activities. For example, repository operation will require careful scheduling to ensure that waste is delivered on time, handling capabilities are adequate, and drifts (tunnels) are constructed, filled, and sealed as needed. The obvious characteristics of this systems management approach are engineering and economic efficiency. Less obvious but equally important is that systems management will also enhance safety through proper scheduling and by minimizing exposure to radiation and toxic materials.

The most important factor in fostering systems management is careful long-term planning. The various facilities and operating procedures need to be integrated to allow consistent throughput without adding substantial excess capacity. The plan should reflect a rate of waste receipt and disposal adequate to meet the needs of waste generators. The rate should also be attainable within the budget of the organization. The plan should make allowances for maintenance, equipment breakdowns, and possible emergencies. Careful planning can be facilitated through periodic review by NRC, host state regulatory agencies, and by requirements for public hearings on operational procedures and planning. It can also be encouraged by hiring individuals committed to careful planning, and establishing an organizational commitment to systems management.

The other important managerial factors related to this objective are stability and authority. The organization should be stable so that a consistent management system can be implemented and pursued. Changes in the system should be made only in response to new circumstances or major problems in the existing system. Frequent organizational fluctuations which could adversely affect the waste management system should be avoided. The organization must also have the authority to take expeditious actions. It must, for example, be able to control the volume of waste deliveries to mesh with its disposal schedule; otherwise a coherent management system cannot be deployed.

2. Provide quality assurance--The second key objective of the operation phase must be to ensure that radioactive waste is handled and disposed of safely and securely. This will minimize both the short-term and long-term risks to workers, to the environment, to nearby residents, and to all who might be impacted.

Several managerial and organizational factors are relevant to this objective.

First, the organization must be stable so that consistent management patterns can be developed and implemented. This makes deviations from acceptable performance easier to detect.

Second, the organization must take steps to ensure accountability. Individuals and groups should be held responsible for errors or failures to comply with safety and health standards. Such accountability will lead to greater care and attentiveness to quality assurance procedures.

Third, management systems to avoid oversights caused by boredom and inattention should be deployed. The operation of a waste management facility will be a routine process involving constant repetition of the same series of tasks for each shipment. Management systems to cope with such tasks often employ techniques such as personnel rotation, quality circles, performance checklists, and retraining programs. In addition, recruitment practices should emphasize hiring alert and motivated individuals for these tasks.

Fourth, careful inspection and monitoring procedures are a crucial aspect of quality assurance. A comprehensive array of monitoring devices should be emplaced, and consistent checks of procedures should be made. It would also be desirable to encourage periodic inspections by independent experts, and the facility should always be open to federal, state, and local regulatory officials. The organization must be responsive to the concerns of such officials, and have the willingness and authority to change its procedures to address their concerns. In this regard, substantial authority should be delegated to the repository manager.

#### TRANSPORTATION PHASE AND ITS OBJECTIVES

The transportation phase involves moving waste from at-reactor and other storage sites to permanent disposal facilities and any interim locations pending operational capability of the repository.

The geographic scope and population affected by waste transportation are greater than for any of the other phases, which means that both technical concerns and public acceptability will be of great importance.

The principal objectives of the transportation phase will be to: (1) emphasize safety; (2) address public concerns; and (3) ensure efficient operation. Each of these objectives is described below.

1. Emphasize safety—Shipments of radioactive waste will follow a variety of routes involving a majority of states. Safely delivering these materials to their ultimate destinations will be the preeminent goal of the transportation phase.

A number of factors will influence the organization's ability to achieve this objective.

First, the organization will need technical experts to design, test, and inspect shipping containers for waste.

Second, competent drivers and other workers will have to be hired and trained. This will require considerable knowledge of typical operating practices and will involve the organization in interactions with carriers and unions.

Third, performance appraisals should be conducted and deficiencies in performance corrected.

Fourth, the organization will need to establish its own inspection program, and coordinate it with the scheduling and inspection procedures of states and local jurisdictions.

Fifth, the organization should have the ability to carefully evaluate and select with the Department of Transportation the safest transportation routes under federal law.

Sixth, the organization must develop an emergency response capability and the appropriate contingency plans.

Seventh, the organization must coordinate its activities with affected federal, state, and local government agencies. The organization must be willing to negotiate on the concerns and responsibilities of these agencies, and must have the authority to enter into binding agreements with them.

Eighth, because these agreements may require financial aid for inspections, emergency response equipment, or highway improvements, a source of adequate funding is essential.

Finally, the ninth factor is the need to establish an organizational commitment to safety. Incentive systems should emphasize safe performance, with speed, economy and convenience of scheduling as secondary considerations. Training and retraining programs should focus on this goal.

2. Address public concerns--Since so many people are potentially affected, public concerns about transportation may rival those for siting. The organization must be sensitive and responsive to such concerns if it is to accomplish its mission with minimal interference and delay.

Obviously, an organizational commitment to safety is essential to alleviating public concerns. And this commitment must meet four key tests pertaining to public credibility.

First, the transportation program must be perceived as being objective, acting in the public interest and not just that of the waste producers. Local jurisdictions and the general public must be assured that decisions will be made for objective technical reasons while meeting legitimate citizen concerns, rather than in response to narrow political pressures or other factors.

- Second, the transportation program must be credible with the organization, backing up its words with actions. This suggests that the organization must have the authority to make changes in program details to accommodate special situations and concerns.

Third, it must be receptive to public involvement. It must offer education programs, provide access to information, support planning and policy comments of merit, and allow independent inspections.

Transportation managers should be indoctrinated in the need for public participation and the methods of achieving it at the local, state, and national levels.

Fourth, the program must be flexible, showing a willingness and ability to negotiate on public concerns.

3. Ensure efficient operation--The final objective of the transportation phase should be to maximize operating efficiency subject to the paramount goal of safety. Transportation will be a costly aspect of the disposal program, and efficient use of the available resources should be strongly encouraged. This is likely to be a complex problem given the multiplicity of reactor sites and transportation routes, and changes in flows of waste over time.

Planning and consistency in program execution are the key to cost efficiency. Proper selection of routes and scheduling of equipment can lead to major cost advantages. In addition, on-going monitoring and accountability for costs should be encouraged. Periodic independent financial evaluations will help to identify potential savings.

#### CLOSURE AND POST-CLOSURE MONITORING AND ITS OBJECTIVES

The monitoring phase involves supervising and evaluating the site of the waste facility after its closure. There will probably be relatively little activity at the site beyond on-going inspections and tests with necessary records maintenance and security.

The major objectives of the monitoring phase will be to: (1) provide continuity; and (2) address public concerns. These two goals are discussed below.

1. Provide continuity--Monitoring of waste disposal sites will go on for thousands of years. The fundamental objective in such a situation must be to ensure continuity and build an institutional memory. In the absence of such continuity, important records and results could be lost or misunderstood.

Since very few human institutions have managed to persist for even hundreds of years, there is little empirical data about particular organizational and managerial factors that could foster such continuity. However, there are several factors that need attention.

First, the organization needs to recruit and retain committed individuals who will be dedicated to careful and systematic monitoring.

Second, the organization must develop complete recordkeeping systems, both about its own operations and those of the preceding phases.

Third, it must have an assured source of long-term financing. The amounts needed annually will not be large, but they will be needed year after year after year. This suggests that the funding source be insulated from competing needs.

Fourth, adequate attention to liability will be required. For public confidence in the program, there must be assurances that any release of radioactivity will be remedial and that the Federal Government has responsibility for it.

2. Address public concerns--The other major purpose of the monitoring phase is to provide information in response to public inquiries. The presence of a closed waste facility will become a part of daily life for local residents, but at closure there may be a display of public concern to which the organization will need to respond, since the waste will then be sealed in and no longer will be retrievable.

Achievement of this objective can be facilitated in at least three ways.

First, the organization should issue periodic reports on its work to ensure that the public knows that careful monitoring is being conducted.

Second, it must be open and responsive to requests for information.

Third, it must welcome requests by independent experts to conduct monitoring tests at the site, and must be willing to exchange information and ideas with them.

### Summary

Numerous objectives for a waste management organization were identified by the Panel. Each of the five phases of the waste management process has its own distinct set of objectives. Meeting these objectives, in the opinion of the Panel, is essential to the successful conduct of the entire radioactive waste management program.

Table 3.1 summarizes the identified objectives for each program phase. It also lists the major organizational and managerial factors that will facilitate the achievement of the objectives.



## B. SITING CONSIDERATIONS

### The Siting Problem

Siting high-level radioactive waste facilities, whether for permanent geologic isolation or for long-term storage, has been a major problem for many years. There have been a number of reasons, some the result of historical accident, some arising from the program's difficulties in integrating state and federal responsibilities, and some inherent in the very search for a site.

The problem arises from the toxic nature of radioactive waste and the resulting public apprehension about its safe management. This apprehension is evident in the display of concern, and often strong opposition, among the public and their officials about proposals to investigate and develop possible sites.

At the state level, health, safety, and environmental concerns have driven state reactions to the program. In some cases there has been local support for waste facilities, arising from expectations of substantial employment and other economic benefits. Some of the supportive communities have also been accustomed to atomic energy activities. Perhaps because the localities involved have been both small and remote from the bulk of state population, local support has not prevailed over opposition from elsewhere within a given state.

Public concerns in the past have created a Catch-22 situation. The Federal Government needs to conduct substantial site evaluations in order to determine whether a repository could be sited safely. State officials, doubting their ability to exercise control over federal activities after large expenditures have been made, have opposed federal investigations within their jurisdictions, even though these investigations were to address the very concerns that led to state opposition. In other words, the states have said: "Show us it's safe before you come in." The Federal Government's answer was: "Let us come in to show you it's safe." While the Federal Government clearly had the ultimate legal power to overcome a state's objection, a determined state could impose enormous political and financial costs on the exercise of federal power.

Program history has included false starts and dramatic changes in such crucial questions as whether the emphasis was on permanent isolation or on some form of long-term storage. The changes themselves have eroded credibility. The erosion has been particularly drastic when the changes have been in response to technical inadequacy or uncertainty.

### The Nuclear Waste Policy Act

The Nuclear Waste Policy Act's provisions for state and tribal involvement in the site selection process provide a response to their demands for a statutory role. The NWPA's provisions fall short of the absolute veto power that some states wanted (and perhaps thought they had), but the requirement for a two-house override of any state or tribal objection is probably as extensive a degree of control as is possible, given Congress' ability to legislate in this area.

The NWPA provides other mechanisms for addressing the overriding concern with public safety by requiring that the Department of Energy (DOE) negotiate consultation and cooperation agreements with states and tribes at the start of site characterization. These agreements provide a procedural framework for independent evaluation by state and tribes of the lengthy technical evaluation of potential sites for major high-level waste facilities. This participation should lead to the systematic identification and addressing of state and tribal concerns about the suitability of any potential site, and therefore should reduce public apprehension about safety.

The NWPA also has fairly extensive provisions for addressing the sorts of state, tribal, or local concerns that might arise with development of any major industrial facility. It has provisions for impact assistance funds to states and tribes and grants in lieu of taxes for local governments. Generally, these provisions were included to compensate for any adverse impacts of a repository or other related facility rather than as incentives for state, tribal, or local support of facility siting. Presumably the industrial and economic development implicit in such a facility would be the limit of any incentive to accept it. It is also possible, of course, that the political process may provide incentives outside the framework of the NWPA.

It is certainly possible that a state and any affected tribes might welcome or at least acquiesce in a federal siting proposal for a repository or major storage facility for radioactive waste. Participation in the lengthy process of characterizing a site might create sufficient confidence in the facility and the siting organization to dissipate concerns about health and safety, leaving the benefits of development to prevail. If so, the NWPA's provisions for formal state and tribal opposition might never be used.

More likely, given the historical record and the dynamics of the political process, is the use of a state or tribal veto and the need to seek Congressional override of the objection. To the extent that a veto is probable, the NWPA can be seen as orchestrating a way out of the Catch-22 described above by deferring the exercise of this opposition until after site characterization. At that point, sufficient analysis will have been done to allow siting decisions to be made on a technically sound basis.

In a sense, the two-house override requirement can be seen as codifying what has always been the case: both houses of Congress would have had to support a siting decision, through the appropriation of resources for the facility to be constructed and operated.

#### Stakeholder Decisionmaking

A broad approach to siting could well build upon experience in environmental conflict resolution. This approach postulates that the affected parties are best able to resolve their disputes, often in rather informal decisionmaking contexts.

Allowing the stakeholders increased opportunity to resolve the very difficult problems of siting waste facilities has a great deal of intuitive appeal. Moreover, successful resolution of a number of environmental disputes suggests the approach can work in the real world. There are, however, some open questions.

First, the interests of major stakeholders are both partly conflicting and partly tangential. States and tribes have been primarily interested in very strong assurance that any facility they host is safe. They share weak general interests in safe waste disposal or storage outside their boundaries and presumably common interests in avoiding arbitrary site selection decisions in which any one of them may lose. Nonetheless, the choice of a site in state or tribe A over state or tribe B may very well be a loss for one and a gain for the other. Moreover, the political heat likely to accompany any siting decision may lead even public officials who favor the facility for economic development reasons to wish to hide behind a cover of federal preemptive action.

Beyond the possibilities for conflicting interests among states and among tribes are the differences between these two as potential hosts for facilities and the utilities that create the waste and need to get rid of it. The utilities' interests are generally in timely removal of the waste from their powerplants in order to allow them to continue operating their existing reactors and, somewhat secondarily, to eliminate waste management as a barrier to building additional plants.

#### Conclusion

Siting waste repositories and long-term storage facilities has been very difficult in the past and is likely to continue to be so. The NWPA defines a siting process to resolve the difficulties. To succeed, it requires both a technically defensible site proposal and a clear procedural record of responsiveness to states, tribes, and other groups. Reaction to DOE's implementation of the NWPA to date has been mixed, both with improvements in program procedures and in concern due to the unevenness of its performance.

TABLE 3.1

OBJECTIVES AND ORGANIZATIONAL FACTORS  
FOR RADIOACTIVE WASTE MANAGEMENT

<u>Objective</u>	<u>Organizational Factors That Facilitate Achieving This Objective</u>
<b>SITING</b>	
Achieve technical excellence	Attractive personnel policies Flexibility in hiring, firing, promotion Research capability Incentives for innovation Internal and external evaluation of findings and proposals Individual and group accountability Competitive procurement of contractors Careful monitoring of contractors
Gain public acceptance	Objectivity Commitment to address environmental and socioeconomic concerns Freedom from political influence Credibility of reports Stability in plans and personnel Realistic scheduling Receptiveness to public involvement Authority to make and keep commitments Willingness and ability to negotiate Conflict resolution mechanisms
Obtain the construction authorization	Experience with NRC procedures Flexibility Ability and power to interact

<u>Objective</u>	<u>Organizational Factors That Facilitate Achieving This Objective</u>
<b>CONSTRUCTION</b>	
Achieve technical excellence	Attractive personnel policies Flexibility in hiring, firing, promotion Incentives for innovation Internal and external evaluation of findings and proposals Individual and group accountability Competitive procurement of contractors Careful monitoring of contractors Technical expertise to redesign facilities
Obtain stable financing	Requirements for long-range financial planning Allowances for contingencies Periodic revision of financial plans Dedicated revenue account Guaranteed source of capital financing Independence from political control of budget Independence from budgetary needs of a larger organization
Ensure cost efficiency	Incentives for innovation Incentives for internal cost control External financing monitoring Careful monitoring and auditing of contractors
<b>OPERATION</b>	
Ensure efficient systems management	Requirements and incentives for long-range planning Stable management system and organization Authority to implement management system

Objective

Provide quality assurance

Organizational Factors That Facilitate Achieving This Objective

Stable management system and organization  
 Individual and group accountability  
 Programs to compensate for routine tasks  
 Careful personnel selection  
 Inspection and monitoring procedures  
 Openness to external inspectors  
 Willingness and ability to change procedures to address concerns of inspectors

TRANSPORTATION

Emphasize safety

Technical expertise  
 Careful recruitment and training of personnel  
 Performance appraisals  
 Internal inspection program  
 Selection of safest routes  
 Emergency response capability  
 Coordination with local, state, and federal officials  
 Adequate funding for state and local support  
 Incentive systems to encourage safety

Address public concerns

Objectivity  
 Credibility  
 Receptiveness to public involvement  
 Willingness and ability to negotiate

Ensure efficient operation

Careful planning, routing, and scheduling  
 Accountability for costs  
 External financial monitoring

Objective

MONITORING AFTER CLOSURE

Provide continuity

Address public concerns

Organizational Factors That  
Facilitate Achieving This  
Objective

Attractive personnel policies  
Careful recordkeeping systems  
Assured source of long-term  
financing  
Liability insurance

Periodic reporting  
Receptiveness and responsiveness  
to public involvement  
Interactions with independent  
technical experts





CHAPTER IV. CHARACTERISTICS OF WASTE MANAGEMENT

- o Single-purpose service business; intrinsically a monopoly or franchised activity.
- o Little control over volume of business; must cope with potentially large swings in waste volume.
- o Full-cost recovery required, but essentially unable to control costs or revenues on a year-to-year basis.
- o Program has extraordinary longevity, well beyond historic lifetime of any normal business.
- o Total program consists of sequential phases involving many disparate activities.
- o Regulatory uncertainties exist.
- o Broad requirements for institutional coordination and public participation mandated.
- o High degree of political accountability required.
- o Serious issue of third-party liability exists.
- o Mission carries negative public image.
- o Comparison to existing toxic waste disposal industry: more differences than similarities.

These capsule characteristics of the high-level radioactive waste management program point to a conclusion that it is a unique undertaking, quite unlike any "normal" business (or government) activity.

The following discussion provides more detail on each of the salient characteristics of radioactive waste management identified by the Panel, and the organizational implications of these characteristics.

#### Monopoly

A primary characteristic of waste management is that it seems to be inherently a monopoly or a franchised type of business, at least for the two initial repositories called for by the Nuclear Waste Policy Act (NWPA). Public health and safety, security issues, and the specified timetable and procedural requirements for developing and operating two repositories all point to having a single organization manage the program.

These factors are likely to result in a mandate or charter from the Federal Government that will constrain the business to a single purpose, that of managing high-level radioactive wastes and spent fuel. The monopoly nature of the business is also likely to result in utility-type regulation, plus an unusual degree of public oversight and concern for a cohesive management approach.

### Business Volume

The waste management organization cannot influence or stimulate the growth of nuclear generation and therefore has little control over its business volume unless it is also involved in other facets of the nuclear power program. Generally speaking, it must operate in a business climate which is largely dependent upon economic trends and emerging energy policies.

First and foremost, the amount of spent fuel waste that will be handled by the high-level radioactive waste management organization is a function of the number and size of nuclear powerplants operating in the United States now and in the future. If there is a co-mingling of defense wastes, the latter will also influence the total amount of wastes to be handled.

While the utilities have the primary responsibility for decisions to add new plants or retire old ones, the basis for these decisions lies in the broader issues related to U.S. energy policy, the growth of the U.S. economy in the aggregate and in particular regions of the country, and in other public policy issues that influence the role of nuclear power in the U.S. energy "mix." The utilities have limited control over the resolution of these issues.

Uncertainty over the ultimate volume of high-level radioactive waste and spent fuel is due to the widely disparate projections of the growth (or decline) of the U.S. nuclear power industry. Current waste management planning by the Department of Energy (DOE) is based upon a September 1983 memorandum issued by DOE's Energy Information Administration (EIA). According to this projection—one of several "scenarios" developed by EIA alone--the cumulative volume of spent fuel from commercial reactors will approximate 50,000 metric tons of uranium (MTU) by the year 2000 and 134,000 MTU by 2020. Added to this is an estimated 10,000 MTU of defense wastes generated by the latter year.

Other projections developed by EIA, the nuclear utility industry, and other entities are premised upon significantly greater volumes of generated wastes during the first quarter of the 21st Century. The differences are largely accountable to the diversity of expectations with regard to the number and size of new commercial reactors to be built. The actual volume of spent fuel generated will also be dependent upon the capacity factors of the various powerplants, the degree of fuel burnup, and other technical/economic trends.

One scenario not considered a valid case by EIA, but mentioned here to illustrate the special nature of the business risk in the high-level radioactive waste management field, is that all U.S. nuclear powerplants might be arbitrarily shut down. This would leave the waste management organization with a legacy of accumulated waste to be handled--about 12,000 MTU as of 1984--but with no ongoing revenues from nuclear generated electricity to support the management of those wastes.

The future of the U.S. nuclear power industry--not to mention the defense program--will largely be shaped by influences extraneous to the waste management organization. International developments, political policies, and socioeconomic factors will largely determine the future volume of radioactive waste with which the management organization will be expected to cope.

#### Full-Cost Recovery

The purpose of the Nuclear Waste Fund created by the NWPA is to provide for full-cost recovery by the waste management program through fees collected from the nuclear utilities. The fee is currently set at 1 mill per kilowatthour of nuclear-generated electricity.

While provisions of NWPA allow for adjustment of the fee to reflect changes in program costs--theoretically freeing the organization from the major problem of running short of funds--the waste management program is quite constrained in its ability to control either its costs or its revenues on a year-to-year basis. Under Section 302(a)(4) of the NWPA, either house of Congress can block any increase in the 1 mill/kwh fee imposed on utilities, although this power may be constrained by a recent Supreme Court decision invalidating the single-house legislative veto.

Borrowing authority, while provided for in NWPA, is also subject to various controls from both the executive and legislative branches of the Federal Government. In particular, the Office of Management and Budget has been opposed to providing loans to the program since these would lead to short-term increases in the federal deficit. In addition, obligations would necessarily be made through appropriation acts passed by Congress.

This leaves the waste management organization in the uncomfortable position of facing the possibility of substantial cost increases and sizable variations in business volume--which could result from changing technical or regulatory requirements or other developments--but with constrained authority to obtain sufficient revenues to meet its program obligations.

#### Longevity

The waste management program will have an extraordinary longevity. Siting, construction, and emplacement of wastes will likely occupy a period of 45 years at the most. A repository would need to be maintained in a state such that the wastes could be retrieved for various purposes for an additional period of time, perhaps 50 years, before decommissioning.

Thus the time frame for all of these activities runs about a century, already an exceptional period of time for most business organizations, and longer than the lifetime of most of our government agencies. But this is not the end of public concern with the wastes, since these wastes represent an environmental responsibility for thousands of years. Throughout this period the repository sites will require monitoring and reminders to the public of the nature of the sites.

The intensity of the program would doubtless decline as the operational phase winds down, although decommissioning could be a period of significant activity and public interest.

This long-term responsibility of the waste management program is far beyond the historic lifetime of any commercial enterprise, or for that matter any continuous form of government. Even religious organizations do not have an organizational history approaching the requirements for the monitoring period of the waste management program, as they have changed considerably over time. This raises important questions about organizational continuity. In any case, the anticipated term of radioactive waste management and monitoring is unique within the framework of human activity.

#### Phases of the Waste Management Program

As noted in Chapter III, the waste management program will go through a number of distinct phases in the performance of a repository cycle. Each phase will require somewhat different organizational skills and characteristics, and consideration has been given to the changeover from one organizational structure to another better suited to a given phase or phases.

In the initial phase—that of characterizing potential sites and selecting one for the first repository—heavy demands will be placed on the organization to conduct a scientifically valid site selection process. The nominated site will have to conform to Environmental Protection Agency (EPA) standards and Nuclear Regulatory Commission (NRC) regulations. In addition, the waste organization will need to deal sensitively with the concerns of a variety of parties including states, Indian tribes, and other affected entities to an extent well beyond that of any normal business.

In the second phase—during which the repository will be constructed—the key demands on the organization will be for technical expertise, scheduling and cost-effective management.

In the next phase—where waste will be transported, encapsulated and placed in the repository—logistics, quality control, and cost-effectiveness will be imperative. (Heretofore, in this report transportation has been designated as a separate phase. Its inclusion here is solely for purposes of brevity.)

In the last phase—that of closing down and monitoring the repository site—the waste organization must ensure that the decommissioned site will maintain the long-term integrity of the emplaced wastes.

Each of these phases will represent very different demands upon the organization, and might well call for different organizational modes. The sequence of phases will essentially be repeated with respect to developing a second repository.

#### Technical and Regulatory Uncertainty

The waste management program must be equipped to accommodate many technical challenges and regulatory uncertainties which are yet to be resolved.

The principal technical issues include the appropriateness of various geologic media and other characteristics of particular sites, the transport, handling and emplacement of the wastes, the closure and monitoring of the repository site, and the inclusion of defense wastes in commercial repositories.

As for regulation, the nuclear waste program is regulated by the NRC, which must license waste facilities, transportation casks, and other aspects of the program and whose regulations must assure compliance with EPA's standards for allowable radiological releases, and by the Department of Transportation (DOT), which is concerned with the safety of waste transportation systems. A variety of other federal and state regulatory agencies will also have some concerns with the nuclear waste program. (These would include national security agencies if a decision is made to co-mingle defense wastes and civilian ones.)

#### Institutional Coordination and Public Participation

Public participation requirements are built into the NWPA in recognition of the public interests in the waste management program. NWPA also spells out a process of coordinated planning and consultation with states and Indian tribes.

The requirements for program outreach and consultation are so imperative as to claim a significant amount of time of the waste organization. Its technical capabilities must be matched by a clear demonstration of negotiating differences with all concerned parties and bringing them into the planning process. Affected states and Indian tribes are to be involved through formal "consultation and cooperation" agreements and in other mechanisms provided under the NWPA.

In addition, utility companies that pay the costs of the program have an interest in monitoring program activities and costs, as do the ratepayers of these utilities.

#### Political Accountability

The waste management program is subject to a great deal of political oversight both within the framework of the NWPA and outside it. Table 4.1 shows the various Congressional committees that have been involved in different aspects of the waste management program--and probably will continue to be.

NWPA contains stringent requirements for auditing both the financial and programmatic aspects of the undertaking. In addition, the program needs annual appropriations and triennial authorizations from Congress.

Changes in the fee charged to utilities can be overturned by Congress.

Under the present organizational structure, program management is directly responsible to the Secretary of Energy, with the Director of the Office of Civilian Radioactive Waste Management (OCRWM) being nominated by the President, subject to confirmation by the Senate, and serving at the pleasure of the President.

Such a broad range of public oversight and accountability is unusual for a business venture. This accountability not only limits the organization, but will consume a great deal of time and attention by senior management officials.

TABLE 4.1

CONGRESSIONAL COMMITTEES AND SUBCOMMITTEES  
WITH OVERSIGHT OF THE OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

<u>Committees</u>	<u>Subcommittees</u>
<u>House</u>	
Appropriations	Energy and Water Development
Armed Services	
Energy and Commerce	Energy Conservation and Power
Interior and Insular Affairs	Energy and the Environment
Public Works and Transportation	
Science and Technology	Energy Research and Production
Ways and Means	
<u>Senate</u>	
Appropriations	Energy and Water Development
Armed Services	
Commerce, Science, and Transportation	Science, Technology, and Space
Energy and Natural Resources	Energy Conservation and Supply
	Energy Research and Development
Environment and Public Works	Nuclear Regulation
Finance	Energy and Agricultural Taxation

Liability

In any form of transportation or materials handling, there is the possibility of an accident. An accident involving high-level radioactive waste or in long term releases could result in an unusually large liability claim or claims against the Federal Government.

The probability of such an accident may be very low, but the financial risk to the organization of such third-party liability is potentially enormous. Whatever the form of the ultimate waste management structure, it will need a measure of Federal Government protection or liability provisions to assure its financial integrity.

Negative Public Image

Despite the potential for very substantial economic benefits to a community or state, resistance to being the host location for a repository may be expected. This is underscored by the NWPA provision for a veto by the Governor or legislature of a proposed host state or by affected Indian

tribes--although such a veto can be overturned by Congress. The waste management organization must be capable of accomplishing its mission within a negative and perhaps obstructionist environment by spending a substantial part of its time dealing with states, Indian tribes, and other constituencies to resolve issues and concerns. This is a difficult, time-consuming but necessary task of the organization.

#### Comparison With Toxic Waste Disposal

The Panel felt that it would be worthwhile to compare the high-level radioactive waste management business with a somewhat parallel example in U.S. industry--the toxic waste disposal business. The latter shares some of the listed characteristics of the high-level radioactive waste business in kind, if not in degree. There are, however, important differences between the two, as the following comparison indicates.

1. Like radioactive waste management, the toxic waste disposal business has no control over the quantity of waste generated, nor does it control the size or rate of growth of its market. However, there is an important difference, in that a company competing in the toxic waste disposal industry has broad latitude in the particular types of toxic waste it seeks to handle, in the technologies it elects to apply, and in the geographic areas it seeks to serve. Thus, through strategic choices of waste type, technology, and geographic area, a toxic waste disposal company can achieve substantial control over its business volume. A radioactive waste management organization will have limited or non-existent control over its business volume.
2. Toxic waste disposal is also a single purpose service business, but it is not intrinsically a monopoly or franchised business. There are many treatment, storage, and disposal facilities operated by different firms.
3. The power to control costs is constrained in the toxic waste disposal business in the same sense as is true of high-level radioactive waste management--namely, the extent to which costs may be pushed up by changing regulations. However, the toxic waste industry has the freedom to set prices at any level the market will bear, without being subject to legislative oversight as required for the high-level radioactive waste management program.
4. Toxic wastes can be extraordinarily long-lived and some surpass high-level radioactive wastes and spent fuel in the duration of their toxicity and potential harm to people and the environment. However, public concern has generally been greater with regard to radioactive waste than for toxic substances.
5. Substantial technical and regulatory uncertainties do exist in the toxic waste disposal business. However, there are a variety of technologies with considerable operating experience, and there are no major unresolved programmatic issues. High-level radioactive waste disposal, on the other hand, has not yet been demonstrated in practice and faces unresolved programmatic issues such as the role of the MRS. Furthermore, some important procedures and regulations have not been finalized. This makes

the uncertainties facing radioactive waste disposal far more significant than those for toxic waste disposal.

6. Requirements for public participation in toxic waste disposal are not as numerous or as comprehensive as they are for radioactive waste. For example, there are no provisions that correspond to consultation and concurrence agreements. However, public interest in toxic waste disposal is increasing, so it is likely that this difference between the two activities will narrow somewhat.
7. The political accountability of toxic waste disposal operations, while by no means non-existent, differs both in kind and degree from that to which high-level radioactive waste management operations are subject.
8. Third-party liability is of serious concern in the commercial toxic waste disposal field, but the potential liability exposure is not of the same order of magnitude as a high-level radioactive waste management organization could experience.
9. The subject of toxic waste disposal may have negative connotations for the general public in the abstract. In those localities in which the disposal operation takes care of locally generated wastes, the public attitude could well be positive because the economic benefit to the locality outweighs the environmental risk. On the other hand, sites accepting wastes from relatively broad areas are often opposed by local residents who do not want their community to be a dumping ground for materials produced elsewhere. This attitude has made it increasingly difficult to identify new toxic waste disposal sites. Likewise, in high-level radioactive waste management the repository sites will be taking care of wastes shipped in from various parts of the country, so the local environmental cost-benefit consideration will be absent.

These comparisons of toxic waste disposal and high-level radioactive waste management lead to the conclusion that despite some superficial similarities, embarking on the business of high-level radioactive waste management represents an altogether different and immeasurably more substantial set of risks than choosing to invest and compete in the field of toxic waste disposal. While this conclusion has implications for any organization being considered for the radioactive waste management program, it will particularly complicate direct participation by private investor-owned firms.





CHAPTER V. TESTS OF A WASTE MANAGEMENT ORGANIZATION

- o The organization should be mission-oriented.
- o It should be able to maintain credibility with all stakeholders.
- o It should have stable and continuous processes.
- o It should have programmatic authority (including funding)..
- o It should be accessible.
- o It should be responsive.
- o It should have internal flexibility to allocate and reallocate resources, including the ability to hire and fire.
- o It should be politically accountable.
- o It should be immune from political interference.
- o It should be financially accountable.
- o It should be able to stimulate cost-effectiveness.
- o It should demonstrate technical excellence.
- o It should be able to effect a smooth transition in replacing the present organizational structure.

These 13 tests by which to measure alternative organizational structures for the safe long-term isolation of high-level radioactive wastes stem from the Panel's consideration of the objectives described in Chapter III and the characteristics discussed in Chapter IV. The tests also were influenced by advice from various contributors to the Panel's deliberations.

The tests evolved through small group discussions, and were later refined by the full Panel. They were designed to be a composite measuring stick against which to evaluate an array of organizational alternatives. Each of the latter was then assessed as to its likelihood of meeting the individual tests.

Clearly the tests overlap to some degree. For example, accessibility and responsiveness both have a major influence on an organization's ability to maintain credibility. Further, some of the tests may appear to be mutually exclusive, or at least contradictory. For example, full programmatic authority could not co-exist with complete political accountability. In essence, the tests are conceptual tools--their application is a matter of degree.

As the tests were refined and applied to organizational alternatives, it became obvious that no single form of organization could garner high marks on all of the tests. The evaluation process, however, gave the Panel valuable insight with respect to alternative structures and the prospective strengths and weaknesses of each.

As will be described in Chapter VIII of this report, an effort was made to "weight" each of the 13 tests as to its importance as an evaluation tool. The results of this weighting process were useful but not comprehensive or conclusive--a fact which the Panel arrived at whenever it applied quantitative values to conceptual models.

The following listing of the 13 tests is not in the order of their relative importance. It merely reflects the manner in which they evolved in Panel discussions.

### Mission Orientation

This test has two basic components and one corollary consideration. First, it requires that the waste management organization have a single purpose or mission. It seems apparent that this mission should be the safe, long-term isolation of radioactive waste. A mission-oriented organization will gear all of its activities toward this end, rather than shift between a series of relatively unfocused activities. Such an organization can best assure the understanding of its staff and their dedication to the mission.

The second component of this test involves the relationships between this primary mission and any secondary goals. In the case of radioactive waste management, these might include cost-effectiveness, public acceptability, and compliance with schedules for waste acceptance. To the extent that these can conflict with the primary mission, a truly mission-oriented organization must have some sense of priorities among goals or have some way to reach prompt and acceptable resolutions of conflicts. Otherwise, the organization's true mission will be unclear, and it may end up trying to achieve two inconsistent goals.

A corollary consideration has to do with the organizational alignment of the waste management program. If it is part of a larger organization with multiple missions, it is conceivable that waste management may not receive the top-level attention it needs, or that its program requirements may on occasion be subordinated to other agency objectives.

This need not be the case, and there are examples in the Federal Government (the Army Corps of Engineers (DOD), the Forest Service (DOA), and the Department of Energy (DOE) power marketing administrations) which illustrate that sub-cabinet agencies can operate effectively and with a substantial degree of autonomy within a broader Department. There are similar examples in the private sector, e.g. the semi-autonomous divisions of General Motors Corporation and other successful conglomerates.

### Credibility

Any waste management organization will have to operate in an environment with many different groups watching and attempting to influence its actions. Among these stakeholders are states, tribes, local governments, environmental groups, scientific groups, nuclear utilities, residents near potential repository sites, and federal agencies such as the Nuclear Regulatory Commission and the Environmental Protection Agency. If the organization is not credible with these groups, they are far more likely to oppose its actions and attempt to change the program.

An organization earns credibility through its actions. Although there are many ways to earn credibility, a few seem particularly important to the waste program. The organization should demonstrate that it collects and analyzes all necessary technical information in an objective manner. It should be willing to share such information, explain its interpretations, and be willing to consider new options. It should be able to make plans and stick to them, changing only as circumstances warrant, rather than shift from plan to plan. Perhaps above all, it must be committed to its mission of safe isolation of spent fuel and waste, with strict performance standards related to cost and scheduling.

It is possible for any type of organization to gain and maintain credibility, just as any type of organization can lose it. Hence, it may appear that this test would not differentiate among organizations. However, there are certain factors that will influence the likelihood of an organization gaining and keeping credibility. For example, the organization's ability to focus on its mission of safe isolation of radioactive waste to the exclusion of competing goals will be affected by its organizational structure. The ability to collect and analyze data may also depend upon organizational characteristics.

### Stability and Continuity

A successful radioactive waste management organization should follow stable and continuous processes in performing its mission. This stability makes it more likely that plans will be followed, stable long-term relationships with interested groups will be developed, and careful and consistent technical standards will be maintained. An organization that is constantly flitting from one development process to another or that perpetually seems to be rearranging its internal structure and personnel will find it difficult to maintain technical standards and gain credibility.

This stability does not require an unchanging, rock-like organization. Successful organizations do—in fact, must—grow and change. However, stability does imply that changes in structure, process, or personnel be carefully planned, logically defensible, and understandable to outside observers. Changes in response to external events or influences should be identified as such. But stability and predictability have many virtues for a program such as radioactive waste management, and departures from such stability should have significant demonstrable benefits if they are to be implemented.

Personnel turnover is an oft-discussed aspect of stability. While it is true that personnel stability is generally desirable, it is also true that a stable process is at least as important. After all, many organizations that are characterized by great stability also have rapid personnel turnover; the military is perhaps the best example of this. If an organization is set up in such a way that it can adopt and maintain stable policies, a reasonable turnover in personnel should not be an impairment.

#### Programmatic Authority (including funding)

In order to achieve its mission, the waste management organization should have authority to control its activities and resources. In other words, the organization should be free to choose among alternative approaches and priorities to meet its goals. Groups and individuals outside of the organization can and should be involved in defining the organizational mission and in setting broad boundaries on its actions, but the organization itself should have considerable freedom in conducting its activities.

Programmatic authority does not imply complete freedom from oversight. Congress and the courts will always have the ultimate control over the program. Programmatic authority instead means that the organization has the freedom to direct its activities and make choices without substantial prior restraint. These choices can be reversed by higher authorities if necessary, but such authority should be exercised rarely and only when the organization has clearly exceeded its mandate or has drifted far away from the purposes of the program.

One important aspect of programmatic authority is funding. The organization should be able to obtain adequate funding for its activities, and these funds should be both reliable and predictable. If costs increase, the organization should be able to increase its revenues as needed.

#### Accessibility

Since radioactive waste management is of concern to many disparate groups, the organization responsible for the program will inevitably operate in a fishbowl. In order to maintain credibility and public confidence, and to facilitate prompt achievement of the program's goals, the organization must be accessible. Accessibility requires that the organization be open to comments and participation by interested individuals and groups. Information should be shared, hearings held, and public comments welcomed.

#### Responsiveness

In addition to being accessible, the organization must be responsive to inputs from the public and interested groups. Comments and suggestions should be considered in good faith and should be evaluated carefully. This does not mean that the organization can or should comply with every suggestion or request; such actions are neither possible nor desirable. It does mean that the organization should be willing to change its policies or practices when it receives good suggestions, and that the reasons for rejecting other suggestions should be explained and justified.

### Internal Flexibility

Just as the organization needs the programmatic authority to choose how it will achieve its goals, it needs the internal flexibility to decide how it will use its resources to advance the program. It should be able to shift funding, personnel, and other resources in response to changing requirements or new information. Moreover, the organization should be able to make such transfers promptly and without interference from a cumbersome approval process.

There are at least three important aspects of this flexibility. First, programmatic flexibility is needed. The organization should be able to internally realign and prioritize programs, and make changes in internal policies. Second, financial flexibility is desirable. The organization should be able to transfer resources to areas of greatest importance without lengthy rebudgeting procedures. Third, personnel flexibility is required. The organization should be able to hire individuals it wants, transfer them among programs as needed, provide competitive salaries, offer performance incentives, and terminate unproductive workers.

### Political Accountability

A substantial degree of political accountability is inherent in the radioactive waste management program. No matter what type of organization is chosen to run the program, Congress will continue to hold hearings to review the organization's goals and activities. Congress will listen to comments from stakeholders, and may seek to influence the program in a variety of formal and informal ways. Individuals and groups interested in radioactive waste management will express their concerns through governmental channels, and will seek policy changes to address these concerns. A long history of legislation and court decisions makes it clear that Congress can take actions related to nuclear power at any time, so an organization will, at a minimum, be subject to this degree of political accountability.

The organization will be politically accountable to other officials and entities. The President and others in the Executive Branch will monitor program activities, and will be focal points for concerns expressed by states and interest groups. State legislatures and executive officials will hold hearings, request information, and desire to negotiate problems affecting their constituencies.

Political accountability of this type is not only inevitable but desirable. Some external check must exist to ensure that the organization complies with the broad objectives of the program and performs its functions in a manner consistent with legislative, regulatory and procedural standards governing the program. Political accountability will also help to build public support since it provides a review mechanism for the organization's activities that is accessible to all interested parties.

### Immunity from Political Interference

While maintaining political accountability is necessary, it is also important that the organization should be free from undue political influence. Political preferences should not affect hiring practices, pre-siting

decisions, and day-to-day activities. A change of elected officials should not require changes in the organization's plans and personnel. Decisions should be made based largely upon technical, not political, grounds.

While political accountability and freedom from political interference may seem contradictory, there are at least two major differences.

First, political accountability involves broad issues, such as overall program objectives, while freedom from political interference usually involves limited concerns, such as specific hiring or contracting decisions.

Second, political accountability usually involves review of actions after they take place, while freedom from political interference involves how decisions are made before actions are taken.

#### Financial Accountability

The organization should be financially accountable in order for overseers to assure that funds have been expended properly. This auditing function could be performed by either public accounting agencies (such as the General Accounting Office), by private firms or both.

It is important to distinguish financial accountability of this type from external control over the organization's budget. The organization needs to be able to assure itself of adequate revenues and have the flexibility to allocate them to meet program needs. Financial accountability should simply ensure that funds are spent for legitimate and intended purposes.

#### Cost-Effectiveness

Since the radioactive waste management program will be an expensive undertaking, it is important that the organization be able to operate in a cost-effective fashion. It should be able to provide incentives for improved performance. It may be desirable to have a periodic external inspection and evaluation that focuses on the cost-effectiveness of the organization.

#### Technical Excellence

A fundamental goal of the organization is to ensure technical excellence in its designs and the execution of those designs. Without such technical capabilities, the organization will not be able to achieve its basic mission of ensuring safe, long-term isolation of waste.

There are several components of this test. The organization must be able to recruit and retain qualified technical workers at all levels and in all relevant fields, including geology, hydrology, materials science, program management, and others. It must have adequate funding to ensure that superior testing and construction procedures are employed. It must have an understanding of the licensing process, and be able to utilize individuals who have experience with and knowledge of licensing requirements.

Since a number of key waste management activities will be assigned to private contractors, the management organization must have latitude in selecting the best firms commensurate with cost-effectiveness. This latitude--along with careful oversight--should assure that technical excellence, not merely competence, can be brought to bear in the design, construction and operation of a waste management facility.

#### Organizational Transition

This test in and of itself is not meant to disparage or disqualify the existing DOE structure responsible for radioactive waste management. Should this structure be retained, there would be no need for a major organizational transition.

In considering alternatives, however, the Panel felt it necessary to speculate about the phasing out of the DOE program and assigning it to a new or different entity. Should such a major change take place, the matter of transition would be of critical importance. At best, such a transition would be a formidable undertaking for the replacement organization. Handled ineptly, the changeover could result in delaying the program schedule by many months if not years, with a devastating effect on the program's integrity and budget.

It is apparent that one salient measure of any alternative organization must be its ability to effect a smooth transition. Hence the inclusion of this test on our list.



CHAPTER VI. TEN ORGANIZATIONAL ALTERNATIVES

- o Present organization: OCRWM and the Operations Offices.
- o Sub-Cabinet office: such as the Bureau of Reclamation or the EPA Superfund.
- o Administration responsible to a Cabinet department: such as the Rural Electrification Administration or Bonneville Power Administration.
- o Federal executive agency: such as the National Aeronautics and Space Administration.
- o Independent federal commission; such as the former Atomic Energy Commission.
- o Government-controlled corporation: such as the Tennessee Valley Authority, Synthetic Fuels Corporation or the U.S. Postal Service.
- o Mixed government-private corporation: such as Amtrak.
- o Government-chartered private corporation: such as COMSAT.
- o Utility-type private organization: such as the Ohio Valley Electric Corporation or Middle South Utilities.
- o Private corporation: such as Westinghouse Electric Corporation or Waste Management, Inc.

The 10 organizational structures that were initially identified by the Panel are distinguished from one another by differences in ownership, structure and management mode. This list was reduced to a grouping of four as described in the next Chapter, prior to selection of the preferred option identified in Chapter XI.

The 10 organizational alternatives were derived from literature search, organizational structures used in other countries, suggestions made at the Panel's public meetings, and research into various existing organizations. The list includes the Department of Energy (DOE) Office of Civilian Radioactive Waste Management (now in its second year of operation), and nine conceptual models.

These organizational types cover the spectrum from a conventional government agency to a purely private corporation. A variety of specific organizational structures can be included under each of these broad categories. For example, a government-controlled corporation may or may not have shareholder equity. Hence, the organizational alternatives developed by the Panel represent general models, not specific entities.

This Chapter does not evaluate the alternatives nor describe their respective strengths and weaknesses—that is done in Chapters VIII and IX. This Chapter only provides brief descriptions of the important characteristics of each organizational type. Profiles of specific examples of the ten organizational alternatives appear in Appendix C.

### The Present Organizational Structure

The existing radioactive waste management organization consists of three major components: The DOE Office of Civilian Radioactive Waste Management (OCRWM) headquartered in Washington, D.C., several DOE Operations Offices located in different parts of the country, and a large number of contractors. OCRWM has responsibility for overall program planning, financing and execution, while the Operations Offices manage research and site investigation activities. Contractors are heavily involved in program activities at both the headquarters and Operations Office levels.

Under the provisions of the Nuclear Waste Policy Act (NWPA), the OCRWM Director reports directly to the Secretary of Energy. Moreover, this position is subject to Presidential appointment and Senate confirmation. This raises the Office to a relatively high level within DOE: the highest level, in fact, in the history of the waste program. Despite its "Office" designation, OCRWM is organizationally equivalent to an assistant secretary's component.

The Operations Offices are independent of OCRWM and also are responsible directly to the Secretary. These offices are involved in a wide variety of activities, including many that are not related to radioactive waste. Several offices, including the Richland, Idaho Falls, and Savannah River Operations Offices, operate temporary waste management storage facilities. Others such as Oak Ridge and Chicago perform applied research in waste management technology, geologic media, and waste handling equipment.

The present organizational structure differs from a typical sub-Cabinet agency in at least three ways. First, OCRWM is headed by a Director, but the Office's organizational status corresponds to units run by assistant secretaries. Second, the headquarters organization responsible for the program does not have direct control over field operations, although relationships have become increasingly close. Third, the program relies heavily on contractors in both planning and operations.

### A Sub-Cabinet Office

One possible governmental organizational alternative would be an office within an existing Cabinet department or federal executive agency.

Given the prominence and national importance of the waste management program, an office of this type would probably report directly to the Cabinet secretary or agency administrator, rather than through some intermediate official. The office would probably be run by an assistant secretary or deputy administrator. It would be akin to the Bureau of Reclamation or the EPA Superfund office.

There is a variety of possible structures for sub-Cabinet offices, but most fall into a general pattern. The office would be created by legislation and would have a few senior political appointees in major decisionmaking positions. The remainder of the staff would be career civil servants covered by federal employment standards and civil service protections. The office would rely on the department's staff branches for legal, administrative, and financial services. Major policy decisions would require the approval of the Cabinet secretary or agency administrator, and perhaps the approval of other officials within the larger organization.

The office could be financed from a trust fund or from general appropriations. Its budget would be included in the department's total budget and would be subject to oversight by Congress and the Office of Management and Budget (OMB). Major financial actions and plans would probably require clearance within the department and perhaps with OMB. This organizational alternative is essentially very similar to OCRWM, but is described here in generic terms for purpose of comparison.

#### An Administration Responsible to a Cabinet Department

A somewhat similar organizational alternative would be to create an administration within an existing Cabinet department and give it authority over the waste program. Such an entity might report to an assistant secretary rather than directly to a Cabinet officer. However, an administration would have a greater degree of independence and responsibility than a normal sub-Cabinet agency. Examples are the Rural Electrification Administration, the Bonneville Power Administration and the Army Corps of Engineers.

An administration of this type would be created by legislation. Its administrator and deputy administrators would be political appointees, and the rest of the employees would be covered by civil service provisions. The administration would probably maintain its own staff functions and might not rely solely on the department for legal, administrative, and financial support. The administration would be relatively autonomous, although major policy actions would probably have to be cleared with the Cabinet secretary or one of his deputies.

The administration's budget might be listed with the department for bookkeeping purposes, but its outlays and revenues would probably be given a separate section in the overall federal budget. The administration's financial plans probably would be independent of the department's, and its budget would receive less intensive departmental scrutiny than a conventional unit. The budget would be subject to OMB and Congressional oversight. In fact, it is not unusual for Congressional subcommittees to consider an administration's budget entirely separately from the budget of the department which includes the administration.

#### A Federal Executive Agency

The fourth organizational option would be to establish an independent federal executive agency to run the radioactive waste management program. Such an agency would not be part of an existing Cabinet department or other

organization, and would instead be responsible directly to the President. An example of this type of organization is the National Aeronautics and Space Administration (NASA).

An executive agency would be created by legislation. Its administrator and deputies would be political appointees. The agency's other staff members would be career civil servants. The agency would have its own legal, financial, and other administrative offices. Policy decisions made by the agency would require no external approvals, although policy oversight by Congress and the President would exist.

The agency would develop its own budget, which could be adapted to a trust fund. The budget and financial plans would be subject to OMB and Congressional approval. Funding would be provided through a separate appropriation, rather than as part of the appropriation for a larger organization.

#### An Independent Federal Commission

An independent commission is similar to an executive agency except for the manner in which top officials are selected and their tenure. An example would be the former Atomic Energy Commission.

This type of organization is headed by a group of individuals, known as commissioners, who set policies based on majority vote. There are usually five or seven commissioners who hold staggered, multi-year terms. This means that only one or two commissioners are appointed each year. The commissioners usually are eligible for reappointment, sometimes represent particular constituencies, and may intentionally provide a specified partisan political balance on the commission. The commissioners are appointed by the President subject to Senate confirmation.

The commission's staff probably would be civil service employees, although some exemptions might be obtained. The commission would have its own administrative capabilities, and would have broad decisionmaking authority. It would have its own budget and have considerable latitude in the allocation of funds. The budget would, either from appropriations or in the form of a special trust fund, be subject to OMB review and Congressional approval.

#### A Government-Controlled Corporation

The Federal Government has used the corporate organizational form for a variety of business-type activities in the past. These activities generally, although not always, involve commercial interactions with the public, and the corporation is usually intended to break even or make money on some or all of its activities. Examples would be the Synthetic Fuels Corporation, the Tennessee Valley Authority and the U.S. Postal Service.

There is considerable variation among the specific characteristics of these government corporations, so a general model will be described here.

The corporation would be created by legislation. It could be an equity corporation, with all of the stock held by the Federal Government, or it could be created without equity. The corporation would be headed by a Board of Directors. The directors would be appointed by the President with the consent of the Senate, and the make-up of the Board could be designed to ensure that particular groups were represented. The Board would select the corporation's executive officer or officers. The corporation's personnel might or might not be covered by civil service provisions. Even if they were covered, exemptions from such requirements would probably be easier to obtain than for a traditional federal agency.

The corporation would have a high degree of policymaking autonomy. It would have its own staff functions and would not require advance approval of its policies from outside groups. Presidential influence would be less than for an executive agency, but Congressional involvement and oversight would still be significant.

The corporation's budget would probably be more similar to the budget of a private firm than that of a public agency. The budget would not be included in a larger agency's budget and OMB oversight might be somewhat less. Active Congressional oversight would be probable, however. Auditing procedures for the corporation's budget would follow private sector practices rather than governmental ones.

#### A Mixed Government-Private Corporation

This organizational option would be set up as a stock corporation with some stock held by the government and some by private individuals or private corporations. An example would be Amtrak.

In such a mixed corporation--while structurally and financially similar to a government equity corporation--some of the stock would be held by private parties. Generally, limitations are imposed with respect to who can own stock and how much they can hold. The government usually maintains majority ownership. Seats on the Board of Directors are usually apportioned to reflect the ownership shares of the different groups.

Mixed ownership might give the corporation a source of funds other than government appropriations. The private participants might buy their shares and thus provide the corporation with cash or services. These participants would also provide another avenue for oversight. Oversight by Congress and the Executive Branch would be maintained as well. Given the mixed ownership, the corporation's employees might not be covered by civil service provisions, although some sort of labor agreements would probably be in place.

The corporation's budget would still be included in the federal budget. The budget would be arranged like that of a private entity, and would be audited along those lines. Financial oversight by OMB and Congress might be less than for a corporation held entirely by the Federal Government, but would still be significant.

### A Government-Chartered Private Corporation

The third type of Federal Government corporation would be one created by the government and then transferred to private ownership. An example would be the Communications Satellite Corporation (COMSAT).

The government might originally own and operate the corporation and gradually transfer it to private hands, or it might simply create it and turn it over to the private sector immediately. This approach is often thought of as a way to reduce obstacles to private activities in a particular field.

The individuals or groups who can buy stock in the corporation and the number of shares they can hold are usually specified, and seats on the Board of Directors are apportioned based on holdings. The government usually holds a few seats on the Board to make sure that the public interest is represented. The organization's employees are not considered to be government workers, and thus would not be covered by civil service. The corporation would be free to set policies as it wishes without approval or oversight by the government. However, this policymaking freedom is often constrained by the enabling legislation, which may mandate that certain activities be pursued or certain procedures be followed.

The corporation would maintain its own business-type budget, which would not be subject to government approval. The government might still collect revenues and funnel them to the corporation, although this responsibility could be transferred to the corporation as well. Some degree of governmental oversight would probably be maintained through Board members or through provisions in the enabling legislation.

### Utility-Type Private Organization

This organizational option would give responsibility for radioactive waste management to an entity that was not organizationally related to the Federal Government in any way. This organization would be a private entity organized in a fashion similar to a utility, and in fact might be a consortium of nuclear utilities or other groups. Examples would be the Ohio Valley Electric Corporation and Middle South Utilities.

The organization would be given full authority for the program. It would probably have a Board of Directors selected by the stockholders or participants in the organization. The Board in turn would choose operating officers. Employees would work for the private organization, not the government.

Like a utility, the organization would be subject to economic and policy regulation. Changes in major policies or fees would have to be submitted to some sort of government review. This review could involve Congress, the President, the Nuclear Regulatory Commission, the Federal Energy Regulatory Commission (FERC), or perhaps some newly created body. This regulation would be intended to ensure that the organization complied with the program's goals and operated in a cost-effective fashion.

Other than this regulation, the organization could arrange its finances as it wished. It would follow private sector accounting and auditing practices. The organization could be either a for-profit or not-for-profit entity.

#### Private Corporation

The final option considered by the Panel would be a private corporation. Examples abound—Westinghouse Electric Corporation for one, Waste Management, Inc. for another.

The private corporation could be an existing firm or one created for the purpose of radioactive waste management. It would probably be granted a monopoly over these activities, although it is possible to imagine allowing several firms to be involved. These firms could be given monopolies in particular regions, or could be allowed to compete with one another.

This option differs from the preceding one because of the absence of economic and policy regulation. The corporation would be free to set prices, and if prices were set too high the waste producers might choose to expand on-site storage or switch to a competitor and thereby induce the corporation to reduce its charges. The corporation's organization and budget would be like those of a typical private corporation.

## CHAPTER VII. FOCUSING ON FOUR ALTERNATIVES

- o The present organization: DOE Office of Civilian Radioactive Waste Management (OCRWM).
- o Alternative governmental approach: an Independent Federal Commission (IFC).
- o Public/private entity: a Government-chartered "Corporation for Waste Management" (CWM).
- o Private corporation: two concepts--ANCORP and BIDCORP.

### Work Group Assignments

Based on preliminary screening--which took into account the phases, objectives, characteristics and tests of the waste management program--the Panel grouped the 10 organizational alternatives described in Chapter VI into four categories for a more detailed evaluation. Panel work groups were assigned to develop specific organizational models within these four categories:

1. Present Department of Energy (DOE) waste management structure;
2. Alternative governmental approach;
3. Public/private entity; and
4. Private corporation.

The remainder of this Chapter is devoted to descriptions of the present waste management structure and alternatives developed by the work groups. The preferred DOE structure is addressed in its dynamic context and includes capsule recommendations for enhancing its performance. With respect to an alternative government approach, two concepts were explored, but they were narrowed to the independent federal commission as being the preferred alternative within this general category. The described public/private corporation can be adapted to various programmatic forms and phases. And finally, the private corporation approach resulted in two alternate structures--one a management entity and the other assuming a contractor's role.

As developed by the work groups, each of the organizations described in this Chapter was subjected to the 13 organizational "tests" included in Chapter V. In addition, the perceived advantages and disadvantages of each organizational structure were cited in the work group writeups.

To aid the reader in digesting this material, the test-by-test comparisons for each organizational model are presented in Chapter VIII. The advantages and disadvantages of each proposed structure are addressed in Chapter IX. This



format generally parallels the evaluation process conducted by the Panel in reaching its ultimate conclusions and recommendations. The latter are contained in Chapter XII of this report.

#### A. PRESENT DOE WASTE MANAGEMENT STRUCTURE

##### Purpose

The present organizational structure of the commercial high-level radioactive waste management program is the Office of Civilian Radioactive Waste Management in the Department of Energy. The responsibilities of OCRWM include developing repositories for the disposal of high-level radioactive waste and spent fuel; the establishment of a research, development, and demonstration (RD&D) program regarding such disposal; and other purposes defined in the Nuclear Waste Policy Act of 1982 (NWPA). In short, OCRWM is responsible for all aspects of the waste management program for high-level wastes or spent fuels coming out of commercial reactors, and from defense activities if the President so decides. OCRWM is responsible for all phases of the program from RD&D through repository construction, operation, and decommissioning. OCRWM is required to follow a siting process and schedule that are laid out by the NWPA in unusual degrees of detail and prescriptiveness.

##### Organizational Structure

The NWPA provides for the establishment of OCRWM. The Office is located in DOE, and headed by a director who is appointed by the President and confirmed by the Senate. The Director of OCRWM reports directly to the Secretary of the DOE, an unusually high level of reporting for an entity labeled as an office. Thus, OCRWM's status is more like that of an administration or division within a Cabinet-level agency, and OCRWM's director is of a status comparable to an assistant secretary of a Cabinet-level agency. The Director's salary is determined by the schedule for Executive Level IV in the Federal Government. This is a typical level of compensation for a sub-cabinet official.

The internal structure of OCRWM is not defined in the NWPA. The current internal structure is depicted in the first of two following charts. It shows four staff offices attached to the Director's office, and three major operating divisions of resource management, geologic repositories, and storage and transportation systems. OCRWM is dependent on certain staff services of DOE, including the Office of General Counsel, procurement, and personnel.

An important aspect of the current structure is the use of field project offices for the major programmatic activities. Individual field offices specialize in the exploration of different geologic media (including subseabed disposal), storage technologies, and transportation. Each field office has its program/project management responsibilities, as shown in the second chart. While the field offices report directly to the Office of the Secretary, their waste management activities are coordinated with the programmatic direction from OCRWM.

No formal advisory groups are required by the NWPA, although extensive consultation is clearly intended with states and Indian tribes which are potentially impacted by repository sites. In fact, the NWPA provides for formal written agreements with affected states and Indian tribes which lay out procedures for consultation and cooperation on OCRWM's activities.

#### Personnel Practices

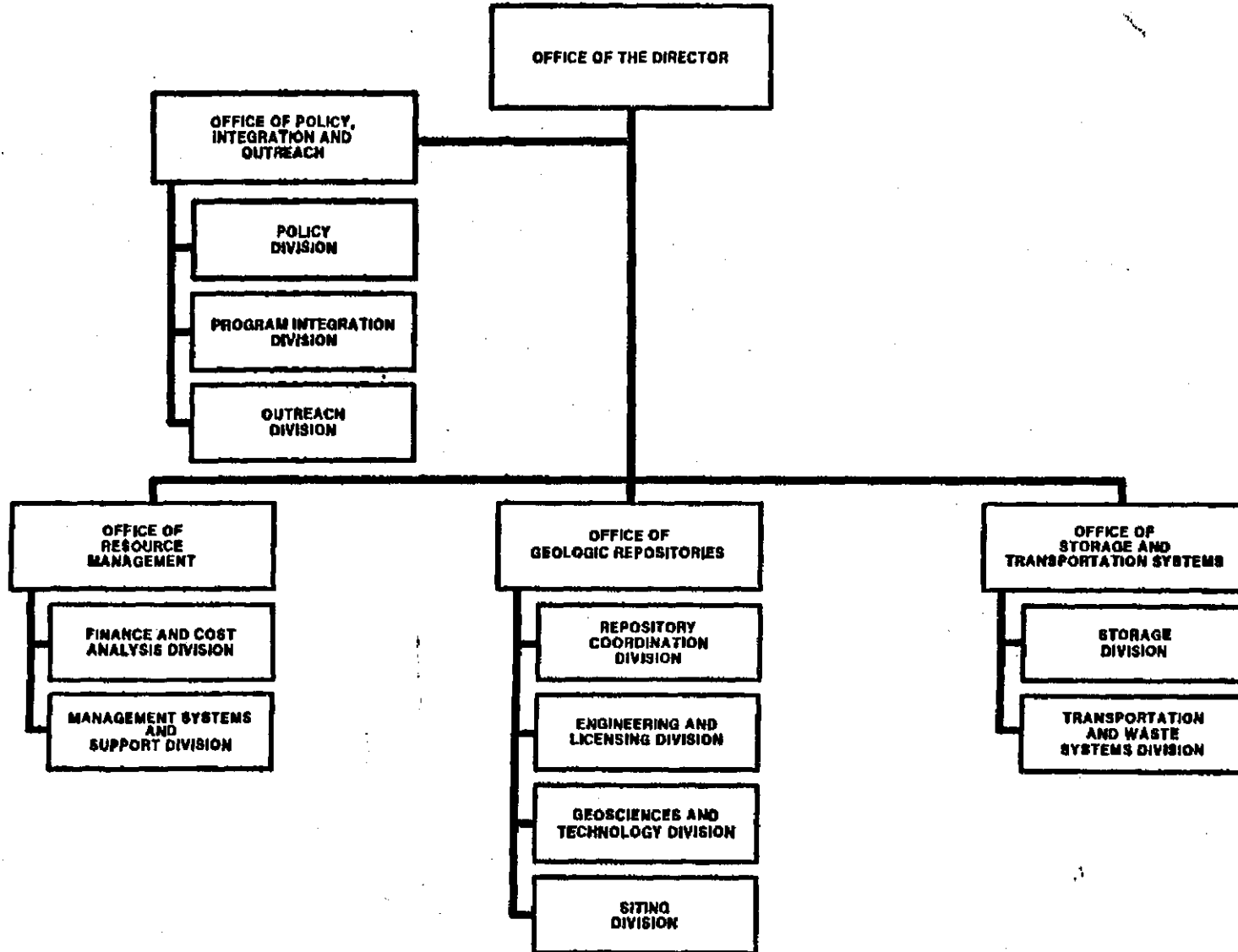
As an entity of the Federal Government, the usual civil service personnel practices apply to the majority of positions in the headquarters office of OCRWM. Some positions are exempt from the civil service rules, but here flexibility is somewhat constrained because OCRWM is located within DOE. DOE conflict-of-interest rules therefore apply, and have proven to be a hindrance in quickly hiring executive-level personnel.

#### An Overview of the Existing Organizational Structure

As described in Chapters VIII and IX, there are serious questions with respect to OCRWM and its perceived ability to carry out successfully the formidable tasks mandated by the Nuclear Waste Policy Act. While identifying and generally agreeing upon these inadequacies, the Panel did not feel it to be appropriate to recommend specific improvements to the OCRWM structure and programmatic elements. Quite simply, the Panel did not view its charge from the Secretary of Energy as that of assuming the role of a management consultant. It also recognized that the new Director is actively involved in enhancing OCRWM staffing and organization through the administrative latitude available to him.

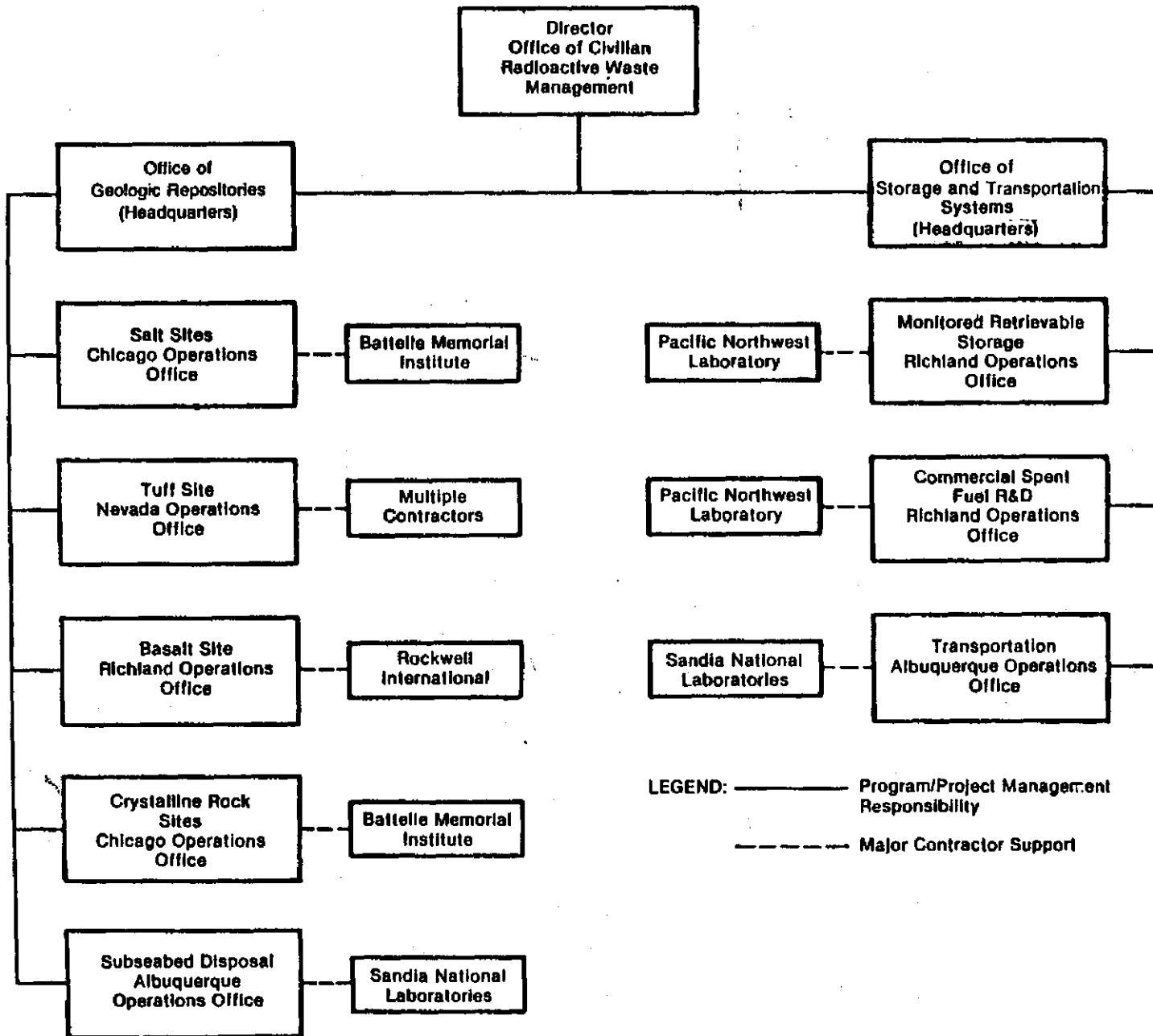
Rather than focusing upon the existing organization, the Panel chose to take a generic approach to the kinds of capabilities which would benefit any organization designated to implement the NWPA provisions. Chapter X of this report is devoted to a discussion of "Key Components of Any Waste Management Structure."

# OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT



**FIELD OFFICE AND CONTRACTOR MANAGEMENT  
RESPONSIBILITY FOR MAJOR PROJECTS**

**OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT**



LEGEND: ————— Program/Project Management Responsibility  
 - - - - - Major Contractor Support

**B. ALTERNATIVE GOVERNMENTAL APPROACH**  
**An Independent Federal Commission for**  
**Radioactive Waste Management (IFC)**

A new federal agency to succeed the DOE Office of Civilian Radioactive Waste Management is among the Panel's four broad organizational options. Two relatively distinct possibilities have been considered by the Panel and enjoy some support. These are an independent federal commission (IFC) modeled heavily on the former Atomic Energy Commission and a federal executive agency (FEA) standing outside the existing Cabinet departments. IFC enjoys more Panel support than FEA and, therefore, will be presented here as the preferred option between these two.

Policy Assumptions

- a. Radioactive waste management is necessarily a function of the Federal Government as protector of public health and safety and of the natural environment.
- b. The Administration and the Congress would be willing to open the Nuclear Waste Policy Act for the narrow purpose of moving OCRWM out of DOE, making it an independent organization and converting it to a commission form.
- c. Ease of transition is a major consideration in choosing alternatives to the status quo.

Description

Purpose—IFC would have full authority over management of civilian high-level radioactive waste. It would take all the responsibilities now lying within OCRWM.

Ownership and Control—IFC is a body to be created by Congress and subject to the same broad control that Congress and the Administration exercise over other permanent independent federal commissions. IFC would have the same budgetary independence as OCRWM since the Nuclear Waste Fund would be transferred to it.

IFC would have 5 commissioners appointed by the President with Senatorial consent, with the President designating the Chairman. Terms would be of 7 years and arranged on a staggered basis so that no more than one appointment is made in any year. Decisions would be by majority vote. IFC would have a permanent staff under the direction of a general manager. As with all federal organizations, IFC would be subject to audit by the U.S. General Accounting Office (GAO).

The alternative FEA would have an administrator appointed by the President with Senatorial consent. The administrator's term would be 12 years.

Organizational Structure--IFC would have the structure described in the diagram at the end of this section. The structure is essentially that of the former Atomic Energy Commission. This structure includes personnel, administrative and legal services and the appropriate functional suborganizations. IFC would be able to make the same use of contractor services as DOE and NRC.

The FEA alternative would have the same organizational structure except for the absence of a commission at the top. The administrator would be the equivalent of IFC's general manager.

Personnel Practices--IFC staff would be civil servants operating under the rules of the Office of Personnel Management and paid according to the General Schedule and other applicable federal pay scales. The same applies to FEA.

Financial Arrangements--IFC's financial arrangements would be identical to the current OCRWM. In essence the Nuclear Waste Fund and waste management contracts with nuclear utilities would be transferred to the commission. This also applies for the FEA.

External Accountability--IFC would be subject to external accountability through its status as a part of the Executive Branch of the Federal Government. Congress would exercise routine oversight. The usual federal financial reporting requirements would apply to finance, as would the somewhat unusual audit provisions of NWPA. IFC would be subject to a wide range of consultation and comment requirements, including those specified by NWPA and various environmental policies. Obviously the Freedom of Information Act and Administrative Procedures Act would apply.

In other words, IFC would be as externally accountable as any other federal agency not directly involved in national security affairs with the exceptions that the commissioners would have term appointments and the Nuclear Waste Fund would not be part of the annual appropriations process. All of this applies to FEA.

### Advisory Groups

IFC would form three advisory groups. The first would be a broadly participative group whose members would represent the major constituencies for radioactive waste management, the Nuclear Waste Advisory Council which appears on the organizational chart at the end of this section. The second group would be a Technical Review Panel composed of academic and other scientists knowledgeable in the range of disciplines appropriate to radioactive waste management. This group's function would be the continuing review of IFC activities to assure their technical excellence.

The third advisory group would be solely concerned with the cost-effectiveness of IFC's operations. The membership of this Cost-Effectiveness Board would be drawn from the nuclear utilities, major engineering firms, economists and accountants. This group would have a small investigative staff and would make annual reports to IFC, the President and the Congress.

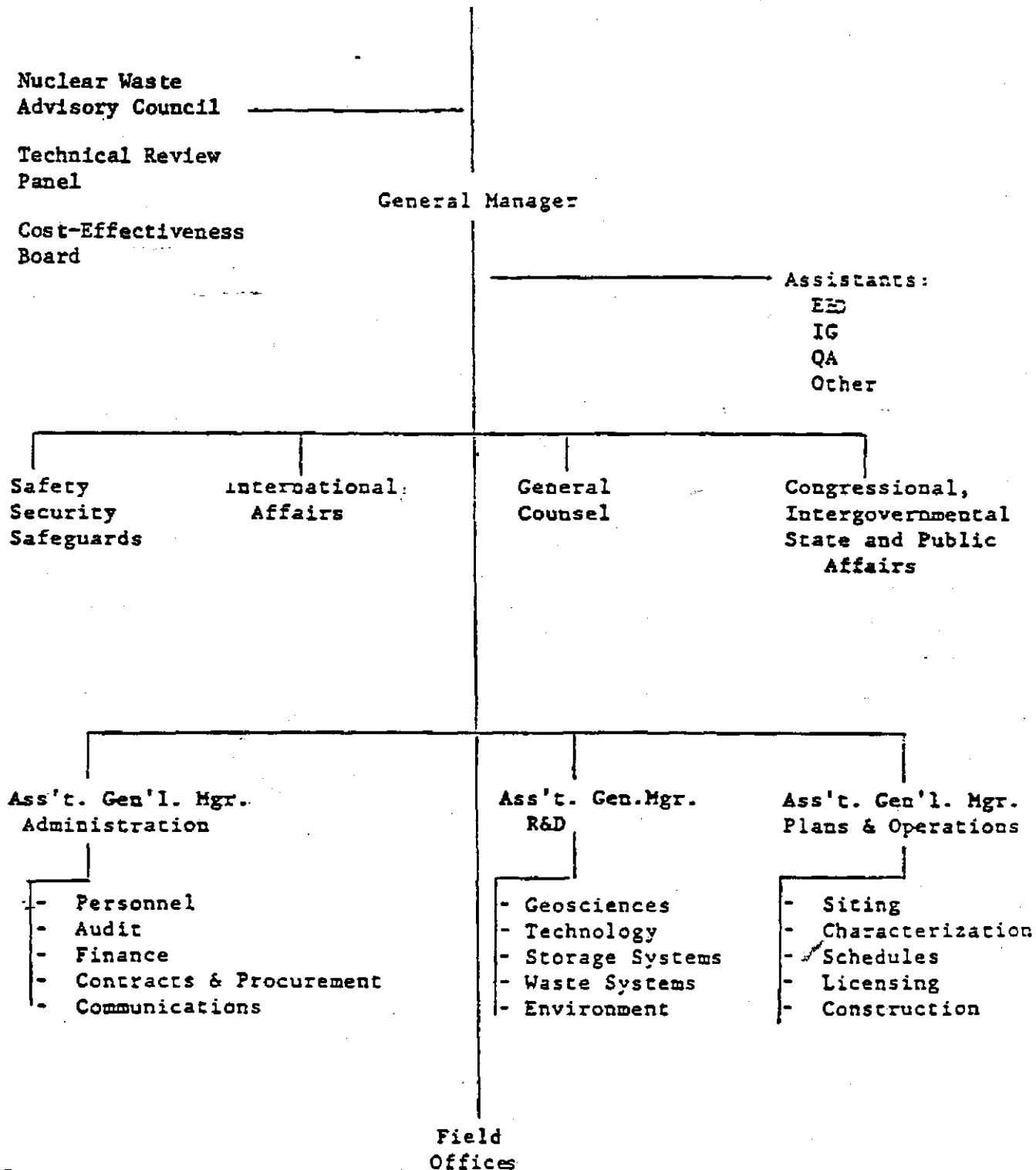
The FEA would have an identical set of advisory groups.

Applicability to Phases

IFC would be able to address the siting phase effectively. The NWPA process would apply to major decisions and the advisory group of stakeholders ought to provide some assistance in addressing political concerns. Construction and operation, including transportation, should present no great difficulties. While IFC could probably switch to an essentially custodial mode of operation after repository closure, it seems likely that a state or federal environmental protection organization would be a better choice for long-term monitoring.

INDEPENDENT FEDERAL COMMISSION

5 Commissioners (Presidential Appointees)  
(7 year appointment)





### C. PUBLIC/PRIVATE ENTITY

#### A Corporation for Waste Management (CWM)

A mixed public/private corporation is one organizational option for radioactive waste management. Although organizations of this type are relatively rare in the United States, they are occasionally established in special circumstances. The National Rail Passenger Corporation (Amtrak), for example, is managed by a Board of Directors consisting of 9 members appointed by the President of the United States and 7 elected by private shareholders. Mixed public/private corporations are commonly employed in many European countries. The organization responsible for radioactive waste management in Sweden is such a mixed corporation, with half of the stock held by the government's State Power Board and half by quasi-private utilities.

#### Description

Objectives/Assumptions--The mixed public/private corporation alternative is based on the following objectives/assumptions:

- o That the Administration and Congress would be willing to open the Nuclear Waste Policy Act to transfer radioactive waste management from the Department of Energy to a public/private entity.
- o That all future revenues will be completely derived from the entities producing the radioactive waste.
- o That independent oversight will be necessary to insure adequate schedule adherence, cost control and quality assurance.
- o That one entity, as opposed to several, must have complete responsibility for radioactive waste siting and financing, and facility construction and operations.

Purpose--The Corporation for Waste Management (CWM) would be established by Congress and given full authority over management and disposal of civilian radioactive wastes. The Corporation would have three objectives specified in its charter:

1. To ensure the safe, long-term isolation of radioactive wastes from the environment, in compliance with standards and requirements issued by the appropriate federal regulatory bodies.
2. To plan, construct, and operate all necessary waste management facilities in an expeditious fashion. Although facilities for ultimate disposal need not be completed by 1998; the Corporation will be obligated to begin accepting waste by that date.
3. To conduct its activities in a cost-effective fashion, and finance all programs from fees on nuclear-generated electricity.

In cases where these organizational purposes came into conflict, the purpose ranking higher in the list would be given preference.

Ownership and Control--The Corporation for Waste Management would be chartered by Congress but would be incorporated as a private corporation. For management purposes, CWM would be considered to operate under the guidelines generally established for private corporations. For regulatory purposes, CWM would be considered to be an establishment of the Federal Government.

The Corporation would be an autonomous entity in the sense that it could sue and be sued. Its enabling legislation would include a fixed limitation on liability, similar to provisions included in the Price-Anderson Act. The Federal Government would assume responsibility for liability in excess of this amount.

The stock in the corporation would be sold to stockholder entities at a par value of \$1 per share. The stock in CWM would under legislation be distributed to stockholder entities based on the formula presented below (for illustrative purposes only):

Nuclear Utilities	38%
Federal Government	31%
Other Relevant Stakeholders	31%

The composition of the above stockholder groups is presented in the following paragraphs.

- a. Nuclear Utilities--The nuclear utilities of the United States would hold 38 percent of the CWM stock. The apportionment of stock among the nuclear utilities would be based on the amount of waste held by each utility plus the amount expected to be generated by reactors for which the utility holds an operating license. Shares would be issued to nuclear utilities for each metric ton of waste. Each nuclear utility would be obligated to purchase the required number of shares. As additional plants are completed, new shares would be issued by CWM to their operators, and a corresponding number of shares would be issued to the Federal Government and the other relevant stakeholder groups to maintain their share of CWM ownership. An annual readjustment of shareholdings would be made to reflect changes in expected waste volumes from existing reactors.
- b. The Federal Government--The Federal Government would hold 31 percent of the CWM stock. The President of the United States would decide how the Federal Government will administer its duties in conjunction with the ownership of CWM stock.
- c. Other Relevant Stakeholders--Other relevant stakeholders would hold 31 percent of the CWM stock. Stakeholder groups would be initially apportioned stock based on the formula presented below (again for illustrative purposes only):

Representatives of States	40%
Environmental Entities	20%
Consumer Entities	20%
Indian Tribes	20%

- (1) Representatives of States--Initially all states which have the potential to be selected to host a repository site would comprise this group and each state would hold an equal amount of CWM stock. As the siting process progresses and sites are eliminated, states no longer under consideration would turn their CWM stock over to the states remaining under consideration, maintaining the principle that all states remaining under consideration would continue to hold equal amounts of CWM stock. The state portion of the other relevant stakeholder category would remain at 40 percent regardless of the number of states remaining under consideration.
- (2) Environmental Entities--Environmental entities having a legitimate stake in the environmental effects of radioactive waste disposal would comprise this group. The distribution of stock among environmental entities would be determined as follows:
  - o A convention of environmental entities would be initially called to determine which environmental groups would represent the environmental entity category.
  - o Those environmental groups selected to comprise the environmental entity category would decide among themselves how their stock would be distributed.
- (3) Consumer Entities--Consumer entities having a legitimate stake in the impacts of radioactive waste disposal will represent this group. The distribution of stock among consumer entities would be determined as follows:
  - o A convention of consumer entities would be initially called to determine which consumer groups would comprise this category.
  - o Those consumer groups selected to comprise the consumer entities category would decide among themselves how their stock would be distributed.
- (4) Indian Tribes--Initially all Indian tribes located on or near potential repository sites would comprise this group and hold equal amounts of CWM stock. As the siting process progresses and sites are eliminated, Indian tribes no longer near potential sites would turn their CWM stock over to the Indian tribes near the sites remaining under consideration, maintaining the principle that all Indian tribes near sites remaining under

consideration would continue to hold equal amounts of CWM stock. The Indian tribe portion of the other relevant stakeholder category would remain at 20 percent as long as there is an Indian tribe located near a site under consideration or selected. If the siting process eliminates all the sites near Indian tribes, then that portion of the other relevant stakeholder stock allocated to Indian tribes would be equally divided among the other three categories.

Board of Directors--The CWM would be run by a 17-member Board of Directors. Sixteen of these directors would be appointed by the three main stockholder categories, and the number of directors appointed by each stockholder category would be apportioned by the distribution of stock. Thus, these 16 directors would be distributed by stockholder category as indicated below:

Nuclear Utilities	6
Federal Government	5
Other Relevant Stakeholders	5

The 6 nuclear utility directors would be elected by the nuclear utilities. Each utility stockholder would cast a number of votes equal to the number of shares held. Election of these directors would be every 3 years for a 3-year term.

The 5 Federal Government directors would be appointed by the President and confirmed by the U.S. Senate. These directors would each have 5-year terms, with the term of one Federal Government director expiring each year. The 5 initial appointments would be for 1, 2, 3, 4 and 5-year terms so as to establish the appropriate schedule of expiration dates.

The 5 other relevant stakeholder directors would be allocated based on the apportionment of stock among the various stakeholder subgroups. Each subgroup would elect its allocated director(s). Election of these directors would be every 3 years for a 3-year term. The nuclear utility directors and stakeholder directors would be elected for the same 3-year terms.

The seventeenth director would be selected by the other 16 directors following each selection of directors by the stockholders, and would serve as Chairman of the Board of Directors.

There would be no limitation on the reelection/reappointment of directors.

Organization Structure--The Board of Directors would be specifically responsible for all external and internal accountability functions. All responsibilities and activities in support thereof could not be delegated to corporation officers or staff. The Board of Directors would also be specifically responsible for the collection of the fee, and any determination on whether or not to raise or lower this fee. All responsibility and activity in support thereof could not be delegated to corporation officers and staff.

The Board of Directors would select a President for the CWM and would also choose the heads of the major operating divisions. These individuals would not have fixed terms of office. The President of the Corporation would be responsible for all day-to-day activities and would have full authority within programmatic guidelines established by the Board.

The CWM would be divided into a series of functional divisions reflecting the various activities of the organization. There could, for example, be divisions responsible for siting activities, transportation, interim storage and processing, and disposal. Each division would have full responsibility for activities in its particular functional area, and would report directly to the Corporation's executives. The divisions would probably have field offices, which would report to the appropriate division director(s). The CWM would have a complete set of staff offices, including legal, accounting, and public relations functions. The Corporation would have full authority to hire contractors as needed.

Personnel Practices--The CWM would be exempt from all Federal Civil Service requirements, salary standards, and personnel ceilings. The Corporation could offer salaries and benefits at levels it felt were appropriate, and could hire and fire employees on the same basis as any private corporation.

Financial Arrangements--The Corporation's activities would be funded from a fee on nuclear-generated electricity. The receipts from the fee would be deposited, as now, in the Nuclear Waste Fund, but the Fund would be removed from the unified federal budget. The CWM could increase the fee at any time, but such increases could not take effect until after a 90-day period of continuous session during which Congress could overturn the fee increase by a joint resolution.

The CWM would be authorized to borrow money from public or private sources. It could sell bonds to the Treasury at any time, subject to an overall limitation of \$3 billion. This limit could be raised only through Congressional action. Such bonds would pay interest rates equivalent to those on Federal Government securities of comparable duration. The Corporation could also issue bonds to the public or any of its stockholders. Any excess funds in the Nuclear Waste Fund could be invested at the Corporation's discretion.

External Accountability--The CWM would prepare an annual report to Congress outlining its activities, accomplishments, plans, and expenditures. Congress would have the authority to hold hearings on any aspect of the program at any time, and would have full access to records and reports of the Corporation. Congress could also overturn any increase in the waste fee by joint resolution within 90 days, and would have to authorize any borrowings from the Treasury in excess of the \$3 billion limit. However, the program would not require reauthorization, and expenditures from the Nuclear Waste Fund would not require appropriation.

The Corporation would retain a private accounting firm to prepare annual financial statements on the program. This private accounting firm would report to the Board of Directors through its Chairman, and not to the CWM President or any of the other officers of CWM. The CWM would be subject to

business-type rather than government-type accounting standards and practices. The Corporation's records would be open to the General Accounting Office and the Office of Management and Budget.

The Corporation would be required by law to utilize the services of an independent oversight contractor to help insure that the CWM mission proceeds on schedule, within the preestablished budget and that strict quality control is maintained. This oversight contractor would be selected through a competitive procurement, could not have previous association with the program and would be specifically prohibited from doing contract work in any other area of the program. The oversight contractor would report to the Board of Directors through its Chairman, and not to the CWM President or any of the other officer's of CWM.

#### D. PRIVATE CORPORATION

##### 1. American Nuclear Corporation (ANCORP)

The Panel is considering a privately owned and controlled corporation as one of four major organization options for the management of commercial high-level radioactive waste. Indeed, it can be strongly argued that a free enterprise economy generally favors such options and, therefore, that each of the other three must bear the burden of showing itself superior in order to be selected. The following is a description of a possible corporation, the American Nuclear Corporation (ANCORP), suited to replacing the DOE Office of Civilian Radioactive Waste Management. A transition to ANCORP would require amending the Nuclear Waste Policy Act, as would adoption of any of the Panel's options except that of retaining OCRWM.

ANCORP would have a number of salient features. First, it would be privately owned and controlled. A major portion of its ownership would be in the hands of such nuclear stakeholders as the electric utilities and the purveyors of nuclear energy equipment and services. ANCORP's management would be accountable to a Board of Directors representing these ownership interests. ANCORP would be federally chartered, with initial organizational activities under the direction of the Secretary of Energy.

Second, the Federal Government would retain its strong existing regulatory roles through NRC and EPA for protection of public health and safety. Because radioactive waste management appears to be a natural monopoly, the government would undertake economic regulation through FERC. Third, because of both stakeholder ownership and economic regulation, ANCORP would be more concerned with cost-effective operation than with maximizing profit.

Finally, ANCORP would not begin operation until after a site for the first high-level waste repository had been selected under the current framework of the Nuclear Waste Policy Act, sometime in the mid-1990's. Within current legal constraints, ANCORP would be free to make decisions about actual construction of the repository, storage instead of disposal, reprocessing, acceptance of defense high-level waste and management of other radioactive and toxic wastes. As an alternative, it is conceivable that ANCORP could begin operations immediately. Doing so, and successfully attracting investor interest, depends upon a high probability of obtaining a site for the

repository and high certainty that the repository will be constructed and operated. Uncertainty in either respect is an extremely adverse investment risk factor.

### Policy Assumptions

1. OCRWM's efforts to select a site for the first geologic repository within the framework of NWPA will continue. ANCORP would take responsibility from OCRWM after the first site has been selected and NRC has issued authorization to construct the repository.
2. While currently viewed as waste, spent reactor fuel has some considerable potential value. Decisions about use or disposal of spent fuel should be made on sound economic grounds.
3. By the time ANCORP would begin operations in the 1990's, economic considerations may favor reuse of spent fuel. Moreover, views about the need for immediate disposal, as opposed to storage of radioactive waste, may have changed, both among political decisionmakers and the public at large. The probability of a change in view favoring disposal may increase substantially with NRC's authorization of the first repository's construction. Having a site approved and available may be sufficient to address public concerns about the feasibility of waste disposal. In light of all these possibilities, ANCORP would be empowered to make decisions about proceeding with construction of the repository or opting for some form of storage. Considerations might include:
  - a. Reprocessing may be desirable for economic or other policy reasons;
  - b. Dry-cask (or other) storage at reactor sites may be optimal pending a decision about reprocessing;
  - c. Monitored Retrievable Storage (MRS) may be the preferred option among the various possibilities for storage or disposal;
  - d. Marginal cost considerations may lead to reevaluation of decisions about including defense or foreign waste in a repository. Weapons proliferation concerns may also influence such decisions.
  - e. There may be other factors developing over the next decade which could argue for flexibility in decisions about storage versus disposal, number of repositories and the like.

### Description of ANCORP

Purpose--ANCORP would have full authority over management of civilian high-level radioactive waste. Purposes to be noted in its charter would include:

1. To ensure the safe, long-term isolation of high-level radioactive waste from the environment, in compliance with federal regulatory standards.

2. To begin accepting commercial high-level waste and spent fuel by the 1998 NWPA deadline and to plan, construct and operate all facilities necessary for doing so in an expeditious fashion.
3. To make economically sound decisions with respect to reprocessing, storage and disposal of commercial, defense and foreign high-level radioactive waste.
4. As ANCORP deems appropriate, to undertake management of other radioactive and hazardous wastes in compliance with applicable regulations and to engage in any other activities consistent with the preceding purposes.
5. To realize profit through the cost-effective conduct of its activities, within the constraints of economic regulation.

Ownership and Control--ANCORP would be chartered by Congress but would be a privately owned and operated corporation. Ownership would be divided equally among the electric utilities with nuclear powerplants and other investors. The utilities' half of ANCORP's common stock would be distributed among the utilities holding NRC nuclear reactor operating licenses on the basis of each licensee's portion of total nuclear electric generating capacity. The general investor portion of ANCORP's stock will be sold on the open market with a par value of one dollar. It is expected that the nuclear industry generally would seek these shares in order to protect its long-term business interests through exerting ownership control over ANCORP to assure effective waste management. Each of these two ownership groups would elect 6 of ANCORP's directors. An additional 3 directors would be appointed by the President of the United States and would include the Assistant Secretary of Energy for Defense Programs.

ANCORP will be organized by the Federal Government. The initial directors would include the president of the Institute of Nuclear Power Operations (INPO), Nuclear Safety Analysis Center (NSAC) or a similar nuclear industry safety oriented organization; the chairman of the Council on Environmental Quality; and the Secretary of Energy, who would be the ANCORP chairman. The sole function of these organizing directors would be to oversee the issuance of ANCORP's stock and arrange a shareholder's meeting to adopt by-laws and select a full Board of Directors.

Normal corporate practice would apply to such government issues as terms and election of directors and other corporate officers, by-laws, annual shareholder meetings and the like. ANCORP would have ordinary corporate status with respect to its susceptibility to federal regulation, tax and general legal liability. Its charter would specify that its nuclear fuel cycle activities fall within the purview of the Price-Anderson Act.

Organization Structure--ANCORP would be divided into a series of functional divisions reflecting the various activities of the corporation. Examples include engineering and construction, transportation, interim processing, storage, and disposal. In addition to these would be the normal array of staff functions, including quality assurance and regulatory compliance, legal, --accounting and finance, public affairs and planning and economic analysis.



Continuing federal regulation will make the quality assurance and regulatory compliance functions extremely important. Similarly, possibilities for expanding ANCORP's activities will require very serious attention to the planning and economic analysis functions. New divisions might emerge if ANCORP were to undertake activities beyond storage and disposal of high-level radioactive waste. Each division would have full responsibility for activities within its functional area and would report directly to ANCORP's chief executive. ANCORP would have the usual corporate ability to retain contractors to assist it.

Personnel Practices--The Board of Directors would select ANCORP's President and other corporate officers and review the President's choices for major managerial positions. The President would be responsible for all day-to-day corporate activities and would have full authority within guidelines established by the Board. ANCORP would have normal corporate flexibility in personnel matters, including setting salary and benefit levels, hiring and firing, and development of bonuses or other incentives for cost-effectiveness.

Financial Arrangements--ANCORP's revenues would be fees on nuclear-generated electricity and, to the degree that the corporation broadens its activities beyond management of commercial high-level radioactive waste, other waste management fees. Initially these revenues would be the fees currently paid into the Nuclear Waste Fund. ANCORP would simply become DOE's successor in the operation of the contracts between the utilities and DOE required under the NWPA. ANCORP would also receive the money remaining in the Nuclear Waste Fund when it begins operation, plus the proceeds of its initial stock offering. In addition, ANCORP's ownership of spent fuel under the NWPA contracts will allow it to realize any economic value from reprocessing.

Once it succeeded DOE, ANCORP would be able to negotiate modifications in the fees charged the electric utilities and develop fee structures for wastes from other sources. The corporation would be able to raise additional capital through the issuance of stock, as well as issuing nonvoting securities, bonds and debentures as its directors desire.

High-level radioactive waste management in the United States has important characteristics of a natural monopoly. Repositories for disposal of this waste will be enormously expensive, making the likelihood of investment in competing facilities low. Moreover, the marginal costs of disposing of additional waste in any given repository are apt to be very low relative both to that of repository's average costs and to either marginal or average cost for a new facility. Thus the operator of the first repository will have an enormous advantage over any competitor. In light of its monopoly position, ANCORP would be subject to economic regulation, most probably by FERC. The corporation will fall within the purview of the Price-Anderson Act with respect to liability and indemnification for nuclear accidents arising from its activities.

Perhaps most important among its financial arrangements is that the inclusion of the users of ANCORP's services and other investors among its owners would create strong incentives for cost-effective operations. The nuclear utilities would, despite their ability to pass waste management costs on to their ratepayers, have substantial interest in cost control. Other investors,

particularly nuclear industry interests, would have even stronger interests of this kind. It is probable that the corporation would not only control its costs, but develop an incentive fee structure in order to reduce overall waste management costs. For example, a shift in the fee structure to some form of charge on waste volume might lead to savings in costs of storage or disposal capacity.

External Accountability--ANCORP will be accountable to external interests in a variety of ways. First, it will be regulated by the NRC as a licensee. This form of accountability would be concentrated on public health and safety. There would be some additional accountability in this broad area to NRC under the rubric of the Price-Anderson Act determinations with respect to liability and indemnification for accidents. NRC would exert some accountability with respect to ANCORP decisions to move beyond management of high-level commercial waste as part of its continuing oversight of ANCORP as a licensee. There is considerable reason to believe that NRC would be more effective in regulating ANCORP than it would be in regulating another federal agency.

Economic and financial accountability would be to FERC as an economic regulator and, because ANCORP stock will be publicly offered, to the Securities and Exchange Commission, primarily in the form of reporting requirements. There would be some additional indirect accountability in this area because of state public utilities commission oversight of ANCORP's utility owners and users.

Obviously, the corporate form would make ANCORP directly accountable to its owners: the nuclear utilities and other investors. This ownership accountability would include something like the normal accountability to customers in a competitive industry. A degree of similar accountability would go to the Federal Government through its three seats on the Board of Directors.

Finally, continuing Congressional interest in radioactive waste management is a certainty. This interest, combined with Congress' clearly established constitutional powers with respect to nuclear energy, mean that ANCORP would remain accountable to general Congressional oversight in the form of occasional hearings and possible legislative action.

Advisory Groups--ANCORP could chose to form one or more advisory groups. Two obvious possibilities include a scientific advisory Board to complement NRC oversight of the corporation's technical performance and a citizen's review group to address environmental, ratepayer and other concerns.

Applicability to Phases--ANCORP's strengths would be greatest in the construction, operation and transportation phases of waste management. Partly in reflection of the political concern in siting, the corporation would not address this phase. Another reason for introducing ANCORP after site selection is to minimize transition difficulties. Perhaps its major advantage during construction, operation and transportation would be its flexibility to adjust activities to reflect economic considerations.

Like the other three options, ANCORP would not be particularly attractive for post-closure. This final phase is properly the concern of some federal or state agency whose mission is environmental monitoring and protection of

public health and safety. The combination of no growth in activities and a high degree of concern for stability raise doubts about the effectiveness of any of the four options which have their greatest strength in development and operation.

#### D. PRIVATE CORPORATION

##### 2. BIDCORP

BIDCORP is the second of two forms of private corporation considered by the Panel. The other, ANCORP, would largely be a service consortium of nuclear utilities and begin operation after OCRWM had obtained a site for the first repository. BIDCORP would replace OCRWM immediately (or as soon as practicable) and be responsible for all phases of repository development and operation.

BIDCORP would have a number of salient features. First, it would be privately owned and controlled. It would simply be the winner of a bidding competition for the national franchise to develop and operate repositories for commercial high-level radioactive waste. BIDCORP could either be a preexisting corporation—Westinghouse is an example because of its wide-ranging nuclear energy activities—or an entity created for the purpose of seeking the franchise. In other words, corporate form, age and other characteristics would not be specified nor controlled except as they bear on any candidate firm's ability to succeed with the franchise.

Second, the Federal Government would retain its strong existing regulatory roles through NRC and EPA for protection of the public health and safety. Because radioactive waste management appears to be a natural monopoly, the Federal Government would also undertake some form of economic regulation.

Finally, while BIDCORP would take on the full range of OCRWM activities in high-level waste repository developments, the corporation would not itself propose repository sites either for characterization or selection. Instead a Radioactive Waste Management Board would make such recommendations to the President under the framework of the Nuclear Waste Policy Act. This Board would include the major constituencies concerned with radioactive waste and would perform a role analagous to a state public utility commission in addition to site selection, including necessary economic regulation noted above.

#### Policy Assumptions

1. The Administration and Congress would be willing to open the NWPA to move radioactive waste management to a private entity.
2. Private ownership and control of radioactive waste management is the best way to assure both cost-effective operations and efficiency in regulatory implementation.
3. The political concerns raised by siting proposals can best be addressed by those most directly concerned and are unlikely to be effectively resolved by an ordinary private corporation.

Description

Purpose--BIDCORP would have full authority over management of civilian high-level radioactive waste, including:

To ensure the safe, long-term isolation of high-level radioactive waste from the environment, in compliance with federal regulatory standards.

To begin accepting commercial high-level waste and spent fuel by the 1998 NWPA deadline and to plan, construct and operate all facilities necessary for doing so in an expeditious fashion.

To make economically sound decisions with respect to reprocessing, storage and disposal of commercial, defense and foreign high-level radioactive waste, as the Radioactive Waste Management Board agrees.

To realize profit through the cost-effective conduct of its activities, within the constraints of economic regulation.

Ownership and Control--BIDCORP would be the winner of a competition for the national franchise to manage commercial high-level radioactive waste. Although a corporation is the most probable, it is conceivable that this entity could be a partnership, a charitable trust or even an individual. Except as questions of ownership and control affect judgments about how well the franchise would be exercised, they are of no consequence to this alternative.

BIDCORP would be subject to control by the Radioactive Waste Management Board, such federal regulatory agencies as NRC and EPA and by appropriate state and local agencies. The Radioactive Waste Management Board would consist of 7 directors appointed by the President and confirmed by the Senate. Their constituency distribution would be (for illustrative purposes):

States	2
Indian tribes	1
Nuclear-generating utilities	2
Environmental community	1
Department of Energy	1

Except for the DOE seat, terms would be for 6 years, with one seat available for reappointment every year. The Board would select its own chair annually. It would develop a limited permanent staff for the purpose of overseeing BIDCORP's operation of its franchise.

The Board would in general function as a public utilities commission functions. In consultation with the Department of Energy and NRC, it would conduct the competition for the award of the waste management franchise. The award decision would be made by the Board with DOE and NRC concurrence. Once the franchise was awarded, the Board would regulate BIDCORP economically,

provide broad policy guidance and review the corporation's proposals for major changes in its activities. Beyond these roles, of course, would be the Board's major decisionmaking role in facility siting.

Organizational Structure--BIDCORP would be organized in whatever fashion it chose, subject to the concerns of NRC as its regulator for public health and safety and to those of the Radioactive Waste Management Board. The organizational options would obviously include status as a subunit within a large corporation concerned with business beyond the waste franchise. The Radioactive Waste Management Board would be free to organize its own staff as it chooses.

Personnel Practices--BIDCORP would have roughly the same degree of freedom in this area as a regulated public utility. The Radioactive Waste Management Board would establish its own personnel practices but would be subject to a limit of 100 professional staff.

Financial Arrangements--BIDCORP's revenues would be fees on nuclear-generated electricity and, to the degree that the corporation broadens its activities, to defense or foreign high-level radioactive waste, other waste management fees. Initially these revenues would be the fees currently paid into the Nuclear Waste Fund. BIDCORP would simply become DOE's successor in the operation of the contracts between the utilities and DOE required under the NWPA, as a consequence of winning the franchise for waste management. BIDCORP would also receive the money remaining in the Nuclear Waste Fund when it begins operation. In addition, BIDCORP would be able to realize any economic value from reprocessing spent fuel.

The activities of the Radioactive Waste Management Board would be funded by BIDCORP.

Once it had succeeded DOE, BIDCORP would be able to negotiate modifications in the fees charged the electric utilities and develop fee structures for wastes from other sources, assuming that it could gain Board approval for such measures. BIDCORP would be able to raise additional capital from the internal resources of any parent corporation, as well as by issuing common stock, nonvoting securities, bonds and debentures as desired.

As noted above, BIDCORP would be the holder of a monopoly franchise, not because such a franchise simplifies transition from the present federal program, but because high-level radioactive waste management is a natural monopoly. Repositories for disposal of this waste will be enormously expensive, making the likelihood of investment in competing facilities low. Moreover, the marginal costs of disposing of additional waste in any given repository are apt to be very low relative both to that repository's average costs and to either marginal or average cost for a new facility. Thus the operator of the first repository will have an enormous advantage over any competitor and, therefore, economic regulation to control this monopoly would be necessary.

The corporation will fall within the purview of the Price-Anderson Act with respect to liability and indemnification for nuclear accidents arising from its activities.

Perhaps most important among its financial arrangements is that BIDCORP's financial success would depend upon its ability to manage its operational costs effectively. It has often been observed that regulated utilities have limitations imposed on their interests in cost-effectiveness by their economic regulators' propensity to pass savings on to the ratepayers. In BIDCORP's case, the Board representation of many constituencies should lead to policies recognizing that cost-effectiveness and profit are linked and, therefore, that BIDCORP ought to be able to benefit from cost savings.

To the extent that the Board adopts such policies, it is probable that BIDCORP would not only control its costs, but develop an incentive fee structure in order to reduce overall waste management costs. For example, a shift in the fee structure to some form of charge on waste volume might lead to savings in costs of storage or disposal capacity.

External Accountability--BIDCORP will be accountable to external interests in a variety of ways. First, this alternative will be accountable to the Radioactive Waste Management Board with respect to general policy and economic regulation. Accountability to the Board implies some degree of accountability to the range of constituencies which are represented on it, the major stakeholders in radioactive waste management.

BIDCORP would also be regulated by the NRC as a licensee. This form of accountability would be concentrated on public health and safety. There would be some additional accountability in this broad area to NRC under the rubric of Price-Anderson Act determinations with respect to liability and indemnification for accidents. NRC would exert some accountability with respect to BIDCORP decisions to move beyond management of high-level commercial waste as part of its continuing oversight of BIDCORP as a licensee.

Finally, continuing Congressional interest in radioactive waste management is a certainty. This interest, combined with Congress' clearly established constitutional powers with respect to nuclear energy, means that BIDCORP would remain accountable to general Congressional oversight in the form of occasional hearings and possible legislative action.

Advisory Groups--BIDCORP might chose to form one or more advisory groups. Two obvious possibilities include a scientific advisory Board to complement NRC oversight of the corporation's technical performance, and a citizen's review group to address environmental, ratepayer and other concerns with more extensive participation than is possible on the Radioactive Waste Management Board itself. Obviously, advisory groups may be established by the Board, by BIDCORP or by the two jointly.

#### Applicability to Phases

BIDCORP's strengths would be greatest in the siting, construction, operation and transportation phases of waste management. Because of the heavy loading of political concern in siting, the Board will play a major direct decisionmaking role. This role should be an asset in siting. Moreover, delegation of programmatic authority to the field would utilize BIDCORP's presumed competence in managing siting activities and external relations.

Like the other three options, BIDCORP would not be particularly attractive for the post-closure phase. This final phase is properly the concern of some federal or state agency whose mission is environmental monitoring and protection of public health and safety. The combination of no growth in activities and high degree of concern for stability raises doubts about the effectiveness of any of the four options, which have their greatest strength in development and operation.





CHAPTER VIII. EVALUATION PROCESS

- o The evaluation tools: how 13 tests, financing considerations, objectives and characteristics of waste management were used in comparing the alternatives.
- o Qualitative evaluations: results of the test-by-test analysis of each of the final four alternatives.
- o Matrix evaluations: essentially inconclusive, but a valuable adjunct to the qualitative analysis.

The Panel was divided into four work groups, each of which analyzed and evaluated one of the final four alternatives. Each work group measured its assigned alternative form of organization against the 13 tests described in Chapter V, reaching qualitative conclusions which are reported below.

The 13 tests so thoroughly reflected the financing principles described in Chapter II, the phases and objectives reported in Chapter III, and the characteristics of waste management discussed in Chapter IV, that no separate measurements were made directly utilizing tools other than the 13 tests.

The full Panel thoroughly reviewed and debated each work group's findings, comparing the strengths and weaknesses of each alternative.

Besides this qualitative analysis, alternative by alternative, test by test, the full Panel undertook a quantitative analysis. This took the form of two matrix evaluations which are described later in this chapter.

## A. TEST-BY-TEST COMPARISON OF ALTERNATIVES

The following sections summarize the work groups' evaluations of each of the final four alternatives, test by test. The main subheads denote the 13 organizational tests. For the sake of brevity, in the subsection headings under each test we use "Present" for the existing Department of Energy structure (OCRWM); "Other Federal" for the alternative governmental approach, which is an independent federal commission (IFC); "Mixed" for the model public/private corporation (CWM); and "Private" for the two model private corporations (ANCORP and BIDCORP). Under "Other Federal" we have included an occasional comment about a federal executive agency (FEA) form of waste management organization which also was highly regarded as a potential federal agency alternative to the Office of Civilian Radioactive Waste Management (OCRWM).

Mission Oriented

Present--Clearly, Congress intended OCRWM to be a single-mission organization. Its structure was set up with a highly visible, single-purpose Director with strong authority delegated directly from the Secretary, and who

would be highly accessible and accountable to the Congress. Nevertheless, doubts remain as to OCRWM's ability to operate decisively and to exert its programmatic integrity within a larger agency which has disparate responsibilities and priorities.

The start-up of OCRWM is a case in point. Although its enabling legislation was enacted in January 1983, OCRWM was not formally created until late September and its first official Director was not confirmed until May 1984.

As presently structured, the Department of Energy (DOE) field offices have multiple missions and may be perceived as detracting from the single-mission orientation. This deficiency is aggravated by OCRWM's lack of direct authority with regard to waste management personnel within the field organization; the same applies to contractors on waste management projects conducted in the field.

And finally, there is the lingering effect of the current Administration's earlier intent to abolish DOE or transfer most of its programs to other agencies.

Other Federal—Mission-orientation for the independent federal commission (IFC) would be quite high. The commission would be subject to no intra-agency pressures to concern itself with anything other than radioactive waste management. Indeed, IFC would not have the legal authority to go beyond its mission. This point also applies to an FEA. Both of these federal organizations are apt to be superior in this area to OCRWM or to a profit-oriented private corporation.

Mixed—The CWM's independence would give it the same strong mission orientation as the federal alternatives. There would be about the same possibility of conflict among its missions, but this potential conflict also could be minimized by establishment of proper priorities among the missions.

Private—ANCORP or BIDCORP would have an equal degree of strong mission orientation because either would be an independent structure whose sole responsibility is for cost-effective—but safe—waste management. This clear orientation contrasts to OCRWM's somewhat diffuse concerns with R&D as well as management. It is possible, of course, that success in the BIDCORP competition by a large existing corporation would bring the same kind of balancing among different corporate activities. The Board's sole concern with radioactive waste management should provide a strong buffer against any such dilution of BIDCORP's focus on its mission.

For either ANCORP or BIDCORP, there could be possible conflict among its missions of safe, prompt, profitable and cost-effective management. In the case of ANCORP, additional conflict could arise if it were to seek to broaden its range of activities; potential conflicts could be minimized if proper priorities were set among the missions and the interests of the corporation's owners. For BIDCORP, these potential conflicts might reflect differing priorities among Board members and, therefore, could be troublesome.

### Credibility

Present--This is a major difficulty for OCRWM. Its parent DOE is seen as an entity with a variety of functions, some of them promotional in nature. There is a segment of public opinion which sees DOE as pressing for a "quick fix" on repository siting and development in order to revive the nuclear industry. The ill-handled siting experiences in Kansas, Michigan, and New Mexico give support to this view.

OCRWM credibility has also been strained by its initial efforts with regard to site selection guidelines. The early versions were criticized for being superficial and vague; this criticism mounted when public hearings were held on environmental assessments of potential sites long before the guidelines were finalized.

Both the OCRWM information program and its institutional relations have suffered from a lack of credibility, an area which is now showing considerable improvement. Nevertheless, a lack of confidence in OCRWM's forthrightness and good faith continues to dog the agency's efforts to mend its political and institutional fences. One important consequence is the snaillike pace of negotiating consultation and cooperation agreements with states and Indian tribes.

Other Federal--As a new organization, IFC would gain some advantage in credibility over the current OCRWM. The commission form itself would be an asset in maintaining this credibility in the future. However, success on this organizational test will be very heavily dependent on how well IFC performs. Steady progress towards its objectives is a major element of success. Another is the defensibility of its technical work and important decisions.

To the extent that their concerns are addressed and that they make few major public complaints about IFC's activities, its three advisory groups would enhance the commission's credibility and help preserve it.

Mixed--CWM's diverse Board representation would help it maintain stakeholder credibility. Utilities, states, tribes, consumers, and environmental groups would be represented on the Board. The availability of information from Congressional hearings and reports of an independent accounting firm and oversight contractor also would build credibility. However, many stakeholders might be critical of the utility involvement in CWM, which could weaken overall credibility.

Private--ANCORP's diverse ownership, including representation of the general public by inclusion of government members on the Board of Directors, would help it achieve and maintain credibility. However, the strong ownership presence of nuclear industry stakeholders may stand in the way of public credibility, especially among environmental interests. Because of the importance of public health and safety concerns, profit-oriented private organizations are likely to be less credible in managing radioactive waste than government.

Oversight of BIDCORP by a Board with broad stakeholder membership should enhance its credibility. In addition, regulation by Nuclear Regulatory Commission (NRC) should provide a major source of credibility for either ANCORP or BIDCORP. To the degree that the public and important interest groups perceive that NRC will be better able to regulate a corporation than it would a government agency such as OCRWM, the overall credibility of waste management would increase. Obviously, ANCORP's credibility would be damaged by poor performance--or even public dissatisfaction with OCRWM's conduct of siting. (ANCORP would not commence its major functions until the first repository site were chosen). BIDCORP's credibility also would be damaged by poor performance or public dissatisfaction with the Board's siting decisions.

### Stability and Continuity

Present--This is a major problem for OCRWM or any federal entity whose senior staff and their superiors serve at the pleasure of the President--particularly when OCRWM's mission will span a number of Administrations. Beyond this inherent weakness is the history of the radioactive waste management program under three different agencies and multiple program structures. Prior to the creation of DOE--and to some extent thereafter--the program and its individual elements were shuttled from one temporary "home" to another. With few exceptions, each change tended to undermine or fragment the program's integrity.

This record of instability has shown marked improvement under DOE--particularly since the enactment of NWPA. But four decades of organizational turmoil and their accrued effect on public opinion cannot be dissipated overnight.

Other Federal--The term appointments of IFC's commissioners, civil service status of its staff and the Waste Fund's high degree of independence from the federal budgetary process should give this option substantially more stability than OCRWM and its predecessors have enjoyed. Similarly, the insulation from untoward political influence that comes from these three characteristics should reduce the incidence of drastic change in waste management policies or activities and, therefore, contribute to stability.

An FEA would be about equally attractive on this test.

Mixed--CWM should be relatively stable considering the way the Board of Directors is constituted, the selection process, and the tenure of officers. CWM would be relatively insulated from political influence and therefore policies and officials would not change frequently in response to political concerns. There would be a close balance of power on the Board. There may be occasional major policy changes in response to changes in directors; however, this should not undermine the organization's long-term stability.

Private--ANCORP or BIDCORP should be stable relative to other options. A private corporation's insulation from political influence means that policies and officials would not change frequently in response to political concerns. If there were to be a close balance of power on the Board associated with strongly differing views about the corporation's activities, there may be sporadic major policy changes and some undermining of this stability.

Programmatic Authority

Present--There are strong constraints on the programmatic authority of OCRWM due to the extensive oversight of the Congress. A large number of Congressional committees have jurisdiction over various aspects of the waste management program.

CommitteesSubcommitteesHouse

Appropriations  
 Armed Services  
 Energy and Commerce  
 Interior and Insular Affairs  
 Public Works and Transportation  
 Science and Technology  
 Ways and Means

Energy and Water Development  
 Energy Conservation and Power  
 Energy and the Environment  
 Energy Research and Production

Senate

Appropriations  
 Armed Services  
 Commerce, Science, and Transportation  
 Energy and Natural Resources  
 Environment and Public Works  
 Finance

Energy and Water Development  
 Science, Technology, and Space  
 Energy Conservation and Supply  
 Energy Research and Development  
 Nuclear Regulation  
 Energy and Agricultural Taxation

Such oversight would limit the programmatic authority of any alternative form of waste management organization. But the existing structure appears to be more vulnerable to Congressional and other constraints and influences than the alternative organizations.

In structuring OCRWM, the Nuclear Waste Policy Act (NWPA) attempted to give it adequate programmatic authority, and OCRWM indicates its willingness to accept and exercise that authority, including best efforts to meet the milestone dates and to control costs. OCRWM is developing its own resource management system, separate from DOE and internal to the Office. It is setting up its own business management capability, coupling project performance and schedule to cost data.

Despite these improvements, OCRWM will be under the close scrutiny of Congress, and its ability to shift programmatic priorities might be more constrained than structures with a freer rein to carry out a unique mission.

Other Federal--IFC should have a decidedly greater measure of programmatic authority than OCRWM because it would stand outside of any larger executive agency. Those aspects of authority associated with financial independence would be the same as for the status quo and inferior to either of the non-federal options. All of this is also the case for an FEA.

Mixed--The CWM would also have virtually complete programmatic authority. It would be subject to relatively few restrictions, such as the possibility of Congressional override of increases in the waste fee, but would essentially be able to direct the program as it sees fit.

Private--ANCORP or BIDCORP would have virtually complete programmatic authority. Either would be subject to regulatory restrictions and to the possibility of Congressional assertion of influence, but would essentially be able to operate as it determines. ANCORP's or BIDCORP's freedom of operation should be markedly superior to certain other alternatives.

### Accessibility

Present--OCRWM now stresses accessibility. The latest organization chart includes a major division reporting to the Director, the "Office of Policy, Integration and Outreach." It is staffed with personnel largely recruited from outside DOE. It is also clear that the new Director personally intends to be very accessible. Accessibility has been emphasized to all principal staff.

Other Federal--IFC would share the high degree of accessibility that all federal agencies enjoy. The general accessibility implied by both a public institution in a democracy and Congressional oversight will be complemented by a long list of statutory and other policies including the Freedom of Information Act, the NWPA, National Environmental Protection Act, the Atomic Energy Act, the Federal Advisory Committee Act and the Administrative Procedures Act.

There is some reason to expect that the commission form may be the most accessible governmental option. Each of the five commissioners would be a channel through which outsiders might raise their concerns to the commission, since any commissioner would be able to put items on IFC's agenda. This situation is in marked contrast to OCRWM or to an FEA option, both of which require getting the attention of the agency's head in order to raise major concerns.

Mixed--An organization of this type should be relatively accessible since it includes representatives of many groups on the Board of Directors and must issue annual reports. CWM would probably not have as many formal hearings as a government entity, and so might be somewhat less accessible in this regard than some other alternatives.

Private--ANCORP and BIDCORP would be relatively accessible since either would include public stakeholder and investor representatives among its directors. Apart from stakeholder representation, the multiple member Board form allows several channels through which outsiders may raise their concerns, since each board member would be able to force discussion of issues he or she thinks important. Additional major sources of accessibility would come from regulatory oversight by NRC and the Federal Energy Regulatory Commission (FERC) and from the Securities and Exchange Commission (SEC) reporting requirements. Neither ANCORP nor BIDCORP would be subject to the Freedom of Information Act, and neither would have as many formal hearings as a purely government entity; thus either might be somewhat less accessible than other alternatives.

### Responsiveness

Present--OCRWM clearly has attempted to be responsive. It must be responsive to NRC in order to get a repository license and it must be responsive to secure funding. The real difficulty in this area is to find ways to be responsive, and to be perceived as being responsive to groups which do not have clear roles in the process as do NRC and the Congress but which do have the inherent power to delay or halt the program (e.g., states, Indian tribes, environmental groups). Responsiveness to these groups while maintaining programmatic authority and a reasonable degree of adherence to a schedule is a very difficult management task. One of the major criticisms that has been leveled at the organization in its brief life to date has been that there is an inevitable tension between being responsive while at the same time trying to meet the very specifically designated milestones in the NWPA. OCRWM has been unable to meet some of the early milestones in the NWPA as a result. Its recently accelerated efforts to put in place consultation and cooperation agreements with the states, its close collaboration with the Environmental Protection Agency (EPA) and NRC on the siting guidelines, and the extensive revision of the Mission Plan in response to comments on earlier drafts all are seen as evidence of OCRWM's responsiveness. Much, however, remains to be done in this area.

Other Federal--IFC's responsiveness to outside interests would be limited relative to other options, except possibly the private corporation. The commission form and independence arising from term appointments would make the IFC less responsive to either the Administration or to Congress than most federal agencies. The Waste Fund's insulation from normal budgetary control would further reduce responsiveness.

However, NWPA's provisions for consultation with and concurrence by other agencies in important program decisions, and the specific role of the President in making recommendations for site characterization and site selection, would require that IFC be responsive to concerns arising from these decisions.

The commission would need to be responsive to NRC, and to a lesser extent to EPA, although it can be argued that the degree of responsiveness to these regulators would be less than would be the case for either of the corporation options. Despite its relative freedom from Congressional control, IFC would necessarily be responsive to Congress both through routine oversight activities and General Accounting Office (GAO) audits.

IFC would also be responsive to its advisory groups, although perhaps not so highly responsive as would be the case if these groups had formal authority over the commission. Responsiveness to these groups would turn largely upon the potential costs to the commission of having strong dissatisfaction within the groups and the inevitability that such dissatisfaction would be publicly expressed and of great interest to Congress.

Finally, the commission form itself may inhibit responsiveness somewhat by making decisionmaking more ponderous than might be the case with an organization with a single person in control. Thus an FEA may be somewhat superior in responsiveness to an independent federal commission.

Mixed--The CWM would have to be responsive to the Federal Government, the nuclear utilities and states, Indian tribes, and environmental and consumer interest groups due to their ability as members of the Board to vote on management and policy issues. CWM responsiveness to other stakeholders would probably be somewhat less, although the Board make-up appears to be comprehensive, well thought out, and designed to fairly consider the views of all stakeholder groups.

Private--ANCORP or BIDCORP would be highly responsive to its owners, users, and regulators. As a privately-owned organization, either could be expected to be less responsive to interest groups among the general public than a government organization might be. The corporate form, however, allows ANCORP flexibility to be appropriately responsive to any interest within the context of its mission and objectives.

### Internal Flexibility

Present--Serious impediments exist (e.g. Civil Service constraints, DOE conflict-of-interest rules, need for political clearance on appointed positions). It is possible, although difficult, to bring outside people into the senior staff via the "exempt" route. OCRWM has recently shown that it can hire senior people in this manner. As a generality, either the federal commission or the corporate forms would be more flexible on staffing issues.

Other Federal--Flexibility of this sort is generally limited in government agencies. The combination of a large number of statutes and regulations imposing procedures, especially in personnel matters, and the evolution of relationships with important external constituencies results in major constraints relative to non-governmental options. It is possible, of course, to look to Congress to provide exemptions from many of the normal restrictions, as it did for the Atomic Energy Commission (AEC). An FEA should be identical to IFC on this test.

Mixed--The CWM would have almost complete control over its finances and personnel policies and, therefore, enjoy a great deal of internal flexibility.

Private--ANCORP or BIDCORP would have almost complete control over its finances and personnel policies, and thus would have very great internal flexibility relative to governmental alternatives. Policy and economic oversight by the Board and NRC regulators would provide limited constraints relative to those imposed on the other alternatives.

### Political Accountability

Present--It would be hard to conceive of an organizational structure which by its nature would be more politically accountable than OCRWM. It is accountable to the Executive Branch, at whose pleasure the Director serves, and to the Congress, which holds it accountable for explicit provisions of NWPA.

Other Federal--IFC's political accountability should be less than that of OCRWM because of the independence implicit in term appointments for the commissioners and the structure of the Waste Fund. Obviously, however,



Congress will exercise political accountability through oversight activities and the ever-present possibility of legislative action. Because such intervention would require substantial legislative effort, it is unlikely that Congressional exercise of accountability would be so intense as to jeopardize progress in IFC's mission.

The commission would also be accountable to the President, both in the broad considerations which lead to selection of individual commissioners and through some degree of informal exercise of influence. Finally, the Nuclear Waste Advisory Council will have some ability to hold IFC accountable to political concerns.

The commission and an FEA should be equal on this test and somewhere between the status quo and the non-governmental alternatives.

Mixed--CWM would have substantial political accountability. Five of its directors would be Presidential appointees, and Congress would have complete access to information and could hold hearings at any time. However, political accountability would be quite limited since the federal directors would serve for fixed 5-year terms and 12 of the directors would not be political appointees. Moreover, the Congress would not authorize or appropriate funding for the program.

Private--ANCORP or BIDCORP would have indirect political accountability. Three ANCORP directors and the BIDCORP Board would be Presidential appointees. Congress would have access to information and could hold hearings at any time. However, political accountability would be quite limited since only 20 percent of the ANCORP directors would be political appointees, and in the case of BIDCORP all but one of the Board members would have a term longer than a Presidential term. No authorizations or appropriations would be required. Relative to other options BIDCORP's political accountability will be low, although higher than normal for a private organization.

#### Immunity from Political Interference

Present--In this regard the existing structure would probably rank quite low, mainly because the Director and other key exempt employees serve at the pleasure of the President, whomever he may be at any given point in time. But, then, potential for political interference is inherent in any structure for a program where so many activist groups and political constituents have such direct interests and, in fact, such "political interference" is encouraged in specific provisions of NWPA.

Other Federal--IFC would be substantially more immune from political influence than OCRWM. The term appointments of its members, including the dispersion of each full cycle of appointments over two Administrations, civil service status of the staff and budgetary independence would make IFC very resistant to political manipulation relative to other federal agencies. Immunity will be somewhat less for an FEA. Obviously, greater immunity will be enjoyed by the corporate options.

Mixed--CWM would be as immune as possible from political interference with its policies. The only avenues for political influence would be through the periodic appointments of federal directors (one appointment occurs only once per year) and the Congressional power to hold hearings and take legislative action.

Private--ANCORP or BIDCORP would be relatively immune from political interference. Avenues for such influence on either would be through Presidential or DOE appointments and Congressional hearings and other oversight activities.

### Financial Accountability

Present--NWSA established a Nuclear Waste Fund which finances activities of OCRWM. The 1-mill-per-kwh fee paid into the Fund by utilities which produce the wastes can be adjusted by the Secretary of Energy, subject to a veto by Congress. OCRWM must obtain triennial authorization from Congress and annual appropriations in order to spend monies in the Fund. Annual reports to Congress on the financial condition of the Fund are required, and an external audit of the Fund occurs at regular intervals. Thus, OCRWM is accountable to the President, the Congress, and the public for the use of monies in the Fund. That process represents an extraordinary degree of external financial accountability.

Other Federal--NWSA's provisions imply a high degree of accountability for the Waste Fund. This would apply as strongly to IFC or an FEA as it currently does to OCRWM. Beyond these special provisions are the normal mechanisms for assuring accountability by federal agencies. The use of an advisory group concerned with cost-effectiveness and armed with its own staff would enhance IFC's performance on this test. While there may be a marginal advantage here for the FEA over a commission, each would be superior to the non-governmental options.

Mixed--The CWM's financial activities would be subject to both public and private audits, so awareness of the Corporation's finances would be widespread. CWM would be accountable to its ratepayers--the utilities--because of their representation on the Board. It would be much less accountable to the Office of Management and Budget (OMB) and Congress since it would be an off-budget entity without the need for periodic authorization or appropriation. Its main accountability to Congress would occur if it sought increases in the waste fee or its borrowing authority.

Private--ANCORP would be accountable to its ratepayers--the utilities--because of their representation on the Board, and BIDCORP to its contracting authority. ANCORP would be highly accountable to FERC and generally to the investor community both through direct ownership and through SEC requirements. BIDCORP would be responsible also to the Board, and ultimately to all the stakeholders. There would be no direct financial accountability through appropriations processes.

### Ability to Stimulate Cost-Effectiveness

Present--This is difficult to achieve in a monopoly business, and especially one which, by the nature of its particular mission, cannot look forward to any growth or diversity expectations. These characteristics largely eliminate the classical motivation for cost-effectiveness, namely, the expectation of profit, which even if major program cost savings could be achieved, would likely flow back to the fee payers (and the electricity users.)

There is also the fact that there are many stakeholders to whom the organization has to be accessible and/or responsive, and there is the potential for substantial technical changes as site characterization proceeds and as NRC and EPA procedure evolves. Consequently, maintaining a coherent project schedule, obviously a key to cost-effectiveness, cannot be assured, even neglecting the possibility of the kind of delays brought on by legal challenge.

Apart from the above constraints on encouraging cost-effectiveness, which would apply to any organization, a further impediment is that with the federal civil service system, it is difficult to offer meaningful financial rewards for exceptional performance, and in a single mission organization with no visible growth and diversification opportunities, professional upward mobility is also quite limited. Thus, the best performers often have to leave the program, e.g., go to private industry, to get such benefits. This may be less of a constraint to the contractors and their personnel, although this program is so much in the public eye that even for the contractors, many practices normal to private industry might not be politically acceptable for contractors. In general, motivation by substantial rewards is an advantage for a private or quasi-private corporation, and the lack of that capability is a disadvantage to any federal structure.

Other Federal--Government organizations are generally thought to be less capable of cost-effectiveness than corporations, and concerns have been raised about this aspect of OCRWM's behavior. It should be noted, however, that both OMB and Congress have been increasingly concerned with improving the performance of federal agencies in cost-effectiveness.

IFC's advisory group concerned with this area should be especially helpful, given its staff capability and mandate to report its findings publicly. Clear mission-orientation would help by allowing IFC staff to focus the commission's resources well.

While some possibilities exist for providing staff incentives for cost-effectiveness, these are limited relative to what a corporation is free to do. Moreover, absence of any profit incentive would add to the likelihood that a commission or the closely-related FEA form of organization would be less impressive than the non-governmental options but superior to OCRWM.

Mixed--As with ANCORP, the representation of utilities on the CWM Board, the corporation's goals, the requirement to utilize an independent oversight contractor, and the flexibility in personnel hiring/firing all suggest that the CWM would be able to achieve cost-effectiveness.

Private--The representation of both utilities and other investors on the Board, the corporation's goals, and the flexibility it has in personnel and financing all suggest that either ANCORP or BIDCORP will be able to stimulate cost-effectiveness. The private corporation should be superior to other options in this regard.

### Technical Excellence

Present--OCRWM has drawn most of its senior technical staff, both at headquarters and in its contractors, from people with long experience in the business, and with generally good technical competence. However, excellence is another matter, and the nature of the business, its very long duration and its negative image, might well discourage bringing onto the permanent staff people with extraordinary competence. It is possible that the contractor organizations, recognizing that they are selected (and can be removed) based on their technical performance, can better strive for excellence. It is also possible that the level of technical excellence can be improved and supplemented by (technical) advisory Boards. Such bodies, if given serious responsibility, should be able to attract a peer group of excellent capability. In general, large private corporations represent a much greater diversity of professional opportunities for growth and reward and are thus better equipped to strive for excellence.

Other Federal--IFC should be able to perform quite well on this dimension. Radioactive waste management is an important and highly visible national concern. The commission would be both healthily and stably financed. Thus it should be able to attract good talent in the relevant fields, especially at junior professional levels, and keep such talent relatively permanently. An FEA would be in the same situation.

Mixed--CWM would be able to hire and retain quality employees given its personnel flexibility. It would also be able to obtain an adequate amount of funding to ensure proper construction and operation of facilities. This combination indicates that the CWM would be able to achieve technical excellence. There is some possibility that this goal could be compromised if pressures to provide waste disposal facilities rapidly or inexpensively are allowed to offset quality standards.

Private--Either ANCORP or BIDCORP should be able to hire and retain quality employees given its personnel flexibility. Moreover, the highly visible nature of radioactive waste management and its ability to pay well and provide other employee performance incentives should contribute to the quality of its staff. Either ANCORP or BIDCORP should also be able to obtain an adequate amount of funding to ensure proper construction and operation of facilities. Thus either private corporation should be able to achieve technical excellence. There is some possibility that this goal could be compromised if pressures to provide waste disposal facilities are allowed to offset quality standards. Obviously such pressures would affect other alternative organizations as well. Since NRC and other regulatory oversight is apt to be more effective for a private corporation, these pressures should be less for ANCORP or BIDCORP.

### Ease of Transition

Present--Any organizational change will necessarily involve a difficult transition, even if most of the bureaucracy is simply transferred. A major organizational change will require a change in the NWPA legislation. It would seem much simpler to try, within the latitude permitted by NWPA, to graft improvements onto the present structure, e.g., those described in Chapter X. However, if the existing structure is to be replaced, it would be best to make this change soon, before the present organization gets further solidified. Agreements and understandings with a variety of constituencies are being cemented in place each day that goes by. The states and Indian tribes feel they have been given certain commitments. The NRC and OCRWM have agreed on general siting criteria. Technical decisions regarding site characterization needs, as well as overall waste system design, are moving forward. The more a new organization is bound by OCRWM decisions, commitments, and actions at the time of transition, it would be limited in some of the other areas, such as ability to stimulate cost-effectiveness. Once a site for a waste repository has been selected and approved, OCRWM could, within the present statute as we interpret it, choose between constructing and operating the facility itself, or contracting these responsibilities to qualified firms. Or perhaps responsibility for the program could be transferred from OCRWM to some other governmental organization; this would require legislative action. There are a number of organizational forms which would appear to be reasonable candidates to take over this responsibility. One warranting serious consideration would be a "State Waste Authority" that could be established by a host state to carry out these functions as a prime contractor.

Other Federal--IFC would be very good on this dimension--as would an FEA--relative to the two corporate options, since it is at least conceivable that the transition would merely be movement of OCRWM staff to a new federal organization.

Mixed--A shift to an organization of this type might be difficult but not impracticable. An entirely new internal organizational structure would be created, and members of the Board of Directors would have to be selected. Personnel would have to be hired and organized, and transfers of existing offices would have to be accomplished. All of this indicates that a transition to the CWM would have to be well planned and implementation well managed.

Private--ANCORP's activities are closely related to the nuclear fuel cycle activities of its utility owners. This preexisting expertise among the owners should reduce startup difficulties. Moreover, allowing OCRWM to complete site selection puts the transition to ANCORP at a point in the waste management process which will be marked by major changes in any event, a convenient time to introduce a new organization. In addition to beginning operations at a natural transition point, ANCORP could further reduce any startup difficulties by using the decade remaining until that time for planning and other transitional activities. Indeed, it may even be desirable to allow the nuclear utilities to establish ANCORP now in order to provide for extensive planning for the beginning of operations in the 1990's and for exploration of

activities beyond managing commercial high-level radioactive waste. ANCORP is equal to or better than any of the other alternatives with respect to this test, except retention of OCRWM.

Transition to BIDCORP implies major change in the current program. While the franchise competition itself may be relatively easy to manage, the successful bidder may face formidable tasks in getting up to speed. The transition is likely to come during the very tightly-scheduled process of evaluating potential sites for the first repository. Some schedule slippage is very likely. Moreover, the intense political concerns surrounding siting suggest a considerable amount of effort will be necessary to establish effective working relationships with state and tribal officials and others heavily involved with siting.

## B. MATRIX EVALUATIONS

Early in its deliberations, the Panel discussed the use of quantitative matrix evaluations to supplement its critical-path logic analyses of various organizational concepts. It should be noted that there was little if any Panel support for basing organizational preferences upon numerical values--the latter simply do not lend themselves to the complex factors intrinsic to this type of study.

Nevertheless, it was felt that the assembly and "grading" of one or more matrices might be a worthwhile exercise in: (1) identifying and refining the tests of a waste management structure; and (2) supporting the tentative findings developed through a qualitative evaluation process. As it turned out, the matrix approach did prove to be useful in both contexts, although its substantive results were at best inconclusive.

In July-August 1984 the first rough matrix was developed; its comparative elements were 10 organizational alternatives and an equal number of organizational tests. These tests, which are described in Chapter V, represent considerations felt to be desirable in an organization charged with the management of high-level radioactive waste. In attempting to assign values to this matrix, the Panel quickly found that certain of the matrix elements were subject to conflicting interpretations and other inadequacies which badly skewed the preliminary results. This was useful in and of itself, since it disciplined the Panel to hone its test definitions and expand them from 10 to 13. The resultant revised matrix appears as Table 8.1. at the end of this Chapter. (The collective "scores" on this matrix, however, proved to be widely disparate and instilled little confidence that numerical values could vie with subjective analysis of either "real" or conceptual organizational models.)

A different type of matrix approach was applied at two Panel meetings in September 1984. Again it utilized the 13 organizational tests--but this time in comparison to the 4 categories of organizational structure which by then had become the focus of Panel deliberations.

Rather than apply numerical values to these matrix elements, the Panel members simply denoted "plus" and "minus" scores based upon a given organizational form being likely or unlikely to satisfy a given test. (See Table 8.2 at the end of this Chapter.)

The results were somewhat more illuminating than those of the earlier matrix application, but still not conclusive in an analytical sense.

Before putting aside this matrix application, the Panel decided to subject it to a weighting process. By a vote of the Panel, the five "most important" tests were identified as being stability, credibility, flexibility, immunity from political interference, and ability to stimulate cost-effectiveness—in that order. The results were interesting if still inconclusive. Importantly, the weighted "scores" supported the ranking of the "preferred" organizational alternative which resulted from the unweighted matrix evaluation.

It should be stressed that the Panel's preferred alternative was in no way selected as a result of a numerical process. For one thing, the Panel recognized that it was mathematically impracticable to compare an existing structure (OCRWM) against hypothetical models. Attempting to use raw numbers to predict the behavior of a conceptual organization is not a viable analytical practice. This is particularly true when the various alternatives—including OCRWM—are subject to a broad array of unpredictable influences and events.

In summary, the matrix evaluations served to demonstrate the Panel's commitment to pursuing all reasonable approaches in carrying out its study. As with many analytical processes, the conduct of the matrix exercise itself was more fruitful than what it produced.

Table 8.1

AN/FN Advisory Panel  
ORGANIZATIONAL ALTERNATIVES MATRIX EVALUATION

August 1964

Please rank each Organizational Alternative on each Organizational Test.  
Use ratings 0 to 4, 0 being lowest and 4 highest.

ORGANIZATIONAL TESTS

ORGANIZATIONAL ALTERNATIVES	Mission Oriented	Ability to Maintain Credibility	Stability and Continuity	Programmatic Authority (Incl. funding)	Access-ability	Responsiveness	Internal Flexibility (Hire/Fire)	Political Accountability	Immunity from Political Interference	Financial Arrangibility	Ability to Stimulate Cooperation	Technical Excellence	Ease of Transition (Phases)	TOTALS
Present Org. Structure														
Sub-Cabinet Office														
Administration in Cabinet Dept.														
Federal Executive Agency														
Independent Federal Commission														
Government-Controlled Corp.														
Mixed Govt.-Private Corp.														
Government-Chartered Corp.														
Utility-Type Private Corp.														
Private Corporation														

\_\_\_\_\_  
Name of Panel Member







Table 8.2

ORGANIZATIONAL ALTERNATIVES VS. TESTS  
Poll of (10) Panel Members Taken on September 6, 1984\*

<u>ORGANIZATIONAL TESTS:</u>	<u>Present Structure</u>	<u>Federal Agency or Commission</u>	<u>Mixed Public - Private Corporation</u>	<u>Private Corporation</u>
No. 1 - Mission Oriented	+ 4 - 6	+10 - 0	+10 - 0	+ 3 - 7
No. 2 - Ability to Maintain Credibility	+ 0 - 8	+ 7 - 2	+ 9 - 0	+ 1 - 8
No. 3 - Stability and Continuity	+ 0 - 9	+ 3 - 6	+10 - 0	+ 6 - 4
No. 4 - Programmatic Authority (Including Funding)	+ 3 - 6	+ 9 - 0	+ 9 - 0	+ 7 - 3
No. 5 - Accessibility	+ 7 - 3	+ 8 - 2	+ 6 - 3	+ 1 - 9
No. 6 - Responsiveness	+ 4 - 4	+ 3 - 6	+ 4 - 5	+ 0 - 9
No. 7 - Internal Flexibility (Hire/Fire)	+ 0 -10	+ 2 - 7	+10 - 0	+ 9 - 0
No. 8 - Political Accountability	+ 8 - 2	+ 9 - 1	+ 6 - 4	+ 0 -10
No. 9 - Immunity from Political Interference	+ 0 - 9	+ 0 - 9	+ 9 - 1	+ 9 - 0
No. 10 - Financial Accountability	+ 8 - 2	+ 9 - 1	+ 9 - 1	+ 7 - 3
No. 11 - Ability to Stimulate Cost Effectiveness	+ 0 -10	+ 0 -10	+ 8 - 2	+10 - 0
No. 12 - Technical Excellence	+ 2 - 5	+ 3 - 5	+ 7 - 0	+ 8 - 0
No. 13 - Ease of Transition Phases	+ 8 - 1	+ 4 - 5	+ 1 - 8	+ 1 - 8
Net Totals	-31	+13	+74	+1

\*The purpose of the poll was to ascertain the respective compatibilities of 4 Organizational Alternatives with 13 Organizational Tests developed by the Panel. A "plus" rating denotes that a given Organizational Alternative has a strong likelihood of satisfying a given Test. A "minus" rating denotes a slim likelihood of satisfying a given Test. (A number of the element ratings reflect Panel members' abstentions.)



CHAPTER IX. ADVANTAGES AND DISADVANTAGES OF EACH ALTERNATIVE

- o OCRWM—Major advantages: established and working; no need for new legislation. Disadvantages: vulnerable to policy and personnel changes; history of organizational change; credibility problems and schedule slippages.
- o Other Federal Agency--Major advantages: mission-orientation, stability, balance of political accountability and independence. Disadvantages: limited internal flexibility and ability to control costs.
- o Public/Private Corporation--Major advantages: incentives for cost-effectiveness, broad public support, freedom from undue political influence, financial control, and internal flexibility. Disadvantages: difficulty of transition.
- o Private Corporation--Major advantages: strong incentives for cost control and likelihood of more effective regulatory control over its actions. Disadvantages: lower credibility and less political responsiveness, difficulty of transition.

From the work group findings and evaluation process described in the preceding chapter, there emerged the apparent advantages and disadvantages highlighted above and described in more detail below for each of the four broad alternatives. Ability of each type of organization to deal with the sequential phases of the waste management program is also summarized below.

PRESENT STRUCTURE

Advantages--A principal advantage of the present structure is that the Nuclear Waste Policy Act (NWPA) does not have to be revised by Congress if the structure remains as is, or if it is improved only via actions which do not require Congressional action. The NWPA represents a delicate political compromise; a better political balance may not be achievable. A second major advantage is that the Office of Civilian Radioactive Waste Management (OCRWM) is an operating organization already embarked upon its program to implement the goals of the NWPA. Any alternative could force the program through a considerable transition, possibly requiring renegotiation of many of the commitments OCRWM has made. OCRWM has also established good working relations with the Nuclear Regulatory Commission (NRC), which other alternative organizations may find more difficult. And finally, a Federal Government agency is likely to have the longest stable institutional life of any organization in a position to monitor and protect repositories over millenia.

Disadvantages--Location of OCRWM within the Department of Energy (DOE) makes it vulnerable to changes of policy and senior management as Administrations come and go. Also, despite Congress's upgrading of the waste management program within DOE, OCRWM is still a subordinate element of a parent agency with disparate and competing priorities and responsibilities. An offshoot of this organizational weakness is the relationship between OCRWM and DOE field structure.

OCRWM bears the legacy of four decades of organizational, policy, and programmatic disarray with regard to waste management--both before and since its DOE adoption. The resultant instability in structure and personnel is cause for concern. So is the agency's record on building stable and credible relationships with states, tribes, interest groups and the public. No consultation agreements have yet been negotiated, and most DOE/OCRWM reports are criticized for their superficiality and unresponsiveness to public concerns. Failure to meet program schedules further undermines confidence in OCRWM's ability to carry out its formidable task in a successful, timely manner.

Phases--Although OCRWM is designed to be responsible for all phases of the nation's waste management program, it has thus far failed to meet important deadlines within the first, or siting phase.

#### ALTERNATIVE FEDERAL AGENCY

Advantages--The major advantages of an independent federal commission (IFC) are its high degree of mission-orientation, effective balancing of political accountability and political independence, stability, financial accountability, and ease of transition. Perhaps the major advantage turns on individual judgments about whether high-level radioactive waste management is inherently a governmental function. If so, an IFC appears the best way to perform it and yet minimize the disadvantages, largely arising from political responsiveness, that seem to mark public organizations.

Disadvantages--IFC could be expected to be less cost-effective and less in control of its own activities than the corporate options. Moreover, there is reason to believe that NRC and other regulators would be less effective in their oversight of another agency of government than of a private or mixed public/private corporation.

Phases--IFC would be able to address the siting phase effectively. The NWPA process will apply to major decisions and the advisory group of stakeholders ought to provide some assistance in addressing political concerns. Construction and operation, including transportation, should present no great difficulties. While IFC can probably switch to an essentially custodial mode of operation after closure, it seems likely that a state or federal environmental protection organization would be a better choice for long-term monitoring. If not, IFC is likely to be at least as effective during this phase as the other alternatives.

## PUBLIC/PRIVATE CORPORATION

Advantages—A mixed public/private corporation such as the Corporation for Waste Management (CWM) offers five major advantages. First, the involvement of the utilities would provide strong incentives for cost-effectiveness and timely completion. Rather than being outside observers, the utilities would have significant control over the program and its activities. This would allow them to promote efficiency and interact with others concerned about the program.

Second, the involvement of other relevant stakeholder groups would provide the basis for broad public support, probably the most essential element in ensuring the long term success of the program.

Third, CWM would be relatively free from political influence. This would increase the Program's credibility and would help ensure more stable policies and funding.

Fourth, CWM would have almost complete financial authority over the program. It would be broadly responsible for the collection and distribution of the fees paid by the producers of radioactive wastes. It could raise short term capital from a variety of sources in the amounts and at the times that were required. Its borrowings and spending would be minimally subject to political whims and would be quite reliable. The program would provide full financial disclosure through public and private audits.

Fifth, CWM would have a great deal of internal flexibility. Its personnel practices would not be subject to federal salary limits, hiring policies, or constraints on firing. It thus could obtain the professionals needed to manage the program and reward them as appropriate. CWM would also have substantial capability to reallocate financial and other resources among its activities in a timely manner.

Disadvantages—A mixed public/private corporation would have only one major disadvantage. It will be necessary to transfer programmatic authority to such an entity from the current system, which would require considerable transition time as well as Congressional legislation.

Phases--The mixed public/private model offers different advantages and disadvantages for different phases of the program. It might be useful during siting since it is relatively insulated from political pressure and has representation from different groups, but it could be open to criticism due to the large role played by utilities. It would be well-suited for construction, operation, and transportation because of its programmatic authority and internal flexibility. It would probably be less desirable for monitoring after closure, since this would necessarily truncate its multi-faceted program capabilities.

## PRIVATE CORPORATION

Advantages—ANCORP and BIDCORP offer several substantial advantages relative to other organizational options. First, private ownership and the possibility of realizing profits provide strong incentives for cost-effective operations. In the case of ANCORP, these cost-effectiveness incentives are strengthened by utility and other investor ownership, particularly since it is likely that the investors will include much of the nuclear industry. This industry's long-term interest in allaying public concerns will stimulate strong concern within the corporation for assuring health and safety.

Beyond this internal focus on safety, of course, will be the NRC's role as regulator in this area. A major advantage for ANCORP and BIDCORP arises from the likelihood that NRC will be substantially more effective in carrying out its oversight responsibilities than it would in regulating a government agency.

In the case of BIDCORP, the Radioactive Waste Management Board will have the advantage of giving stakeholders a measure of direct control over all phases of waste management.

Finally, BIDCORP should have some advantage in siting relative to other options. One advantage shared with the mixed public/private corporation is the anticipated benefit of having the Board of major stakeholders in radioactive waste management make decisions about site characterization and selection. Beyond this broad siting capability, BIDCORP will have advantages over public agencies in quickly responding to site-specific concerns. BIDCORP's site manager is, for example, more capable of making commitments to local interests than an OCRWM site manager might be. This difference is a function of the general willingness of private organizations to delegate decision authority more readily than do government agencies.

Disadvantages—There are, of course, some disadvantages for the privately-owned corporation in comparison to other options. One disadvantage is that corporations generally have less credibility in matters related to assuring public health and safety than do government agencies. For the corporation, profit is assumed to dominate all other concerns, subject to constraints such as legal liability and long-term self-interest. Protection of public health and safety is, on the other hand, a preeminent concern of government. Presumably, however, this disadvantage in terms of credibility would dissipate through a combination of effective regulatory oversight and through a history of good performance by ANCORP or BIDCORP. Moreover, protection of public health and safety will be the primary concern of regulatory agencies. While it can be argued that the governmental options would be less inclined to cut corners in favor of profits, they will have incentives to control their costs and generally behave as developers of the waste management system. As noted above, there is reason to believe that regulators will do better in controlling ANCORP or BIDCORP than they would with other public agencies.

A second disadvantage arises because a private corporation is perceived to be less responsive to political interests. The rather substantial level of public concern with radioactive waste management will continue to produce pressures for political intervention. ANCORP's or BIDCORP's likely proclivity



to resist such intervention in order to get on with its mission may create some difficulties which would not occur in a more publicly controlled organization. Obviously, this disadvantage is reduced in the case of ANCORP by leaving a public organization, OCRWM, to carry out the most politically sensitive phase of waste management, namely site characterization, selection, and the obtaining of construction authorization for the first repository. In the case of BIDCORP, this disadvantage is reduced by having a stakeholder Board in a position of general policy control and with responsibility for decisionmaking in the most politically sensitive phase of waste management--siting.

A final disadvantage for ANCORP is its dependence on OCRWM to manage siting of the first repository. Siting is both the waste program's source of greatest difficulty and the function which seems least consistent with the rationale of cost-effectiveness which underlies the ANCORP and BIDCORP concepts. ANCORP is not intended to become fully operational until siting has been achieved, while BIDCORP would cover this crucial phase as well. In either case, a risk-capital venture does not appear to be as amenable to the siting process and its ramifications as a public entity.

Phases--ANCORP's strengths would be greatest in the construction, operation, and transportation phases of waste management. Partly in reflection of the heavy loading of political concern in siting, the corporation would not address this phase for the first repository. Should it attempt to do so, substantial problems arising because of the uncertainty in both siting and ultimate use of any site obtained will present major problems. It should be noted, of course, that the major reason for introducing ANCORP after site selection is to minimize transition difficulties. Perhaps its major advantage during construction, operation, and transportation is its flexibility to adjust activities to reflect economic considerations.

BIDCORP's strengths would be greatest in the siting, construction, operation, and transportation phases of waste management. Because of the heavy loading of political concern in siting, the Siting Board will play a major direct decisionmaking role. This role should be an asset in siting. Moreover, delegation of decision authority to the field should make BIDCORP very good at managing siting activities and external relations between the major Siting Board decisions.

Like the other three options, neither ANCORP nor BIDCORP would be particularly adaptable to the post-closure phase. This long-term phase is more properly the responsibility of a federal or state agency whose mission is environmental monitoring and protection of public health safety.

#### Reshaping the Public/Private Entity Concept

Throughout several months of intensive deliberations, the Panel sought to identify and attain consensus on a "preferred alternative" from among the four organizational categories assessed in Chapters VII through IX. At two meetings in September 1984, the Panel members were polled as to their individual preferences. The results favored the mixed public/private entity (called the Corporation for Waste Management or CWM)--but by a majority, not a consensus.

Two facts were apparent from this process. First, even its majority of supporters acknowledged that this alternative had its shortcomings. And second, the Panel as a whole realized that a unanimous recommendation to the Secretary of Energy would be of considerably greater value to him than a "split opinion."

Accordingly, the Panel embarked upon a consensus-building effort. Using the public/private alternative as a basis for discussion, the Panel painstakingly hammered out an improved version—actually a rather different concept altogether. This was done by reshaping the public/private model in a manner that incorporated the best features of the other three alternatives—OCRWM, the independent federal commission, and the two kinds of private corporation.

The end-product of this enhancement effort is a "preferred alternative" known as the Federal Corporation for Waste Management or FEDCORP. It would be a public corporation chartered by Congress but structured to operate more like a private enterprise than a government agency.

Before describing FEDCORP in greater detail, this report addresses a set of organizational components and functions which—in the Panel's estimation—would enhance the performance of any waste management structure.

**CHAPTER X. KEY COMPONENTS OF ANY WASTE MANAGEMENT STRUCTURE**

- o Reevaluation of NWPA milestones, including contingency planning.
- o A commission responsible for cost-effectiveness and Nuclear Waste Fund oversight.
- o An Advisory Siting Council representing key stakeholders.
- o Scientific/technical advisory oversight of siting and project development.
- o Strengthening state and tribal participation in the repository program.
- o Community-economic development incentives and project mitigation.
- o Education and public involvement.
- o Technical oversight contractor.
- o Retention of a law firm experienced in regulatory affairs.
- o Independent auditors to document expenditures and prepare financial statements.
- o Continuity of top management.
- o Flexibility in administering the personnel program.
- o Incentives for outstanding staff performance.
- o Streamlining the Congressional oversight function.

The Panel has agreed on a set of recommendations for key elements and components which any radioactive waste management organization should implement and achieve. The elements and components delineated below should be achieved whether the ultimate radioactive waste management organizational structure is the Panel's preferred option, remains as the Office of Civilian Radioactive Waste Management (OCRWM), or is a third organizational form which Congress might select based on the Panel report and its own further investigation and deliberations.

1. Milestone Reevaluation and Achievement--Project milestones should be reconsidered and reevaluated in the context of what will actually be required to accomplish specific tasks taking cognizance of technical requirements, logistics and institutional relationships. This should include the formulation of a contingency planning process which would

effectively deal with unforeseen problems and provide a means for adjusting to change while keeping the project on schedule. The project decision schedule called for in the Nuclear Waste Policy Act (NWPA) which provides the mechanism for a balance between schedule and participation should be reviewed, agreed upon and published. Once milestones have been reevaluated and set, they should be met on schedule.

2. Waste Fund Oversight Commission--A blue ribbon advisory commission drawn from those constituencies most concerned with avoiding an increase in the one mill per kilowatthour fee should be established to provide policy guidance to the executive(s) directly responsible for managing the radioactive waste management organization. This commission would be specifically charged with cost-effectiveness and providing alternatives to fee increases. It would be charged with concurring or not concurring on any recommendation to Congress with regard to a change in the utility fee. Members of this commission should be drawn from the nuclear utilities and ratepayer representatives, probably including representation of state Public Utility Commissions through the National Association of Regulatory Utility Commissioners (NARUC).
3. Advisory Siting Council--An Advisory Siting Council should be established to provide input to and oversight of the siting process to whatever entity is charged with the ultimate site selection responsibility. The Advisory Siting Council would provide input to the siting process and review and comment on the siting recommendation(s) made by the site selection authority. The Advisory Siting Council would be composed of stakeholders (e.g. states, including a representation of corridor states, Indian tribes, and environmental groups) most concerned with siting issues.
4. Scientific Peer Review Board--A Scientific Peer Review Board should be established to provide scientific and technical expertise to whatever entity is charged with the ultimate site selection responsibility. This Board should be a technical advisory group, drawn from the scientific and engineering communities conversant with radioactive waste management. This Board would have staff and access to all program information and activities. The Board would also be available to address other technical issues on a required basis at the request of the radioactive waste management organization.
5. State and Tribal Technical Review Capability--Under the Nuclear Waste Policy Act, states and Indian tribes are provided the opportunity to undertake independent reviews of repository siting actions potentially involving their jurisdictions. The radioactive waste management organization should enter into negotiations with potential host states and affected Indian tribes to work out binding agreements which set forth procedures that would enable states and tribes to carry out these review responsibilities. The Panel supports efforts to strengthen state and tribal technical capacity to monitor the repository program. The radioactive waste management organization should encourage state/tribal efforts in this area and in the use of consultation and cooperation agreements as provided in the Nuclear Waste Policy Act. This would

reinforce the commitment of financial assistance to states and tribes and provide other procedural protections to assist them in independently reviewing and monitoring waste management activities. Increased technical capability of the states and tribes would enhance program credibility and provide the confidence necessary for achieving national objectives.

6. Local Economic Development--The Nuclear Waste Policy Act makes certain provisions for financial assistance to mitigate potential impacts caused by the radioactive waste management function and associated facilities development. The radioactive waste management organization should have wide latitude to negotiate an array of appropriate incentives to communities that are potential hosts for a repository. This would give communities potentially affected a clear understanding of what socioeconomic assistance is required and possible. Providing such economic benefit programs may encourage states, tribes, and local communities to carefully reflect on how a repository might be integrated within an area and provide a net benefit to the community. This type of encouragement should not, however, have any impact upon the technical sufficiency of the radioactive waste management program.
7. Public Education and Information--The radioactive waste management organization should undertake an effective education and public involvement program to present the facts associated with radioactive waste storage and disposal. Such an education program would be structured so that it would be perceived by the public as being helpful and useful and not interpreted to be a "promotional" campaign. This program need not and should not be carried out solely by the radioactive waste management organization. Potential host states and affected Indian tribes should be funded to assist in carrying out activities to increase citizen awareness and understanding of the national radioactive waste management program. The radioactive waste management organization's education efforts should be closely coordinated with those at the state and tribal levels and should not infringe on state/tribal programs.
8. Oversight Contractor--A firm experienced in providing oversight services for large technical contracts should be engaged to provide oversight to the radioactive waste management organization. This firm would serve as an internal consultant, using its access to all program activities to identify emerging problems and marshal the staff and other resources needed to resolve them. The primary focus would be on schedule and cost control, although general technical oversight would clearly be within its scope. The oversight contractor would provide the mechanism to facilitate policy level understanding of design tradeoffs, technical licensing issues, and state/tribal/local concerns. It would enhance communication and coordination of field and site-specific activities. To assure the avoidance of conflicts of interest, the firm selected for this oversight role, as a condition of being awarded this contract, must not have had any previous contracts with OCRWM or its predecessor organizations and would specifically be prohibited from obtaining any future contracts with the radioactive waste disposal organization.

9. Special Regulatory Counsel--It is essential that the radioactive waste management organization have a dedicated counsel to handle regulatory and other legal affairs. The best way to accomplish this is through engaging the services of a private law firm experienced in the Nuclear Regulatory Commission licensing process. The law firm would provide continuing counsel for the repository licensing process and advice to the radioactive waste management organization on how to handle its relationship with its regulator, the Nuclear Regulatory Commission. This firm should be selected through competitive bidding.
10. Private Accounting Firm--It is essential that the radioactive waste management organization have dedicated auditors to document expenditures and provide a basis to judge the progress of the program. Such documentation should be subject to business-type rather than government-type accounting standards and practices. Thus, a private sector accounting firm should be retained by the radioactive waste management organization to prepare annual financial statements on the program. These records should be open to the General Accounting Office (GAO), the Office of Management and Budget (OMB), and the general public.
11. Tenure of Chief Executive Officer--If management of radioactive waste disposal remains in a federal agency, the executive directly responsible (no matter how titled) for managing the waste program should be given tenure which is not subject to changes in Administration or in agency directors. Although tenure of this nature is recommended, the Panel does not intend that the manager be given guaranteed employment from which he/she cannot be removed. In the case of a private corporation, a mixed public-private corporation, or a federally chartered corporation, this recommendation would apply to the chief executive officer who would serve at the pleasure of the Board of Directors.
12. Personnel Flexibility--Any radioactive waste management organization should have the flexibility in personnel matters to accomplish the business and technical requirements necessary to implement radioactive waste disposal. Salaries and benefits should be set at competitive levels which the radioactive waste management organization deems to be appropriate. Hiring and termination practices should be as flexible as in the private sector. A personnel system should be implemented which would enable the organization to recruit the best-qualified personnel and manage them effectively.
13. Staff Incentives Program--Regardless of whether the radioactive waste management program is moved to a new organization or remains at OCRWM, monetary rewards for personnel who exhibit outstanding performance should be provided. (Bonuses are presently available to SES personnel.) The range of other possible personnel incentives aimed at superior performance is enormous and by no means limited only to monetary rewards. In view of this range, it is reasonable to expect that any radioactive waste management organization could devise a persuasive plan for staff incentives either within or outside the framework of the Office of Personnel Management regulations.

14. Congressional Oversight—At the present time, seven Senate and six House of Representatives committees, and a total of ten subcommittees, oversee the radioactive waste management program. This large number of Congressional committees require extensive servicing and have the potential to cause schedule delays and increase costs. The Panel recommends that the Congress attempt to simplify its oversight process with respect to NWPA implementation.

The components and capabilities described in this chapter are salient features of the Panel's preferred alternative organizational structure, which is presented in Chapter XI. The recommended components would also strengthen the performance and credibility of any other waste management entity, including the existing Office of Civilian Radioactive Waste Management.





## CHAPTER XI. THE PREFERRED ALTERNATIVE:

### FEDERAL CORPORATION FOR WASTE MANAGEMENT (FEDCORP)

The Panel's preferred long-term alternative to the Office of Civilian Radioactive Waste Management (OCRWM) for managing the nation's high-level radioactive waste program is a public corporation chartered by Congress. It would be called the Federal Corporation for Waste Management (FEDCORP).

The preferred alternative grows out of the mixed public/private corporation alternative called a corporation for waste management (CWM) and contains features from each of the final groups of alternatives considered by the Panel. But it is significantly different from any of the forms of organization described in the preceding chapters.

It was only toward the end of its year-long deliberations that the Panel concluded that all of the alternatives then under consideration fell short of meeting the tests and attributes of an ideal waste management organization. CWM came closest, and the Panel decided to use it as the basis for developing this preferred alternative. The other alternatives that were found wanting--but from which desirable features were borrowed--included an improved OCRWM, an independent federal commission (IFC) and two types of private corporation (ANCORP and BIDCORP).

FEDCORP would embody all of the key components described in Chapter X.

#### Major Features

FEDCORP would have a Board of Directors appointed by the President, subject to confirmation by the Senate. While this implies a substantial measure of political oversight, the FEDCORP directors would essentially comprise a managerial body functioning like the Board of Directors of a private corporation. The organization which it would oversee would have most of the flexibility enjoyed by private business, including financial flexibility and the same opportunity to hire and fire personnel and offer appropriate pay scales as in a private business.

FEDCORP directors would select a Chief Executive Officer (CEO) who would employ a small staff of highly competent individuals, certainly no greater in number than the present OCRWM. FEDCORP would use private contractors to carry out its various functions of site selection, repository construction and waste transportation and emplacement. It would also retain an independent oversight contractor.

Associated with FEDCORP would be a Waste Fund Oversight Commission (described in Chapter X). In addition, there would be an Advisory Siting Council (ASC) broadly representative of stakeholders and the general public. The ASC is described in greater detail in the next few pages.

The primary activities of FEDCORP would be, first, to provide necessary continuity and stability of management, schedule adherence, effective cost control and adequate quality assurance; second, to select two or more politically and technically acceptable sites for geologic waste repositories; third, to construct and operate radioactive waste disposal facilities with both technical competence and cost-effectiveness; and, fourth, to enhance opportunities for state and tribal participation as contained in and directed by the Nuclear Waste Policy Act (NWPA).

Following is a more detailed description of FEDCORP, comparable to the descriptions in Chapter VII of the four groups of alternatives.

### DESCRIPTION OF THE ORGANIZATION

#### Primary Assumptions

The FEDCORP alternative is based on the following assumptions:

- o That the Administration and Congress would be willing to open the Nuclear Waste Policy Act to authorize the establishment of a public corporation to manage the high-level radioactive waste program.
- o That the transition from the existing organization can be accomplished in a timely and cost-effective manner.
- o That future revenues will be predominantly derived from the entities producing the radioactive waste.
- o That one organization can take complete responsibility for radioactive waste siting, financing, and facility construction and operation.

#### Purpose

FEDCORP would be established by Congress and given full authority over management and disposal of civilian radioactive wastes. The Corporation would have three objectives specified in its charter:

1. To ensure the safe, long-term isolation of radioactive wastes from the environment, in compliance with standards issued by the appropriate federal regulatory bodies.
2. To plan, construct, and operate all necessary waste management facilities in an expeditious fashion. Although facilities for ultimate storage or disposal may not be completed by 1998; the public corporation would be obligated to begin accepting waste by that date.
3. To conduct its activities in a cost-effective fashion, financing its programs from fees on nuclear-generated electricity and perhaps defense wastes.

### Ownership and Control

Congress would establish FEDCORP as a government-chartered corporation with no equity apportionment. The charter would transfer the revenue flow, administration, and accountability of the Nuclear Waste Fund and Interim Storage Fund from the Department of Energy (DOE) to FEDCORP. Although FEDCORP would come into being on the date on which the President signs the new or amended legislation, it would have a specified transition period for assuming all authorities and activities now vested in OCRWM.

The FEDCORP charter would make it a wholly owned instrumentality of the Federal Government, but chartered as a public corporation and governed by a Board of Directors. There would be 7 presidentially appointed directors who would be confirmed by the U.S. Senate. Directors would serve terms of 7 years—arranged on a staggered basis—with no limitation on reappointments. The President, with the consent of the U.S. Senate, would designate one of the directors as the Chairman for a 7-year term. The length and staggering of the directors' terms would provide continuity and insulation from excessive political influence. The directors would appoint a Chief Executive Officer (CEO) to serve at their pleasure and to be an ex officio member of the Board.

The Board of Directors would function as in the private sector. The CEO would be full-time, with an annual salary plus benefits comparable to those of executives holding similar positions in the private sector. Other Board members would serve on a part-time basis, but would meet as frequently and devote as much time as necessary to carry out their responsibilities. Directors' fees would be commensurate with those of equivalent private corporations. The directors in turn would set the compensation of the CEO, providing adequate incentives tied to management performance.

FEDCORP could sue and be sued within the ordinary framework of corporate law. FEDCORP would be subject to regulatory oversight by the Nuclear Regulatory Commission (NRC) and other appropriate federal agencies.

### Organizational Structure

FEDCORP's operational management would be that of a strong CEO selected by and reporting to a Board of Directors. The CEO would manage the corporation under the general policy guidance of the Board: his/her power would be that normally accorded the CEO of a large private corporation. The CEO, with Board approval, would have authority to select top managers, establish the management structure, and set personnel policies. The CEO would have prime responsibility for day-to-day corporate operations.

### Advisory Siting Council (ASC)

In view of the significant political aspects of selecting repository sites, FEDCORP would establish an Advisory Siting Council composed of representatives of all legitimate stakeholders.

ASC members would be appointed by the FEDCORP Board of Directors. It is intended that the ASC would maintain the function for the specified duration of the siting process for the first and second repositories.

ASC would be responsible for making recommendations to the FEDCORP Board of Directors concerning site selection processes. To assist ASC in carrying out its responsibilities, the FEDCORP Board of Directors would provide it with sufficient staff resources.

### Institutional Relations

FEDCORP would have the authority and responsibility to implement programs and procedures to permit independent reviews of federal actions under the Nuclear Waste Policy Act. This would include opportunities for public participation, consultation and cooperation agreements, and encouraging the development of state/tribal technical capability through financial assistance.

### Personnel Practices

FEDCORP would be exempt from all federal Civil Service requirements, salary standards, and personnel ceilings. FEDCORP would be able to offer salaries and benefits commensurate with the responsibilities of its personnel.

FEDCORP would be empowered to hire and fire employees on the same basis as any private corporation. This would facilitate incentives for superior performance and allow management the flexibility to shape personnel resources in line with the business and technical requirements of FEDCORP. Federal employees who transfer to FEDCORP would retain vested retirement benefits.

### Financial Arrangements

FEDCORP's activities would be funded from a fee on nuclear-generated electricity. Charges for defense wastes would be negotiated and would come from the federal general fund with full-cost recovery. The receipts from the fee would be deposited, as now, in the Nuclear Waste Fund, but the Fund would be removed from the unified federal budget. However, the radioactive waste management program would not be expected to require reauthorization, and expenditures from the Nuclear Waste Fund would not require appropriation.

FEDCORP would replace DOE in the NWA-mandated waste management contracts with nuclear utilities. The FEDCORP Board of Directors would have authority to raise or otherwise modify the fee at any time after soliciting the advice of the Waste Fund Oversight Commission. Such changes would not take effect for 90 days of continuous Congressional session, during which period Congress could overturn a proposed fee change by joint resolution. Responsibility for management of fee revenues would lie directly with the FEDCORP Board of Directors.

FEDCORP would be authorized to borrow money from public or private sources, including the federal Treasury. FEDCORP would be free to invest any temporary surplus from the Nuclear Waste Fund at its own discretion. Consideration would be given to reducing the fee in the event of a net life-cycle surplus.

### External Accountability

FEDCORP would prepare an annual public report to Congress, states and Indian tribes outlining its activities, accomplishments, plans and expenditures. This annual report would be a public document with broad dissemination.

Congress would have the authority to hold hearings on any aspect of the program at any time, and would have full access to records and reports of the corporation.

The corporation would retain a private accounting firm to prepare annual financial statements on the program. This private accounting firm would report to the Board of Directors through its Chairman, and not to the CEO or any of the other FEDCORP officers. FEDCORP would be subject to business-type rather than government-type accounting standards and practices. The corporation's records would be open to the General Accounting Office (GAO), the Office of Management and Budget (OMB), and the general public.

The corporation would be required by law to utilize the services of an independent oversight contractor to help insure that the FEDCORP mission proceeds on schedule, within the preestablished budget and that strict quality control is maintained. This oversight contractor would be selected through a competitive procurement, and if selected would be specifically prohibited from doing contract work in any other area of the program. Prior experience with the nuclear waste program will not be a criterion. The oversight contractor would report to the Board of Directors, and not to the CEO or any of the other FEDCORP officers.

In addition to the oversight contractor, FEDCORP might well benefit from the services of a Scientific Peer Review Board such as that described in Chapter X.

Finally, FEDCORP would be accountable to the NRC under the terms of its license, and to other regulatory agencies as appropriate. In this context, FEDCORP would be well-served by retaining a special regulatory counsel with experience in NRC and state regulatory processes.

#### Revenue and Cost-Reduction Opportunities

FEDCORP would have chartered authority to contract for revenue-oriented activities other than nuclear waste disposal so long as these activities would relate to and not hinder the main thrust of the waste management program. For example, future economic, political and technological changes may encourage the reuse of high-level radioactive waste and spent reactor fuel and create revenue opportunities for FEDCORP. Such activities could dampen the need for increasing nuclear utility generating fees.

### EVALUATION USING ORGANIZATIONAL TESTS

#### Mission-Oriented

FEDCORP would have a strong mission orientation since it would be an independent organization whose sole responsibility is the waste management program. There would be some possibility of conflict among its missions of safe, prompt, and cost-effective management, but this conflict would be minimized by the priorities set among the missions.

### Ability to Maintain Credibility

FEDCORP's business orientation, and particularly its combination of a strong CEO and a management Board of Directors would enhance its credibility among the nuclear electric utilities which would bear the costs of its activities and require its waste management services. The Advisory Siting Council, by providing direct involvement of major stakeholders in the decisions of most direct concern to them, would provide a strong measure of credibility among states, tribes, and environmental groups, as well as utilities and ratepayers. The availability of information through Congressional hearings and reports of the independent accounting firm and oversight contractor would also build credibility.

Finally, it is likely that FEDCORP would be more responsive to regulatory control than a federal agency. This responsiveness will enhance credibility to the extent that the NRC and other regulators are viewed as credible in their own right.

### Stability and Continuity

FEDCORP should have even greater stability than a normal corporation, since its directors would serve lengthy terms. It would be substantially insulated from political influence and therefore its policies would not change frequently in response to short-term political pressures.

### Programmatic Authority

FEDCORP would have virtually complete programmatic authority. It would still be subject to some restrictions, such as the possibility of Congressional override of increases in the waste fee, but would essentially be able to direct the program with free-enterprise efficiency.

### Accessibility

Considerable accessibility for the major public concern of siting would be implicit in the Advisory Siting Council. NRC licensing proceedings and continuing oversight will provide additional access. Beyond these, of course, FEDCORP could be expected to be somewhat more accessible than most corporations because of reporting requirements and the high probability of Congressional displeasure if accessibility were to be limited by the corporation.

### Responsiveness

FEDCORP would be responsive to the major stakeholders in siting through the mechanism of the Advisory Siting Council. It would be strongly responsive to its Board of Directors, particularly in view of their extraordinary financial power over the corporation. The corporation would also be responsive to its regulator, namely the NRC. In addition, FEDCORP would be responsive to Congressional requests for information, briefings and the like and, obviously, to concerns that might lead to amendment of its charter.

### Internal Flexibility

FEDCORP would have a very large measure of internal flexibility because of its corporate form and strong business orientation. The Board's financial and other powers would somewhat constrain the CEO's exercise of internal flexibility in the interest of maintaining accountability.

### Political Accountability

The directors would be subject to political scrutiny through the appointment and confirmation process, but their lengthy terms would greatly limit any undue exercise of political control over their conduct. The combination of reports to Congress, continuing Congressional interest in radioactive waste management and the prospect of legislative intervention should force an appropriate degree of political accountability on the corporation.

### Immunity from Political Interference

FEDCORP would be relatively insulated from political interference with its policies. The only avenues for political influence would be through the periodic appointments of directors (only one appointment would occur annually on the 7-person Board) and the Congressional power to hold hearings or, by implication, intervene through legislation.

### Financial Accountability

FEDCORP's financial activities would be subject to both public and private audits, so awareness of the corporation's finances would be widespread. It would be only moderately less accountable to OMB and Congress since it would be an off-budget entity without the need for periodic authorization or appropriation. Its major accountability to Congress would occur if it sought increases in the waste fee or its borrowing authority.

### Ability to Stimulate Cost-Effectiveness

The overall cost-effectiveness of the waste management program should benefit from the new corporate style and the more flexible personnel practices. In addition, the Waste Fund Oversight Commission should be a potent stimulus for controlling costs and improving programmatic performance.

### Technical Excellence

The corporation should be able to hire and retain quality employees given its personnel flexibility. It should also be able to obtain an adequate amount of funding to ensure proper construction and operation of facilities. This combination indicates that FEDCORP would be able to achieve technical excellence. In addition, the advice of the Scientific Peer Review Group should help to maintain the technical quality of the corporation.

### Ease of Transition

Shifting to a public corporation, as opposed either to improving the status quo or creating another federal agency, would be difficult. The complex set of relationships that OCRWM and its forerunners have developed with the

various federal agencies, states, tribes, interest groups and other stakeholders would have to be developed anew by FEDCORP. Moreover, all of this would have to be accomplished while an ongoing program is striving to meet tight statutory deadlines.

Nevertheless, the advantages of FEDCORP over the existing entity should overshadow any transitional problems when placed in the context of a 15 to 50-year program. Under these circumstances, a major reorganization should be initiated sooner rather than later if it is to achieve maximum benefits.

#### ADVANTAGES AND DISADVANTAGES

In general, FEDCORP would have great strength on the five organizational tests weighted most heavily by the Panel: credibility, stability, internal flexibility, political immunity and cost-effectiveness.

##### Six Major Advantages.

A government-chartered corporation such as FEDCORP would offer six major advantages. First, the strong business orientation and structure would tend to encourage cost-effectiveness and the timely completion of projects.

Second, the involvement of relevant stakeholder groups in siting decisions through the Advisory Siting Council would provide the basis for broad public support, probably the most essential element in ensuring the long term success of the program.

Third, FEDCORP would be largely free from political influence. This would increase the program's credibility and help to ensure more stable policies and funding.

Fourth, the corporation and its Board would have almost complete financial authority over the program. They would be solely responsible for the collection and distribution of the fees paid by the producers of radioactive wastes. FEDCORP could raise short term capital from a variety of sources in the amounts and the times that are required. Its borrowing and spending would be less subject to changes in political climate and would be much more stable than the alternatives. The program would provide full financial disclosure through public and private audits.

Fifth, FEDCORP would have a great deal of internal flexibility. Its personnel practices would not be subject to federal salary limits, hiring policies, or financial disclosure rules. It thus could obtain the professionals needed to manage the program and reward them as appropriate. The corporation would also have substantial capability to allocate financial and other resources among its activities in a timely and efficient manner.

Sixth, FEDCORP's corporate form should make it more responsive to the NRC and other regulators than a Federal Government agency would be.



### Disadvantages

A Congressionally chartered public corporation would have the one apparent disadvantage common to any new organizational structure that would be considered, namely the problem of transition. It would be necessary to transfer programmatic authority to FEDCORP from the existing OCRWM, and a period of time would be needed to accomplish this transition efficiently. In that latter context, it must be recognized that the new FEDCORP organization could open for reconsideration many of the programmatic decisions on which the effort is currently very actively proceeding.

It should also be noted that the advantages of FEDCORP which the Panel perceives and which are discussed in the foregoing material, remain to be demonstrated in practice, and discussions of the Panel recognized that these have a potential negative side. As one example, those discussions recognized that FEDCORP could by its structure be less responsive to the stakeholder concerns, and thus it would need to be sensitive to the advice and recommendations of the Advisory Siting Council.

### APPLICABILITY TO PHASES

FEDCORP offers different advantages and disadvantages for different phases of the program. Its Advisory Siting Council would provide a political body composed of the appropriate interest groups to make decisions about siting, the program's most politically charged phase. Beyond siting, FEDCORP's strong managerial orientation would ensure that construction, operation and transportation activities are conducted with appropriate concern with schedule and budget. FEDCORP would probably be less desirable for monitoring after closure, which seems to involve custodial functions best performed by federal or state agencies whose missions are related to the protection of the environment.



CHAPTER XII. CONCLUSIONS AND RECOMMENDATIONS

As required by Section 303 of the Nuclear Waste Policy Act of 1982 (NWP) and by the task assigned to it by the Secretary of Energy, the Panel has studied alternative approaches to managing the construction and operation of all civilian radioactive waste management facilities, including the feasibility of establishing a private corporation for such purposes. The Panel has also considered alternative means of financing the program as implied by the title of Section 303.

Organizational Considerations

The Panel finds the Office of Civilian Radioactive Waste Management (OCRWM) within the Department of Energy (DOE) to be, and to have, a moving target. The 15-month-old OCRWM is now in the midst, following appointment of its first Director in May 1984, of yet a new set of actions fundamental to the implementation of the NWP:

1. A revised OCRWM organizational structure is again being put in place, with several key changes, e.g., establishment of the Office of Policy, Integration and Outreach, and again with a number of key personnel changes.
2. The Draft Mission Plan is again being revised, including reconsideration of each of the schedule milestones and the programmatic requirements of a total waste systems approach. This effort reflects studies of the entire system, including considerations of allowances for contingencies. The ongoing changes in the Mission Plan, including design decisions and milestone schedules, are likely to impact the budget and the adequacy of program revenues.
3. Effort is underway to execute consultation and cooperation agreements with states and Indian tribes, and in that context, OCRWM is making commitments to those constituencies. Commitments are also being made (or at least the Director is articulating the latest OCRWM positions) to other key stakeholders, such as the utilities and environmental groups, on key interpretations of NWP provisions, e.g., the responsibility of the Federal Government to take title to spent fuel in 1998 whether or not a repository is ready; that NWP does not require all three candidate sites to be found acceptable on completion of site characterization; the need for an MRS; etc.

It is in midst of these events, and with the knowledge that it may be difficult to effect any legislative changes to the NWP, that the Panel presents its recommendations. Within that frame of reference, we find there are serious defects in OCRWM as a management structure. Particularly, and recognizing the history of predecessor organizations (AEC and ERDA) and continuing discussion of the liquidation of DOE, there is a serious and inherent lack of stability and continuity. This is a major cause of the absence of credibility, which inhibits DOE's effectiveness in carrying out the

waste management program. In fact, when we subject OCRWM to this and other tests developed by the Panel, and compare it to the alternate forms of organization considered, the overwhelming majority of the Panel gives the other forms higher ratings.

At the same time, such rating exercises done in the abstract must clearly be examined in the light of real-life circumstances before recommendations can be extracted from them. In that context, the Panel also recognizes that civilian radioactive waste management, as a "business," has a number of distinct phases with unique characteristics (presented in Chapter IV), with which any organization would find it difficult to cope. The NWPA recognizes the need for provisions designed to assure maximum accessibility and responsiveness to many and diverse constituencies with serious influence on the program, and the need for prescriptive milestones. We find that organizational forms which better meet the tests may be desirable, but recognize that there is an intrinsic uncertainty as to how confident one can be that the organizational form that looks best on paper will in reality and over time fulfill its promises, and will in fact function as it is designed to function. We also recognize that any organizational change will present transition problems.

It cannot be overemphasized that the most difficult phase of the overall waste management program is the selection and approval of a repository site. Once such a site has been selected and licensed, the programmatic responsibilities will be substantially different, and could be transferred or contracted to an organization other than the one responsible for site selection and obtaining licensing. The Panel believes that there are several organizational forms, including private corporations, more suited than DOE for managing the construction and operation phases. The Panel also believes that, regardless of the "preferred" organizational form, the site selection process could be enhanced and made more credible by the use of a special advisory siting council comprised of representatives of all legitimate stakeholders.

We conclude that an immediate effort must be made to improve the credibility, internal flexibility and cost-effectiveness of OCRWM. However, in recognition that no modification to DOE/OCRWM organization would necessarily provide adequate stability and continuity, it is our principal recommendation that investigation of the specific steps necessary to implement, for example, a dedicated federally chartered corporation (the first choice of the Panel voting on organizational tests), should be undertaken immediately so that Congress can have a precise understanding of the legislative changes required to bring about such an organization.

### Financing Considerations

The main thrust of the Panel study has dealt with the structure and capabilities of various organizational alternatives for managing the high-level radioactive waste management program. As evidenced by the material contained in Chapter II of this report, however, the Panel also gave consideration to the financing processes of the NWPA, and to certain financing alternatives which might be substituted for the existing mechanisms. In doing so, the Panel encountered an array of financial uncertainties which confront the radioactive waste management program as it moves forward over the next two

decades. At this juncture, it is extremely difficult to predict how future events, programmatic developments, and economic influences will affect the financing structure and cost level over the term of the program.

It is the Panel's conclusion that the financing mechanism provided by Congress under the Nuclear Waste Policy Act appears to be fair, amenable to administrative implementation and cost controls, and sufficiently flexible to accommodate the full-recovery requirement of the legislation. Under NWPA, utilities are assessed a fee of 1 mill per kilowatthour of nuclear-generated electricity, plus a one-time fee for spent fuel accumulated prior to April 7, 1983.

Based upon the Panel's general scrutiny, DOE implementation of the NWPA financing provisions is proceeding in a generally satisfactory manner. More importantly, the financing system devised by Congress shows no evidence of a serious flaw in its design and operation to date. And finally, this financing strategy appears to be adaptable to a change in organizational structure such as that contemplated in this report.

\* \* \* \* \*

APPENDICES

## APPENDIX A. ACTIVITIES OF THE PANEL

As directed by the Panel's charter (following to this section), the Panel held 10 public meetings as follows:

<u>Date</u>	<u>Location</u>
January 24-25, 1984	Washington, D.C.
February 21-22, 1984	Washington, D.C.
April 7, 1984	Richland, Washington
May 22-23, 1984	St. Charles, Illinois
June 27-28, 1984	Washington, D.C.
July 29-31, 1984	Portland, Oregon
September 5-6, 1984	San Antonio, Texas
September 25-26, 1984	Washington, D.C.
October 22-23, 1984	Washington, D.C.
November 13-14, 1984	Washington, D.C.

The early meetings consisted of briefings from various nuclear waste experts and members of the public on the Nuclear Waste Policy Act (NWPA) and the program outlined in it. In addition Panel members inspected several radioactive waste storage and test facilities in the Western U.S. The Panel visited the Hanford Nuclear Reservation in Washington State and was briefed extensively by the manager of the Department of Energy Richland Operations Office, Alex G. Fremling, on the physical facilities and waste management program on the Reservation. This was following a tour of several Hanford facilities, including the Near-Surface Test Facility and the Exploratory Shaft Test Site of the Basalt Waste Isolation Project (BWIP).

At the Nevada Test Site, Thomas R. Clark, Manager, Nevada Operations Office, and Donald L. Vieth, Director of the Waste Management Project Office, described the programs being conducted at the site, with particular emphasis on the organization and management of contractors involved in the programs. The Panel inspected the Spent Fuel Test--Climax facility and were given technical information by Wes Patrick, Task Director at the facility.

The Panel's final site visit was to the Waste Isolation Pilot Project (WIPP) near Carlsbad, New Mexico. WIPP will be a test site within salt beds for transuranic (TRU) defense wastes and a research facility for limited amounts of defense high-level waste. The Panel learned about the technical aspects of the project and also about various inter-agency and contractor relationships on the project.

Nuclear waste management and disposal is an international problem and one on which there is continual informational exchange. The Panel was especially interested in what organizational structures had been developed by other

nations, the nature of their programs, and the scheduling and financing of radioactive waste storage and disposal. Accordingly, four members of the Panel, its staff director, and two DOE representatives met with government and utility officials of six European nations and two international organizations for briefings on these matters. These consultations--including several facility tours--took place in England, Switzerland, West Germany, Belgium, France, and Sweden during the period April 27-May 9, 1984. A description of the European contacts follows (Appendix B).

As the scope of the Panel's task took shape, subsequent meetings focused on options for the organizational structure best suited to manage the NWPA program. A summary of each meeting is contained in the Panel minutes. These minutes and the full transcripts of all Panel meetings are available in the Freedom of Information Reading Room, 1E-190 Forrestal Building, 1000 Independence Avenue SW., Washington, D.C., between 8:30 a.m. and 4:00 p.m., Monday through Friday, except federal holidays.

The charter given to the Panel follows this section.

DEPARTMENT OF ENERGYAMENDED CHARTERADVISORY PANEL ON ALTERNATIVE MEANS OF FINANCING AND MANAGING  
RADIOACTIVE WASTE FACILITIES1. Panel's Official Designation:

Advisory Panel on Alternative Means of Financing and Managing (AMFM) Radioactive Waste Facilities.

2. Objectives and Scope of Activities:

To study and report to the Department of Energy on alternative approaches to managing the construction and operation of civilian radioactive waste facilities, pursuant to Section 303 of the Nuclear Waste Policy Act of 1982 (Public Law 97-425). The Panel's report will include a thorough and objective analysis of the advantages and disadvantages of each alternative approach. The Panel shall complete and deliver its report to the Department by October 15, 1984.

3. Time Period Necessary for the AMFM to Carry Out Its Purpose:

Approximately 10 months.

4. Official To Whom This Panel Reports:

The Secretary of Energy, through the Director, Office of Civilian Radioactive Waste Management.

5. Agency Responsible for Providing Necessary Support for the AMFM:

The Department of Energy. Within DOE, primary support shall be furnished by the Office of Civilian Radioactive Waste Management.

6. Description of Duties for Which the AMFM is Responsible:

The duties of the Panel are solely advisory and are stated in paragraph 2 above.

7. Estimated Annual Operating Costs in Dollars and Person-Years:

\$330,000; 0.75 person-years.

8. Estimated Number and Frequency of Meetings:

The AMFM will meet approximately six times, on a monthly basis, or as deemed appropriate by the Department of Energy.

9. AMFM Termination Date:

No later than December 31, 1984.



10. AMFM Members:

The AMFM shall consist of approximately ten members appointed by the Secretary of Energy. The Secretary shall also designate one member to serve as chairman.

This charter for the AMFM named above is hereby approved on:

Date: June 24, 1983

/Signed/ K. Dean Helms  
K. Dean Helms  
Advisory Committee Management Officer

Date Filed: June 24, 1983

Amended (Change in reporting and termination date): January 30, 1984

## 1. PANEL MEMBERS' BACKGROUNDS

Diarmuid F. O'Scannlain, Chairman, of Portland, Oregon, is a senior partner in the law firm of Ragen, Roberts, O'Scannlain, Robertson & Neill. Except for a brief period of public service, he has been a practicing attorney engaged in corporate and regulatory law practice for the past 21 years. In 1971-73 he served as Public Utility Commissioner of Oregon, and as Director, Oregon Department of Environmental Quality in 1973-74. He was a member of the Oregon Nuclear and Thermal Energy Council in 1971-74. Mr. O'Scannlain was invited to serve on the Reagan Administration's Department of Energy Transition Team in 1980-81, and subsequently was team leader on the Energy Task Force of the President's Private Sector Survey on Cost Control (Grace Commission). He is a member of the Republican National Committee. Mr. O'Scannlain graduated from St. John's University and earned his J.D. degree from Harvard Law School in 1963.

E. Linn Draper, Jr. of Beaumont, Texas, is Senior Vice President-External Affairs for Gulf States Utilities Company, as well as serving as Vice President - Nuclear Technology and as Technical Assistant to the Chairman of the Board. Prior to joining the firm in 1979 he was Director of the Nuclear Engineering Program at the University of Texas for some 10 years, and served as a consultant to federal and state agencies, utilities and industrial concerns. An author of numerous technical publications, he is currently President-Elect of the American Nuclear Society, and a member of the Nuclear Committee of the Texas Energy Advisory Council and the Conservation Commission of the World Energy Conference. He received a B.S. in chemical engineering from Rice University and a Ph.D. in nuclear engineering from Cornell University in 1970.

Brig. Gen. Mahlon E. Gates, USA (Ret.) of San Antonio, Texas, is Senior Vice President - Operations for Southwest Research Institute. During his more than 40 years of federal service, he was a combat commander in Burma in World War II and served as Commanding General, U.S. Army Support Command, and Director of Construction in Vietnam in 1966-67. Between the two wars he occupied key military positions in Europe and Iran, and in the Office of the Joint Chiefs of Staff. His involvement in the nuclear field began with his assignment to the Corps of Engineers' Manhattan District, Oak Ridge, Tennessee, in 1945-47. He subsequently held important posts involving military nuclear applications, the last being for 10 years as Manager, Nevada Operations Office, U.S. Department of Energy, from which he retired in 1982. He is a graduate of the U.S. Military Academy at West Point and the University of Illinois where he received his MSCE in 1948.

Rodman D. Grimm of Washington, D.C., is President of DGR Investment Corporation and has 20 years of experience in securing, organizing, managing, and financing large projects in both the government and private sectors. Having assisted in preparing agency, OMB and Congressional budget submissions for the Energy Research and Development Administration, he participated in the organization and activation of the Department of Energy. He was an active member of the Reagan Administration's Transition Team, including preparing policy papers on energy, environment and deregulation and assisting the Synthetic Fuels Corporation transition. He has a broad range of successful experience in energy marketing and consulting, large project financing, domestic and foreign marketing, and environmental consulting.

Bruce W. Johnson of Seattle, Washington, is presently Chairman of the Board of Computer Learning Systems, Inc., Chairman of the Management Committee of the Technical Arts Corporation, and Chairman of the Operations Committee of the Robbins Company. He was until recently Chief Operating Officer of Sealaska Corporation, a diversified enterprise which stemmed from the Alaska Native Claims Settlement Act. He founded Chem-Nuclear Systems Inc. in 1971 and served as its top official until it was acquired by Waste Management Inc. in 1983. Chem-Nuclear dealt extensively with the treatment, packaging, transportation and storage of radioactive wastes, and was a major contractor in the Three Mile Island clean-up. Mr. Johnson has been active with the Atomic Industrial Forum and has presented a number of papers on the nuclear fuel cycle. Prior to entering the nuclear field, he held important positions with ITT Rayonier and The Boeing Company. He is a director of several business firms and associations and holds B.A. and M.B.A. degrees from the University of Washington.

Barbara Keating-Edh of Modesto, California, is President and Chief Operating Officer of CONSUMER ALERT, a nationwide membership organization engaged in research, education and legal activities based on free market principles. A public speaker, writer and public interest activist, she was the 1974 candidate for the U.S. Senate for the Conservative Party in New York, and campaign manager and special assistant to U.S. Senator James L. Buckley in 1975-77. She served as Secretary of the New York State Conservative Party and as a director of the American Conservative Union in 1975-80. She was appointed by President Reagan to head the Administration's transition team for the Consumer Product Safety Commission in 1980, and presently serves on the Administrator's Toxic Substance Advisory Committee of the Environmental Protection Agency. She has participated in statewide consumer affairs initiative campaigns in New York and California.

Dr. Terry R. Lash of Springfield, Illinois, is Director of the Illinois Department of Nuclear Safety. This agency is responsible for nuclear emergency planning, radioactive monitoring, and the regulation of radioactive wastes and waste shipments within Illinois. A former consultant on nuclear and energy policy, Dr. Lash held key positions with the Scientists' Institute for Public Information in New York City, The Keystone Center near Dillon, Colorado, and the Natural Resources Defense Council in San Francisco. He has served on numerous government and scientific advisory committees and has gained national recognition in the area of radioactive waste management. A graduate of Reed College, he earned M.Ph. and Ph.D. degrees from the Yale University Department of Molecular Biophysics and Biochemistry in 1967 and 1970.

Melvin Sampson of Wapato, Washington, has been an elected member of the Tribal Council of the Yakima Indian Nation since 1971. Because of its proximity to the U.S. Hanford Reservation, the Yakima Indian Nation has for many years taken a keen interest in the Hanford nuclear installations and radioactive waste management programs. Mr. Sampson has been a leading tribal authority and spokesman in this regard. He serves as Tribal Chairman of the Legislative and Health, Employment, Welfare, Recreation and Youth Activities Committee and as a member of the tribes' Special Tax Committee. In addition to his affiliations with various civic organizations and Indian rodeo associations he has represented Indian health and social service interests on a number of national and regional policy and advisory boards.

Dr. S. Fred Singer of Charlottesville, Virginia, is Visiting Professor at George Mason University in Fairfax, Virginia, and is presently on leave as Professor of Environmental Sciences and member of the Energy Policy Studies Center of the University of Virginia. A geophysicist, he has held important academic posts and consultant positions with government and industry. A former Deputy Assistant Secretary of the Interior and Deputy Assistant Administrator of the Environmental Protection Agency, he currently serves on the State Department Science Advisory Committee on Oceans and International Environmental and Scientific Affairs, the White House Acid Rain Peer Review Panel, and as Vice Chairman of the National Advisory Committee on Oceans and Atmosphere. He holds A.M. and Ph.D. degrees in physics from Princeton and a D.Sc. (honorary) from Ohio State University.

David W. Stevens of Olympia, Washington, is Director of the High-Level Nuclear Waste Management Office in Washington State (Department of Ecology). He formerly was Special Assistant for Energy and Natural Resources to Governor John Spellman of Washington State. He represented the Governor on the State Board of Natural Resources, chaired the State Oil and Gas Conservation Committee, and was the Chairman of the Northwest Regional Compact on Low-Level Radioactive Waste until March, 1984. He serves as the Governor's representative to the National Governors' Association Subcommittee on Nuclear Power and as Co-Chairman of the NGA's Task Force on High-Level Nuclear Waste. In 1977-79 he was Director of the Association's Energy Facility Siting Project. Prior to that assignment he served for four years as Special Assistant to Governor (now Senator) Daniel J. Evans of Washington State. Mr. Stevens holds a Master's degree in Public Administration from the University of Washington.

Sidney M. Stoller of New York City is Chairman and Chief Executive Officer of the S. M. Stoller Corporation. This international nuclear power consulting firm, originally founded as a private practice by Mr. Stoller in 1959, has consulted on more than half of the nuclear power commitments in the United States, as well as having served foreign utilities and U.S. and foreign government agencies. A chemical engineer and a licensed professional engineer, Mr. Stoller has over 40 years of engineering experience, more than 35 of which are in the nuclear field. He joined Vitro Engineering Company in 1948 to contribute to the design and construction of the first post-war irradiated fuel processing plant at Hanford, Washington. As Vice President of Engineering with Vitro, he had important responsibilities on a number of pioneering nuclear projects, including the early power reactors, Naval reactors, and waste handling facilities. He has numerous professional affiliations and publication credits.

Larry J. Wallace of Indianapolis, Indiana, is a practicing attorney in that city. He was Chairman of the Public Service Commission of Indiana from 1974 to 1984. Previous positions in local and state government include a term in the Indiana House of Representatives. Mr. Wallace has been President of the National Association of Regulatory Utility Commissioners and has been Chairman of its Executive Committee and of its Legislative Affairs and Electricity Committees. He has served on the Board of Directors of the National Regulatory Research Institute and the Advisory Councils of the Electric Power Research Institute and Institute for Nuclear Power Operations. He has an A.B. degree in economics and an LLB degree from Indiana University.

Arnie Wight of Amherst, New Hampshire, has been a member of the New Hampshire State Legislature since 1977 and has national recognition in the nuclear legislative field. His service with the Legislature includes chairing its Science and Technology Committee and task forces on radioactive waste management and economic development. Active in the National Conference of State Legislatures, he holds posts on its Energy Committee and its National Advisory Committee on Development of State Legislative Policy. He previously held management positions with Nashua Corp. and Rohm and Haas Company. He has served his local community as Town Meeting Moderator and Village District Moderator for nearly 30 years. He holds a B.S. degree in chemical engineering and business administration from Massachusetts Institute of Technology.

APPENDIX B. EUROPEAN CONTACTS

In undertaking its study project, the Panel recognized that high-level radioactive waste management and disposal is not solely a U.S. problem. Most industrialized nations of the world--particularly the European democracies, Canada and Japan--are substantially dependent upon nuclear energy facilities. To a considerable degree, they share the problem of accumulated radioactive wastes and spent fuel, and of how to safely dispose of these materials.

Based upon information from the Department of Energy (DOE), consultants on international nuclear affairs, and other sources, the Panel determined that it could benefit from personal contacts with waste management agencies and utility organizations in Western Europe. Accordingly, planning began in February 1984 to schedule meetings with managerial, financial, and regulatory officials in six European nations. The prime purpose of the Panel mission was to obtain first-hand information on the development, financing, and organizational structures of waste management programs in the United Kingdom, Switzerland, Federal Republic of Germany, Belgium, France and Sweden. These contacts also focused on the political, institutional, and socioeconomic factors bearing upon waste management activities, and how each nation was handling these issues.

A high degree of cooperation was extended from both sides of the Atlantic. The U.S. Department of State, through its embassies, was extremely helpful with logistical arrangements and the scheduling of meetings, as were the Department of Energy's offices of International Affairs and Civilian Radioactive Waste Management. The foreign government agencies and utilities responded in like spirit, and the mission was scheduled for the period April 27 through May 9, 1984. Two international organizations--the Commission of European Communities and the Organization for Economic Co-operation and Development--were included in the itinerary.

For reasons of economy, the Panel delegation was limited to five: Panel Chairman O'Scannlain, Messrs. Gates, Grimm and Lash (each representing a Panel subcommittee), and the staff director. This group was accompanied by Messrs. Robert M. Rosselli and Alex Perge of the DOE waste management office.

Following are summaries of the information obtained by the Panel delegation through its European contacts. While the experience was generally beneficial with respect to waste management activities abroad, it was of particular value as regards organizational structure. Nearly all of the structures encountered demonstrated a governmental orientation blended with private-sector flexibility and financing elements.

While the Panel went on to shape its organizational findings and recommendations through a separate analytical process, the latter took heed of the parallels between the Panel's objectives and the organizational concepts being applied to radioactive waste management in Europe.

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## UNITED KINGDOM

Representatives of the Panel and the U.S. Department of Energy held meetings with United Kingdom government and utility officials in London, England, on April 27 and 30, 1984.

### Background

The United Kingdom is very close to being self-sufficient in meeting its total energy requirements—thanks in large part to its North Sea oil/gas development in recent years. In 1982, U.K. electric utilities generated 254 billion kWh of electric power, about 16 percent of it from nuclear plants. In 1982 there was 7.5 GWe of installed nuclear generating capacity, which is expected to grow to 18 GWe by the end of the century.

The U.K. spent fuel and waste management strategy is strongly weighted toward reprocessing of spent fuel, vitrification and long-term interim storage of high-level waste (HLW), and shallow land burial of intermediate- and low-level waste. The present U.K. policy is to postpone the development of permanent repositories—several types are under study—while relying upon dry above-ground storage for up to 50 years. The U.K. philosophy is that carefully monitored dry storage voids the foreclosure of future options which might offer technological or cost advantages. It also provides an opportunity to benefit from the experience of those nations which are moving ahead with permanent disposal facilities for radioactive wastes. In keeping with this policy, the Nuclear Industry Radioactive Waste Executive (NIREX) was established in 1982 to plan for and perhaps ultimately direct the development of permanent HLW repositories.

The principal responsibility for current radioactive waste management supervision is vested in the Department of the Environment (DOE). This agency develops policy and administers the statutory controls over utility operations. The implementation of waste management processes is delegated to the Nuclear Industry Radioactive Waste Executive (NIREX), whose members are responsible for financing the waste management programs.

Defense radioactive wastes are the responsibility of the Ministry of Defense (MOD). There is close liaison between MOD and DOE to assure that MOD waste management standards are at least as rigorous as those required by DOE, and that storage/disposal of both categories of radioactive wastes is environmentally safe and publicly acceptable.

### Summary of Meetings

#### U.K. Department of Environment

The first meeting in London was with the United Kingdom Department of Environment, which was represented by Dr. Frank L. Feates, Director of the Nuclear Waste Management Division, and Mr. D. R. Lewis, Director of the Administrative Division.



As noted above, present U.K. policy with respect to nuclear waste is to store it in dry surface facilities for a minimum of 50 years while considering such disposal options as deep geological, seabed and subseabed repositories. Most of the U.K. reactor waste is from magnox-type reactors, from which spent fuel is processed and reused. The remaining waste is vitrified prior to placement in intermediate dry storage facilities. Most of the existing waste is stored at Sellafield, England.

The Nuclear Industry Radioactive Waste Executive (NIREX) was formed in 1982 by the British nuclear industry to coordinate plans for the management and disposal of low- and intermediate-level radioactive waste. NIREX is comprised of representation from the Atomic Energy Authority (AEA), two Electricity Generating Boards, and British Nuclear Fuels, Ltd. (BNFL). The latter is government-owned but there is a provision for selling up to 49 percent of its shares in the private sector. The Atomic Energy Authority, the two generating Boards, and British Nuclear Fuels each contribute one-third of the support for NIREX.

Since 1960 the Department of the Environment has been responsible for overseeing nuclear waste management and disposal. It works closely with the Nuclear Inspectorate, which is a branch of the U.K. Ministry of Health and Safety. Together, the two agencies are roughly comparable to our Nuclear Regulatory Commission.

The Atomic Energy Authority is the major force in nuclear research and is also the chief or only stockholder in several commercial nuclear corporations including BNFL and NIREX. The AEA chairman is directly responsible to Parliament. Its 18,000 employees are largely non-civil service, similar to the former U.S. Atomic Energy Commission. Approximately 60 percent of the AEA work is in R&D of a Prototype Fast Reactor, and 40 percent is devoted to improving the existing reactor technology.

Four reasons were given for delaying a decision on the ultimate disposal of high-level nuclear waste.

1. There is confidence in the existing technology for dry storage to safely accommodate the nuclear waste for 50-100 years, during which period it will dissipate a substantial volume of its thermal heat.
2. The delay will permit the U.K. to benefit from the repository, etc., experience of other countries such as the U.S., the Federal Republic of Germany, and Sweden.
3. There is presently strong environmental and public opposition to the siting of nuclear waste facilities.
4. Delaying a final decision offers time to continue research on the various repository concepts. About \$10 million per year is being spent on such research, although exploratory drilling was banned by the government in December 1981. Some of the funding for this research comes from the Organization of European Communities through its Seabed Working Group.

Currently the bulk of the nuclear waste transportation within the U.K. is done by rail. Most of the reactors have limited at-reactor storage facilities and transport their spent fuel to Sellafield within 6-9 months after refueling.

The United Kingdom, France, and West Germany are the leaders in reprocessing spent fuel from other European countries. Under current policy, reprocessing is an essential part of the U.K. fuel cycle. A major reason is that--unlike the U.S.--the U.K. has no indigenous uranium deposits, according to the Department of the Environment officials.

Public attitude toward nuclear waste management is one of growing concern, and government officials are frank to admit that their educational efforts to date are generally inadequate. By giving priority to the disposal of low-level waste, however, it is felt that some public confidence has been fostered in the ability to handle high-level waste in the future.

#### Atomic Energy Authority (AEA)

The second meeting on April 27 was with the Atomic Energy Authority, which was represented by Mr. Frank Chadwick, Principal Officer, Commercial Policy and External Relations. He was accompanied by Mr. Donald Grazebrook, AEA Legal Advisor, and Mr. Norman J. Keen, AEA Radioactive Waste Projects, Harwell Laboratory. The meeting also included Dr. Morris Ginniff, President of NIREX.

It was explained that NIREX deals exclusively with low-level and intermediate-level nuclear wastes, and its facilities are available to hospitals and industry as well as the U.K. government. The U.K. Ministry of Defence uses NIREX facilities and R&D resources, but is not a NIREX member.

Present storage of low- and intermediate-level waste is in shallow land burial. The original Sellafield site is near Drigg, England. Subsequently NIREX explored numerous sites for a second shallow land facility and also for a deep geological repository for low- and intermediate-level waste. The prime considerations in site selection were geology and hydrology, plus access to major transportation routes. The second shallow land site selected is near Bedford, England, and the prospective deep burial site is an old mine shaft near Billingham, England. NIREX hopes to have both sites in operation by the early 1990's.

With respect to the acquisition of nuclear waste from various utilities, there is no standard form of exchange of title. Different contracts with utilities may specify different points where the title to the waste may be transacted. Transportation of waste appears to provide no particular legal problems since counties in the U.K. have no authority to restrict such transportation.

#### Central Energy Generating Board (CEGB)

On April 30 the Panel and DOE representatives met with officials of the CEGB for England and Wales. (There are two other Generating Boards, one in Scotland and one in Northern Ireland.) Representing the CEGB were Mr. R. Rowlands and Dr. J. K. Wright, as well as a Mr. Graham of the CEGB Department of Health and Safety.

The CEGB has 7 nuclear (magnox) powerplants plus one AGR plant in operation, three being commissioned, and one under construction. There is a foreseen need for additional nuclear reactors—if not to accommodate load growth, then to replace the older facilities. In the U.K., pressurized water reactor nuclear plants are considered to be cheaper than coal-fired ones by a factor of 3 to 2, primarily because of coal-mining costs there.

Presently 16 percent of the U.K. electric load is served by nuclear generation. This will increase to 20 percent by 1986, when the total load is projected to be 40,000 average megawatts.

Over the past decade, the U.K. has experienced a decrease in electric load due to economic recession, the abundance of cheap North Sea gas and oil, and energy conservation.

The CEGB experienced nuclear construction "growing pains" during the 1970's, including problems of inexperienced management, design changes, and technical "bugs." These problems have largely been resolved in recent years, however, and public acceptance of the nuclear technology has considerably improved.

With respect to financing, the CEGB pays the BNFL directly for reprocessing and storage service under a "terms of trading agreement" between the two. The CEGB buys most of its uranium from Canada and Australia. The raw uranium is shipped to a European commercial firm for enrichment, then to BNFL where it is converted into reactor fuel elements. BNFL reprocesses the spent fuel as well as storing excess uranium and plutonium and the waste from reprocessed spent fuel.

In common with the other U.K. entities interviewed, the CEGB "does not plan any permanent waste disposal for a long time to come," according to CEGB officials. In the meantime, the U.K. is following with interest the programs to develop high-level waste repositories in Sweden and the U.S.

CEGB was subjected to strong government pressure to participate in the formation of NIREX. This stemmed from the current U.K. government's preference for private enterprise while recognizing the public need for government control of nuclear facilities and waste management activities. Thus NIREX is a compromise solution. CEGB tends to look upon NIREX as an interim mechanism pending the establishment of a permanent waste disposal policy.

A leading role in developing such a policy has been assigned to the Radioactive Waste Advisory Committee established by the current government. Chaired by an academician, the Committee's membership includes both nuclear experts and a broad spectrum of public and political interests—labor union representatives, local government officials, environmentalists, etc.

UNITED KINGDOM

Secretary of Employment

Health and Safety Executive  
Nuclear Installations Inspectorate  
- Approves facility operation licenses

DoE

Secretaries of State for  
Environment, for Scotland  
and for Wales  
- Establishes overall  
waste management strategy

Ministry of Agriculture, Fisheries  
and Food (MAFF)  
- Administers Radioactive  
Substances Act

National Radiological Protection  
Board  
- Published guidance on  
criteria of safety

Radioactive Waste Liaison Committee  
- For DOE considers policy  
issues and coordinates  
interests of all concerned  
Government Agencies  
- Independent review of  
NIREX plans in light of  
Government's overall waste  
policy  
- NIREX is represented

Radioactive Waste Management  
Advisory Committee (RWMAC)  
- Independent experts that  
advise DOE

Waste Producers  
CEGB  
SSEB  
BNFL  
UKAEA

Nuclear Industry Radioactive Waste Executive  
(NIREX)  
- Plans and secures disposal of ILW/LLW  
from all partner organizations  
- Promotes standardization of packaging  
transport and disposal facilities  
- Provides info for the public to RWMAC  
- Costs of disposal borne by producers



## SWITZERLAND

Representatives of the Panel and the U.S. Department of Energy held meetings with Swiss government and utility officials in Berne, Switzerland, on May 1, 1984.

### Background

Electricity is generated in Switzerland by more than 450 independent companies. Twenty years ago almost all of their electricity was generated by hydroelectric plants. As this resource reached its limit, alternate energy resources were developed. Nuclear energy seemed most viable in that all fossil fuel must be imported. Today, four nuclear powerplants are in operation. These are owned by three of the larger electricity companies. They have a total net capacity of about 2000 MWe, generating about 30 percent of Switzerland's electricity. Another plant of the 1000 MWe class is planned to go into operation in 1984.

Waste management is legislated by the Atomic Energy and Radiation Protection Act and several regulations. A basic premise of the Swiss legislation is that radioactive waste management handling and disposal is the financial responsibility of the generating utilities.

Switzerland's program is also guided by a body of policy. Whereas the overall policy of eventual disposal—as opposed to prolonged storage—is anchored in law, most of the other policies grew out of decisions taken by the implementing organizations and informally approved by the nuclear safety authorities and an Interdepartmental Working Group (AGNEB). These policies can be summarized as follows.

- Spent fuel is stored on-site and then sent for reprocessing; there are now plans for a central storage facility.
- Radioactive wastes may be stored for a limited time but eventually storage has to be succeeded by final disposal.
- Part of the low- and intermediate-level waste has been disposed of by sea-dumping.
- All types of waste will be disposed of in geological formations; depending on waste type, two or three repositories at varying depths are presently envisaged.

The number and structure of the waste management institutions aims at a clear separation between regulatory and implementing bodies. The regulatory authority is with the federal administration and consists of two organizations working in close cooperation: the Nuclear Safety Division of the Federal Office of Energy, and the Nuclear Safety Commission. Implementation of waste management is the responsibility of an organization called National Cooperative for the Storage of Radioactive Wastes (NAGRA).

Switzerland has a unique method of public involvement in national policies. The "popular initiative" allows citizens to propose amendments to the constitution which, with enough support, are then put to a referendum. Such a referendum was held in 1979. Included was an amendment which would have put a stop to future nuclear development in Switzerland. This was rejected, although by a very narrow margin. A similar referendum is now pending for 1984.

### Summary of Meetings

#### National Cooperative for the Storage of Radioactive Waste (NAGRA)

The U.S. contingent spent the morning in Berne with Dr. Rudolph Rometsch, who is the president of NAGRA and the acknowledged "father of nuclear waste management" in Switzerland and is held in the highest esteem throughout the international waste management community.

By way of historical background, Dr. Rometsch outlined the Swiss system for legislating, developing and carrying out the nuclear waste management program there. A 1957 amendment to the Swiss constitution provides that all nuclear waste management is a federal responsibility. During the 1970's, as nuclear development burgeoned, a number of oversight laws were enacted by the Swiss Parliament. These include a requirement for majority parliamentary approval of any new reactor in addition to a stringent licensing process. A federal "stipulation law" also requires an explicit guarantee--upon application for such parliamentary approval--that all radioactive wastes will be properly managed and will ultimately be placed in a permanent repository. This law provides a "safety valve" which permits the Federal Government to take operational control of the wastes if necessary to insure public health and safety. To date this prerogative has not been invoked, nor is it anticipated to be.

Approximately one-third of Switzerland's electric utilities are privately owned. The remainder are quasi-private with the majority of shares held by one or more cantonal governments. The average retail cost of Swiss electricity is about 7 cents per kilowatthour.

NAGRA, which is considered a cooperative under Swiss law, was formed in 1972 to carry out the interutility charter concerning nuclear waste management activities and ultimate disposal. The licensing of nuclear reactors is the responsibility of the Federal Department of Energy's Nuclear Safety Division and the Nuclear Safety Commission (KSA), would jointly function like the U.S. Nuclear Regulatory Commission.

In mid-1984 there were four operating nuclear powerplants in Switzerland which provided approximately 30 percent of the country's electric power. Two additional plants were underway and would increase the nuclear capability to about 3000 megawatts or 45 percent of total power production. Otherwise Switzerland is dependent upon hydroelectric projects and small oil- and gas-fired generation. Switzerland has no nuclear enrichment or reprocessing facilities, nor are any presently contemplated. Most of its enrichment services are purchased in the U.S.

Regarding spent fuel, the present plan is to reprocess in France and the United Kingdom through contracts which specify the return of the waste and its specific form. This arrangement extends into the early 1990's.

Following the passage of the Swiss stipulation law concerning waste management, the government and utilities focused upon the radioactive wastes already generated. Parliament is presently considering an accrued waste disposal plan for scheduled enactment by the end of 1985, although some delay is already anticipated.

Prior to passage of the stipulation law, the licensing of a new reactor took less than 2 years with a total development cycle of approximately 7 years. Today the entire process would require 12-14 years as in the U.S.

Two important referendums will be on the Swiss national ballot in late 1984, both of which would become amendments to the Swiss constitution. The first of these would place a moratorium on future reactor development after the completion of the Lypshack project now under construction. The second referendum would establish a strong national energy conservation program to be financed by a Swiss tax on energy production. Both of these referendums will be decided by majority votes in the 26 Swiss cantons.

Those promoting the passage of the two referendums include environmental and anti-nuclear groups, the Social-Democratic party (whose economic philosophy advocates the decentralization of power generation), and a consortium of oil and natural gas industries. At the time of our visit, this anti-nuclear faction appeared to be dominant, but there was a growing pro-nuclear sentiment largely stemming from the potential acid-rain threat posed by coal-fired plants.

[Both of these referendum measures were defeated in September 1984.]

#### NAGRA Program

Under Federal Government supervision, NAGRA is currently developing a plan for a deep geologic repository. The responsibility for the program would be NAGRA's through the sealing of the facility, when the long-term responsibility would revert to the Federal Government.

NAGRA is pursuing two primary work programs:

1. The year 2020 is the target date to commence loading high-level waste in a repository. This facility would accommodate up to 15,000 cubic meters of high-level waste.
2. A separate repository for low- and intermediate-level waste is scheduled to enter service in the period 1995-2000 with an approximate capacity of 170,000 cubic meters of waste.

Borings and geologic/hydrologic studies are now underway for the high-level waste repositories. The prime HLW locale now under consideration is a crystalline formation near the Rhine River and the Federal Republic of Germany border.



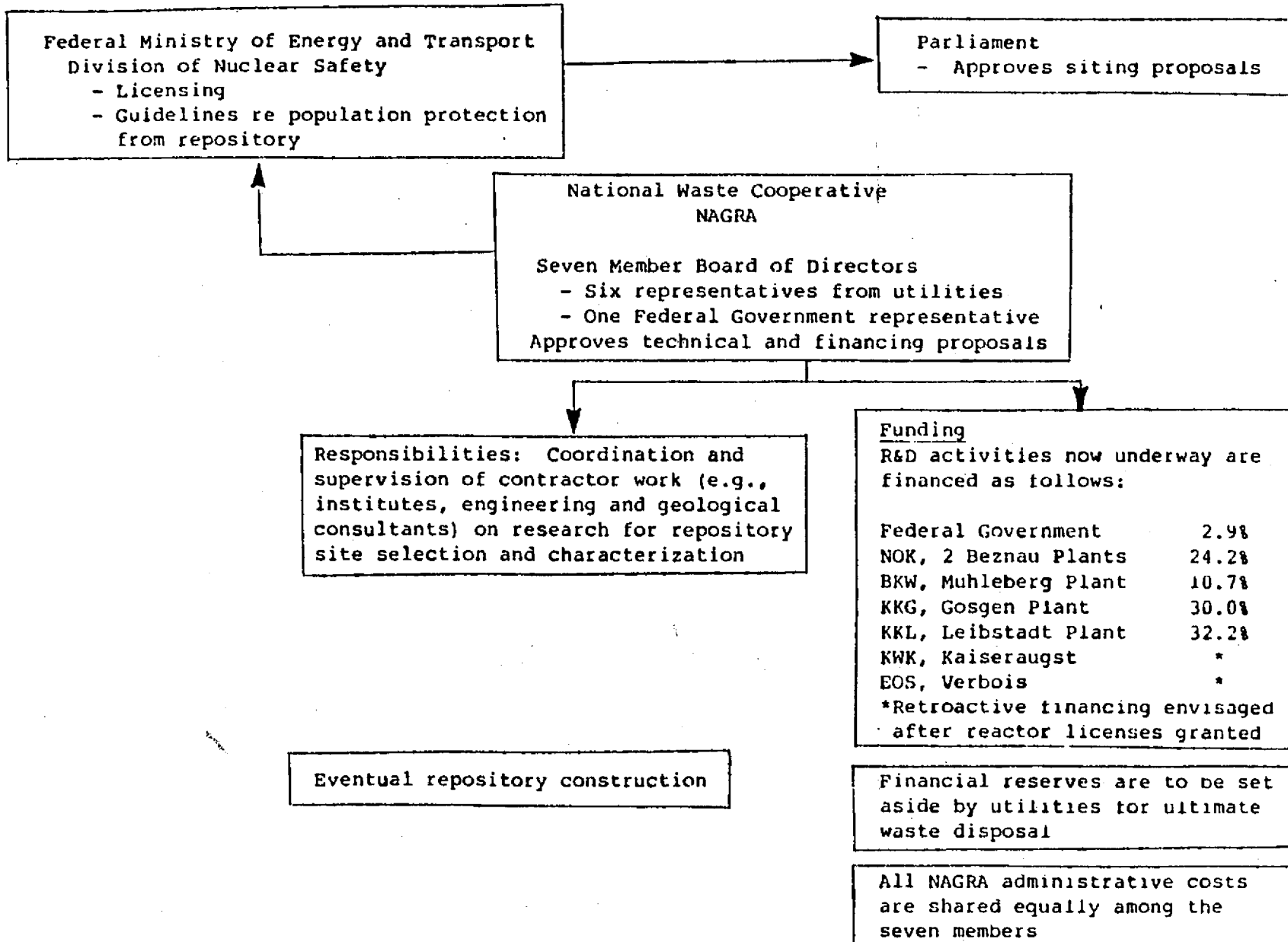
With regard to financing, the present estimated budget for the two repositories--based upon 6,000 megawatts of generating capacity--is 1.5 billion Swiss francs or approximately 700 million U.S. dollars. Three percent of this total cost would be borne by the Federal Government, with the remainder apportioned among five operating nuclear plants and two which are still in the planning stage. Some 4 million Swiss francs were spent for general administration in 1983 and 70 million for R&D and testing operations.

#### Meeting with Swiss Deputy Minister of Energy

Also on May 1, 1984, the U.S. delegation met with Dr. Christian Favre, the Deputy Minister of Energy of the Swiss Federal Government.

During the relatively brief meeting, the Deputy Minister emphasized that the Swiss waste management program appears to be working well. He noted the difference in philosophy between the Swiss program and that of the U.S., whereby the Swiss utilities take the lead with close government supervision as compared to the U.S. program of government implementation with utility funding. It was the Deputy Minister's view that each concept is probably appropriate for the respective countries and that the quality of management would largely determine the success of each program.

SWITZERLAND





FEDERAL REPUBLIC OF GERMANY

Representatives of the Panel and the U.S. Department of Energy held meetings with German government and utility officials in Bonn, Federal Republic of Germany, on May 2, 1984.

Background

At the end of 1983 the Federal Republic of Germany (FRG) had 15 nuclear plants in operation (13,000 MW total capacity) and 12 more under construction (10,000 additional MW). The in-service nuclear reactors generated some 18 percent of the nation's electricity, which is expected to increase to 30 percent by the mid-1990's. The development pace of new commercial reactors has improved as a result of a recent streamlining of the FRG licensing process and the adoption of a standardized pressurized water reactor (PWR) design.

Generally speaking, FRG electric utilities are privately owned, although most of their stock may be held by local municipalities. These utilities develop their own generation, including nuclear facilities, under Federal Government supervision and licensing. This FRG government-utility cooperation will be expanded in the development of Europe's most modern breeder reactor, which enjoys the participation of France, Italy, the U.K., Belgium and the Netherlands. This facility, the SNR-2, is scheduled to enter service in West Germany about the turn of the century.

With respect to radioactive waste management, the German Atomic Energy Act sets forth the basic responsibilities for the industry. Basically, the utilities with nuclear powerplants are responsible for all nuclear waste management activities and facilities except for permanent disposal facilities, which are the responsibility of the Federal Government. To this end, the 12 utilities with, or planning, nuclear powerplants formed the German Company for Reprocessing of Nuclear Fuels (DWK) in 1977. Each utility's share in DWK is based upon the projected amount of nuclear waste which the utility is expected to generate. For permanent disposal, the national scientific and engineering laboratory is responsible. This organization is the Physikalische-Technische Bundesanstalt (PTB), under the Ministry of Economics.

The Federal Republic of Germany has an extensive commercial fuel cycle program, which has been based for many years on the concept of recycling plutonium to breeder reactors, and possibly to LWRs. It includes worldwide uranium exploration (at least indirectly supported by the government), participation in Urenco and CENTEC centrifuge enrichment projects, extensive UO<sub>2</sub> and mixed-oxide fuel fabrication capability, and the development of commercial fuel reprocessing and waste management facilities.

Current FRG strategy includes: (1) thorough evaluation of the final storage of spent LWR fuels as an alternative to reprocessing; (2) indefinite storage of spent fuels at one or more AFRs, using the dry storage concept; (3) interim reprocessing of FRG fuels (2700 metric tons) by COGEMA at LaHague; (4) construction of one or more small (350 metric ton) reprocessing plants; (5)

construction of a salt dome repository at Gorleben for HLW, TRU wastes and possibly spent fuels; and (6) conversion of the abandoned Konrad iron mine into a repository for non-TRU wastes.

### Summary of Meetings

The U.S. delegation met first with Dr. Rolf-Peter Randl and his staff, who provided a broad overview of the Federal Republic of Germany (FRG) nuclear energy development and its waste management program. A second meeting was held with Dr. Rosel of the FRG Company for Construction and Operation of Repositories (PTB-DBE). Following is a synopsis of the information imparted at these meetings.

#### The FRG Nuclear Industry

As in the United States, load forecasts in the FRG have experienced a drastic decrease and for essentially the same reasons—economic slump and price-induced energy conservation.

The FRG experience also parallels that of the U.S. with regard to:

1. The lengthening of nuclear reactor development from 4 years to the current 10-12 years;
2. The downturn in load forecasts from 7 percent a decade ago to less than 2 percent now; and
3. A proliferation of siting, licensing and operating regulations.

Originally the FRG utilities purchased most of their nuclear fuel and enrichment services from the U.S. Because of changes in U.S. political policies, the FRG now obtains its fuel from Canada, Australia, and South Africa, with most of the enrichment services provided by the U.S.S.R.

#### Nuclear Energy Management Structure

The preponderance of technical planning—both for reactor technology and radioactive waste facilities—is performed by the Federal Government. All nuclear energy programs must be paid for by the utilities, except for the final waste disposal, which is largely financed by the Federal Government and constructed by private contractors.

Three Federal Government departments bear the prime responsibility for developing nuclear energy and waste management programs. The Federal Ministry for Science and Technology (BMFT) manages nuclear research and development, including the operation of research laboratories and the construction of demonstration projects. The Ministry of Interior (BMI) oversees the conduct of reactor and waste management licensing procedures. The main subsidiary organization to BMI is the Federal Science and Engineering Laboratory (PTB), a government entity which is in charge of licensing, construction and operation of radioactive waste repositories. In addition, BMI utilizes the technical services of two independent advisory bodies—the Reactor Safety Committee (RSK), and the Radiation Protection Committee (SSK).

The private sector is strongly represented in the FRG Company for Construction and Operation of Permanent Repositories (DBE). This public-private corporation gathers data for PTB planning and carrying out deep drilling operations, and will be in charge of constructing and operating radioactive waste repositories.

Twelve FRG nuclear-generating utilities comprise DWK, which will be represented on the DBE directorate to insure cost-effectiveness in waste management activities. DWK ownership is divided among the Federal Government, local governments within utility service areas, and about 15 percent held by private shareholders.

The overall FRG radioactive waste program is overseen by an interparliamentary committee comprising representatives of six Federal Government ministries.

#### Radioactive Waste Management Planning

Under FRG law, a utility must file an official assurance concerning the safe, permanent handling of radioactive wastes at least 6 years in advance of a nuclear reactor license being granted. As in the U.S. and other countries, the nuclear generating utilities are responsible for funding the costs of radioactive waste management and final disposal.

The site of the first high-level waste repository has already been designated near the town of Gorleben in the southeastern (Lower Saxony) corner of the country. Away-from-reactor (AFR) storage near the site commenced in May 1984.

In addition, an abandoned iron ore mine in Bavaria is being prepared as a repository for low- and intermediate-level wastes. Construction on this 800-meter deep facility (Konrad) is scheduled to commence in 1988 with an anticipated in-service date of 1998.

After an extensive public involvement process and environmental documentation, two reprocessing plants are expected to be licensed by late 1984—one in Konrad, Bavaria, and the other near Gorleben in Lower Saxony. Both reprocessing facilities will handle all levels of radioactive waste.

The Federal Republic of Germany is strongly pursuing the reprocessing option for two stated reasons: (1) The FRG has no indigenous uranium deposits, and (2) The cost of mining coal is extremely expensive since there are no FRG open-pit coal deposits.

#### Financing of FRG Waste Repositories

Under FRG law, the cost of radioactive waste repositories are apportioned in the following manner.

- 75.5 percent is paid by those firms and local governments which hold licenses for reprocessing facilities with a capacity of 50 metric tons annually (including those which have filed applications for such plants);
- 4 percent is paid by licenseholders of lesser-capacity reprocessing plants;

- 17.5 percent is paid by those holding licenses for nuclear powerplants of more than 200-megawatt capacity; and
- 3 percent is paid by those licensed to use radioactive materials.

The PTB serves as the collecting agency, including advance payments to cover R&D, planning, property acquisition, and design and construction costs. PTB is required to reassess the revenue needs annually, both those projected and retrospectively.

In 1983, the total cost of waste processing and handling, transportation, storage, and repository development was 4.0 mills per kilowatthour based on FRG nuclear power production.

#### The Gorleben Repository

The Gorleben facility is being developed in a salt dome located near the East German border and the Elbe River. It will be approximately 3,000 meters in depth, with the lower section reserved for high-level waste and the upper tiers for low- and intermediate-level waste.

Approximately \$150 million per year is being spent on developing the Gorleben facility, which is the only high-level waste site presently being constructed for a repository. Under current FRG policy, the advantages of pursuing a single repository site include:

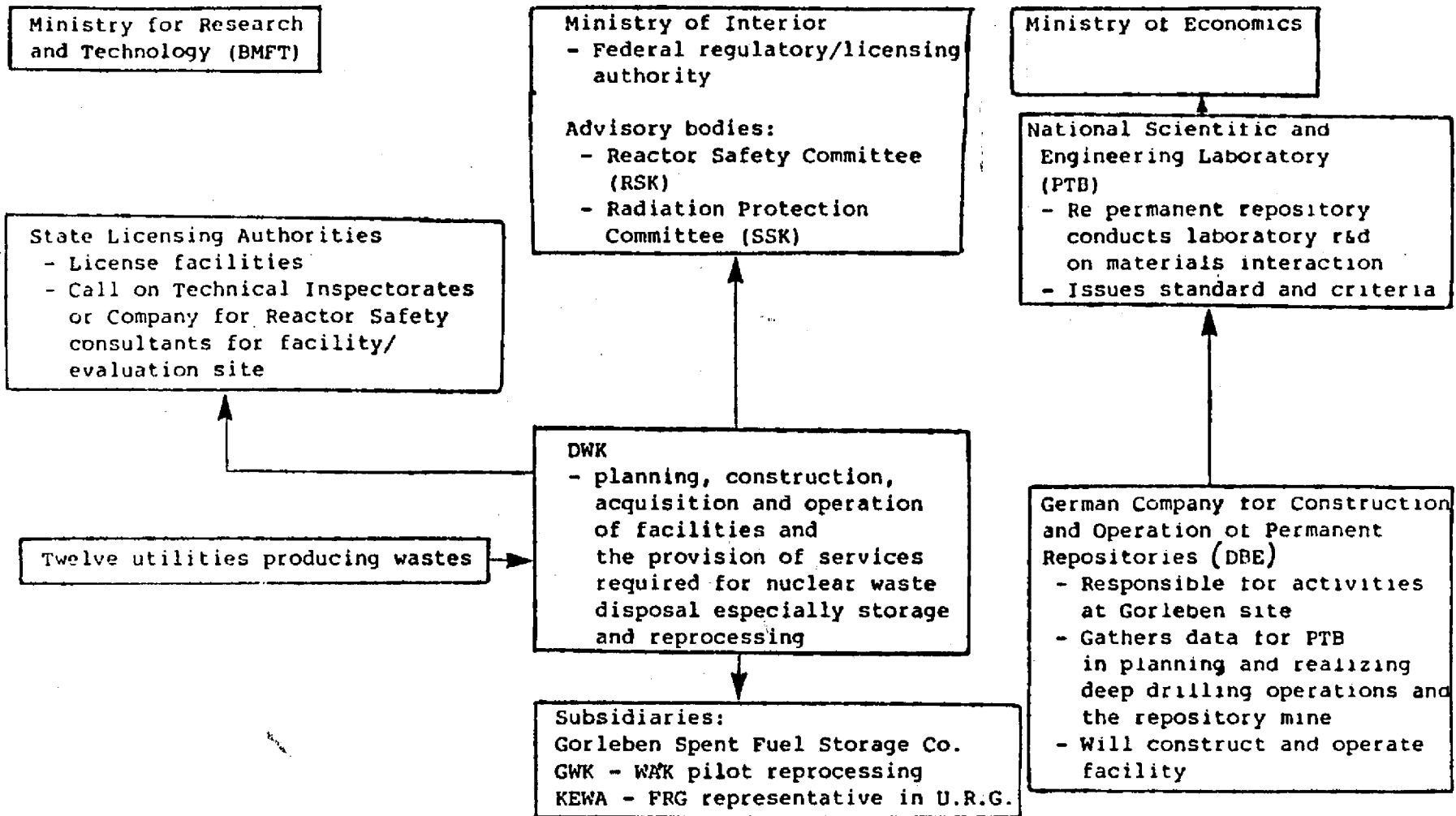
1. It is more economical than exploring several alternatives;
2. It is easier to overcome one set of institutional obstacles; and
3. Should the Gorleben site not qualify, it would not leave "less desirable" sites to pursue.

The obvious disadvantage to the single-site strategy is that a Gorleben disqualification would substantially lengthen the time frame in developing a suitable repository.

Through its construction phase, the Gorleben repository is expected to cost about \$1 billion. It is being designed to operate for a 50-year period and to accommodate up to 50,000 megawatts of generating capacity.

Any future high-level waste repositories will probably also be located in Lower Saxony because it is the logical choice from a geologic standpoint--all of the FRG clay and deep-salt formations are in that locale.

FEDERAL REPUBLIC OF GERMANY







## BELGIUM

Representatives of the Panel and the U.S. Department of Energy spent May 3 and 4, 1984, in Belgium. The first day was devoted to a tour of radioactive waste handling facilities in the Mol complex in northeastern Belgium. On May 4 the group met in Brussels with energy representatives of the Commission of European Communities in the morning and with officials of the Belgian government agency responsible for radioactive waste treatment, transportation, and disposal in the afternoon.

### Background

Belgian parliamentary legislation providing for the comprehensive management and disposal of radioactive wastes was enacted in 1980. This legislation, supplemented by a Royal decree in 1981, established the national structure for carrying out the program. As with France, management of the radioactive waste program is essentially a responsibility of the national government rather than of the utilities.

As of mid-1984, five pressurized water reactor commercial powerplants were operating in Belgium with a total capacity of 3400 megawatts. These plants generated 46 percent of the nation's electricity in 1983. By 1986, planned nuclear generation will increase to 65 percent following the start-up of two additional PWR 1000-MW units.

In addition to this reactor program, the Belgian government oversees uranium and plutonium fuel fabrication and waste management industry programs. Belgium also participates in various international nuclear activities such as the Eurochemic processing plant located at Mol, the EURODIF enrichment plant in France and the fast breeder reactor SNR-300 in the Federal Republic of Germany.

There are several organizations involved in the nuclear fuel cycle in Belgium.

The Centre d'Etude de l'Energie Nucleaire (CEN/SCK) is a government agency which holds a key position in the structure of the nuclear industry in Belgium. CEN/SCK operates a plant to condition low- and medium-level radioactive wastes and is actively involved in reactor research and the development of waste treatment and waste disposal technology.

Synatom S.A., owned by three private utilities which operate Belgium nuclear power stations, provides nuclear fuel cycle services: purchase of natural uranium; procurement of uranium enrichment, conversion, reprocessing and waste disposal services; interim storage of spent fuels; and reprocessing.

Belgonucleaire S.A., owned partly by CEN/SCK (50 percent) and partly by private interests, manufactures MOX fuels and provides nuclear engineering services.

Eurochemic was established to build and operate a small reprocessing plant. This international company was substantially sponsored by the Organization for Economic Cooperation and Development (OECD). The plant was shut down in 1974, and Eurochemic facilities, including waste treatment pilot plants, have been transferred to Belgian ownership.

Public Organization for the Management of Radioactive Waste and Fissile Materials, ONDRAF (NIRAS in Dutch) was established by Royal decree of March 30, 1981. Under this decree, ONDRAF has responsibility for the transport of radioactive wastes, spent nuclear fuels, enriched fissile materials and plutonium-containing materials; the conditioning of radioactive wastes for the producers who do not own adequate facilities; the storage, outside the producer's facilities, of radioactive wastes prior to their conditioning or disposal; the disposal of conditioned radioactive wastes; the storage of spent fuel outside the nuclear powerplants and reprocessing plants; and the storage of enriched materials or plutonium which are not directly required to secure the operation of the facilities which produce or use them.

ONDRAF is supervised by a Board of Directors representing several Belgian ministries. The consultation between the waste producers, the scientific and university world, and ONDRAF takes place in a Permanent Technical Committee. The daily management of the organization is exercised by a General Manager. ONDRAF is empowered to establish a fund for financing its long-term activities by charging waste producers according to the volume and type of waste created. These charges can be no more than the costs of services, since the organization is non-profit.

Belgian fuel reprocessing and waste management planning is based on the following assumptions:

1. Some or all Belgian spent fuel will be reprocessed in foreign plants. (COGEMA is under contract to treat 500 tons of Belgian fuel by 1990.) The Eurochemic fuel reprocessing plant will probably be renovated and used to reprocess domestic LWR fuels or handle specialty fuels from various countries.
2. An AVM-type HLW vitrification plant is to be built at Mol to immobilize existing Eurochemic wastes and to treat future Belgian HLW. Other Eurochemic waste treatment and storage facilities will be used by Belgium.
3. An underground long-term storage site will be constructed for high-level treated waste and plutonium fuel fabrication waste. An underground research laboratory is being construction at Mol in a clay formation.

#### Summary of Meetings

##### Tour of Mol Facilities

On May 3, 1984, the U.S. delegation inspected the various radioactive waste handling, treatment, and research facilities at the Mol complex. This Nuclear Research Center was originally developed in 1952 as a private research

institute financed both by the Belgian government and other European interests of both a governmental and quasi-private nature. The Center's director, Dr. Paul Dejonghe, hosted the visit.

The major multi-national facility at Mol, the Eurochemic demonstration reprocessing plant, became operational in 1966 and was closed down in 1974. This plant successfully processed a large variety of spent fuels from research and power reactors until it became evident that Western Europe was faced with a reprocessing over-capacity. After the shutdown of its plant Eurochemic undertook a twofold program: decontamination of the reprocessing facilities and the conditioning of the accumulated wastes. In 1981 the ownership of the reprocessing plant was taken over by the Belgian government and plans for a re-start were undertaken. If and when the facility returns to service, 55 percent of the ownership will be retained by the Belgian government with the remainder to be held by U.K., French, and West German interests.

Presently the Eurochemic facility is limited to site characterization R&D and pilot programs dealing with the handling and volume reduction of low- and intermediate-level radioactive wastes.

For repository purposes, the country of Belgium is almost entirely limited to clay formations. Commencing in 1974, preliminary drillings at a Mol site have led to the development of an "underground laboratory" which could become Belgium's first operating repository for radioactive waste. Under Belgian law this program and others dealing with applied research in waste management must be financed by the consumers of nuclear-generated power.

The experience to date with the Mol test repository indicate that clay is the most expensive geologic medium for waste disposal, although perhaps the safest due to its moisture-absorption properties. The present underground laboratory is located at a depth of 210 meters.

The high-level waste produced by the Eurochemic plant is scheduled for reprocessing at a new facility now under construction at Mol. This PAMELA plant, which is being built by the West German Reprocessing Company (DWK) with financial support from the FRG Ministry for Research and Technology, will demonstrate a new West German vitrification process. The PAMELA facility is scheduled for operation in late 1985. The high-level waste it produces should be amenable to safe--and retrievable--storage for a period of up to 50 years.

Mol has the world's first vitrification plant, which operates at temperatures up to 1500 degrees Centigrade. The U.S. delegation also toured Mol's high-temperature waste volume reduction facility.

#### Meeting with Commission of European Communities (CEC) Representatives

On May 4, 1984, the U.S. contingent met with a panel of CEC officials in Brussels, where the international agency is headquartered.

The principle objectives of the CEC with respect to radioactive waste management are:

1. To implement a CEC "action plan" adopted in 1980. This plan includes consultation among CEC member nations on waste management technology, the development of common criteria for the acceptance of conditioned waste, and the promotion of CEC concerted action on waste disposal.
2. To promote radioactive waste R&D, including the construction of pilot or demonstration facilities. This R&D program is currently supported by a CEC budget of \$2 million per year.
3. To insure that radioactive waste management is conducted in a manner which will protect the environment and comply with international radiological protection standards.

The CEC funding of its action plan and corollary activities by its member nations has several sources. The principal ones are national value-added taxes and a portion of the customs revenues of the member countries. The selection of specific R&D projects for CEC funding can originate either with a member nation or with the CEC itself.

The CEC's official policy is to support the reprocessing of radioactive waste and spent fuel. Three of its member nations--the United Kingdom, France, and the Federal Republic of Germany--are the world's largest reprocessors since the U.S. discontinued reprocessing.

The CEC energy budget presently has averaged about \$150 million in recent years. This is divided about equally among R&D on nuclear fission, nuclear fusion, and radioactive waste management. With respect to the latter, high-level waste enjoys a clear priority in the CEC financing program. CEC policy concerning waste disposal is to support a "network" of coordinated disposal facilities among its member nations. The possibility of developing a multi-national repository is under consideration, but no active planning is yet underway. Based upon its studies and surveys to date, the CEC anticipates no serious problems with respect to the international transportation of radioactive waste. (This opinion, however, predates the August 1984 sinking of a French radioactive shipment near Ostend, Belgium.)

#### Meeting with ONDRAF/NIRAS Officials

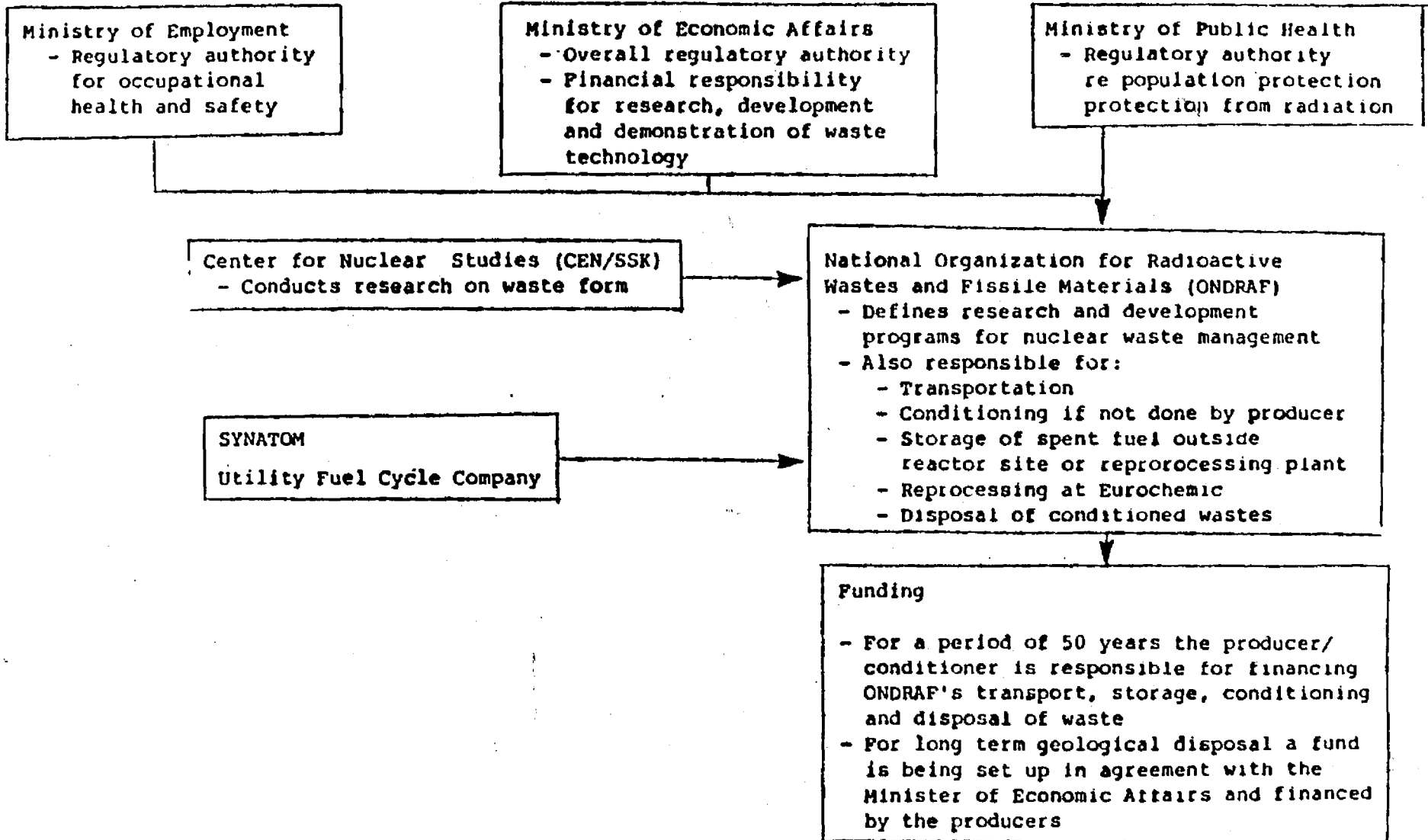
On the afternoon of May 4, 1984, the U.S. contingent met with Dr. Emile Detilleux, Director of ONDRAF/NIRAS, and his colleagues.

ONDRAF is responsible to the Belgian Ministry of Economic Affairs. ONDRAF has no regulatory powers, but develops technical recommendations for various government ministries concerning environmental, health, and public safety criteria and/or regulations dealing with radioactive waste. ONDRAF presently has a total staff of 17 and does not contemplate increasing this beyond 30. Most ONDRAF investigations and pilot projects are performed by private contractors.

By mid-1985 ONDRAF will issue a report on the feasibility and design criteria for a full-scale radioactive waste repository. The primary recipient of the report will be the Belgian Ministry of Public Health and Environment.

The ONDRAF staff is not under the Belgian civil service; they enjoy a somewhat higher pay scale but little or no job security. Their pay and operating costs are financed by Belgian nuclear utilities through contracts with ONDRAF. The latter's Board of Directors is comprised of 20 career government employees appointed by the various Belgian ministries concerned with energy, the environment, and public health and safety.

BELGIUM



FRANCE

Representatives of the Panel and the U.S. Department of Energy met with French government officials in Paris on May 7, 1984.

Background

France depends heavily on foreign supplies of fossil fuels, in 1983 importing more than half of its total energy and 98 percent of its oil. French authorities consider nuclear power to be the one alternative energy source capable of replacing oil in the short and mid-terms, and France has mounted an aggressive nuclear power program. In 1983, French powerplants generated about 284 billion kilowatthours of electric energy. This was distributed between nuclear (48 percent), coal and oil/gas (27 percent), and hydro (25 percent).

By the end of 1984, France's 36 operational reactors will supply nearly 60 percent of its total electricity production, the highest proportion in the world and more than four times nuclear's share in the U.S. By 1990, when an additional 25 reactors are scheduled to be in service, nuclear is expected to produce nearly 75 percent of French electricity. This would achieve the national goal of almost eliminating the need for imported energy—especially as the French master plan calls for a massive conversion of the transportation system to electricity.

France is the Free World leader in developing domestic nuclear power and fuel cycle capability, marketing fuel cycle services, and exporting equipment, plants, and technology. At the present time, emphasis is being placed on expansion of fuel reprocessing capacity to satisfy domestic and foreign requirements, demonstration of the fast breeder reactor fuel cycle, development of waste treatment and terminal waste storage technology, and construction of industrial waste treatment plants.

The French Atomic Energy Commission (CEA) controls all nuclear R&D, while its semi-autonomous subsidiary, COGEMA, handles all industrial fuel cycle activities. Waste disposal responsibility has been assigned to another CEA subsidiary, ANDRA. These and other French nuclear organizations are described more fully in the body of this report on France.

France has been reprocessing spent fuels since 1958, initially in UP-1 at Marcoule, and since 1967 in UP-2 at La Hague. Plans are underway to expand the capacity of La Hague by the end of this decade. This will involve construction of UP-3A, which is to be dedicated to foreign fuels for a 10-year period (1985-1995).

COGEMA has contracts to reprocess spent fuels for utilities in Belgium, West Germany, Japan, The Netherlands, Sweden, and Switzerland. Most of the work will be done under contracts requiring the customer to pay a share of the UP-3A construction costs and, by December 31, 1995, to take back reprocessing wastes, immobilized according to French specifications. After 1995, UP-3A is to be used for domestic fuels.



Plans for waste management include:

1. Sustained efforts to minimize waste generation rates and to recover plutonium for recycle;
2. Immobilization of reactor plant wastes and short-lived wastes from reprocessing plants, and semi-permanent (retrievable) burial;
3. Interim (5-20 years) storage of acid high-level liquid waste (HLLW) from reprocessing;
4. Conversion of HLLW to borosilicate glass in vitrification plants at Marcoule and La Hague, and interim storage of the HLW glass logs in air-cooled vaults at the vitrification plant sites;
5. Return of wastes from reprocessing foreign spent fuels, to the country of origin;
6. To vitrify all HLW, provide interim storage for up to 100 years for the waste glass canisters in an engineered surface facility, then isolate in a suitable geologic formation;
7. To process LLW by conventional techniques, producing a decontaminated stream (which can be discharged into the environment) and a radioactive concentrate which will be immobilized in bitumen, concrete, or a resin and then stored; and
8. Development of technology for geologic disposal of HLW glass and long-lived (transuranic) wastes in crystalline rock, salt, or clay formations, or under the seabed. Site selection for a permanent repository is being pursued. Under the previous administration, France was conducting an aggressive program to: (1) locate and characterize a small number of potential repository sites; and (2) develop a second burial/storage site for low- and intermediate-level wastes. This program has intensified under the current administration.

#### Summary of Meetings

##### Ministry of Industrie

On May 7, 1984, Panel and DOE representatives first met with French Ministry of Industrie officials headed by Mr. Thierry Salmona, Chef de la Cellule Nucleaire. The latter explained that the Ministry of Industrie is responsible for the overall application of materials and energy in shaping and enhancing the French economy. With respect to the development of nuclear energy, the Ministry has three salient responsibilities:

- To promote nuclear facility planning, construction and operation;
- To advise the French government on nuclear energy matters; and
- To insure the safe and environmentally acceptable management of the nuclear industry and its radioactive wastes.

Following are brief descriptions of the key organizations in France and their responsibilities in the area of nuclear energy production and waste management.

Electricite de France (EDF), 100 percent owned by the state, is responsible for all public generation of electricity in France, and in 1977 produced 85 percent of the total French electrical power. EDF owns and operates all of the nuclear power facilities except the demonstration power reactors, which are owned by the CEA.

The Atomic Energy Commission (CEA) advises the government on nuclear energy matters, and controls all nuclear R&D and industrial fuel cycle activities, including the production of nuclear materials for defense (enriched uranium, plutonium and tritium). The CEA operates under the direct authority of the Ministry of Research and Industry.

COGEMA, a semi-autonomous company formed by the CEA in 1976, offers integrated services covering the entire nuclear fuel cycle. COGEMA owns a number of major fuel cycle plants and, in addition, owns or has participating shares in several uranium mining companies, Comurhex (UF<sub>6</sub> production), Eurodif (a multi-national spent fuel reprocessing consortium) and SGN (design, construction, and marketing of fuel cycle facilities for domestic and foreign customers).

ANDRA is a semi-autonomous company, formed by the CEA in 1980, to: (a) manage long-term waste storage centers, either directly or through other companies; (b) plan and provide for new long-term storage sites; (c) develop waste package and storage specifications; (d) coordinate French R&D programs related to long-term waste storage; and (e) fund applied waste disposal R&D. The activities of ANDRA, which is a public service, are financed as follows:

Operating costs of disposal centers and ANDRA's operations are directly billed to the waste-producing organizations in proportion to their deliveries.

Specific investments concerning the disposal of special wastes are prefinanced by their owners.

Preliminary studies for licenses to build disposal centers are financed by prepayment of the waste producers.

The construction of disposal centers is financed by loans, the costs of which are shared by the different organizations concerned in proportion to their effective use, under multi-annual handling contracts that guarantee satisfactory debt service.

IPSN (Institute for Nuclear Protection and Safety) is a specialized branch of the CEA which deals with safety problems and related research. The IPSN staff prepares safety regulations for the Ministry, provides technical support to ANDRA, prepares safety analyses on proposed waste management plans, approves processes for waste treatment, and conducts R&D relating to safety.

Meeting with Agence Nationale Pour le Gestion des Dechets Radioactifs (ANDRA)

The U.S. delegation met with ANDRA Deputy Director Alain Barthoux and Mr. Robert Janin, Deputy Director of Electricite de France, on the afternoon of May 7. Also participating in the meeting was Madame Kinsky of the CEA Waste Management Department.

ANDRA is responsible for developing a single budget for all French waste storage facilities and services. As with the other European countries visited, the producers of high-level radioactive waste and spent fuel are responsible for underwriting most waste management activities. A fee based upon projected metric tons of generated waste is assessed at the beginning of each year and subsequently revised according to the pro rata volume of waste materials actually produced. These fees are designed to cover all ANDRA costs except for research and development, which are financed by general funds through CEA and its Technical and Scientific Commission. By financing R&D in this manner, CEA has total control over the R&D function as applied to the entire nuclear fuel cycle.

The basic safety rule in the development of a radioactive waste surface storage facility is:

1. That its operation can be predicted by intensive technical modeling;
2. That its average Alpha emissions not exceed .01 curies per ton; and
3. That planning of such facilities adhere closely to other government criteria for the transportation and handling of radioactive wastes.

France is presently committed to the operation of three large radioactive waste reprocessing plants. The need for additional reprocessing facilities is undergoing continual reevaluation based on changing economic and technical factors.

ANDRA policymaking is determined by a 12-person Board of Directors. Four of these are CEA representatives and three are lay members. The remainder of the Board comprises one member each from EDF, COGEMA, the Ministry of Industrie, the operating utilities, and the Ministry of Health.

ANDRA's role is currently limited to the transportation, mid-term storage, and final disposal of low- and intermediate-level wastes. It is anticipated that it will undertake similar responsibilities for high-level waste in the future. Current plans are to vitrify all high-level wastes and store them in temporary facilities for periods up to 80 years prior to permanent disposal.

ANDRA presently operates one shallow-land repository and is planning two others—one scheduled to enter service in 1989 and the other in the early 1990's. ANDRA contracts with private companies with respect to the design and building of its waste storage facilities.

A major effort is underway to identify three sites for an "underground laboratory" by 1985. Investigations are going forward in salt, granite, and clay formations with no preferred medium as yet identified.

Thirty-four possible sites for the "underground laboratory" have been identified. It is anticipated that this facility will be qualified for HLW disposal testing by 1992 and ultimate storage before the end of the century. The overall siting and characterization program and schedule are quite similar to those specified in our Nuclear Waste Policy Act.

With respect to the public involvement process, the prime contacts and public input are at the local government level rather than with the "departments," which are comparable to our states. While concerned about the technical aspects of siting, ANDRA gives equal weight to the political, socioeconomic and transportation impacts inherent in permanent waste disposal. When the French government officially approves a repository site, neither local governments, public interest groups nor individuals can legally oppose the site selection.

#### Electricite de France (EDF)

This organization is owned by the French government, but is operated as a private entity. EDF has a contract with ANDRA to ship all categories of radioactive wastes and spent fuel to the storage facility at La Hague after 2-3 years of at-reactor storage. EDF pays all transportation and capsule costs, as well as providing some 80 percent of ANDRA's total budget. Eventually EDF will also fund ANDRA for permanent disposal services, and is now underwriting most of the repository siting and characterization costs.

The "Super-Phoenix" breeder reactor is being developed in concert with Italian, West German, and Belgian interests, but EDF has a 51 percent ownership share. This unique facility is scheduled to enter service in late 1985.

EDF studies show that nuclear energy is the economic choice if a needed plant is to operate more than 3,000 hours annually. A lesser plant factor favors the use of coal. The licensing and construction of a nuclear powerplant in France now requires 5-6 years.

In early 1984 the cost of reprocessing spent fuel averaged 5,000 francs (\$1750) per kilogram. Residential electric rates in France averaged about 5-1/2 American cents per kilowatthour.

FRANCE

Central Government Authorities

Ministry of Health  
- Service Central de  
Protection contre  
Rayonnements Ionisants  
(can veto a license)

Ministry of Research and Industry  
- Service Central de Surete  
Installations Nucleaires (SCSIN)  
(construction and operation  
licensing)

Ministry of Environment

Establish general policy  
and protection objectives  
Enforce regulations  
Approve technical choices  
Conduct inspections

Institute de Protection et de  
Surete Nucleaire  
- Provides technical support  
to SCSIN

Commissariat de l'Energie Atomique

ANDRA  
Long term radioactive waste management  
Issues specifications  
- Consistent with technical  
safety choices  
- In compliance with regu-  
ations  
Controls application of these speci-  
fications among waste producers and  
operators

Operators  
Disposal Center  
Operators  
Transporters

Waste Producers  
EDF  
Cogema  
CEA  
Defense  
Hospitals  
Industry  
Research

## SWEDEN

Representatives of the Panel and the U.S. Department of Energy held meetings with Swedish government and utility officials in Stockholm, Sweden, on May 8, 1984. An inspection of a Swedish waste management test facility was conducted on May 9.

### Background

Present Swedish nuclear energy policy, mandated by a March 1980 national referendum, calls for completion and operation of a total of 12 power stations (9,400 megawatts) by 1985, to provide about 45 percent of Sweden's electricity. Thereafter, the Swedish government plans no further growth in nuclear power. Instead, it will require the phasing-out of all nuclear plants by the end of the year 2010. All such facilities are to be decommissioned at the completion of their 25-year operating life or by December 2010.

Long-term policy to accomplish the above goal was formulated by the Swedish Parliament in 1981. It is based on the following principles:

- The nuclear utilities as producers of the waste bear the primary responsibility for the safe disposal of the waste.
- The state bears the ultimate responsibility that the waste is disposed of in a manner which is satisfactory to society.
- The costs of the waste management shall be borne by those who benefit from the activity which produces the waste.

As a consequence, the Swedish Nuclear Fuel Supply Company (SKBF) was designated as the prime entity for conducting nuclear waste management and disposal activities. The ownership of this company is divided proportionally among four nuclear utility holding companies. The SKBF consortium has the charter to coordinate, plan, and execute the investigations and measures required to realize the safe management of nuclear waste. It bases the development of a waste management system on the following general conditions:

- It shall be possible to carry out the required measures with a high degree of national independence, from which it follows that disposal shall be arranged in Sweden and employ a technology which is available in Sweden.
- Burdens on future generations shall be avoided.
- A very high level of long-term safety is essential, which entails demonstrating that the long-term impact of a repository on its environment does not essentially alter natural radiological conditions in the region.

Two state entities were established to regulate and supervise the safety of nuclear power in Sweden. They are the Swedish Nuclear Power Inspectorate (SKI) and the National Institute of Radiation Protection (SSI). They

prescribe the conditions which the nuclear utilities have to meet before they can obtain permits to build and operate a facility. They then assure that these conditions are adhered to and, if they deem it necessary, impose new or supplementary conditions. All costs incurred by these entities are paid by the nuclear generating utilities through a special fee.

A third state entity, the National Board for Spent Nuclear Fuel (NAK), has been established to oversee the SKBF on non-regulatory issues. This agency keeps abreast of nuclear technology in order to review the work of SKBF and administer the fund set up by the government to pay for SKBF activities.

This fund was established in 1982. It covers the future costs of high-level waste disposal and also includes the costs of decommissioning all 12 nuclear powerplants. The fee level is reevaluated annually by NAK, and adjusted accordingly.

Under the aegis of SKBF, a high-level nuclear waste repository is scheduled to be in operation by 2020.

#### Summary of Meetings

##### Ministry of Industry

On May 8, 1984, Panel and DOE representatives met with Swedish Ministry of Industry officials headed by Mr. Per O. Strangert of the Energy Division of the Ministry. Of the 150-person complement of the Ministry, Mr. Strangert is the only fulltime staff person responsible for nuclear energy matters. His general charge is twofold: (1) the promotion of nuclear energy, and (2) the development of nuclear waste management policy within the Ministry. In the latter role, he coordinates closely with the Nuclear Power Inspectorate, the National Board on Spent Nuclear Fuel, the National Institute for Radiation Protection, the Ministry of Agriculture, and the Ministry of Foreign Affairs.

Under the Swedish constitution, government ministers only provide broad oversight of the various government agency programs and are constitutionally limited with respect to the direct management of agency programs, including nuclear energy activities. In general, Swedish government agencies are fairly independent of Ministry direction and are essentially responsible to the Swedish Parliament.

The national direction concerning nuclear waste management essentially derives from four laws passed by the Swedish Parliament. Two of these--the Nuclear Energy Act of 1956 and the Radiation Protection Act of 1958--are of a general nature and for the purpose of regulating nuclear safety and radiological protection.

Two more recent laws specifically govern the management and disposal of radioactive waste and spent nuclear fuels--the Stipulation Act of 1977 and the Financing Act of 1981. The Stipulation Act lays out the conditions which a sponsor must satisfy in order to obtain a license for a new power reactor. Among these requirements is the assurance of the safe disposal of all nuclear waste resulting from the reactor's construction, operation, and decommissioning. The Financing Act of 1981 specifies the organizational and financing mechanisms for nuclear waste management and ultimate disposal.

In February 1984 a new act was passed, its purpose being to streamline and amalgamate the key provisions of the earlier pieces of nuclear energy legislation.

Under this Act:

1. A government or relevant authority permit is required for each nuclear activity, including the handling of various nuclear materials.
2. A special government permit must be obtained before a nuclear reactor may be loaded with fuel for the first time. This section of the Act stipulates that the licensee has given assurance that there exists a method of final waste disposal which meets safety and radiation technical requirements. (The last two large commercial reactors in Sweden were licensed under this stipulation in the summer of 1984.)
3. The licensee must also prepare a comprehensive plan for the research and development needs to accomplish its waste management program.
4. The new Act also reinforces the requirements of the Financing Act of 1981 wherein nuclear generating utilities (and their consumers) bear the cost of high-level nuclear waste management and disposal.

Planning for future nuclear waste in Sweden does not contemplate the reprocessing of spent reactor fuels following the expiration of current reprocessing contracts with COGEMA in France. Reprocessing is not viewed as being cost-effective in comparison to other options, and the Swedes are concerned about the potential proliferation of weapons-grade plutonium as a by-product of reprocessing.

Under the oversight of the government agencies noted above, the Swedish nuclear generating utilities are responsible for planning and implementing all high-level nuclear waste management and disposal activities. This program is directed by the SKBF comprising four utility holding companies. These activities are aimed at carrying out the mandate of the March 1980 Swedish referendum which will terminate the operation of nuclear powerplants by the year 2010. According to the Ministry of Industry, this generating capability will be replaced by energy conservation, coal, cogeneration, and renewable energy resources including wind, wood-fired, and hydroelectric facilities. It is worth noting that the 1980 referendum was reportedly influenced by the 1979 Three Mile Island incident in Pennsylvania.

#### National Board for Spent Nuclear Fuel (NAK)

The second Swedish government agency consulted by the Panel and DOE representatives was the National Board for Spent Nuclear Fuel (NAK), which has a total staff of 5 and a 10-person Board of Directors. Mr. Gerhard Rundquist is the NAK director with whom our delegation met.

He noted that the Swedish Parliament will ultimately decide what sources of power will be developed to replace the phased-out nuclear reactors by 2010. It will also be up to Parliament to "prepare the public to pay the price" resulting from this conversion.



A prime responsibility of NAK is to oversee the preparation of an annual report required of SKBF and to verify its cost data. The report includes an annual projection of nuclear generation, spent fuel, operating estimates, and waste management costs. From this data the annual kilowatthour SKBF fee is derived, with varying rates of interest applied. It is important to note that this fee is calculated annually. In 1984 the fee is the U.S. equivalent of 2.3 mills per kilowatthour.

A major thrust of the NAK oversight role is to assure that (1) SKBF adequately projects its annual and out-year cost estimates and, (2) that it conducts its activities in a cost-effective manner.

Based upon recent estimates, SKBF consumers will pay a total of 39 billion Swedish kroners (approximately \$5 billion U.S.) to develop and operate spent fuel repositories during the period 1980 through 2060. Nearly all of these accrued fees will be collected by 2010 when all Swedish nuclear reactors are closed down.

Present plans are for an intermediate spent-fuel repository (CLAB) to enter service in mid-1985. This facility—located some 50 meters below the ground in one or more water pools—would provide up to 40 years of cool-down storage of spent fuel rods. The initial capacity of the CLAB project will be 3,000 metric tons, which can be expanded to 7,000 metric tons. Its design, construction, and operation will be closely supervised by NAK.

#### Nuclear Power Inspectorate (SKI)

The next agency interviewed was the Nuclear Power Inspectorate (SKI), which is roughly comparable to our Nuclear Regulatory Commission. An agency within the Ministry of Industry, SKI is headed by a seven-member Board of overseers, four whose members are political appointees and three are technical experts (all 3-year terms). SKI is also responsive to three citizen advisory committees on reactor safety, waste management safeguards, and research and development. SKI has a staff of approximately 80 and a current annual budget of 66 million kroners or about \$8 million U.S. About two-thirds of this budget goes to R&D. Nearly all of these costs are paid by the nuclear generating utilities as part of their annual fee.

SKI is responsible for issuing licenses both for nuclear reactors and nuclear waste management facilities. The most recent reactor license was granted in mid-1984.

According to SKI, the local Swedish communes (approximately 250 in all) have legislative authority to veto the siting of any nuclear reactor or nuclear waste management facility. Such a veto can only be overridden by the Swedish Parliament (as similarly provided under the U.S. Nuclear Waste Policy Act of 1982).

#### Swedish Nuclear Fuel Supply Co. (SKBF)

The last meeting conducted by Panel and DOE representatives in Stockholm was with Mr. Lars B. Nilsson, SKBF director, and his assistant, Mr. Claes Thegerstrom.

SKBF was originally formed as a joint nuclear fuel supply organization--a "front-end of the nuclear cycle" consortium. The concern about and planning for nuclear waste management and disposal have developed over the past decade or so and now dominate the SKBF activities.

SKBF has a Board of Directors comprised of utility presidents--career managers--only one of whom is appointed by the State Power Board. This directorship provides strong management continuity and has no set term of office. Its members generally serve until retirement or death.

Under law, SKBF reports to Ministers of both Industry and Agriculture through SSI, SKI, and NAK. The SKBF fees support these government agencies as well as SKBF operations and R&D activities.

The general organization of SKBF encompasses four areas of activity:

1. R&D (performed by a subsidiary, KBS, which uses academic/technical services as consultants)
2. Administration
3. Facilities
4. Fuel supply.

All of these operations are supported by consultant services as well.

Following is a brief chronology of the SKBF nuclear waste management and repository program.

- 1982--Initiation of the Sea Transport System, which provides for offshore transportation of nuclear waste and spent fuel from reactors to low-level waste storage sites and for similar transportation of high-level wastes to intermediate storage facilities and eventually to permanent repositories.
- 1985--A central away-from-reactor facility (AFR) for spent nuclear fuel to be in operation.
- 1988--A permanent repository for low-level nuclear wastes to be in operation.
- 1990--An intermediate/high-level waste storage facility to be in operation.
- 2020--A repository for high-level waste to be in operation.

As currently proposed, the latter facility will be sunk 500 meters deep in a granite formation, with the unprocessed spent fuel suitably encapsuled.

To date, 10 sites in Sweden are being investigated for the high-level waste repository, with the following schedule to be met:

- 1980-90—Studies of all candidate sites.
- 1990-2000--Detailed characterizations of optimal sites.
- 2000—Nomination of the preferred site and application for construction/operation licenses.
- 2000-2010—Licensing process.
- 2010-2020--Construction period.
- 2020—Repository in operation.

It is presently contemplated that the repository will be in operation for about 40 years or through 2060. Its total estimated cost is projected to be the equivalent of \$5.2 billion in 1983 dollars.

Mr. Nilsson expressed pleasure that the U.S. Congress has established a schedule for developing one or more permanent repositories. He indicated that he and his colleagues will monitor progress in the U.S. with great interest.

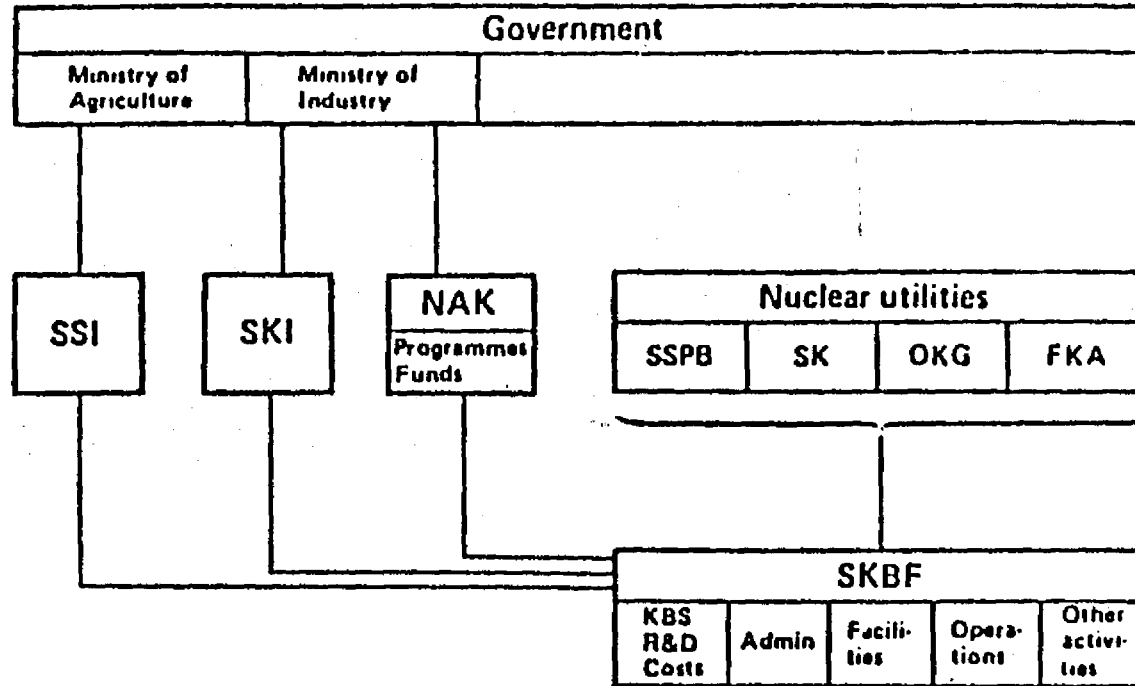
#### The Stripa Project

The International Stripa Project started in 1980 and is scheduled to continue until 1986. The project is an abandoned iron ore mine in central Sweden. A granite formation is adjacent to the ore excavations and is accessible to a depth of 350 meters. Horizontal tunnels have been excavated into the granite where rock conditions are suitable for experimental investigations.

The project is an autonomous OECD/NEA project involving several different investigations of matters of importance for the storage of radioactive waste in crystalline bedrock; such as buffer and sealing material behavior, migration of nuclides in fissured rock, hydrology, geochemistry and development of geophysical methods. In addition to Sweden itself, other countries participating in the Stripa project include: Canada, Finland, France, Great Britain, Japan, Switzerland, and the United States. This project provides for exchange of technical information among the participants in the research and development areas under study, interchange of qualified personnel, and offers opportunities for coordination of regulations and acceptance criteria.

On May 9, 1984, members of the Panel visited the Stripa Mine with representatives of the U.S. Department of Energy and received briefings on studies of hydrology and geochemistry being carried out there.

## SWEDEN



### *Controlling authorities:*

- NAK National Board for Spent Nuclear Fuel
- SKI Swedish Nuclear Power Inspectorate
- SSI National Institute for Radiation Protection

### *Utilities*

- SSPB Swedish State Power Board
- FKA Forsmarks Kraftgrupp AB (SSPB 74.5%, private and municipalities 25.5%)
- SK Sydkraft AB (municipalities 53.5%, private 46.5%)
- OKG OKG Aktiebolag (Sydkraft 35%, municipalities 16.25%, private 48.75%)

### *Executing organization:*

- SKBF Swedish Nuclear Fuel Supply Co (SSPB 36%, FKA 30%, OKG 22%, SK 12%)
- KBS A division of SKBF and responsible for R & D and cost estimates



## APPENDIX C. PROFILED ORGANIZATIONS

In addition to the Department of Energy waste management office, the Panel identified 9 generic organizational structures (and examples of each) for consideration in the study. The Panel assigned its prime contractor, Human Affairs Research Centers, Battelle Memorial Institute, the task of preparing profiles of the selected entities with respect to their history, financing, and organizational modes, and how each entity might relate to key organizational tests developed by the Panel. Following are these organizational profiles.

<u>Organizational Type</u>	<u>Examples Profiled</u>
Sub-Cabinet office	Bureau of Reclamation EPA Superfund Office
Administration responsible to a Cabinet department	Rural Electrification Administration Bonneville Power Administration Corps of Engineers
Federal executive agency	National Aeronautics and Space Administration
Independent federal commission	Atomic Energy Commission
Government-controlled corporation	Synthetic Fuels Corporation Tennessee Valley Authority U.S. Postal Service
Mixed government-private corporation	National Railroad Passenger Corporation (Amtrak)
Government-chartered private corporation	Communications Satellite Corporation (COMSAT)
Utility-type private organization	Ohio Valley Electric Corporation Middle South Utilities, Inc.
Private corporation	Waste Management Inc. Westinghouse Electric Corporation

## BUREAU OF RECLAMATION

### Establishment

The Reclamation Act of 1902 authorized the establishment of the Bureau of Reclamation (Bureau). The Bureau's purpose was to reclaim the arid and semiarid lands of the western United States by supplying irrigation water and ensuring its efficient use.

Congress has enlarged the Bureau's mission considerably in the 82 years since its inception. Today, the Bureau is involved in multipurpose water development that includes providing water not only for irrigation but also for home and industry use, outdoor recreational purposes, and wildlife enhancement. In addition to these and various other projects related to water use, the Bureau constructs dams and reservoirs that aid in flood control and provide hydroelectric power.

### Organization

For 21 years following its creation in 1902 the Bureau was known as the Reclamation Service. In 1923, the Secretary of the Interior reorganized it to become the Bureau of Reclamation and appointed its first commissioner. Today, the Bureau of Reclamation is still a sub-Cabinet office within the Department of the Interior. The Commissioner of Reclamation is appointed by the President and supervised by the Secretary of the Interior.

In its early years, the Bureau committed itself to scientific and nonpartisan development of the nation's resources. Because of high costs involved in administering its many projects plus a variety of complaints from the people—especially farmers—the Bureau was trying to serve, a new approach was inaugurated during Eisenhower's presidency that called for "partnership" in projects between the public and private sectors, and greater control by states of their own water resources. This led to a highly decentralized organization managed by federal officials, but involving local governments, private contractors, local residents, and staff engineers on a state-by-state basis.

### Financing

The Bureau of Reclamation has attempted from the start to be a self-financing agency. The reclamation fund was established originally by requiring settlers who took reclaimed lands to pay for the costs of improvement. This system failed because the settlers complained of the limited time for repayments and excessive costs. Later these problems were alleviated by extending repayment periods and by relying on new sources of Bureau funds generated from its own projects. These funds are called "special funds" and are comprised of: (1) the Reclamation Fund, largely derived from irrigation and power revenue; receipts from the sale, lease, and rental of public lands; and certain oil and mineral revenue; and (2) the Colorado River Dam Fund.

The Federal Government makes appropriations for research, project feasibility studies, and maintenance of projects. It also makes emergency appropriations to ensure continuous generation at all projects in the event of drought, canal bank failures, electrical system failures, municipal and industrial water

delivery system failures, or other emergencies. These appropriations are screened carefully. The Bureau can also sell interest-bearing government certificates to obtain funds for advances.

### Organizational Tests

The total construction cost of completed projects since 1902 is about \$7 billion. About \$5 billion of that cost has been or will be returned to the federal Treasury through the sale of power and water, and through repayment contracts with water users covering the construction cost of water distribution.

1. Mission-Oriented. In his first message to Congress in 1901, Theodore Roosevelt called for the creation of a federal reclamation service and described its mission like this: "The reclamation and settlement of the arid lands will enrich every portion of the country, just as the settlement of the Ohio and Mississippi Valleys brought prosperity to the Atlantic states . . . Successful homemaking is but another name for the upbuilding of the nation." This notion of "up-building the nation" still characterizes the Bureau's mission today.
2. Ability to Maintain Credibility. In its early years, political squabbles from outside and inside the Bureau led to inconsistencies in practices and loss of faith by early settlers. In more recent times, the collapse of the Teton Dam and controversies over conservation issues have led to criticism and protest. However, if "credibility" as an organizational test means that stakeholders believe what an organization says it is doing, then the Bureau's extensive record of successfully completed storage reservoirs, canals, pipelines, tunnels, and transmission lines surely attests to its credibility.
3. Stability and Continuity. Although the Bureau has certainly proceeded sporadically in its 82 years of existence, there has been a fairly strong and adaptable leadership style affiliated with the Bureau's highest officials that has carried the Bureau through tumultuous times. The Bureau's continuing efforts over the past years bear witness to its ability to adjust to changing political, social, and economic times.
4. Programmatic Authority. Whereas most government agencies feel constraints on their programmatic authority from higher branches of government, the Bureau of Reclamation is largely self-financing and thus finds itself restricted instead by individuals and communities that can either decide to support or restrict its projects. In other words, if a community does not want to finance a proposed project, the Bureau loses its programmatic authority.
5. Accessibility and Responsiveness. The Bureau has learned the importance of partnership and cooperation with the public from its early mistakes with alienating the people who it was trying to help. In learning to at least address the social questions along with the engineering concerns in reclamation projects, the Bureau has evolved from an organization run and administered by engineers and water resource specialists to an organization sensitive to the needs of the people it is serving.



6. Internal Flexibility. Since the Bureau is involved in the construction of various projects of varying sizes, requiring different types of technical expertise and frequent adjustments to the contingencies that inevitably arise, the bureau is given plenty of independence and flexibility in its hiring, firing, and relocating of specialists, contractors, laborers, etc.

7. Political Accountability. As a sub-cabinet office headed by a presidentially appointed commissioner, the Bureau is accountable to the Department of Interior, the Congress and the President, but in times of little or no complaints against the Bureau, political accountability diminished substantially.

8. Financial Accountability. As alluded to in the last organizational test, when controversy plagues the Bureau and the Bureau's reclamation fund diminishes, Congress has to appropriate the necessary funds and takes special interest in where, why, and how effectively the money is being spent. When the Bureau is operating in an environment of acceptance, Congress cuts its funds and except for annual budget reports, concerns itself little with how the Bureau spends its own money.

9. Technical Excellence. Despite the Bureau's present precarious position because of complaints against its projects from conservationists, the Bureau is generally thought of as the technical leader in all types of water projects, especially dams. This focus on technical excellence and neglect of social needs hurt the Bureau in early years, but there now exists more of a balance between the two.

## EPA SUPERFUND OFFICE

### Establishment

Before the passage of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in December of 1980, federal and state governments did very little to clean up hazardous waste sites or to respond to spills of hazardous substances. Particularly when dumpsites were old and abandoned, identifying the responsible party or any party able to afford the cost of a cleanup proved extremely difficult and consequently, demanded governmental action. The Federal Government lacked general authority in these areas; its responsibilities were mainly regulatory. State governments lacked the funds and the legal authority to respond effectively. CERCLA established the Superfund program to solve this problem by providing the needed general authority and establishing a Trust Fund to finance response activities at the state and federal levels. The Environmental Protection Agency (EPA) is responsible for managing the program.

### Organization

The Office dealing with Superfund represents one of nine operating divisions of EPA, and is responsible directly to the EPA Administrator and Deputy Administrator. This Office is led by the Assistant Administrator for Solid Waste and Emergency Response who has three offices under his control: the Office of Solid Waste, the Office of Emergency and Remedial Response, and the Office of Waste Programs Enforcement.

With federal authorization, state and local governments may conduct the cleanups and receive reimbursement through Superfund. The Federal Government itself may conduct the removal if the state or local government requires assistance. In both cases, the Federal Government plays an advisory and coordination role. Four basic components form the Superfund program: Hazardous Substance Response Actions, Enforcement, Research and Development, and Management and Support. Support services include access to specialized monitoring, sampling, and safety equipment, as well as training courses and information manuals.

Superfund and Section 311 of the Clean Water Act require that EPA, the Coast Guard, the Federal Emergency Management Agency, the Department of Health and Human Services, the Department of Interior, and nine other federal agencies cooperate as members of the National and Regional Response Teams to coordinate emergency activities. Each agency has responsibility for its particular area:

- o the Coast Guard or EPA has primary responsibility to respond, depending upon the location of the emergency;
- o the Federal Emergency Mngement Agency is responsible for evacuations;
- o the Fish and Wildlife Service in the Department of Interior and the National Marine Fisheries Service in the Department of Commerce research the effects of the disaster on marine, aquatic, and terrestrial life; and
- o the Public Health Service in the Department of Health and Human Services investigates incidents of hazardous substance exposure to humans and threats to the public welfare.

### Financing

The Hazardous Substance Response Trust Fund receives 86 percent of its funds from taxes on manufacturers, producers, importers, and exporters of certain chemicals and petroleum. The remaining funding comes from general revenues. The Fund is estimated to amount to \$1.6 billion by the end of its 5-year expected lifespan. The Fund provides financial support for both emergency and long-term cleanup of releases of hazardous substances and of inactive waste sites.

### Organizational Tests

The organization is too new to allow for effective evaluation.

## RURAL ELECTRIFICATION ADMINISTRATION

### Establishment

The Rural Electrification Administration (REA) was first established as an independent agency by Executive Order on May 11, 1935, as part of a general program for unemployment relief. Passage of the Rural Electrification Act 1 year later gave it statutory authority. In July of 1939, REA became part of the Department of Agriculture.

The REA originally was created to provide financial support for extending electricity to rural areas. During the year prior to its Congressional authorization, a great deal of argument arose over who could receive loans; particularly, whether private utilities should be eligible, and whether public rural electrification should receive federal subsidies in the form of lower interest rates on loans. The final decision was to make "persons and corporations" eligible, but only after public bodies (i.e., cooperatives) received preference. The Reconstruction Finance Corporation was to supply REA with \$50 million for each of its first 2 years and Congress could then appropriate funds up to \$40 million per year for the following 8 years. Thus, until the passage of the Pace Act in 1944, REA was intended to end after 10 years.

In 1949 REA expanded into a new area, receiving the additional authority to loan funds for telephone service in rural areas. The Administration currently also offers business management and technical assistance on a regular basis to its borrowers.

### Organization

An Administrator, appointed by the President of the U.S., controls REA. The person holding this office has the authority to make loans for rural electrification and telephone service, to make or request investigations concerning the organization's progress in fulfilling its purpose, and to publish and disseminate information related to its activities.

As a result of a major reorganization effort in 1980, REA's five area offices were replaced by two new divisions: the Distribution Systems Division and the Power Supply Division. Other newly created divisions included:

- o the Engineering Standards Division, which is to develop standards and approve construction materials;
- o the Environmental Energy Requirements Division, which is to develop energy forecasting and environmental policies and procedures;
- o the Electrification Loans and Management Division, which is to process distributive loans and provide management assistance to borrowers; and
- o the Energy Management and Utilization Division, which is to oversee the development and effective utilization of supplemental energy sources.

### Financing

The REA makes subsidized direct loans, and guarantees loans made by certain other lenders, to rural electric and telephone systems. The rural electric and telephone systems, organized as consumer cooperatives, use these funds to construct and maintain electric power generation and distribution systems and telephone systems in rural areas throughout the country. The REA also provides business management and technical assistance to its borrowers.

Appropriations from the general fund are made to cover REA's administrative costs. These costs are approximately \$30 million per year. User charges will be proposed to cover these administrative costs during the 1985 legislative year.

REA loans outstanding total over \$36 billion. These loans are off-budget and are financed in several ways. REA makes direct loans from a revolving fund. It also guarantees loans made through the Federal Financing Bank (FFB) and other qualified lenders.

Table 1 shows a summary of REA off-budget financing in Fiscal Year 1984. REA direct loans from its revolving fund amounted to over \$1.1 billion in Fiscal Year 1984, with over \$10.1 billion in outstanding loans. These loans are made with a 5 percent interest rate and a 35-year term. The revolving fund itself is financed through loan repayments from the consumer cooperatives, and through borrowing from the Treasury as needed. The guaranteed loans made by other lenders made in the amount of \$403 million in FY 84; nearly \$3.9 billion of such guaranteed loans were outstanding in the same year. The largest source of funds for the REA's programs is direct loans by the FFB. Such loans amounted to nearly \$3.8 billion in FY 84 with \$22.5 billion outstanding as of the end of that year. As shown in Table 1, total lending by or through the REA amounted to nearly \$5.3 billion in FY 84, with outstanding loans of \$36.5 billion in the same year. New loan obligations are expected to decline somewhat from this rate in the future, due to declining electric power growth rates throughout the country.

#### Organizational Tests

1. Mission-Oriented. REA's original mission of supporting the effort to extend electricity to rural areas was subsequently broadened to include offering telephone service to these areas. These goals were clearly defined, as were the methods through which REA would pursue them.

TABLE 1  
 Rural Electrification Administration Loan Program, FY 1984  
 (Thousands of dollars)

Source of Funds	Total Obligations During Year	Balance Outstanding
I. Rural Electrification Administration Revolving Fund	1,100,000	10,154,997
II. Federal Financing Bank		
A. Sales to FFB of loans guaranteed by REA	403,400	3,870,907
B. Direct loans by FFB	<u>3,765,000</u>	<u>22,503,905</u>
TOTALS	5,268,400	36,529,809

Source: Budget of the U.S. Government FY 1985, pp. III-3 to III-4.

2. Ability to Maintain Credibility. Through its history, REA gained the support of many groups including the Farmers Union, the National Grange, and the Farm Bureau. Even power companies eased their opposition to REA by the early 1950's and have accepted REA as a partner in the rural market.
  3. Stability and Continuity. Confusion and dispute over REA's future reached a peak during the early 1940's. The most important issue of conflict was whether REA should remain solely a distributor of electricity or expand to become a producer as well. REA's ability to generate power, however, was recognized as a vital component of its overall strategy to provide electricity to rural areas. Consequently, its scope of activities was widened in order to continue to serve its original mission. Since then, the organization has followed a predictable and stable path.
  4. Programmatic Authority. REA has a great deal of control over its programs and activities. Its range of funding sources and its separation from the unified federal budget help to ensure that it has adequate funding for its programs.
  5. Accessibility and Responsiveness. Since it works with individuals and cooperatives in the pursuit of its mission, REA tends to be both accessible and responsive.
  6. Internal Flexibility. REA has relatively little need for internal resource allocation, so this test is not particularly important. The Administration's personnel are covered by civil service provisions, which provides at least one limitation on flexibility.
  7. Political Accountability. As a government agency, REA has a high degree of political accountability to the Executive Branch and Congress. Since its activities are politically popular, particularly in the South and West, REA has generally had good relationships with officials having oversight responsibilities.
  8. Financial Accountability. REA theoretically is very accountable financially since it is an agency of a federal department. In practice, the Administration is free from many financial constraints due to the range of resources it can tap. It can receive monies through loan repayments, loans from the Federal Financing Bank, and guaranteed loans from third party sources. This diversity of sources increases REA's programmatic authority and makes financial oversight more difficult.
- Furthermore, the off-budget status of REA's trust fund means that financial limitations and accountability are less likely. Individuals concerned with federal budget deficits or spending totals will overlook REA, since it is not included in the unified federal budget.
9. Technical Excellence. REA has performed its technical activities without major difficulties.

## BONNEVILLE POWER ADMINISTRATION

### Establishment

The Bonneville Power Administration (BPA) was created in 1937 to act as a marketing agent for power from the Bonneville Dam. As the Grand Coulee Dam neared completion in 1941, BPA was selected to market power for this project as well. Since then, BPA has become the marketing agent for 28 other federal dams in the Northwest as well as a number of non-federal projects.

BPA's mission, as outlined in its enabling act, is to:

- o sell at wholesale the electric energy from the Bonneville Dam;
- o construct, operate, and maintain transmission lines and substations;
- o connect the Bonneville project with other federal projects and publicly-owned power systems;
- o encourage the widest possible use of all of the electric energy that can be generated and marketed, and prevent monopolization by limited groups by giving preference to public bodies and cooperatives; and
- o set rates to recover the cost of generating and transmitting electric energy.

The Administration was originally a bureau of the Department of the Interior and was transferred to the Department of Energy (DOE) in 1977. Its headquarters is in Portland, Oregon.

### Organization

The Secretary of Energy appoints the BPA Administrator, who directs the six Offices of the organization: Engineering and Construction, Regional Operations, Power and Resources Management, Management Services, Financial Management, and Conservation. The Administrator holds responsibility for the sale and disposition of electric energy throughout Idaho, Oregon, Washington, Western Montana, and parts of 4 contiguous states. These responsibilities were significantly expanded by the enactment of Public Law 96-501, the Pacific Northwest Electric Power Planning and Conservation Act of 1980.

### Financing

Initially, BPA obtained appropriations from Congress to finance both its construction program and its operations and maintenance. Under P.L. 93-454, passed in 1974, BPA became a self-financing agency. It now finances its operation and maintenance from its revenues. These revenues are also used to help finance the construction of new transmission facilities, with any additional funding needs met through the sale of revenue bonds to the U.S. Treasury.

The BPA staff develops rates and then submits them to DOE for review and ultimate approval by FERC. The Administrator, subject to requirements of the Federal Water Power Act, keeps complete and accurate accounts of operations, including all funds expended and received in connection with the transmission and sale of electric energy generated at the Bonneville Project. The Administrator also is required to obtain an independent commercial-type audit of such accounts after the end of each fiscal year.

Total revenues and receipts for fiscal year 1985 are estimated to exceed \$3 billion.

### Organizational Tests

1. Mission-Oriented. BPA is charged with a variety of missions that have evolved over time. These missions have occasionally come into conflict, particularly in recent years when demand has been unpredictable and costs have skyrocketed.
2. Ability to Maintain Credibility. Throughout most of its existence, BPA was a highly regarded and publicly credible organization. It received praise for its efficiency and for providing low-cost power that encouraged economic development. This credibility has been severely shaken in recent years, however. Regional electricity demand forecasts in the early 1970's proved to be far too high, and these forecasts are now attacked by numerous entities. BPA's involvement as the guarantor of some of the Washington Public Power Supply System's (WPPSS) nuclear plants weakened its credibility with the financial markets and with some political officials. BPA is trying to enhance its credibility through public information and involvement activities, improved forecasts, environmental and fisheries projects, and a variety of other mechanisms.
3. Stability and Continuity. For many years, BPA's missions and activities evolved smoothly and steadily. The events of the 1970s and early 1980s, such as the fluctuations in power demands and the WPPSS cost overruns, disrupted this continuity and led to major changes in Northwest power supply strategies and policies.
4. Programmatic Authority. BPA's status as a separate administration within DOE and its self-financing nature give it substantially more programmatic authority than most federal agencies. Recent controversies have led to closer oversight by OMB and Congress, which has somewhat weakened this authority. Further weakening may occur as a result of the establishment of the Northwest Power Planning Council.
5. Accessibility and Responsiveness. There has been some criticism of BPA's accessibility to ratepayers, environmental groups, and energy conservation advocates. The Administration has expanded its public involvement activities in response to these concerns. Some critics still question BPA's responsiveness, however.
6. Internal Flexibility. BPA's relative independence probably makes it somewhat more flexible than typical government agencies.
7. Political Accountability. BPA's accountability is similar to that of most federal agencies. In recent years, political officials have become increasingly concerned about the Administration's activities and funding, which has led to closer oversight by Congress and the Executive Branch.



8. Financial Accountability. BPA enjoys some financial autonomy because of its revenues and borrowing authority. It is, however, part of the federal budgeting process and thus is monitored by officials in the Executive and Legislative branches. Large rate hikes in recent years have been controversial and have led to increased financial oversight.

9. Technical Excellence. BPA's expertise in high-voltage transmission design, construction and operation is highly regarded. It is building a promising regionwide energy conservation program, and exercises a high degree of competence in marketing power both within and outside its service area.

## ARMY CORPS OF ENGINEERS

### Establishment

The Army Corps of Engineers (Corps) was established by Congress in 1802. Its original purpose was purely military: to support the nation's armed forces during times of war and peace. In 1824 a series of laws expanded the Corps' mission to include a civilian role. The General Survey Act committed the Corps to the surveying and planning of "internal improvements of national importance." The development of the nation's water resources and the operation and maintenance of completed water resource projects have become two of its major civilian activities.

The specific objectives of Corps' civil works are:

- o to support the defense of the U.S. by maintaining an experienced engineering organization immediately available for defense needs;
- o to promote the quality of life by serving society's objectives of enhancing national economic and social development and protecting the quality of the environment; and
- o to determine the appropriate role of water resources in solving current and emerging problems.

The Corps is now the largest single producer of hydroelectricity in the U.S. Its civil works organization has approximately 300 officers and 30,000 civilians.

### Organization

Technically, the Corps is part of the Defense Department, but in the area of civil works it has traditionally carried out the will of Congress. Congress holds responsibility for formulating national and regional water resources development policy and thus directly influences the Corps' civilian activities. The Congressional involvement and the Corps' status as an arm of the military give it unique organizational characteristics. For the purposes of this analysis, the Corps' relative independence from the Defense Department and its separate budget make it most akin to an administration within a Cabinet department.

At the top of the organizational structure rests the Office of the Chief of Engineers. The Chief makes policy decisions, sets engineering requirements, and reviews final projects. This officer is responsible to the President and Congress.

The organization is divided into five offices, known as operating directorates: Civil Works, Real Estate, Engineering and Construction, Resources Management, and Research and Development. The substantial amount of decentralization in the organization allows the Corps to extend a great deal of autonomy to its ten districts. The planning, construction, and operation of the Corps' public works projects occur at the district level.

### Financing

The Corps finances its programs through annual and permanent appropriations as well as intragovernmental funds.

Its appropriations requests for civil works programs for fiscal year 1985 include:

- o \$118 million for General Investigations, to continue and initiate surveys, plans, data collection, and research to determine the need, engineering feasibility, economic justification, and the environmental and social suitability of solutions to water and related land resource problems;
- o \$874 million for General Construction, to finance construction and related activities for water resource development projects having navigation, flood control, water supply, hydroelectric, and other attendant benefits to the nation;
- o \$1.3 billion for General Operations and Maintenance, to operate and maintain water resource projects, further develop recreation facilities, process applications for activities and structures affecting navigable waters, administer data on waterborne commerce, and develop national emergency preparedness plans;
- o \$10 million for Flood Control and Coastal Emergencies, to fund flood emergency preparation, flood fighting and rescue operations, and repair flood control and federal hurricane or shore protection works; and
- o \$304 million for Flood Control in the Lower Mississippi Valley, to finance approximately 8 studies of potential development, 11 construction projects, and 1 dam safety assurance project, plus the operation and maintenance of numerous navigation locks, flood control dams, and flood control structures.

### Organizational Tests

1. Mission-Oriented. The Corps has a dual role, serving both a military and civilian purpose, but carries out a clearly defined mission in both areas.

2. Ability to Maintain Credibility. Some observers accuse the Corps of manipulating various political officers and agencies in order to impose its own will and serve its own interests rather than those of the public. On occasion, the Corps has been known to denounce plans for particular projects

and then claim credit for them once they have proved successful. Many observers feel that its record for pollution control, over which it had sole responsibility for 70 years, has reflected a lack of concern. All of this has led to a lack of credibility among many groups.

3. Stability and Continuity. The Corps' long history reflects its ability to maintain its stability while adjusting to changes in the environment. It began devoting some of its efforts to the development and conservation of water resources over a century and a half ago and it continues to pursue this area, currently billing itself as "the largest planner and builder of channelization, dam, and flood control projects in the Nation."

4. Programmatic Authority. All of the Corps' projects must receive approval from Congress and depend upon appropriations from the federal budget, which are also subject to Congressional discretion. The Corps, consequently, possesses relatively little control over its programmatic activities.

5. Accessibility and Responsiveness. In the earlier years of its existence, the Corps provided a forum for hearing the public's opinions on proposed projects. The National Environmental Policy Act (1969) made more rigorous demands for providing public accessibility by requiring that early notice be given of the preparation of an Environmental Impact Statement, that a draft of the statement be made available prior to the public hearings, and that all citizens' comments be incorporated into the final statement. Under its own initiative, the Corps in 1970 altered its policy so as to require three public meetings in the pre-authorization phase of a project. In 1971, the Corps authorized district engineers to increase their survey investigation costs by up to 10 percent to allow for expanded citizen participation in project planning.

In order to ensure its responsiveness to environmental concerns, the Corps established a Board of Environmental Advisors (composed exclusively of environmentalists) and directed it to examine the existing and proposed policies, programs, and activities of the Corps; to identify its problems and weaknesses; and to suggest appropriate remedies. Despite this effort, the Corps still receives criticism for not being responsive to public concerns.

6. Internal Flexibility. Civil Service restrictions limit the Corps' internal flexibility with regard to its civilian workforce. Funds are often appropriated to specific projects and cannot be transferred internally by the Corps.

7. Political Accountability. The Chief of Engineers is responsible to the President and Congress, thereby making the Corps strictly accountable to the Federal Government.

8. Financial Accountability. Since all of its activities are financed with federal monies, the Corps is financially accountable to Congress. Its annual appropriations requests must provide detailed information regarding the specific use of the funds.

9. Technical Excellence. Although there have been some widely publicized exceptions, most of the Corps' projects have been quite successful and well-built.

## NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Establishment

Spurred by national anxiety over the Russian's success in launching Sputnik, the first man-made satellite, President Dwight Eisenhower sent a bill to Congress in April 1958 providing for a civilian space program run by a National Aeronautics and Space Agency (NASA). This agency was to be formed around the National Advisory Committee for Aeronautics (NACA), the principal aeronautical research institution of the United States.

On October 1, 1958, under the National Aeronautics and Space Act, NASA was established to plan and direct exploration in space and aeronautics. It was expected to cooperate with other branches of the U.S. Government, industry, and the scientific communities of this country and foreign nations that had similar interests.

Organization

NASA Headquarters in Washington, D.C. manages the space flight centers and other NASA installations. Planning direction and management of NASA's research and development programs are the responsibility of individual program offices, which report to and are directed by Headquarters officials. It is at Headquarters that determination of projects and programs; the establishment of management policies, procedures, and performance criteria; and the review and analysis of all phases of the aerospace program takes place.

Six administrators have been in charge of NASA over its 26-year history. The NASA Administrator is responsible for all functions and authorities assigned to the agency. The Administrator is nominated by the President and must be confirmed by the Senate in order to be sworn in. Under the Administrator's office comes the position of Chief Engineer and the position of Chief Scientist, followed by the Associate Administrator for Policy.

Apart from the centralized nature of NASA's Headquarters, the Administration is decentralized with broad general programs managed from Headquarters but enjoying considerable autonomy in executing their responsibilities. Since its establishment in 1958, NASA's network of these centers and facilities has expanded throughout the U.S. by way of contracting pre-existing private facilities, construction of new field stations and adoption of centers started by older government agencies.

Financing

NASA's budget comes almost exclusively from general federal revenues appropriated annually by Congress. The budget has declined steadily in real terms from its high of \$5.25 billion in 1965. Its budget for 1983 was about \$7.22 billion.

Budget proposals for 1984 and beyond envision major shifts from research and development to operations, primarily due to changes in the status of the space shuttle program. In addition, spending for the military space program (which is part of the Defense Department's budget) now exceeds NASA's spending.

4. Programmatic Authority. While all production facilities and nuclear reactors were government owned, the need for great security necessitated that all research findings and technical information be under the Commission's control, which meant that it wielded a great deal of programmatic authority. Its close ties to the Joint Committee on Atomic Energy also strengthened its authority.
5. Accessibility and Responsiveness. Although the nature of the Commission's business forced the AEC to take on a fairly secretive character, especially in regard to its weapons testing programs, the Atomic Energy Act of 1954 encouraged the Commission to share technical and scientific information with foreign governments and provided for American industry's access to technical data and the right to own reactors. The Commission's success in establishing the groundwork for today's nuclear industry is proof of its responsiveness and success at technology transfer. However, the AEC was frequently criticized by environmental and anti-nuclear groups as being inaccessible and unresponsive to their concerns.
6. Internal Flexibility. Congress gave the AEC extraordinary independence and power. For example, the Commission was made exempt from the civil service system. This provided the AEC with tremendous freedom in its hiring of professionals and scientists.
7. Political Accountability. The AEC was created by Congress for a broad specific purpose, and the Joint Committee on Atomic Energy was kept well informed. The President's authority to appoint commissioners gave the government some additional control. The unknown nature of atomic energy gave the AEC great freedom to get approval for a wide variety of projects, at a more rapid speed than would ever be allowed today.
8. Financial Accountability. Provisions for the budget were broad because the costs of producing atomic energy were difficult to establish. In this way, the AEC had unique control in defining its own budget needs.
9. Technical Excellence. As the pioneer in a new field, the AEC was successful in achieving most of its goals because of its power to use all of the technical experts and facilities available. It was the AEC's ability to involve private industry through loan programs that provided it with the ability to test a variety of possible reactor types.

## SYNTHETIC FUELS CORPORATION

### Establishment

The passage of the Energy Security Act of 1980 created the U.S. Synthetic Fuels Corporation (Synfuels). The goal of this government corporation is to stimulate development of the commercial capability to produce synthetic oil and gas products through the use of coal and certain heavy oil resources. In attaining this goal, Synfuels focuses on the Act's dual requirements: use of a diversity of technology and resources, and attainment of a significant synthetic fuel production capacity. More specifically, section 125 of the Act

hire and fire as needs and projects dictate. For this reason, in the late 1960s and 1970s when the budget was severely cut because of declining enthusiasm over grandiose space programs, the personnel strength was responsively tailored from a high in 1967 of 37,000 employees to less than two-thirds that number in 1980.

Although civil service laws are followed in the hiring of most NASA employees, "specially qualified scientific and engineering talent" may be hired as the Administration sees fit. This clause in the Act provides further flexibility in staffing.

7. Political Accountability. NASA represents an interesting case as far as political accountability is concerned because politics has historically played such an influential role in NASA's programmatic direction. Again, the Administration's world-wide visibility as a symbol of power and progress has, to varying degrees, been relied upon as a tool for political muscle flexing. An example of this was John F. Kennedy's push to land a man on the moon shortly after the embarrassments suffered at the Bay of Pigs. The fact that NASA was born out of political fear with the advent of Sputnik has meant that NASA's successes, direction, and failures have always been important political issues.

8. Financial Accountability. NASA has been very accountable for its finances since its budget derives almost exclusively from general revenues. Changes in financing have often disrupted the space program.

9. Technical Excellence. There is no doubt that NASA has come to be synonymous with technical excellence. Although the repeated snafus in the shuttle program have led to a more cautious attitude toward NASA's technical competence, NASA's technological virtuosity has been nurtured by its ongoing preeminence in space science and aeronautics. With its Viking Mission to Mars and its numerous contributions to earth-resources technology and recent medical studies on the shuttle, NASA remains in the forefront of technological progress and has made a concerted effort to ensure the widest practical dissemination and exploitation of the hardware and techniques developed for flight in the atmosphere and space.

## ATOMIC ENERGY COMMISSION

### Establishment

Less than 1 year after the end of World War II, Congress declared that atomic energy should be employed not only in the nation's defense, but also to promote world peace, improve the public welfare, and strengthen free competition in private enterprise. The Atomic Energy Act, which placed atomic energy under civilian control, was signed by President Truman on August 1, 1946. This Act combined development, production, and control of atomic science and technology in one agency, known as the Atomic Energy Commission (AEC)

### Organization

The Atomic Energy Act of 1946 provided that the Commission's operation would be controlled by five Presidentially appointed commissioners. A General Manager, also appointed by the President, would act as chief executive officer. The Act also provided for three major advisory committees: a Congressional Joint Committee on Atomic Energy, a Military Liaison Committee, and a General Advisory Committee of outstanding scientists.

The AEC was highly dependent upon contracted personnel and facilities to carry out its activities. This system led the way for the private development of nuclear power in the United States.

On October 11, 1974, President Gerald Ford signed the Energy Reorganization Act, ending the AEC's 28-year stewardship of the nation's nuclear energy program. On January 19, 1975, the commission's two major functions were divided between the Energy Research and Development Administration, which took over the research and development responsibilities, and the Nuclear Regulatory Commission, which assumed the AEC's regulatory and licensing functions. Three years later the Energy Research and Development Administration, like the AEC before it, became part of a larger agency. On October 1, 1977, Congress created the Department of Energy to coordinate federal energy policies and programs at the Cabinet level, and the Department assumed responsibility for nuclear research and development.

### Financing

Funding for the AEC was provided through the normal federal budgetary process. In its early years, the Commission was generously funded and given considerable latitude in internal allocation. In later years, increasing criticism of the AEC's activities led to tighter budgets and closer oversight.

### Organizational Tests

1. Mission-Oriented. The AEC's mission was extremely broad but fairly clear in its early years when it was the agency in charge of all aspects of nuclear development and research. Later, it encountered conflicting duties when it succeeded in its promotional mission and was required to simultaneously develop regulation and safety procedures. This conflict in missions was the major motivation behind the reorganization in 1974 that abolished the Commission.
2. Ability to Maintain Credibility. The AEC was faced with great credibility problems from 1955 until its termination in 1974. Its conflicting missions left it with divided responsibilities, and increasingly widespread criticism.
3. Stability and Continuity. The AEC, by virtue of its structure under Presidentially appointed Commissioners, was highly respected for stability in operations and continuity of approved policy. It was successful throughout its life in establishing and maintaining the country's nuclear programs at the forefront of technology and as superior to those of any other country.

4. Programmatic Authority. While all production facilities and nuclear reactors were government owned, the need for great security necessitated that all research findings and technical information be under the Commission's control, which meant that it wielded a great deal of programmatic authority. Its close ties to the Joint Committee on Atomic Energy also strengthened its authority.
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sets the production capacity goal from domestic resources at a minimum of 500,000 barrels per day of crude oil equivalent by 1987 and at least 2,000,000 barrels per day by 1992.

The Corporation is directed to solicit proposals intermittently from concerns interested in constructing and/or operating synthetic fuel projects. Such solicitations are supposed to encompass a variety of technologies as well as all of the forms of financial assistance authorized by the enabling legislation. Financial assistance is to be awarded on the basis of competitive bid.

The oil crisis created by the Iranian revolution provided the strongest impetus for the creation of this agency. To direct and finance such an ambitious mission, government support was needed. Despite the large size of the oil industry, it could not hope to reach a 2,000,000 barrels a day level of capacity in such a new field as synfuels in just 12 years, even with tax breaks. The costliness of demonstration-scale plants used to evaluate the potential of various technologies also further restricted private initiative. Thus, Synfuels was organized as a government corporation to lead the effort towards creating a synfuels industry.

#### Organization

Seven members comprise the Board of Directors, including the Chairman. Board responsibilities include appointing officers to the Corporation, defining their duties, and setting their compensation. Such officers include the General Counsel, Treasurer, and Inspector General. An Advisory Committee reviews the Corporation's solicitations of proposals for financial assistance and offers advice in areas in which its members possess expertise. The Committee consists of the Secretaries of the Treasury, Defense, Interior, and Energy, along with the Administrator of the Environmental Protection Agency.

At the end of fiscal year 1983, 196 employees worked at Synfuels, including 131 professionals and 65 support staff. Most of the professional staff came from the private sector. The Corporation has its headquarters in Washington, D.C., and has a small field office in Denver, Colorado.

#### Financing

The Corporation has authority to issue, solely to the U.S. through the Secretary of the Treasury, notes or other obligations in the aggregate principal amount of \$20 billion. Within 10 days after the end of each fiscal quarter, the Corporation submits a written report to the Secretary of the Treasury outlining all monies received during the previous fiscal quarter.

Five instruments of financial assistance are available to the Corporation. It may extend loans or loan guarantees not to exceed 75 percent of the initial total cost of the synthetic fuel project (as estimated by the Corporation). The Board may prescribe or enter into price guarantees providing that the price that a concern will receive shall not fall below a specified sales price determined at the time of agreement. Purchase agreements rest on the understanding that the sales price shall not exceed the estimated prevailing market price as of the date of delivery, unless the Corporation determines

that such a sales price is necessary to ensure the production goals of the Act. The Corporation may engage in joint ventures, provided that it does not finance more than 60 percent of the total costs of the synthetic fuel facility. Furthermore, any construction or operation activities performed by the Corporation must be done under contract.

Since its creation, Synfuels has had approximately \$88 billion available to foster the creation of a synthetic fuels industry. To avoid the cumbersome yearly appropriations process, this amount is being appropriated in two large chunks: \$20 billion to last through 1984 plus whatever amount is deemed necessary to finish the job (up to \$68 billion) after that time. The Reagan Administration has proposed substantial reductions in these appropriations. In addition, another \$1.5 billion was made available initially for a separate program using various forms of biomass to produce fuel. The Energy and Agriculture Departments will oversee this program, with the goal of producing enough ethyl alcohol (ethanol) to displace 10 percent of the nation's gasoline by 1990.

### Organizational Tests

1. Mission-Oriented. Synfuels provides an example of an organization that lacks a clearly defined mission, or, perhaps more accurately, has too many missions. The Energy Security Act directs it to pursue two primary goals: to explore a diversity of technology and resources, and to achieve a significant synthetic fuel production capacity. Conflicts between these two goals arise when the responsibility to experiment with a broad range of technologies inhibits the Corporation's ability to meet its production goals.
2. Ability to Maintain Credibility. The unrealistic nature of Synfuels' production goals has seriously impaired its ability to maintain credibility among its stakeholders. The publicity surrounding this weakness as well as the rapid turnover of its staff have, together, given Synfuels a poor public image.
3. Stability and Continuity. The organization is too new for a realistic evaluation on this test.
4. Programmatic Authority. In addition to providing an explicitly defined production goal, the Energy Security Act outlines the initial strategy which Synfuels will employ to carry out this mission. The corporation itself has responsibility to develop the subsequent "comprehensive strategy"; however, the guidelines for doing so combined with all of the authorization and approval requirements severely limits its ultimate programmatic authority.
5. Accessibility and Responsiveness. Included in the Enabling Act are several provisions for insuring public access to information regarding the Corporation's activities. The Corporation must provide to the public, upon request, any information regarding its organization, procedures, requirements, and activities. Furthermore, the public should be able to attend all meetings of the Board of Directors. (Both of these requirements provide for some exceptions.)

6. Internal Flexibility. The Board of Directors may establish the offices of the Corporation, appoint the officers, and define their duties; thus giving the Board some control over the allocation of its staff. With regard to the solicitation of proposals, the Board selects the proposals which will receive contracts; however, once again, the restrictions imposed on the solicitation and selection process preclude the Corporation's ability to emphasize the use of particular technologies or resources or the production of particular synthetic fuels.

7. Political Accountability. As inferred throughout the discussions of the preceding organizational tests, Congress has incorporated numerous provisions in the Energy Security Act for insuring Synfuels' political accountability. An additional example of these safeguards is the Corporation's duty to consult with the Governor of any state in which a proposed Corporation construction project would be located.

8. Financial Accountability. All obligations and outlays of Synfuels are included in the totals of the U.S. budget. It is thus required to submit a quarterly written report to the Secretary of the Treasury detailing all receipts of the Corporation during the previous fiscal quarter. Each grant of financial assistance becomes a general obligation of the U.S. and therefore, is carefully monitored by the Secretary of the Treasury.

9. Technical Excellence. Again, the organization is too new to allow an evaluation using this test.

#### TENNESSEE VALLEY AUTHORITY

##### Establishment

In 1916, as America prepared for World War I, the nation needed synthetic nitrates to manufacture munitions because its natural supply from Chile was threatened by German U-boats. Woodrow Wilson chose Muscle Shoals on the Tennessee River as the site for two nitrate plants and a hydroelectric dam to power them. Just as the plants reached the production stage, the war ended and so did the need for the facilities. The state of the economy for the entire area worsened as the Great Depression arrived. As part of the New Deal plan for revitalizing the economy, Franklin Roosevelt adopted Senator George Norris's proposal to create a regional federal agency which would grapple with the problems of the entire Tennessee Valley area. The Tennessee Valley Authority (TVA) was created in 1933 to:

. . . [plan] for the proper use, conservation, and development of the natural resources of the Tennessee River drainage basin and its adjoining territory for the general social and economic welfare of the Nation. (Franklin Roosevelt's message to Congress on April 10, 1933)

TVA's primary programs focus on power production, agriculture, flood control, and national defense. In producing electricity, its attention centers on charging the lowest possible rates while remaining self-supporting. Within a few years, the TVA significantly expanded its service area to include farms

that had never been served because power companies felt the effort was too costly. In these early years of rural electrification, TVA established an agency to aid farm families in purchasing basic appliances and to educate them concerning their uses. This area of activity begins to cross over to TVA's second set of programs which relate to forestry, conservation, recreation, and community and industrial development. TVA's donation of fertilizers and demonstration of new technologies and methods such as terracing and contour farming exemplify activities in this area.

### Organization

TVA is officially classified as a government corporation. A Board of Directors consisting of three members appointed by the President with the advice and consent of Senate oversees the operations of the TVA. Each Director has primary responsibility for operations in one of three major areas: engineering and construction, organization of the power system, and development of the fertilizer and agricultural program. The responsibilities of the Board as a whole include the establishment of general policies and programs; monitoring of progress and results; approval of major personnel appointments, purchases, contracts, and budgets; arrangement of TVA's basic organization; and the appointments of the General Manager and General Counsel.

The General Manager is TVA's principal administrative officer. This officer is responsible for the overall administration and execution of programs, policies, and decisions adopted by the Board. The six major program offices include: the Office of Coal Gasification, the Office of Agricultural and Chemical Development, the Office of Power, the Office of Natural Resources, the Office of Engineering Design and Construction, and the Office of Economic and Community Development.

A discussion of TVA's organization depends upon an understanding of its purpose. This agency's organizational doctrine is referred to as the "TVA Idea". Five basic components form this "Idea": unified regional development, decentralized administration, active participation of people in the Valley, a strong sense of social responsibility, and a commitment to non-political policymaking. Each of these components is discussed briefly below.

- o Unified regional development. The most critical functional imperative for TVA always has been unified regional development. The holistic approach applies not only to the variety of technical activities, but to the development of the people of the region and to the organizational strategy that encourages maximum intraorganizational cooperation and coordination. TVA attempts to improve the general welfare of the area by balancing its concerns with those of the people it serves. As an example, TVA sets its prices for fertilizers and fertilizer materials sufficiently below those of commercial fertilizers to encourage farmers, retail dealers, agricultural college personnel, and fertilizer manufacturers and wholesale distributors throughout the country to try new products and participate in special educational programs.

- o Decentralized administration. The decentralization of the administration allows room for more flexibility and sensitivity. Being in the Valley rather than in Washington, D.C., for example, increases the chance that the organization will have a genuine awareness and understanding of the needs of those it serves and will consequently show greater responsiveness to those needs.
- o Participation. The active participation of people from the region goes beyond mere awareness to active involvement in TVA activities. Citizens help formulate plans and recommendations, decide on courses of action, and explore alternatives. TVA makes these opportunities available and encourages people to act upon them.
- o Social responsibility. Despite pressure to meet higher production goals, TVA remains sensitive to its social responsibilities. It has an obligation to protect the environment as well as to serve as an example for other utilities.
- o Non-political policymaking. TVA's commitment to non-political policy-making has been viewed at times as a facade for technocratic arrogance and at other times as evidence of commendable adherence to a principle. This commitment continues to be steadfastly upheld.

### Financing

During its early years, TVA's primary financial need was for capital to be used for the construction of dams. Revenues from the sale of power covered expenses, but left little for reinvestment in new facilities. Bonds were issued to allow TVA to purchase most of the privately owned utilities in the area by the end of 1939. World War II stepped up the demand for electric power and the manufacture of chemicals. The increased construction of dams required a large amount of capital, which came in the form of appropriations. After the end of the war, TVA paid \$12 million back to the U.S. Treasury as prescribed by section 26 of the TVA Act. Congress took this occasion to review the financial relationship between TVA's power program and the U.S. Government and passed legislation that outlined TVA's future financial responsibilities.

For the decade after World War II, demands on the TVA power system continued to climb. Appropriations were relied upon to provide the major source of capital for the construction of steam plants and transmission facilities. Since 1954, appropriations have been made only for the completion of power construction already underway, and for nonpower activities. From 1954 until a new bond issue in 1961, TVA depended solely on its power proceeds to initiate the construction of new power facilities. Another review of the TVA occurred during this period. The financial success of TVA's power operations shed any hint of uncertainty and consequently a bond financing amendment to the TVA Act was passed. TVA gained authority to issue bonds to private investors, using its own revenues from power sales rather than the credit of the U.S. as security.

Financially, TVA's programs and activities may be divided into two categories: power and nonpower operations. For the first category, appropriations have been spent on capital additions while revenues pay for power expenses. Although some of the nonpower activities generate revenue, none is expected to be self-supporting; thus, both current expenses and capital additions for this category are financed through appropriations.

### Organizational Tests

1. Mission-Oriented. During the early 1930's, conditions in the Tennessee Valley were among the worst in the country in terms of low personal income, illiteracy, malnutrition, ineffective farming methods, and lack of electricity. The TVA was established to address all of these problems and more: it inherited the very broad mission of developing and revitalizing the region. TVA thus had a clear purpose, but many possibilities for action.
2. Ability to Maintain Credibility. Public opinion concerning TVA is generally positive. People feel that TVA has made a genuine commitment to the area and actively seeks the support and participation of its inhabitants. However, some groups (notably environmentalists) are skeptical of TVA's motives and its commitments to environmental protection and citizen involvement.
3. Stability and Continuity. As evidenced by its continuing efforts over the past 51 years, TVA can adapt and flourish in the midst of a changing environment. Its activities have broadened significantly since the organization began and have shifted in focus in adjusting to various issues such as inflation, conservation, and the use of nuclear power.
4. Programmatic Authority. TVA's programmatic authority is restricted by its dependence on appropriations for much of its financing, but these funds are allocated in broad categories which still provide TVA with some control. Revenues received from the sale of private bonds further augment its span of control.
5. Accessibility and Responsiveness. Two of TVA's organizational goals--to encourage citizen participation and to be socially responsible--reflect its commitment to serving the public. For example, it strives to keep its power rates as low as possible, but when people showed a concern for greater protection of the environment in the 1960's, the TVA made appropriate modifications in production to address this concern and raised its rates accordingly. TVA responded also by establishing toll-free telephone lines for citizen questions and comments and by opening new field offices to make TVA more accessible.
6. Internal Flexibility. TVA's decentralized administration allows the organization to respond more freely to changes. The Board may hire and fire personnel, fix their compensation, and define their duties without Civil Service restrictions. It has a correspondingly high degree of flexibility in allocating its funds as it sees fit, particularly with respect to its sale of private equity.

7. Political Accountability. As one of the purest examples of a government corporation, TVA was created by Congress for a specific purpose and has a definite responsibility to the U.S. government to serve it. Beginning at the top of the organizational structure, political accountability is ensured by the composition of the Board of Directors: three members who are appointed by the President of the United States and who shall not have conflicting interests in any public-utility corporation.

8. Financial Accountability. TVA must file with the President and Congress, annually, a financial statement and a complete report concerning the activities of the Corporation. The Comptroller General of the U.S. is responsible for auditing the transactions of the Corporation not less than once each year.

9. Technical Excellence. TVA may secure technical assistance and advice from "any officer, agent, or employee of any executive department or of any independent office of the U.S." (TVA Act, Sec. 831d(i)). In addition, TVA's program office structure divides its personnel into their particular areas of expertise.

## U.S. POSTAL SERVICE

### Establishment

The Post Office Department was first created in 1789. It began as a part of the Treasury Department and in 1872 became a separate Cabinet Department. The Department failed to adapt to changing demands and its growing financial losses put a severe strain on the Federal Government. Poor management was the central problem: the Postmaster General lacked control over his workload, postal rates, employee salaries and the conditions of their service, physical facilities, and transportation services. Excessive political involvement was singled out as the major source of this problem; consequently, the Post Office Department was reorganized to free it from such tight governmental control. The Postal Reorganization Act of 1971 created the U.S. Postal Service (Postal Service), "an independent establishment within the Executive Branch", to replace the Post Office Department. The three main themes behind the reorganization were to consolidate control in the office of the Postmaster General, to decentralize authority down through a successive line of managers, and to encourage initiative in exercising this authority.

The Postal Service's missions are to:

- o provide prompt, reliable, and efficient mail service;
- o charge reasonable and equitable rates;
- o attain financial independence; and
- o provide fair treatment of employees.

### Organization

The Postal Service has characteristics of both a business corporation and a government agency. Like a business corporation, it has a Board of Directors, can retain its revenues, can borrow and invest capital, and uses collective

bargaining to set wages. Like a government agency, it has a monopoly over and must maintain uniform national rates for letter mail, its workers cannot (in theory) strike, Congress may change its purposes and powers at any time, and it is accountable to a number of government bodies. For the purposes of this analysis, the Postal Service can best be classified as a government-controlled corporation.

An eleven member Board of Governors operates the Postal Service. The President of the U.S. appoints nine of these members who, in turn, appoint the Postmaster General. This tenth member, who serves as the chief executive officer, joins the other members in appointing the final member, the Deputy Postmaster General. Together, the Board members direct the exercise of the powers of the Postal Service, review its practices and policies, and direct and control its expenditures.

Using the authority to reorganize provided by the Postal Reorganization Act, the Board broke up the seven bureaus of the Post Office Department into more than double that many Departments. Each Department is headed by an Assistant Postmaster General. The Departments are grouped under five Senior Assistant Postmasters General. The Executive Committee, composed of the Postmaster General and the heads of these Departments and Groups, discusses and executes major policy, planning, and other management control matters.

The Postal Rate Commission is an independent agency that works closely with the Postal Service. Its five presidential appointees recommend postal rates and classifications for adoption by the Board of Governors, offer advice on proposed nationwide changes in postal services, initiate studies and submit recommendations for changes in the mail classification schedule, and receive and react to complaints from the mailing public.

### Financing

Within the U.S. Treasury, a revolving fund referred to as the Postal Service Fund provides monies without fiscal year limitation. Its sources of funding include:

- o revenues from postal and nonpostal services rendered by the Postal Service;
- o amounts received from obligations issued by the Postal Service (the Postal Service may borrow up to \$10 billion from the general public, and the Treasury may be required to purchase up to \$2 billion of postal obligations and has the authority to hold obligations in excess of this amount);
- o amounts appropriated from federal general revenues for use by the Postal Service (the size of such appropriations has decreased steadily over time);
- o interest which may be earned on investments in the Fund;
- o any other receipts of the Postal Service; and
- o the balance remaining in the Post Office Department Fund.

Appropriations to the Postal Service come in two forms. The first is a general public service subsidy for public service costs incurred in providing effective postal service nationwide, particularly in communities where post



offices may not be self-sustaining. The second type of appropriation is a reimbursement to the Postal Service for congressionally established categories of free and reduced-rate mail. The size of each of these appropriations is supposed to decrease over time.

In fiscal year 1983, the Postal Service for the first time did not request a public service subsidy. The Postal Service's appropriation request for 1985 amounts to \$691.6 million, one-third of which would be used to reimburse the organization for liability incurred by the former Post Office Department and two-thirds of which would be used to cover expenses incurred as a result of its portion of free and reduced rate service. Its total estimated operating budget for 1985 amounts to \$28.5 billion.

### Organizational Tests

1. Mission-Oriented. The Postal Reorganization Act clearly defines the Postal Service's mission; however, its goals sometimes conflict. Providing prompter service, for example, may increase opportunities for errors and therefore, reduce the reliability of service. The Postal Service's dual identity as a business entity and a government agency creates tension between its competitive, business-oriented pursuits and its public service responsibilities.
2. Ability to Maintain Credibility. The Postal Reorganization Act made too many promises, hoping to solve all of the problems of the Post Office Department and more; as a result, the Postal Service has failed to meet the public's high expectations. The fact that the Postal Service's service is easily understandable, widely used, and thus under constant scrutiny further contributes to its credibility problem.
3. Stability and Continuity. The Postal Service has been steadily working towards its goals, as reflected in its successful attempt to make a profit in the last few years and to stop depending on Congressional appropriations. Its activities reveal ongoing efforts to handle the increasing volume of mail more efficiently and to apply new technologies to improve its service.
4. Programmatic Authority. The Board of Governors exercises control over the Postal Service with very few restrictions. The breadth of its mission allows the Board to pursue any of a broad range of activities. In the area of rate setting, however, the Postal Rate Commission has authority over the Postal Service. Only through a unanimous vote of the Board may the Postal Service alter a decision of the Commission.
5. Accessibility and Responsiveness. Particularly with the increasing competition in the communications industry, the Postal Service tries to keep in close contact with the public, its customers. Part of its "All Services Campaign," initiated last year, focuses on keeping clear lines of communication with the public. The Campaign tries to meet this objective by distributing monthly educational advertisements informing the general public about postal services. The Postal Rate Commission provides a channel for public input concerning rates.

6. Internal Flexibility. The Postal Reorganization Act gave the Board of Governors full authority to determine the organizational structure of the Postal Service (except for closing small post offices); consequently, it distributed control throughout the various levels of the organization. The five Regional Postmasters General were given substantial authority over personnel, budgets, and transportation and facility planning. Although personnel policies were freed from civil service regulations with the reorganization, the employee unions which have since formed place some restrictions on control over hiring, firing, and other related matters.

7. Political Accountability. The Postal Service is accountable to a variety of governmental groups through a number of requirements. To begin with, eleven different House and Senate Committees and Subcommittees require the Postal Service to respond to matters ranging from telecommunications to occupational health and safety. Second, the Postal Service must submit a comprehensive statement to Congress annually, discussing its plans, policies, and procedures to carry out its mission; its general operating and financial conditions; and other matters needed to keep Congress fully informed. Third, the Postmaster General must submit an annual report to the President and Congress. As a fourth check, the Government Accounting Office has a permanent staff of 20-25 whose sole responsibility is to study various aspects of postal operations, and to make their reports available to Congress and the Postal Service. The Postal Rate Commission's power to review postal rates and mail classifications provides a fifth method of ensuring accountability. Finally, over 30 executive branch departments, agencies, and bureaus have some oversight over or have issued regulations controlling the Postal Service.

8. Financial Accountability. A 1976 amendment to the Postal Reorganization Act requires the Postal Service to appear annually before House and Senate substantive postal affairs committees to discuss its budgetary requests. As it continues to reduce its reliance on federal monies, the Postal Service gains more control over its finances. Since its rates are closely tied to its public service mission, though, the Postal Service will always be subject to a certain amount of accountability to the Federal Government.

## AMTRAK

### Establishment

By the close of the 1960's, passenger rail service had been pared down so much that it was heading towards extinction. Since private railroads showed little interest in passenger service, the Federal Government decided to create an organization to take over this area. Thus, the National Rail Passenger Corporation (NRPC) was established by the Rail Passenger Service Act of 1970. It has the following responsibilities:

- o to provide modern, efficient intercity rail passenger service with the existing national rail system;
- o to employ innovative operating and marketing concepts to develop the potential of modern rail service in intercity transportation needs; and
- o to operate on a for-profit basis.

The resulting organization, also referred to as Amtrak, is a semi-private, profit-seeking corporation subsidized by the government. It is the first nationwide rail passenger system of any kind in the U.S., with a staff capable of handling problems involving passengers from coast to coast.

The Corporation has the power to own, manage, operate, or contract for the operation of intercity trains; to conduct related research and development; and to acquire or contract for related physical facilities and equipment. It is required to initiate at least one experimental route each year and operate such routes for not less than 2 years.

Amtrak provides three types of train service: long-distance train service complete with sleeping, dining, and lounge cars; conventional coach service on its short-distance routes (less than 500 miles); and electrified, high-speed service in the Northeast Corridor. Private railroads, not Amtrak, actually operate the Amtrak trains over the majority of the system. Amtrak operates trains only on those routes where it owns the track and roadbed, mainly in the Northeast.

#### Organization

The Corporation is organized into a dozen departments, each with its own specific objectives: Executive (overall direction); Computer Systems (computer and telecommunication support services); Finance (financial management and reporting); Government Affairs (liaison with government agencies and elected officials); Labor Relations and Personnel (employment, benefits, labor relations, equal employment opportunities, security, training, general administration); Law (representation before courts and regulatory bodies, claims); Marketing (advertising, sales, tour development, market research); National Operations (monitors and evaluates train operations over private railroads, plans train operations, directly controls on-board and station services, and performs some maintenance); Northeast Corridor Operations (operates Amtrak-owned lines in the Northeast area only); Operations Support (engineering, safety, procurement, real estate and heavy overhaul of equipment); Planning (planning and evaluation); and Public Affairs (communications with public, media and employees).

The Board of Directors was originally to consist of 15 members: eight appointed by the President, three elected to represent common stockholders, and four elected to represent preferred stockholders. Through the Amtrak Improvement Act of 1973, Congress reorganized the Board. It increased the number of appointed directors from eight to nine (plus one ex officio director), introduced a political qualification whereby not more than five of the appointees could be from the same political party, and increased the number of "consumer representative" directors from one to three. This mixture of members from the private and public sectors represents an attempt to balance the interests of each.

Amtrak's unique organizational form combined with the method of selecting its Board members make the responsibilities of this group unclear. The Act expressly states that the Corporation is neither an agency nor an establishment of the U.S. Government and therefore not a public office. Consequently, the role of appointed directors becomes no different from that of elected directors.

The provision for three of the Presidential nominees to be "consumer representatives" created a potential source of conflict between the members' common law duties as corporate directors and their implied but undefined obligation under the Act to represent the consumer. To further complicate matters, the responsibility of "representing the consumer" opened another area of uncertainty: should the members merely voice the consumer's opinion, or serve as the consumer's advocate? And in the latter case, how far can advocacy extend before it becomes harrassment of the other Board members?

These examples support the conclusion that Congress, despite its intent to have Amtrak directors function much like the directors of a private corporation, has imposed upon them a duality which conflicts with that intent by removing them from the traditional bounds of common law and the statutory provisions of the District of Columbia Business Corporations Act. The DC Act, for instance, allows a DC corporation to prescribe the qualifications of its directors in its by-laws, but the qualifications of Amtrak directors already have been determined by Congress.

### Financing

Amtrak receives its financial support through federal appropriations and loan funds guaranteed by the Secretary of Transportation. It is subject to annual audit by the Comptroller General and is required to submit monthly reports of revenues and expenses to Congress.

Amtrak's initial financing came from a federal appropriation of \$40 million, the issuance of common stock, the use of guaranteed loans, and a \$197 million "entry fee" paid by railroads over a 3-year period. It continues to finance its operations through a mixture of private and public funds. Private funds come from revenues earned from passenger service operations and from the sale of equity. Public assistance comes in the form of cash appropriations, which are used for operating expenses, and a combination of Amtrak's guaranteed loan authority and direct grants, which are used for capital improvements. The Act gives Amtrak the authority to issue one million shares of preferred stock (par value \$10 per share) and 40 million shares of common stock (par value of \$10 per share) and provides it with a \$900 million debt guarantee ceiling. Because of Amtrak's unique situation as a mixed-ownership government corporation, it may take advantage of financial tools used traditionally only by private corporations with the added benefit of having the U.S. Government stand behind it. Amtrak exercised this advantage in a "leverage leasing" arrangement for acquiring new rolling stock.

### Organizational Tests

1. Mission-Oriented. Confusion regarding Amtrak's mission arose from the start: it could not satisfy its societal responsibilities and still achieve a profit. An amendment in 1978 which replaced the for profit clause of the Enabling Act with the mandate to behave as a profit-making organization did not solve the problem, either. Observers notice a growing emphasis on the social responsibilities of Amtrak; however, no clear direction has been given to this corporation.

2. Ability to Maintain Credibility. Amtrak started out at a slow pace because of the decayed state of the railroad industry. Its initial management problems and general lack of direction could not command much public support or belief in the Corporation; however, its achievements in the areas of reservations and on-time performance have earned an increased amount of public confidence. An increase in ridership reflects this shift.

3. Stability and Continuity. As shown in the discussions of the two preceding organizational tests, Amtrak has been sorting out its goals and refocusing its efforts. Consequently, its record to date has not shown very much stability. Now that it has set a clearer course for the future its activities should follow a more continuous path.

4. Programmatic Authority. Amtrak's programmatic authority is severely restricted by its numerous reporting responsibilities and its general accountability to numerous government agencies ranging from the Office of Management and Budget (OMB) to the mayors of 545 Amtrak-served communities. It receives adequate funding, but the monies are tightly controlled.

5. Accessibility and Responsiveness. Amtrak has commissioned a couple of Harris polls, indicating the Corporation's interest in its public image. More importantly, the particular questions included in these polls reflected an attempt to listen to people's concerns as well as their ideas for the future direction of the Corporation. It has a separate Public Affairs Department which handles communication with the public and the media. Toll-free numbers provide easy access to 24-hour service for information and reservations.

6. Internal Flexibility. Amtrak has the freedom to hire, fire and allocate personnel as it chooses. It must meet certain specific objectives, such as initiating a new experimental route each year, but enjoys some flexibility in achieving them.

7. Political Accountability. One clear example of Congress's effort to ensure Amtrak's accountability to the public rests with its provision for three of the Board members to be "consumer representatives". This attempt, however, has created a source of conflict between other Board members as well as between the other responsibilities of these Board members. The very nature of the corporation's business--relying on the public to ride its trains--demands that Amtrak address the public's concerns.

8. Financial Accountability. Amtrak's quarterly appropriations process coupled with the diverse composition of its Board (stockholders, presidential appointees, consumer representatives) provide some assurance that funds are spent effectively. In addition, the Corporation must submit monthly reports of revenues and expenses to Congress and is subject to annual audit by the Comptroller General.

## COMMUNICATIONS SATELLITE CORPORATION

Establishment

The Communications Satellite Corporation (COMSAT) was established in 1962 to provide:

. . . as expeditiously as practicable a commercial communications satellite system, as part of an improved global communications network, which will be responsive to public needs and national objectives, which will serve the communication needs of the U.S. and other countries, and which will contribute to world peace and understanding. (Communications Satellite Act of 1962, Sec. 102(a))

Although it was established by federal statute, COMSAT is a private corporation: privately financed, privately owned, and profit-seeking. The enabling statute articulated the Corporation's mission and gave the President the power to choose its incorporators, who would then serve as the initial Board of Directors until the first annual meeting of stockholders or until their successors were elected and qualified.

Organization

The Board of Directors consists of 15 members: three appointed by the President, six elected by stockholders who are communications common carriers, and six elected by other stockholders of the corporation. This mixture of members represents an attempt to balance the traditional dichotomy between private corporate interests and the public interest.

Under the provisions of the Communications Satellite Act, the President of the United States was given responsibility for the initial planning and development of the program, providing ongoing review of all phases of the development and operation of such a system, coordinating the activities of governmental agencies with responsibilities in the telecommunications field, supervising relations between COMSAT and foreign governments, and ensuring availability and appropriate utilization of the communications satellite system for general governmental purposes. The National Aeronautics and Space Administration (NASA) was to provide technical advice and participate in the research and development activities, and the Federal Communications Commission (FCC) was to ensure effective competition in the procurements required for the establishment and operation of the system and guarantee equitable access to the system among authorized carriers.

COMSAT currently engages in five major areas of business: rate regulated services, satellite systems and services, telecommunications equipment, information services, and a satellite business systems partnership. These activities are described briefly below.

- o Rate Regulated Services. COMSAT World Systems Division provides virtually all international commercial satellite communications services to and from the U.S. through the use of the satellite systems of INTELSAT (the International Telecommunications Satellite

Organization) and INMARSAT (the International Maritime Satellite Organization). COMSAT holds a 23 percent share of ownership in each. COMSAT's charges for these services are regulated by the FCC.

- o Satellite Systems and Services. COMSAT General Corporation provides satellite-based systems and services for a broad range of communication needs such as nationwide network television distribution, worldwide consulting, and international videoconferencing services.
- o Telecommunications Equipment. COMSAT designs, manufactures, and markets telecommunications equipment through its TeleSystems and Amplica divisions.
- o Information Services. COMSAT's Satellite Television Corporation is preparing to offer multiple channels of pay-TV programming through its forthcoming direct broadcast satellite service. Through Compact Software, COMSAT develops and markets computer-aided engineering tools for the microwave electronics industry. Its Environmental Research and Technology division also provides computer-based information services.
- o Satellite Business Systems Partnership (SBS). COMSAT shares ownership of SBS with IBM and Aetna Life and Casualty. SBS offers three major satellite-based services: private communication networks; low-cost, long-distance telephone services for business and residential use; and satellite transponder capacity services.

### Financing

To finance its systems, COMSAT has the authority to issue capital stock that carries voting rights and is eligible for dividends. Other financial tools available include the issuance of nonvoting securities, bonds, and debentures. Ownership shares are limited depending on the stockholder; no one, however, may own greater than 10 percent of all outstanding shares. In June of 1964, an initial offering of 10 million shares of stock at \$20 per share was made. COMSAT did not achieve a net operating profit until December of 1967.

### Organizational Tests

1. Mission-Oriented. COMSAT's original mission was to establish a global satellite communications system in cooperation with its counterparts in other countries. Its global satellite, Intelsat, serves this purpose. Since its creation, COMSAT has expanded into many other areas of the communications industry.
2. Ability to Maintain Credibility. Since its creation, COMSAT has proven to be financially and technically successful. The anticipated deregulation of the industry, however, has stirred up some uncertainty concerning COMSAT's ability to tap previously untested skills in such areas as marketing, buying acquisitions, and rate-setting in a competitive market. Thus, its credibility in financial markets has decreased somewhat.

3. Stability and Continuity. The numerous opportunities available for technical advances in the communications industry have allowed COMSAT to go beyond its original mission and to diversify into a variety of areas. Its growth follows a continuous progression rather than disjointed or unguided movements. Some observers view COMSAT as too stable an organization, and urge it to take bolder steps and to expand more rapidly.
4. Programmatic Authority. Because of its private nature, COMSAT has very few external controls on its activities. It may meet its financial needs by issuing private stock and thereby avoid traditional federal budgetary restrictions regarding timing and allocation of funds.
5. Accessibility and Responsiveness. COMSAT has not devoted a great deal of effort to these two areas. As a private corporation, it concerns itself more with its stockholders; furthermore, due to the scope of its services, it focuses on the needs of special interest groups which are typically different from the general public.
6. Internal Flexibility. While three of the Board members are appointed by the President of the United States for 3-year terms, the remaining twelve are elected annually by stockholders, thus providing these investors with some power to influence the staff of the organization. Furthermore, the Board shall appoint the president of the corporation and any other officers it chooses at such rates that it determines. It may change policies and personnel freely. The internal flexibility of the corporation is restricted, however, by the guidelines concerning the status of the Board members as well as the maximum number of shares owned by a stockholder.
7. Political Accountability. The global scope of COMSAT's mission made provisions for federal coordination, planning, and regulation necessary. The President of the United States, NASA, and the FCC all have oversight duties in connection with this organization. COMSAT is thus more accountable than a traditional private corporation.
8. Financial Accountability. COMSAT is financially accountable primarily to its stockholders. The FCC, however, does regulate some of COMSAT's financial activities to insure "effective competition". For instance, it prescribes COMSAT's accounting regulations and systems and ratemaking procedures, and must authorize the issuance of any capital stock (except the initial issue outlined in the enabling act).
9. Technical Excellence. NASA is to provide advice on the technical characteristics of the communications satellite system and assist in research and development activities. The FCC must then approve the technical characteristics of the operational communications satellite system and of the satellite terminal stations. Overall, COMSAT's technical performance has been well-regarded.



## OHIO VALLEY ELECTRIC CORPORATION

Establishment

The Ohio Valley Electric Corporation (OVEC) and the Indiana-Kentucky Electric Corporation (IKEC), its subsidiary, were organized under the laws of Ohio on October 1, 1952, to meet the power demands of the Atomic Energy Commission's (AEC) new uranium enrichment plant at Portsmouth, Ohio.

For a variety of reasons, the use of existing private utility companies was favored over the establishment of a government corporation to carry out this public service mission. First of all, the facilities and capacity of existing companies were needed to meet the immediate demand for electrical power in substantial quantities for construction purposes. Second, the power requirements for the uranium plant operation were expected to expand more rapidly than any new power generating facility could be constructed. Third, the private utility facilities could provide dependable capacity to the AEC operation beyond that available through new generating facilities. Finally, the government facilities needed to be close enough to large power systems that could absorb the capacity of these new powerplants in case of closure of the Portsmouth facility.

Organization

These corporations were formed by 15 private utility companies which agreed to build and operate the necessary new power facilities over a 25-year period. The performance period subsequently has been extended for an additional 15 years. These companies fell into two categories: participating companies, which furnished equity capital; and sponsoring companies, which provided and received power. A group of administrative executives of the participating companies formed the Corporation's Board of Directors.

Financing

The extremely large amount of capital required over a very short period of time to meet AEC's demand also made the use of private companies attractive. An estimated \$400 million was required--\$350 million for generating capacity and substations, \$30 million for transmission facilities, and the balance for working capital. This requirement represented over half the amount customarily imposed upon the U.S. capital market by all corporations during an average month, and far exceeded the amount which the capital market was accustomed to accepting from the public utility industry in a typical month. Meeting this challenge, the OVEC sponsors succeeded within the first 30 days in selling the idea of this private power project to enough financial institutions to ensure the availability of some \$400 million. At this point, the only assets of the project were the backing and know-how of the 15 private utility companies, and the management skill of the implementing company, American Gas and Electric Services Corporation.

Bonds, unsecured debt, and equity were OVEC's primary financing tools. To keep its capital costs at a minimum, the Corporation attempted to minimize its equity base and maximize its debt structure. One result of this action was a decrease in OVEC's return on capital and, therefore, a reduced federal income

tax. Overall, OVEC's financial structure revealed an unusually high level of financial risk: its obligations had little or no coverage in the usual investment sense, and its after-tax and even before-tax profits covered interest charges only about 1.1 times. OVEC's power agreement with AEC (now DOE), however, offsets this business risk. Its current financial statement reflects a continuation of this high debt to equity ratio.

#### Organizational Tests

1. Mission-Oriented. OVEC has a very specific, clearly defined mission. It has met and continues to meet the power demands of DOE.
2. Credibility. OVEC's dependable and efficient service contribute to its credibility. Its performance, however, do not receive much public visibility since it serves only DOE's needs.
3. Stability and Continuity. Since OVEC's mission has not changed since its formation, its activities have remained fairly constant. It has proven its stability by smoothly adjusting to meet cutbacks and increases in demands on its power supply.
4. Programmatic Authority. OVEC enjoys virtually complete control over its strategy for carrying out its mission. The sponsoring companies divided the demand among themselves and planned their method for adapting to changes.
5. Accessibility and Responsiveness. Since it does not have any commitments to the public, OVEC can be evaluated only on the basis of its relationship with DOE in reference to this test. One obvious example of its responsiveness would be its ability to meet DOE's changing power demands with such ease. The fact that DOE extended its agreement with OVEC reflects its satisfaction with OVEC's overall performance.
6. Internal Flexibility. As a consortium of private companies, OVEC has a great deal of freedom to design and adjust its internal structure.
7. Political Accountability. OVEC is politically accountable only to DOE. The limited area of responsibility that binds OVEC to DOE, however, makes the degree of this accountability rather insignificant.
8. Financial Accountability. OVEC's financial accountability to DOE is equally limited. It is expected to charge lower than market rates, but may exercise a great deal of freedom in financing its activities while still achieving that goal.
9. Technical Excellence. In order to achieve its low rates to DOE and still adjust as easily as it does to changes, OVEC must possess a significant level of technical expertise.

## MIDDLE SOUTH UTILITIES, INC.

Establishment

Middle South Utilities, Inc. (MSU) was incorporated on May 27, 1949, under the laws of the state of Florida. MSU is a holding company, which means it neither owns nor operates any physical properties. It is, instead, the parent organization that owns all the outstanding common stock in four operating companies that furnish electric service to 1,310 communities. These companies serve extensive areas in the states of Arkansas, Louisiana, Mississippi, and Missouri.

Organization

MSU is an investor-owned public utility holding company that owns all the outstanding common stock in four operating companies. These companies are Arkansas Power and Light Company, Louisiana Power and Light Company, Mississippi Power and Light Company, and New Orleans Public Service, Inc. Other principal subsidiaries of Middle South Services, Inc., a service company; and Middle South Energy, Inc., a diversified subsidiary that markets the capabilities, expertise, and resources of the system companies. System Fuels, Inc., is a fuels procurement subsidiary of the four operating companies. Associated Natural Gas Company is a gas distribution subsidiary of Arkansas Power and Light Company.

MSU is difficult to characterize in any detail since each company in the system operates in a different state, with correspondingly different state laws, user needs, rate-setting commissions, and political environments. In order to maintain a degree of consistency and consolidation, the system tries to coordinate its policies and financial base through frequent meetings of the Board members and a unified common stock system from which each company is supplied cash and capital according to its reported needs.

The four system operating companies, together with MSU, Middle South Services, and System Fuels, are authorized to participate in a system money pool whereby those companies in the system with available funds can invest in the pool while other companies in the system (except MSU) having short-term needs can borrow from the pool, thereby reducing the system's dependence on external short term borrowings. In addition to these efforts to operate as a consolidated system, MSU encourages solidarity and mutual support between group members in political issues (especially rate-setting) that affect the system as a whole.

Financing

The Middle South Utilities Systems's over-dependence on natural gas and oil as generating fuels has proven to be financially exhausting for MSU. It is estimated that upon completion, approximately \$5.8 billion will have been spent for additional coal-fueled capacity from Independence Unit 2 and two nuclear units, Grand Gulf 1 and Waterford 3. The successful licensing and commercial operation of these plants is critical to the generation of internal funds to offset the need for external financing involved with construction costs.

Besides dependence on commercial sales for financial support, MSU completed its first year of selling common stock in January 1984. Under a Securities and Exchange Commission procedure adopted in early 1982, MSU has been able to take advantage of a continuous offering program to sell common stock.

MSU's consolidated net income for 1983 was \$378 million, a 21.5 percent increase over the 1982 net income of \$311 million. Earnings per share rose 5.6 percent to \$2.46 on a 15.2 percent greater average number of common shares outstanding, compared with \$2.33 in 1982.

### Organization

1. Mission-Oriented. The system's goal of producing readily available and reliable electric energy at a reasonable cost is dependent upon numerous variables that all utilities are faced with today. In the final analysis, the company seems to be making reasonable progress towards its corporate goal by exploiting a wide range of opportunities designed to further future economic growth of the region.

2. Ability to Maintain Credibility. The Middle South system has maintained an image of awareness of community and regional needs and concerns and, above and beyond the usual complaints about rate increases and the unavoidable controversies surrounding nuclear power, enjoys a generally positive public image.

3. Stability and Continuity. The company must be able to sell its common stock in order to maintain an acceptable capital structure and to provide the system operating companies and Middle South Energy with additional funds to continue their construction programs. Contingent upon this and the success of present construction ventures, the system appears able to continue its record of adapting and surviving with relative continuity of process.

4. Programmatic Authority. Limits on programmatic authority are evident in a variety of forms that MSU is attempting to relieve through successful completion, licensing, and start-up of a number of new plants. Until this goal can be met, however, increasingly stringent regulatory procedures, restrictive construction costs calling for external funding, and the government's role in rate-setting will continue to limit the system's programmatic authority.

5. Accessibility and Responsiveness. A major objective of the system operating companies is to enhance the economic and social development of their service areas. System personnel work with state and local agencies as well as civic and professional organizations to attract new and expanded business and industry. Easy access to annual reports, public relations departments with toll-free information numbers, and frequent stockholder meetings are among some of the means by which the system assures the public that its purpose is to assist the communities that it serves.

6. Internal Flexibility. Since the system is organized by region with different companies in each state, the system ensures that each company within the corporation is able to structure and staff itself according to the needs of the region it occupies.

7. Political Accountability. As mentioned in previous organizational tests, MSU is restricted in various activities since utilities in the U.S. are regulated monopolies. In addition to state rate-setting commissions, the system has to answer to the Nuclear Regulatory Commission in respect to the licensing of its new plants and is audited annually by the Securities and Exchange Commission.

8. Financial Accountability. This issue was covered by the discussion of political accountability since rate-setting procedures and reports to the Securities and Exchange Commission resulted in notable constraints placed on MSU. In addition to accounting for themselves to the government, MSU has the stockholders to report to, as well as being responsible to their customers in justifying rate increases.

9. Technical Excellence. MSU is confident that its new nuclear units will be successfully licensed and put into commercial operation because standards of construction are meeting or exceeding licensing requirements. MSU's technical performance in the past also seems to be well regarded.

## WASTE MANAGEMENT INC.

### Establishment

Waste Management Inc. is the largest company providing comprehensive waste management services on a national scale. This private company entered this highly competitive industry in 1971. It provides integrated solid and chemical waste management services, including storage and collection, transfer, interim processing, and disposal. It serves commercial, industrial, and municipal customers, as well as other waste management companies.

Since its incorporation, the company has continued to expand into new geographical areas and new activities. The acquisition of Chem-Nuclear Systems, Inc. in 1982 led Waste Management to begin providing low level radioactive waste management services, primarily to utilities with nuclear reactors. Last year the company began providing street sweeping services to municipalities throughout the U.S. It has also become involved in the extraction, processing, and sale of industrial minerals (lime and aggregates) through its wholly-owned subsidiary, Warner Co. Its latest venture is in building a 1,000 ton-per-day waste-to-energy plant in Tampa, Florida, which will be operational in 1986.

Waste Management currently has operations in the U.S., Canada, Saudi Arabia, Europe, Argentina, Venezuela, and Australia. Its North American headquarters is in Oak Brook, Illinois.

### Organization

Waste Management is organized along the lines of a typical private corporation. A total of five operating groups combine to form Waste Management, Inc. These groups are: Waste Management of North America (the largest division), Chemical Waste Management, Waste Management International, Chem-Nuclear Systems Inc., and Industrial Minerals. These groups are further

divided into regional offices and offices responsible for particular phases of operation. The company currently employs a total of approximately 17,400 people.

### Financing

The company's revenues for 1983 exceeded \$1 billion for the first time. Its principal fixed assets consist of vehicles and equipment. Waste Management owns or leases real property in each state in which it is doing business. Bonds are its major source of debt financing; in the area of equity financing, it has thus far issued only shares of common stock although the Board of Directors may also issue preferred stock. Its shares are traded on the New York Stock Exchange.

Waste Management of North America receives approximately 72 percent of its revenues from collection customers and approximately 26 percent from the transfer, interim processing, and disposal services provided to municipalities, counties, and other waste management companies.

### Organizational Tests

As a relatively small private corporation, there is little information publicly available about Waste Management's performance. This makes it impractical to apply the organizational tests.

## WESTINGHOUSE ELECTRIC CORPORATION

### Establishment

Westinghouse Electric Corporation (Westinghouse) has developed into a large diversified industrial corporation since its incorporation in Pennsylvania in 1872. Westinghouse's early focus on electronic and electrical equipment and services for utilities, industries, and builders has broadened into 28 diversified business activities ranging from defense systems to office furniture to soda bottling.

### Organization

The Management Committee of the Corporation consists of the chairman and vice chairman, the group presidents, the chairman of the broadcasting and cable company, the senior executive vice president of finance, and the senior executive vice president of corporate resources. It is the Management's Committee's responsibility to make policies for the firm. Westinghouse is comprised of four operating groups: the Energy and Advanced Technology group, the Industries and International Group, the Commercial Group, and Westinghouse Broadcasting and Cable, Inc. There is also a Westinghouse Credit Corporation and a corporate staff organization.

The business unit is the fundamental operating unit in the corporation. The corporation's 28 business units are essentially free-standing businesses located throughout the world. Each business unit is responsible for its own

marketing, strategic planning, personnel management, customer service, profit and cash flow, and the productive use of human, physical, and financial resources.

Above the business unit level, executive vice presidents serve as extensions of the Management Committee. They report to the group presidents and Management Committee on the objectives, goals, performance, and allocation of resources at the business unit level.

During 1983, Westinghouse restructured its business units into the aforementioned four operating segments in keeping with the Corporation's efforts to redeploy assets from slower-growing businesses into businesses that possess the potential for rapid growth and improved profitability. In 1981, Westinghouse acquired Teleprompter Corporation and in 1983 Unimation, Inc., while divesting itself of the lamp and lighting fixture business in order to keep with this new strategy.

### Financing

The Corporation has developed a reliable base for future growth. A strong balance sheet based on a diverse portfolio of businesses has made Westinghouse a dependable, profitable, and growing enterprise based on product and service sales and the sale of common stock. In 1983, the firm earned \$449 million on sales of \$9.5 billion.

Westinghouse has its own Finance Organization which directs the Corporation's financial affairs worldwide. The Finance Organization is divided into four functions: controller, treasury, tax and pension investments, and investor relations. The Finance Organization is also responsible for the Westinghouse Credit Corporation.

The two most important functions in the Finance Organization are the Treasury Organization and the Controller's Organization. The latter group develops long-range financial plans and accounting practices, while the former organization monitors cash movements to assure adequate funds for working capital requirements.

### Organizational Tests

1. Mission-Oriented. Although Westinghouse's business involvements are diversified in a myriad of directions, each unit's mission is to achieve as great a profit as possible, preferably while enhancing its public image.
2. Ability to Maintain Credibility. Although Westinghouse's involvement with nuclear power has strained its finances and credibility, the company has the cash reserves and an outstanding reputation in other business units (such as its Public Systems Co., Industry Products Co., etc.) to pull itself through and establish its image as a diversified corporation dedicated to pleasing its customers and stockholders.

3. Stability and Continuity of Process. The exploitation of a wide range of business missions and a fine record in market responsiveness has established Westinghouse as one of the most profitable and progressive corporations in this country. Its basic goals have been relatively stable, although the recent divestitures have changed the Corporation's direction somewhat.
4. Programmatic Authority. Here again, Westinghouse's strength through diversity has assured that recent sanctions on its nuclear utility involvement will not undermine Westinghouse's programmatic authority in most of its 28 fairly autonomous business units.
5. Accessibility and Responsiveness. As most of Westinghouse's business interests involve consumers, their profits would suffer if they did not understand that people are their most valuable asset. Accessibility is provided through public relations departments in each of the business units, availability of highly informative literature on all aspects of the corporation, numerous meetings with stockholders, and community involvement.
6. Internal Flexibility. Westinghouse has 140,000 employees around the world. Each business unit is free to train, hire, and fire as suits its productivity and financial goals.
7. Political Accountability. Westinghouse is required to submit an extensive annual report under the Securities Exchange Act of 1934. In their Government Affairs Office in Washington, D.C., a liaison is provided with the Federal Government as well as with regional, state, and local governments.
8. Financial Accountability. Over and above the Corporation's accountability to the government through the Securities Exchange Act of 1934, its primary financial commitments are to its stockholders. Full and prompt disclosure of important information is a policy rigorously adhered to since the firm's ability to obtain funds for continuing operations depends on its reputation for integrity and fairness in its dealings with investors, analysts, and the general public.
9. Technical Excellence. The story of Westinghouse is a story of firsts in all areas of its technical ventures. Westinghouse is responsible for the first AC generator and motor, the first main roll drive for steel mills, the first regularly scheduled radio broadcasting service, the first nuclear propulsion plant, and the first TV camera on the moon. Its reputation for technical excellence is unquestionable.



APPENDIX D. TECHNICAL CONSIDERATIONS

The Panel accepted the definitions of "high-level radioactive waste" and "spent nuclear fuel" contained in Public Law 97-425 as being the official descriptions of these terms.

Following are some working definitions used by the Panel in its deliberations.

High-level wastes - These are the most highly radioactive wastes. They are characterized by high-level radiation which decays rapidly, though high-level wastes also may contain quantities of the slowly decaying transuranic (heavier than uranium) elements. High-level wastes must be handled by remote control behind heavy protective shielding. High-level wastes are produced by nuclear reactions in the fuel of both commercial and defense reactors.

Low-level wastes - These are radioactive wastes not classified as high-level waste, transuranic waste, spent nuclear fuel, or by-product material. Some shielding may be needed for handling certain low-level wastes; other low-level wastes may have no more than natural background radioactivity. Low-level wastes are produced by many commercial, medical, and industrial uses.

Transuranic wastes - These wastes contain the so-called man-made transuranic elements, which are heavier than uranium. They are predominantly characterized by medium energy radiation and slow decay, though their total radioactivity may be no greater than certain low-level wastes. Most transuranic wastes result from reprocessing nuclear fuel. Some transuranic wastes are being stored in surface facilities but eventually they must be placed in deep geologic repositories. This is because, like high-level wastes, they remain hazardous for long decay times.

Tailings - The by-products of uranium mining and milling, tailings are volumes of naturally radioactive rock and soil. They contain small amounts of radium which decay to emit a radioactive gas (radon). Plans are being developed for controlled disposal of tailings at isolated locations and under sufficient soil cover to reduce the emission of radon gas.

Spent Fuel Versus Reprocessing Wastes - The Panel basically limited its scope to the assumption that the waste form would be encapsulated spent fuel. We recognized that an alternate nuclear fuel cycle, namely one which reprocesses the spent fuel to remove the fission products and recovers the residual uranium and the bred plutonium, may in the future re-emerge as the preferred mode of fuel cycle operation. A fuel cycle involving reprocessing was assumed in this country until the mid-to-late 1970's. The Panel also recognizes that many other countries in the world are in fact proceeding along that path as was emphasized during the foreign visits made by the Panel.

Unlike fossil fuel, spent nuclear fuel when discharged from the reactor still has substantial residual energy value. The timing of the discharge is set by several different considerations.

- a. Data obtained in operations and in tests establish a finite irradiation lifetime for nuclear fuels, after which their physical and mechanical integrity cannot be assured. Discharge from the reactor is scheduled to take place before those limitations are reached.
- b. The fission products which build up and are contained in the fuel elements compete for neutrons during the fission process, and eventually reach the point where economic power production cannot be sustained. The fuel is removed before that point is reached.

When it is discharged, the fuel contains appreciable residual value. About 30,000 kilograms (30 metric tons) are charged each year to a 100 MW light water reactor. Specifically, each thousand kg (one metric ton) of uranium in the initial fuel load contains 967 kg of the uranium isotope U-238 and 33 kg of U-235. At the time of discharge, some 24 kg of the U-238, and roughly 25 kg of the U-235 isotope have been consumed by the fission process, reducing the "enrichment" from 3.3% by weight to about 0.8% by weight of the U-235 isotope. Uranium that is consumed is converted into about 35 kg of assorted fission products, about 9 kg of various isotopes of plutonium, and about 5 kg of U-236 and transuranic elements.

The question of the desirability of recovering that residual value is fundamentally one of economics. Work done in the earlier years of nuclear power demonstrated that the technical issues are essentially in hand. However, there have been safeguard issues raised concerning widespread international traffic in separated plutonium, which is a weapons usable material. Currently, the economics are distinctly unfavorable. Under the current 1 mill/kwh fee basis defined in the NWPA, disposal of spent fuel costs the utilities about \$240/kg of fuel originally charged. Contrasted to that, costs for reprocessing, which have continuously increased since the mid-70's, are generally estimated in the range of \$700-1000/kg of fuel originally charged to such a reprocessing facility. In today's markets, the value of the recovered uranium and the plutonium would only represent about \$60 and \$170 respectively per kilogram of fuel originally charged. In addition, the cost of disposal of the fission product wastes and other wastes from the reprocessing operation must be allowed for. While disposal of wastes from the reprocessing plant would probably cost less than disposal of spent fuel, that difference is likely to be relatively modest. Moreover, the additional cost to fabricate the plutonium must be allowed for. With costs on the order of \$100/kg and a value of only \$70-100/kg of recovered fuel material, it is obvious that the current economic situation does not favor reprocessing.

Should those economic conditions change, i.e., should improved designs or regulatory approaches reduce the current estimates of costs for reprocessing, and should the value for uranium (worldwide market price) and the value of plutonium (related to uranium and the cost of enrichment) increase substantially in the future, reprocessing could once again become a viable option. The Panel did not investigate that prospect in any depth, but simply concluded that should such a change in approach occur, there seemed to be no obvious reason why repositories now being planned could not accommodate packaged and solidified high level wastes from reprocessing operations.

APPENDIX E. ISSUES NOT SUBSTANTIVELY ADDRESSED BY THE PANEL

1. TECHNICAL

During the course of the Panel deliberations, a number of technical issues surfaced that were recognized by the Panel as being important to the overall conduct of the waste program. At the same time, the Panel also recognized that these issues were outside the specific scope of its mission. Thus, they were not considered by the Panel in any depth, but are noted herein to reflect the Panel's view that they deserve further attention. The Panel also felt that these issues could be set aside without serious damage to the consideration of management and financial considerations and the recommendations made in this report. These technical issues are briefly discussed in the paragraphs that follow.

(1) Special OCRWM Responsibilities

There are several sections of the Nuclear Waste Policy Act (NWPA) which assign responsibilities to the Office of Civilian Radioactive Waste Management (OCRWM) and which are under active investigation by OCRWM, but which were set aside by the Panel in its thinking. It should be noted that these responsibilities are not funded from the Waste Fund but rather from general appropriations.

o Subtitle D--Low-Level Radioactive Waste

In Section 151(b) of this Subtitle, the Secretary of the Department of Energy (DOE) is authorized to assume title and custody of low-level radioactive waste sites following NRC-approved decommissioning and decontamination of the sites and termination of the NRC license. The Panel recognizes that some provision must be made for handling these responsibilities in DOE or elsewhere if an alternative to OCRWM is implemented. The Panel has not considered the preferable manner of managing decommissioned low level waste sites in this case.

o Section 218 - Demonstration and Cooperative Programs

This section basically covers a demonstration program for the dry storage of spent nuclear fuel at civilian nuclear power reactor sites. It permits the Department of Energy to enter into cooperative agreements with the utilities involved and to conduct dry storage research and development. It is recognized that there are a number of programs, including dry storage but also rod consolidation, extended burnup, shipping and burial cask optimization, and others which could materially reduce the repository and transportation requirements. The Panel believes these should be encouraged, and to the extent they may involve investment by utilities, consideration of how such encouragement can be stimulated, either by contract or by changes in the fee structure, would seem worthwhile.

o Section 222 - Research on Alternatives

For the permanent disposal of high level radioactive waste, this section authorizes the Secretary to continue and accelerate programs of research, development, and investigation of alternative technologies. Currently, the only such alternative being examined appears to be sub-seabed disposal. The Panel did not collect any information on the status of this program, nor any impressions as to its schedule or its likelihood for success, but clearly to the extent it can be viewed as a "competitor" to geologic disposal in repositories it is of interest.

(2) Possibility of Construction of Other Facilities

a. Monitored Retrievable Storage (MRS)

OCRWM is currently evaluating the question of the role of MRS facilities in the overall waste management program. Under Section 141 of NWPA, it is recognized that long term storage in such facilities is an option. On or before January 1, 1985, OCRWM is obligated to complete a detailed study, including alternate sites and facility designs, of the need for and feasibility of the construction of one or more such facilities. OCRWM shall make recommendations as to the actions they believe preferable. The Secretary of DOE is also to recommend a plan for integrating any such facilities constructed with other storage facilities authorized by NWPA.

This could clearly be a crucial and central issue in the overall program implementation. A recommendation to go ahead with an MRS would certainly affect the financing; currently no allowance for construction funds for an MRS has been made or included in projections of the adequacy of the fee. Clearly, it could also impact the overall program schedule since such an MRS must undergo its own full scope licensing. Since NWPA precludes the location of an MRS in any state in which there is a site approved for repository characterization, it could also seriously add to the transportation component.

Although the Panel did recognize the special importance of this question, it felt it was not within its purview to form any judgment on the likelihood or the desirability of MRS construction. Further, if such facilities were included in the program, the basic organizational issues should not be appreciably affected.

b. Test and Evaluation Facility (TEF)

Several sections of NWPA authorize the Secretary to construct a test and evaluation facility as an extension of siting research activities at a site under characterization. In presentations made to the Panel, it was clear that no such construction at the sites which are candidates for characterization is currently being contemplated, and no funds are budgeted for a TEF.

The Panel does not feel competent to the question of the need for the TEF. It is assumed by the Panel that where appropriate, the data that would be obtained from the construction and operation of such a TEF will be sought and obtained during the general characterization program at each candidate site. It was further accepted by the Panel that the construction of such a facility, should that later be decided favorably, would not change the management or financing recommendations.

c. Interim Storage

Section 135 of NWPA provides for Federal Government storage of not more than 1900 tons of spent fuel if NRC determines such storage to be needed to ensure continued orderly operation of a reactor and if no other reasonable alternatives exist. Such storage would be provided by contracts to be entered into no later than January 1, 1990, and the contracting utility shall pay charges for such storage as established by DOE.

To the best of the Panel's knowledge, no requests for consideration of such storage need have yet been received by NRC, nor does OCRWM currently expect to be called upon to provide such storage.

d. Second Repository

A second repository is required under NWPA. NWPA limits the first repository to 70,000 metric tons of spent fuel or high level waste resulting from reprocessing of 70,000 MT of spent fuel until a second repository is in operation. The Panel recognizes that this limitation probably does not reflect physical limitations of the sites under consideration. Those sites are almost certainly capable of accommodating substantially larger quantities of waste. Furthermore, depending upon the scenario one chooses to accept for future U.S. nuclear power growth, it is quite conceivable on technical grounds that such a second repository might not be required. If only one repository were built, and the site selection process were modified to reflect this goal, substantial cost savings would result for the overall program. However, the Panel simply accepted current plans for putting such a second repository in place, and concluded that those plans would not adversely impact the management and financial analyses made by the Panel.

(3) Defense Wastes

NWPA provides that no later than two years after enactment the President shall evaluate the use of the civilian repositories for the disposal of high level radioactive waste resulting from atomic energy defense activities, taking into account cost, health and safety, regulation, transportation, public acceptability, and national security. Unless the President finds after that evaluation that a separate repository for defense wastes only are required, OCRWM should proceed with arrangements to include defense waste in the civilian waste repository program.

The volume of defense wastes is estimated to be equivalent to some 10,000 metric tons of civilian waste or spent fuel. The civilian wastes may amount to perhaps 140,000 metric tons. Thus, co-mingling the defense and civilian waste does not appear to represent any substantial capacity problem. The Panel believes that the Presidential evaluation will favor including defense wastes in the civilian repository.

The Panel recognizes that the matter of how to charge for storage of those defense wastes has not yet been resolved. NWPA says that the Federal Government will pay for the costs of disposing of defense wastes in the civilian repositories if that option of storage is chosen by the President. However, NWPA is somewhat vague on whether this requirement should be given an average or incremental cost interpretation. The Panel also believes there are no insurmountable technical problems in incorporating such defense wastes, although they do represent solidified high level wastes from defense fuel reprocessing operations, and are thus different in form and isotopic content. Presentations made to the Panel suggest that it would be cost-effective to leave some significant fraction of such defense wastes currently in tank storage at Hanford (and possibly other installations) in place in such storage tanks. The Panel has not given any recognition to the special management considerations which would devolve from custodial care of such in-situ storage. Finally, recognizing that the acceptance rate at the first repository will be limited for the early years of its operation (see Item 5 below), the Panel has not considered how priorities would be established between civilian and defense wastes in the acceptance process.

(4) Possible Inclusion of Foreign Waste

The Panel had cursory discussions of the feasibility of accepting foreign high-level radioactive waste and spent fuel as part of the U.S. storage and repository program. This subject is alluded to in the ANCORP and BIDCORP discussions in Chapter VII, but was not pursued in any depth.

The acceptance of foreign waste would present problems similar to those posed by U.S. defense waste: (1) relatively small amounts and; (2) the question of basing the acceptance fee upon average or incremental costs. A third factor would be the potential need for Congressional action to undertake such an international program. It is worth mentioning here because of the important bearing which it might have on the issue of non-proliferation.

(5) Acceptance Rate

Something in excess of 3000 metric tons per year of spent fuel will be generated by the civilian nuclear power industry by 1998. The Panel believes it was the intention of NWPA that the repository, when placed in operation, should accept spent fuel at the rates at which it was being generated to avoid increasing the substantial backlog of spent fuel then being stored at reactor sites or in other temporary storage facilities (some 40,000 metric tons).

It seems quite clear from the Mission Plan and the representations made to the Panel that during the early years (perhaps the first 5 years) of repository operations, the acceptance rate would be substantially lower than the generation rate. The first Mission Plan suggested an initial acceptance rate of 1800 metric tons/year; the most recent version of the plan projects an initial acceptance rate of only 400 metric tons/year. If that low acceptance rate remains as currently contemplated, this limitation could have serious financial and programmatic implications which the Panel did not consider. We suggest this issue be given serious re-examination.

(6) Contingencies

Finally, the Panel is troubled by the fact that there is very little specific allowance for program contingencies in the Mission Plan. It is clear to the Panel that the licensing process, the characterization process (particularly on multiple sites), the prospect of legal challenges, and other factors could require substantial realignments and adjustments in the program as it proceeds. These could seriously delay the schedule and increase the cost.

It was beyond the scope of the Panel to examine these technical and procedural possibilities in any specific detail, but it is obvious that these contingencies must be taken into account. The Panel recommends more explicit recognition of the need to provide for such contingencies be delineated in the next Mission Plan and in the milestones.

## 2. INSTITUTIONAL RELATIONS

Congress established procedures for action and interaction by federal and state governments, their agencies, and Indian tribes. Specific consideration for smaller units of government was not included, nor specified.

The Panel agreed that siting and licensing processes (procedures) include difficult political and environmental issues which must be resolved by the management of high-level radioactive waste programs. It was beyond the scope of the Panel to study in depth the critical interactions which must exist among these institutions but we recognized the actions demanded of them by NWSA. Our recommendations for alternative management organizations were heavily influenced by these mandated actions.

As the Panel reviewed the requirements of NWSA, issues and concerns of institutions and the public surfaced about the decisionmaking process in the present or any future organization responsible for this program. These issues are described here.

(1) Implementation of NWSA

Obviously, NWSA is untested on the question of whether its procedures will allow the siting of a repository or facilities for long-term storage. In the event of a state or tribal veto, the keys to Congressional willingness to override will be the strength of the



technical case supporting site selection and the Federal Government's record of being appropriately responsive to state and tribal concerns. Some information on both of these major points is available from the Department of Energy's nearly 2 years' experience in implementing NWPA.

Pushed by the tight deadlines specified in NWPA, DOE issued draft siting guidelines in the spring of 1983 and planned to release draft environmental assessments (EA's) shortly thereafter. The impression given states and others was that DOE was in a rush to move forward with repository siting. States and other interests objected strongly, both to the substance of the draft guidelines and to the attempt to develop EA's prior to the promulgation of the final guidelines on which they were to be based.

In the face of such objections, and with the arrival of the Office of Civilian Radioactive Waste Management's first acting director, DOE changed tack and became more solicitous of state views. The EA's were not to appear in draft form until after the guidelines were final. State and other views were to be taken into account in revising the draft guidelines themselves. Added to the revisions to accommodate states were those forced by the Nuclear Regulatory Commission (NRC) as conditions of its concurrence under NWPA. As a result, the guidelines did not become final until November 1984, some 16 months later than DOE originally intended.

While states, tribes, and other interests have been understanding of DOE's problems, they have no great confidence in DOE's institutional commitment to resolve their procedural concerns. This lack of confidence is at least partly due to frequent changes in personnel and policy within DOE and its forerunners. Such change may be inherent in any federal executive agency. Nonetheless, state and tribal confidence should develop over time, assuming the program proceeds in a way that recognizes the participation of states and tribes.

It should be noted, of course, that DOE solicitude for state and tribal interests may have come at the price of rising discomfort among the nuclear utilities. This discomfort turns largely on utility dependence on the 1998 date for the Federal Government to begin accepting title to spent fuel. Each deadline slippage might raise apprehension that they will not be able to transfer their spent fuel to DOE in 1998.

(2) Consultation and Cooperation Agreements

The Panel recognized the importance for DOE of obtaining these agreements with states and Indian tribes. These agreements provide an opportunity for DOE to work with institutions and establish credibility and an air of cooperation. Commitments made by DOE should be honored if a new organization takes over the program.

(3) Public Participation in Decisionmaking

The Panel recognizes the unique role of the states and Indian tribes outlined in NWPA, but acknowledges that an effective public participation process will be necessary for a successful program. In order to gain public acceptance for repositories, time for public involvement activities must be a part of the program schedule. There must be a concerted effort to develop mechanisms for resolving conflicts over siting controversies and other elements of the program.

(4) Uncertain Benefits, Risks, and Technical Feasibility

Although there seems to be some agreement as to the technical feasibility of disposing of high-level radioactive waste in geologic repositories, the benefits and risks associated with this action have many elements of uncertainty. DOE's record on the technical side of siting under NWPA is less clear than its performance on procedure. There have been some expressions of concern about the adequacy of several pre-draft EA's and DOE's draft Mission Plan. While technical inadequacies, missing information, and similar problems are inherent in any development process, perceptions of poor performance on the part of DOE at best erode its credibility. At worst, they portend difficulties with the technical case DOE presents at the time of site selection. Some of the uncertainty may be perceived more than real, but the program will not be successful unless the information is gathered and communicated to those concerned with these issues.

(5) Financial Concerns

Utilities have begun raising doubts about the cost-effectiveness of DOE management of the Nuclear Waste Fund. To some extent, DOE responses to state and tribal concerns may have some impact on program costs.

## 3. ECONOMIC

During the course of the Panel deliberations, a number of economic issues surfaced which were set aside by the Panel as outside the scope of our mission. The Panel feels that they deserve further consideration; thus, although we appreciate that OCRWM is in fact, working on them, they are listed below simply to record their importance.

(1) Cost Allocation for Defense Waste

As represented to the Panel the defense wastes will exist in two (2) forms, either in solidified (virtrified and probably glassified reprocessing wastes), or sludges (saltcake) left in tank storage at the production sites. As regards solidified reprocessing wastes, as earlier noted, the Panel assumed these could be co-mingled with civilian wastes without major programmatic difficulty. The Panel has agreed that the in-situ wastes could represent a special problem for any management with primary responsibility for civilian waste.

NWPA does not define the specific basis for payments for disposal of such defense wastes to be made into the Waste Fund. Studies the Panel have seen focus on the costs for combining defense and civilian wastes in the same repository as contrasted to building separate and unique facilities for defense wastes; the combination appears to be substantially cheaper. However, the Panel has not been made aware of the specific plans for recovering the added costs to the repository program which incorporating the defense wastes would entail.

(2) Cost Allocation for Other Wastes not yet defined

The Nuclear Regulatory Commission has been given the responsibility to define high level waste. NRC could include in its definition wastes other than spent fuel. These wastes would also be disposed of in a repository. At this time there is no fee structure to cover this added cost. The Panel did not consider this question in depth, but recognizes it as a potential problem.

(3) Special Transportation Costs

Two states, Illinois and Pennsylvania, have imposed a levy on radioactive wastes traversing their borders. Other states may in the future decide to act similarly.

Because several thousand shipments to the first repository may cross a number of states these levies could add a substantial annual expense to the waste management program. It would seem worthwhile to consider some remedy for this situation to avoid added or inconsistent expenditures to individual states. Current technical efforts aimed at reducing the number of shipments, e.g., extended fuel burnup, rod consolidation, rail transport systems, etc. should also be encouraged to curtail costs.

(4) Acceptance Rate

If the acceptance rate at the repository for the first five (5) years should turn out to be as low as now projected (e.g., 400 tons per year), the backlog of spent fuel would continue to build up. Assuming that OCRWM intends to accept responsibility for those wastes (and title) in 1998, whether or not the repository is ready to accept them, the Federal Government could face substantial additional costs for a number of years of added storage either at the reactor sites, or at an MRS, or at some other away-from-reactor facility, until the acceptance rate balances the spent fuel production rate.

(5) Allowances for Other Facilities

Apart from such future storage as may be required by 3 above, it was noted earlier in Appendix F.1 that there is currently no provision in the Waste Fund for any facilities such as the TEF or the MRS.

(6) Age of the Spent Fuel

It is clear that we are putting in place many years of spent fuel storage capacity in the U.S. Clearly that circumstance should permit shipping quite old fuel, to take advantage of this economic benefit. It would appear reasonable that the waste management system design reflect the savings that would derive from shipping and handling fuel

with an average age closer to 20 years than the 10 years currently assumed. This would bring about a reduction of about 30 percent in design activity levels.

#### 4. LIABILITY

The development of the national repository program has raised questions about the adequacy of public liability coverage for the operation of a repository and for transportation of nuclear materials for disposal. Various representations have been made as to whether the existing legislation, which focuses on nuclear power reactors, is sufficient and applicable to the repository disposal program. The State of Washington has raised the issue in the conduct of its negotiations in development of a Consultation and Cooperation Agreement with the Department of Energy. The state has indicated that it expects the Federal Government to assume total liability for any incident from repository operations or from transportation carried on as a part of that process. Other state representatives and some public organizations have expressed similar views.

The Price-Anderson Act (P.L. 85-256, 71 Stat. 576, September 2, 1957), currently under review by Congress, would be applied by DOE to cover liability for any accident involving the transportation, storage or disposal of nuclear waste. The Secretary of Energy has asked Congress to extend the life of the Act, to increase its limits to reflect inflation since its original passage, and to extend its coverage to specifically include repository operations. There has been considerable comment as to whether the limits in the Price-Anderson Act are indeed sufficient to cover any repository accident since no economic risk analysis studies have been undertaken (although one is currently underway by DOE). Any claims, beyond the statutory limits under provisions of the Act, would have to be provided by Congress outside of the maximum provided.

DOE has represented that its ability to deal with the liability question is circumscribed by the Price-Anderson Act and by the Federal Tort Claims Act. These conclusions of DOE appear to some parties to be an inadequate response in meeting the need.

Development of an acceptable liability position is the responsibility of Congress. It is essential that whatever organization ultimately has program responsibility have clear authority to deal with any accident, however remote the possibility. The Price-Anderson Act can be amended to apply to repository operations or other legislation can be developed.

While it appears to be outside the mission of this Panel to deal with this issue as central to organizational forms, there are financial implications that should be addressed, particularly if the Nuclear Waste Fund is thought to be an appropriate vehicle to support potential claims. Also, the application of this issue would take place during the operational phase and consequently, the intervening time should provide the opportunity for Congress to carefully consider the question as it pertains to the repository program and to the level of federal responsibility necessary.

APPENDIX F. PANEL BRIEFINGS AND PUBLIC COMMENT

## BRIEFINGS

1. The following presentations were made to the Panel on the dates indicated.

JANUARY 1984:

Nuclear Waste Program - Michael J. Lawrence, Acting Director, DOE/OCRWM, January 24, 1984, Washington, D.C.

Nuclear Waste Fund - Robert M. Rosselli, Acting Association Director (Management), DOE/OCRWM, January 24, 1984, Washington, D.C.

Administrative Considerations - Howard F. Perry, "Designated Federal Official," DOE/OCRWM - January 24, 1984, Washington, D.C.

FEBRUARY 1984:

Nuclear Waste Facilities (Radiation, Fuel Cycle, Reprocessing, and Storage) - Michael J. Lawrence, DOE/OCRWM, February 21, 1984, Washington, D.C.

Legislative Intent - Andrea Dravo, Majority Staff, House Interior Committee - February 22, 1984, Washington, D.C.

NRC Licensing Process - John Davis, Office of Nuclear National Safety and Safeguards, Nuclear Regulatory Commission - February 22, 1984, Washington, D.C.

Technology Assessment - Thomas Cotton, Project Director, Radioactive Waste Management Assessment, Office of Technology Assessment, Congress of the United States - February 22, 1984, Washington, D.C.

Indian Tribal Considerations - Johnson Meninick, Chairman, Confederated Tribes and Bands of the Yakima Indian Nation - February 22, 1984, Washington, D.C.

Utility Perspective - Loring Mills, Vice President, Nuclear Affairs, Edison Electric Institute - February 22, 1984, Washington, D.C.

Contractor Representation - Angelo Giambusso, Vice President, Stone and Webster Engineering Corp. - February 22, 1984, Washington, D.C.

Governors Association - Holmes Brown, Associate Staff Director, National Governors Association - February 22, 1984, Washington, D.C.

Organizational Suggestions, Criteria, Etc., - John Landis, Senior Vice President, Stone and Webster Engineering Corporation (SWEC) - February 22, 1984, Washington, D.C.

Legal Problems of the Waste Management Program - David Berick,  
Director of the Environmental Policy Institute - February 22, 1984,  
Washington, D.C.

APRIL 1984:

Overview of DOE Richland Operations Office (ROO) - Alex G. Fremling,  
manager - April 6, 1984, Richland, Washington

Defense Waste Management - David B. LeClaire, Director of Defense  
Waste & Byproducts Management, DOE - April 6, 1984, Richland,  
Washington

Monitored Retrievable Storage Program - Philip A. Craig, Director,  
Commercial Spent Fuel Management Program Office, ROO - April 6, 1984,  
Richland, Washington

Basalt Waste Isolation Project - O. L. Olson, Project Manager, Basalt  
Waste Isolation Project Office, ROO - April 6, 1984, Richland,  
Washington

International Waste Management Programs - Hilliard W. Paige,  
International Energy Associates Limited; Kent Harmon, Battelle  
Northwest Laboratory, and Alex Perge, DOE/OCRWM - April 6, 1984,  
briefing, Richland, Washington

Nevada Test Site: Nuclear Waste Storage Investigations - Donald L.  
Vieth, Director, Waste Management Project Office, Nevada Operations  
Office - April 9, 1984, Nevada Test Site

General NTS Activities - Thomas R. Clark, Manager, Nevada Operations  
Office - April 9, 1984, Nevada Test Site

Spent Fuel Test--Climax Facility - Don Vieth, Director, WMPO and Wes  
Patrick, the Task Director at Climax - April 9, 1984, Nevada Test Site

Overview of Albuquerque Operations Office - V. V. Berniklau,  
Director, Office of Strategic Planning and Analysis, Albuquerque  
Operations Office

Waste Isolation Pilot Plant, Carlsbad, New Mexico - site visit by the  
Panel, April 10, 1984, Carlsbad, New Mexico--conducted by WIPP  
Manager Randy Cooper

MAY 1984

U.S. Department of Transportation: DOT's Role in Radioactive Waste  
Management - Richard Hannon, May 22, 1984, St. Charles, Illinois

Illinois Department of Nuclear Safety: Illinois Transportation  
Policy - David Ed and John Cooper - May 22, 1984, St. Charles,  
Illinois

Impact of EPA Regulations on NWA Programs - Dan Egan, Health Physicist, U.S. Environmental Protection Agency - May 22, 1984, St. Charles, Illinois

DOE Mission Plan - Robert Bauer, Associate Director, Office of Storage and Systems Development, OCRWM, DOE - May 22, 1984, St. Charles, Illinois

JUNE 1984

Financing the Nuclear Waste Management Program - Staff briefing by David L. Bodde, Congressional Budget Office - June 26, 1984, Washington, D.C.

OCTOBER 1984

Consensus Building in the Great Plains Coal Gasification Project - Keith N. Frye, DOE Deputy Assistant Secretary for Oil, Gas, Shale, and Coal Liquids - October 22-23, 1984, Washington, D.C.

PUBLIC COMMENTS

Public comments were invited at every Panel meeting. Following is a summary of oral and written material submitted to the Panel.

(1) Panel Meeting, Washington, D.C., January 24 and 25, 1984

David Berrick, Director of the Nuclear Waste Project of the Environmental Policy Institute, remarked that the Senate confirmation hearings on the new Director of OCRWM would address many of the issues about which the Panel had expressed concern in the morning. He urged the Panel to pay particular attention to Senate treatment of alternative management organizations and Congressional intent and expectations with regard to the NWA.

Erasmus Klonan of the National Academy of Public Administration offered to the Panel previous studies on nuclear waste disposal done by the National Academy, and indicated that their study of institutional alternatives "had not been welcomed by DOE." He attributed DOE dislike of the study to its recommendation that waste management be undertaken by an organization or agency whose sole responsibility it would be.

Loring Mills of the Edison Electric Institute offered the Panel any assistance it might desire from EEI, and advice and encouragement from the utility standpoint.

He was followed by a representative of the American Nuclear Energy Council who expressed great disappointment with DOE's tradition of missing deadlines, and urged the Panel to stay within its schedule.

(2) Panel Meeting, Richland, Washington, April 7, 1984

Mr. Larry Penberthy, President of Penberthy Electromelt International, Inc. of Seattle, Washington, addressed the Panel on "Generic proposed changes in DOE's approach to repository siting, construction management, and financing." He suggested certain money-saving measures, such as using a tunnel in Rattlesnake Mountain on the Hanford Reservation as a repository and using the abandoned railroad tunnel under Snoqualmie Pass in Washington for retrievable storage. At the end of Mr. Penberthy's presentation, Dr. Lash requested that he provide the Panel with copies of the letters from agency representatives that he had referred to in his speech.

A statement for the record was provided by Senator Thad Cochran of Mississippi, in which he proposed the creation of a "single-purpose independent authority for a nuclear waste management program." Senator Cochran has introduced legislation in the Congress, Senate Bill 1343, to establish the Nuclear Waste Management Authority. He proposed an independent authority and suggested consideration by the Panel.

The Nuclear Waste Management Authority would carry out the nuclear waste site selection, construction and management functions in accordance with the Nuclear Waste Policy Act, and that would be its only responsibility. The authority would be headed by a 9-person board, 6 chosen by the President and 3 chosen by the states which have been nominated to have waste sites. This would assure to the extent possible that the states' views are properly represented. Three of the members of the board selected by the President must have demonstrated scientific expertise in nuclear radiation or geology or a related discipline. All members of the board would be subject to Senate confirmation.

Four major functions of the new authority would be handled by separate offices within the agency. These offices would be: Office of Site Selection; Office of Site Management; Office of Public Health, Safety and Information; and Office of Economic Development.

Expenses of this authority would be borne by user fees paid into the Nuclear Waste Fund, subject to a 5-year appropriation based on the Mission Plan under Section 301 of the Nuclear Waste Policy Act.

(3) Panel Meeting in St. Charles, Illinois, May 23, 1984

Mindy Buren, attorney for Electric Utility Companies' Nuclear Transportation Group:

Ms. Buren described the group, which her law firm, Laboeuf, Lamb, Leiby & McRae of Washington, D.C. serves as counsel. It was founded in 1978 by 33 utilities in response to New York City's ban on shipments. It has since been very active in transportation



issues such as DOT's HM-164. It has worked with DOT in the NYC suit, with NRC in setting physical requirements of shipments, and with DOE to establish the right to transport spent fuel via rail. It was addressing the AMFM Panel out of concern that the DOE Mission Plan did not provide good or concrete methods to deal with the barriers and problems involved in transporting spent fuel.

- (4) Carl Walske, President, Atomic Industrial Forum, Inc., Bethesda, MD; May 21, 1984, letter to Diarmuid O'Scannlain

Pursuant to Section 303 of the Nuclear Waste Policy Act of 1982 (NWP), the following comments were developed on alternative approaches to managing the construction and operation of civilian radioactive waste management facilities. These comments were prepared by the AIF Nuclear Waste Oversight Committee.

The Oversight Committee offered the following recommendations:

- o Central Headquarters' Management of the Waste Program Must Be Strengthened
- o A Detailed Schedule with Realistic Milestones Is Needed
- o Management Controls Must be Project Oriented
- o More Institutional Focus Is Necessary

As part of its undertaking, the Advisory Panel on Alternative Means of Financing and Managing Radioactive Waste Facilities should also give consideration to the establishment of a new separate mission-oriented agency for the sole purpose of implementing the NWP. Past arguments against establishing such an agency because of the momentum that might be lost would appear to be tempered by the halting start that DOE has made to date in implementing the NWP.

It is the opinion of the Oversight Committee that such a separate agency would facilitate implementation of the recommendations cited above. An added bonus would be realized if such a new agency were better able to attract new staff personnel and remove some of the political pressures that will be encountered if the responsibility for implementing NWP remains with DOE.

- (5) Konrad B. Krauskopf, Chairman, National Research Council, Washington, D.C.; April 2, 1984, letter to Michael Lawrence, Acting Director, DOE/OCRWM

The Board on Radioactive Waste Management (BRWM) has reviewed the general siting guidelines prepared by DOE pursuant to Section 112 (a) of the NWP, together with the NRC preliminary decision on those guidelines (49 FR 9650). The guidelines will structure DOE's site selection process in accord with environmental standards proposed by the EPA (40 CFR 191) and regulations for permanent disposal of high-level waste (HLW) promulgated by NRC (10 CFR Part 60).

This letter transmitted comments on the question of specificity in the guidelines.

The BNWM recently completed three analyses in which the scientific basis for designing national systems for HLW management is discussed. The report of the Waste Isolation Systems Panel (WISP), published in 1983, examines the technical system for geologic isolation of radionuclides. The report on Institutional and Socioeconomic Considerations (ISEC), to be released soon, discusses social, economic, and institutional factors relevant to repository selection. Finally, the Board has just completed A Review of the Swedish KBS-3 Plan for Final Storage of Spent Nuclear Fuel, an examination of Sweden's national HLW management plan. All three studies approach the disposal of radioactive waste as a systems problem in which geology, hydrology, engineered barriers, and their associated residual uncertainties along with the institutional framework, determine the performance of the waste management system.

In light of these studies and policy now being formulated by the U.S. Government, BRWM reached the following general conclusions:

- It is not possible to write a set of specific evaluation criteria and procedures that will define, on scientific grounds alone, a basis for an unequivocal preference for one site over another.
- All sites nominated are believed to be sufficiently complex in geology or hydrology to require substantial site-specific investigation after nomination.
- The combination of complexity and uncertainty implies that DOE must be accorded substantial discretion to exercise its best technical judgment in recommending three of the nominated sites according to Sec 112 (b)(1)(B) of NWPA. DOE's decisions on site selection should clearly describe the scientific basis for its actions, so that the adequacy of that basis can be reviewed independently of the procedural and substantive merits of the Department's management decisions.

- (7) July 30, 1984, Letter from R. F. Williams, Electric Power Research Institute - Suggestions and Recommendations to the Subcommittee on Management Structure

Mr. Williams outlined the problems and issue areas within the radioactive waste disposal program. Mr. Williams looked at the underlying causes and to what extent they are due to DOE. Mr. Williams then developed a list of organizational strengths and weaknesses of organizational types and a list of key issues and how they could be addressed. He also developed a matrix of issue areas versus organizational structures. In addition he suggested improvements to the present structure.

(8) Panel Meeting, San Antonio, Texas, September 5-6

Steve Frishman, Director of the Texas Nuclear Waste Programs Office

Mr. Frishman stated that transitional considerations would be very important to create a new program as quickly as possible. He noted that the perception of the change is not important, and that States and Indian tribes should be involved in planning the transition.

The new organization must live up to commitments already made, and the close involvement of federal agencies should be retained. A key element of the new organization should be conflict resolution.

Felix Kellar, Utility Waste Management Group, Washington, D.C.

Mr. Kellar is in favor of some type of utility board so that the utilities can participate in the program. He recommended a management plan for resolving conflicts and a greater emphasis on the licensing process, including dealing with public concerns. Milestones should be established and the organization should be structured to meet them.

(9) September 10, 1984, Memorandum from R. F. Williams, Electric Power Research Institute, subject: Specific Suggestions for Management Improvement in the DOE Office of Civilian Radioactive Waste Management

First, Mr. Williams urged that the Panel get an understanding from Secretary Hodel that their report not be submitted until November 10, 1984, after the election. This is to assure that any constructive suggestions offered by the Panel do not become a last minute election issue; or conversely, that no controversial or critical comments or suggestions are inhibited by the Panel, out of concern that they become an election issue. The goal is long term and nonpartisan.

Second, some of Mr. Williams' suggestions for Panel consideration require no legislative action. Other suggestions might be implemented as part of "technical corrections" to the Nuclear Waste Policy Act of 1982, while others would require changes, but quite limited and specific changes, to the NWPA of 1982. The latter might be accomplished as a rider on other legislation if there were work behind the scenes with Senate and House staff, and something approaching a bipartisan consensus that the changes would be helpful to an effective program.

He provided attachments as follows:

Attachment 1: A summary of nine areas of proposed change. These actions would substantially improve the ability of the present waste disposal organization within DOE to accomplish effective and environmentally acceptable waste disposal in a manner consistent with state and local, as well as national, interests.

Attachment 2: Background on the underlying reasoning that motivates the change, and the problem or difficulty within the present program that the change would address.

(10) Panel Meeting, Washington, D.C., September 25-26, 1984

Mr. Loring Mills of Edison Electric Institute stressed that the Panel's judgment is more important than numbers used in the matrix exercise. He stated that credibility and stability are very important, and asked the Panel to keep in mind the "real world" when considering any organizational change because there is no constituency looking for change now. After reviewing each of the Panel's four alternatives, Mr. Mills suggested that he cannot see anything much better than the present structure with enhancements, and his second choice would be a government corporation.

(11) Panel Meeting, Washington, D.C., November 13-14, 1984

Mr. Joe Bunting of the Nuclear Regulatory Commission addressed material in Chapter II, "Financing." He stated that the Commission was given the charge to define high-level waste and that its definition could very well include wastes other than spent fuel. He noted that the present fee structure does not address certain other types of materials which may become classified as high-level radioactive waste.

Round Table Discussions--June 26; July 31-August 1, 1984

The Panel received valuable input from two Round Table discussions held in Washington, D.C., and Portland, Oregon, on the above dates. These were not full Panel meetings, but were organized by our 4-member Committee on Organization. Those who accepted invitations to these discussions are recognized authorities in various aspects of radioactive waste management, and their thoughtful contributions to the study are very much appreciated. In addition to the four Panel members and several Department of Energy staff, the following individuals participated in one or the other of the Round Table discussions.

Harry Browne  
Bechtel National, Inc.

Thomas Cotton  
Office of Technology Assessment  
Congress of the United States

Sandra Fucigna  
Office of Management and Budget

Colin Heath  
NUS Corporation

Ray Hoskins  
Tennessee Valley Authority

Professor Richard Lester  
Department of Nuclear Engineering  
Massachusetts Institute of Technology

Dr. L. H. Meredith  
Goddard Space Flight Center  
National Aeronautics and Space Administration

Peter Murray  
Westinghouse Electric Corporation

Dr. Robert Neill  
New Mexico Environmental Evaluation Group

James Saling  
Westinghouse Electric Corporation

Dr. Wendell Weart  
Sandia National Laboratories

Robert F. Williams  
Electric Power Research Institute

Dr. Mason Willrich  
Pacific Gas and Electric Company

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