Chapter 5

Policy Analysis: The Nuclear Waste Policy Act of 1982 in Perspective

Contents

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The issues and problems described in the preceding chapter were debated extensively during the 96th and 97th Congresses, culminating in final passage of the Nuclear Waste Policy Act of 1982 (NWPA) in the closing hours of the 97th Congress. During the course of that debate, OTA presented the principal results of its study of commercial high-level radioactive waste management to Congress through testimony and release of a summary report that dealt with the key issues under debate. [1] As part of its study, OTA analyzed a wide range of views from the technical community, Federal agencies, the nuclear industry, the environmental community, State and local officials, and the lay public. OTA then identified the basic elements of a waste management policy that addressed the main concerns of the major affected parties. Thus, while OTA examined a wide range of issues and options as part of its assessment, it focused its testimony and report on that particular combination of options that appeared capable of securing the credibility, stability, and broad support essential to a successful waste management effort. This chapter contains the basic policy conclusions underlying that integrated policy, the key elements of that policy, and an analysis of NWPA from the perspective of that policy. Many of the points summarized in this chapter are discussed at greater length in the following chapters. Discussions of the principal technical issues addressed in NWPA are found in appendix B, and the full text of the Act is included in appendix C.

[1] Office of Technology Assessment, *Managing Commercial High-Level Radioactive Waste,* April 1982.

KEY ELEMENTS OF A COMPREHENSIVE POLICY

The fund amental finding that OTA presented to Congress was that, if history were not-to repeat itself, and if the stalemate on nuclear waste were not to continue, a comprehensive policy was needed that commanded the support and addressed the concerns of all major interested parties, made a formal Federal commitment to developing several disposal facilities according to a firm and conservative schedule, and guaranteed the financial and managerial resources required to meet that commitment.

By 1980 a widespread concern had developed that the Federal Government could not or would not manage radioactive waste safely and efficiently. The doubts concerned not so much the technology of disposal as the institutional capacity of the Federal Government to carry out the difficult and sustained effort required to build and operate a disposal system that could safely handle large amounts of waste. The long-term uncertainties and strong doubts about the Federal Government's capacity to cope with the nuclear waste problem were the main obstacles to the waste management effort. Only a comprehensive policy that focused on solving the final isolation problem and that addressed institutional as well as technical issues appeared likely to overcome those doubts and uncertainties.

Such a policy, moreover, had to be both acceptable and credible to all concerned parties. For unless all parties supported a given policy—or at least had a strong stake in seeing it succeed—the policy instability of the past was likely to persist, with each new administration changing the policy of its predecessor in order to satisfy one interest group or another. Thus, the more a waste management policy represented a formal agreement—a genuine treaty that all sides could accept because it addressed their interests and concerns and because

they believed it could work—the more likely that policy would be to survive changes of administration and to avoid extensive judicial and other delays.

OTA concluded that to be credible, a waste management policy had to adopt a conservative approach that carefully identified all the potential sources of technical and institutional failure, took the steps necessary to keep the risk of failure to a minimum, and included contingency plans for dealing with any failures that did occur. In addition, because of the high level of distrust of the Federal waste management program, credibility required a high degree of explicitness about and commitment to key policy measures and programs for carrying them out.

The radioactive waste management policy that OTA concluded would be both broadly acceptable and credible would contain three main elements, each of which would be aimed at overcoming one of the three major obstacles to a successful Federal waste management effort: 1) policy instability; 2) doubts about the institutional capacity of the Federal Government to implement a long-term policy; and 3) perceptions of a lack of Government trustworthiness.

Element I—Commitment in law to the main goals of a comprehensive national policy for interim storage and final disposal of commercial high-level radioactive waste:

A. To develop several final disposal facilities—mined geologic repositories—on a firm and conservative schedule.
B. To contract with utilities to begin accepting waste at a repository on a conservative date, when a repository is likely to be available.
C. To assist the interim storage efforts of utilities by supporting licensed demonstrations of dry storage technologies, and by providing a limited amount of supplemental storage capacity as an emergency backup in case of unavoidable delays in utilities' efforts to develop their own storage capacity.

Element II—Credible institutional mechanisms for meeting the policy goals:

A. Congressional approval of a binding Mission Plan,[2] developed by the administration, that spells out the technical and institutional actions and the financial and managerial resources required to meet the policy goals.
B. Assured funding through a waste management fund financed by a mandatory user fee based on the Mission Plan and paid by utilities at the time the waste is generated.
C. Assurance of adequate managerial resources through creation of an independent, single-purpose agency whose sole responsibility is to carry out the waste management program.

Element III—Credible measures for addressing the specific concerns of the States and the various publics:

A. Development of explicit plans and provision of assured funds for involvement of the lay and technical publics.
B. Development of a regulatory process that makes ample allowance for the first-of-a-kind nature of the problem of demonstrating that a disposal system will provide the desired degree of isolation for millennia.
C. Provision in law of measures dealing with State and local concerns, such as a form-al role in repository siting decisions and impact compensation.

The technical and institutional elements of the policy outlined above are all mutually supportive and, in several respects, inseparable. For example, unless the policy is carried out by a single-purpose organization with assured and adequate funding, no comprehensive program that attempts to follow a firm schedule over a long period of time is likely to have much credibility with the general public or with the utilities. Similarly, it may be possible to gain broad support for a single-purpose organization with independent funding only if effective oversight mechanisms are assured and if there is substantial agreement in advance, laid out in a Mission Plan, about precisely what the organization is going to do and how it is going to do it.

Because of these interdependencies, several stages may be required to implement all of the elements of the policy. OTA viewed the radioactive waste management problem as a. nettle that, painful as it might be, would have to be grasped in its entirety if it were ever to be resolved.

[1] In OTA's 1982 summary report, *Managing* Commercial *High-Level Radioactive Waste*, the term Management Action Program was used for this concept. However, since NWPA uses the term Mission Plan, this report has adopted that terminology.

THE NUCLEAR WASTE POLICY ACT OF 1982

The passage of NWPA represented a watershed in the development of Federal waste management policy. This section describes and analyzes the major provisions of NWPA, using the integrated waste management policy outlined above as a framework, and identifies the key issues that remain to be resolved.

Element I:

Commitment in law to the main goals of a comprehensive national policy for interim storage and final disposal of commercial high-level radioactive waste.

By including measures to deal with both interim storage and final isolation, NWPA addresses both the concerns of utilities facing the near-term need for additional spent fuel storage and the concerns of those who feel that the highest priority must be given to the long-term task of a developing final isolation system for high-level radioactive waste. The embodiment of an explicit high-level radioactive waste management policy in law demonstrates that Congress as well as the administration is committed to the policy, a fact that should help ensure the policy stability that has been lacking in the past.

OTA's analysis concluded that comprehensive waste management legislation should commit the Federal Government to three basic policy goals:

Goal 1: To develop several final disposal facilities—mined geologic repositories—on a firm and conservative schedule.

Permanent Disposal Facilities.—NWPA resolved the dispute about whether to proceed with long-term storage or permanent disposal by adopting as its primary focus a requirement that the Federal Government site, construct, and operate facilities for the permanent disposal of high-level waste and any spent fuel disposed of as waste.[3] The history of strong and successful opposition to proposals to develop Federal storage facilities for commercial radioactive waste suggests that the development of permanent disposal facilities is required to satisfy public concerns about waste disposal and to serve as the basis for a widely accepted and stable waste management policy. Unlike storage, disposal does not place a burden of continued care and maintenance on the future, and it is less vulnerable to carelessness or neglect by some future generation. Moreover, a commitment to develop disposal facilities provides future generations with a greater range of choices than would storage alone. Such facilities will give waste managers the option of disposing of spent fuel or high-level reprocessed waste, or of deferring disposal by placing any such material delivered to a repository into extended storage at the surface. The development of facilities that can handle both reprocessed waste and spent fuel will also ensure that waste management efforts are not impeded by debates about reprocessing.

At the same time, NWPA ensures that long-term storage will be available as an option by requiring the Department of Energy (DOE) to prepare a detailed proposal for construction of one or more monitored retrievable storage (MRS) facilities and an analysis of the need for such facilities to be presented to Congress for consideration by July 1985. However, it also requires that disposal in a permanent repository proceed regardless of whether any MRS facilities are constructed. The question of the role of MRS facilities in the overall waste management program remains to be resolved, as discussed in the following chapter.

Mined Geologic Repositories. -NWPA does not simply commit the Federal Government to develop permanent disposal facilities; it also lays out a detailed process for siting and licensing one particular permanent disposal technology-the mined geologic repository. (This process is outlined in app. E.) The mined geologic repository is the clear choice as the disposal technology to be developed because it is the most thoroughly studied technology and is most widely favored by the international technical community. Both the technology and the required regulations exist or are being developed, and available analyses indicate that a licensed geologic repository could be developed within the next 20 years if adequate resources are devoted to the task. The legislated commitment to develop geologic repositories both demonstrates and promotes policy stability, since it involves no change in direction from previous programs and policies.

[3] An extended discussion of this dispute is found in issue discussion 1 of app. B.

Unlike subseabed disposal (the most promising alternative disposal technology, disposal in mined geologic repositories in the continental United States does not raise the question of the need for international agreements for access to disposal sites, In any case, development of mined repositories will not preclude development of other disposal technologies and a later decision to use one that proved to be sufficiently attractive; in fact, NWPA requires DOE to accelerate research and development (R&D) of alternative technologies for permanent disposal. If another technology were chosen later, any geologic repository sites that had been developed by then could still be used for supplemental purposes, such as disposal of waste forms (e. g., transuranic-contaminated [TRU] wastes) that might be too bulky for disposal using other technologies.

Several Repositories.—NWPA includes mandatory schedules for siting and licensing two separate geologic repositories, with a site for the second to be selected within 3 years of the first. There are three main advantages to developing several repositories more or less in parallel instead of developing and filling one repository at a time. First, a waste management system with two repositories would be more reliable, since disposal operations could continue at one even if problems arose that interrupted loading or limited the total disposal capacity of the other. Second, if acceptably safe, licensable sites can be found in the East near the majority of existing and projected reactors, the costs and risks of waste transportation—as well as the number of communities affected by it—would be substantially less than those of a system based on a single repository in the West, where most sites now under consideration for the first repository are located. Recognizing this, NWPA explicitly requires transportation impacts and costs to be considered in selection of the site for the second repository. Third, a system with two repositories is more equitable and could allay the fears of any State that it might become the Nation's sole dumping ground for nuclear waste. Thus, siting two repositories may encounter less political opposition than an effort to develop only the single site of a centralized system.

Full realization of these advantages requires that the second repository begin operating within a relatively short time after the first. While NWPA requires the first repository to begin operating by early 1998, there is no explicit target date for operation of the second. To ensure that a second repository ultimately is developed, NWPA prohibits emplacement of more than 70,000 tonnes of spent fuel in the first repository until the second begins operating. While this limit exceeds the 55,000 tonnes expected to be discharged by the reactors that are now in operation, it is considerably less than the total of about 100,000 tonnes that will be produced if the reactors now under construction are completed, Thus, the limit in NWPA is likely to require eventual construction of the second repository. However, its operation could be deferred for up to perhaps 20 years after emplacement of waste begins in the first.

To avoid strong budgetary pressures to continue to expand the first licensed repository and to defer the financial and political costs of developing a second one as long as allowed by the Act, the development of a regional system may require an explicit commitment by DOE to begin operating a second repository within a specified time after the first is operational. The time should be short enough to give credibility to the commitment, but long enough to allow the development of the second repository to benefit from the lessons learned in siting and licensing the first. To give additional credibility to the commitment, and to assure the availability of resources as needed, the actions needed to develop and operate the second repository on schedule should be included in the Mission Plan (Element II-A), and the additional costs should be considered in determining the revenues required from the disposal fee (Element II-B) (Further discussion is found in the following chapter.)

A Firm and Conservative Schedule.—A central provision of NWPA is the requirement that DOE begin disposal of radioactive waste in the first geologic repository no later than January 31, 1998. Prior to passage of the Act, the repository schedules used by DOE and its predecessors lacked the force of law, and repeated slippages had called into question the credibility of Federal assurances that a repository would be available within a reasonable period.

A major conclusion of OTA's assessment was that such a commitment in law to a firm schedule

for operation of a geologic repository was central to a resolution of the radioactive waste problem. It was needed to provide:

1. ***Assurance that a permanent disposal system that does not place a burden of continued care and maintenance on future generations will be developed within a reasonable period of time.*** Any extended delay in the development of disposal facilities would deeply concern both those who wish to remove the waste problem as a burden on the continued use of nuclear power, and those who fear that interim storage would become a permanent solution by default.
2. ***Clear and fixed goals for an implementation program.*** Long-term planning is difficult in the absence of well-defined and agreed-upon program goals, which had been lacking in the past.
3. ***A firm basis for planning interim spent fuel storage.*** Without a repository schedule, the utilities' storage problem would remain open-ended.

For the commitment to a firm schedule to be most credible, the target date for beginning operation of the first repository should be a conservative date that makes ample allowance for the reality that the location, design, and licensing of a geologic repository is a complex endeavor that has never been done before and that, therefore, no one knows for certain how long it will take. OTA'S analysis suggests that the most important aspect of securing and sustaining the public's and utilities' confidence in the waste disposal program is not how quickly a repository can be made available if everything goes right the first time, but whether the repository will be available according to a firm schedule that is widely accepted as feasible and reasonable despite the remaining technical and institutional uncertainties about the siting process.[4]

Whether the January 31, 1998, target date for initial operation of the first repository can be seen as conservative in this sense depends to a considerable extent on the approach to constructing and operating the repository that is adopted by DOE, as discussed at greater length in the following chapter. DOE analysis shows that the 1998 target date is very optimistic if initial operation must await construction of the packaging facilities of the repository.[5] However, if initial operation of the repository is achieved by emplacement of a small amount of waste packaged elsewhere as part of packaging and handling tests during the research, development, and demonstration (RD&D) program, as suggested in chapter 6, **the** 1998 *target* appears to be achievable even if there are delays in the siting and licensing process. (This assumes that a suitable site can be found among those now under consideration for the first repository; if none of these is licensable it appears unlikely that the 1998 deadline could be met.) As discussed further in chapter 6, an approach to repository development using an initial demonstration phase of small-scale operation, analogous to low-power operation of a reactor, could minimize the risk of failure to meet the mandated target date and could, at the same time, allay concerns that corners might be cut in order to meet the deadline.

Goal 2: Contract with utilities to begin accepting waste at a repository on a conservative date, when a repository is likely to be available.

NWPA requires DOE and the owners of spent fuel and/or high-level waste to execute, by June 30, 1983, contracts under which DOE will accept and dispose of such material. A standard contract was promulgated by DOE in April of 1983,[6] and contracts have been signed as required by law.

NWPA does not require that the contracts specify delivery dates for the material that is covered, and the contract form adopted by DOE does not require DOE to publish a priority ranking for accepting spent fuel until 1991, or to approve utility delivery schedules until 1992, at the earliest. To give utilities that must make decisions about interim storage measures before 1992 a firmer basis for planning, the Mission Plan required by the Act would need to include an explicit contractual waste acceptance schedule and a clear statement of priorities for accepting waste.

[4]An extended discussion of the repository schedule is found in ch. 6, and in issue 2 of app. B.

[5]U. S. Department of Energy, *Mission Plan for the Civilian Radioactive Waste Management Program*, DOE/RW-0005 DRAFT, April 1984, Pp. 3-A-27— 3-A-43.

[6]10 CFR, Part 961,

Because the one geologic repository authorized by NWPA is the only facility that DOE is now authorized to construct where spent fuel or high-level waste could be accepted on a large scale, confidence that spent fuel will ultimately leave reactor sites depends largely on confidence in the program for siting and operating the first repository. Thus, the heart of the waste acceptance plan is a ***repository loading schedule***—a target schedule for moving waste to geologic repositories. In order to provide a credible basis for contractual commitments with utilities and to assure communities near reactors that reactor sites will not become de facto long-term waste repositories, the certainty of the repository loading schedule is more important than the speed. To give greater certainty, the Mission Plan would need to contain a repository schedule that is a high-confidence prediction of when repositories are likely to be operating at a full-scale rate comparable to the rate of waste generation, despite the kinds of delays that might be anticipated. To avoid raising false expectations, this "best estimate' schedule would need to be clearly distinguished from more optimistic management goals that show the earliest that spent fuel could be delivered to Federal facilities if all goes well.

OTA's analysis concludes that if an expanded repository siting program (discussed in ch. 6) is used, there can be considerable confidence that the full-scale loading facilities of the two repositories required by NWPA could be operating no later than about 2008 and 2012, respectively, even if difficulties are encountered. This is a conservative estimate because it could be met even if all of the sites initially evaluated are rejected and a new backup site must be used for each repository. If such contingencies do not arise, the repositories could be available earlier. Even if the repositories do not operate at full scale until 2008 and 2012, they could still allow spent fuel to be removed from practically all reactor sites within 10 to 15 years after the expected date of reactor decommissioning. Further discussion of a conservative repository loading schedule using 2008 and 2012 as targets for contractual commitments to full-scale operation of two repositories is found in chapter 6.

Since unforeseen events could cause slippage in the repository loading schedule, even if the schedule included allowances for some delays, explicit provisions are needed for what would be done with waste until it can actually be delivered to a repository. As discussed below, NWPA provides that the utilities have the primary responsibility to provide for, and pay the costs of, interim storage until the material is accepted by DOE for disposal in a repository. The Act does not authorize DOE to construct any large-scale storage facility that could accept a significant quantity of waste before a repository is available.

A major question to be resolved is whether and how the waste management program should take responsibility for spent fuel storage if a repository is delayed beyond the 1998 target date contained in the Act. An extended discussion of this question is found in chapter 6. To summarize briefly here, the Mission Plan should contain provisions for two possible cases of delay in the repository program: relatively small and more or less expected delays in full-scale loading that entail additional interim storage beyond 1998; and large delays (decades or more) resulting from the discovery of now-unexpected problems with geologic disposal that could call into question its feasibility. The former possibility requires a ***post-1998 interim storage plan,*** which discusses who is to be responsible for the storage (the individual utilities with the immediate storage needs or the waste management program funded by all the utilities) and where storage is to occur (at the reactors or in a centralized MRS facility). The latter requires a ***backup facility plan—a*** plan for providing alternative storage (MRS) or disposal facilities if geologic disposal cannot be implemented in a reasonable time. These possible roles for MRS facilities also need to be evaluated in detail in the MRS need and feasibility study required by NWPA.

Goal 3: Assist the interim storage efforts of utilities by supporting licensed demonstrations of dry storage technologies, and by providing a limited amount of supplemental storage capacity as an emergency backup in case of unavoidable delays in utilities' efforts to develop their own storage capacity.

NWPA incorporates these provisions in their entirety. [7] Utilities are given primary responsibility for

[7] An extended discussion of interim storage is found in issue 4 of app. B.

providing interim spent fuel storage capacity—including new storage facilities—until the spent fuel can be accepted by DOE for delivery to a repository. DOE is to aid utilities in developing the needed additional capacity through cooperative licensed demonstrations of new dry storage technologies. Cooperative agreements have been signed with three utilities for such demonstrations. DOE is also authorized to conduct dry storage R&D activities to provide data to assist utilities in licensing new storage facilities. In addition, NWPA includes measures to facilitate NRC licensing of new storage technologies and storage facility expansions.

As a backup to utility efforts, DOE is directed to provide up to 1,900 tonnes of storage capacity on an emergency-only basis to utilities that are unable to provide their own storage capacity in time to prevent shutting down a reactor. NRC is to determine which utilities qualify to use that capacity. DOE can provide the storage either at existing Federal facilities or at reactor sites (using mobile storage equipment such as casks, or new facilities constructed at the site). The full costs of such storage are to be recovered through fees paid by the utilities using the storage.

Utility responsibility for interim storage will allow DOE to focus its attention on the disposal program and to avoid possible confrontations with host States and localities about efforts to obtain or construct a Federal interim storage facility. It should also reduce concerns that the availability of such a facility might undermine incentives for progress in the disposal program. The Act's strong Federal initiatives to promote commercialization of new and flexible dry storage technologies are needed to ensure timely resolution of licensing uncertainties that make such technologies a riskier prospect for utilities than the less attractive but more certain option of the water basin. Provision of a limited amount of emergency backup storage capacity should alleviate utilities' concerns about vulnerability to reactor shutdowns in the event of unavoidable delays in the provision of additional storage capacity. In addition, NWPA'S commitment to a firm repository schedule should reduce the resistance to utility efforts to provide interim storage that has been based on concerns that such storage might become permanent by default.

Because of the promise shown by new storage techniques —rod consolidation (which increases the capacity of existing reactor basins) and dry technologies such as storage casks—the demand for such emergency backup capacity could be quite small. While no analysis of the precise amount of emergency storage needed is available, it can be noted that only 1,000 tonnes of storage would allow all of the 27 reactors projected to need new storage capacity by the end of 1989 an additional 2 years to provide that capacity.[8] DOE currently expects that the increased efficiency of at-reactor storage that is expected to result from demonstrations of rod consolidation and dry storage technologies should be sufficient to preclude need for any Federal interim storage.[9] Thus it now appears that utilities will be able to provide the needed additional storage capacity in time to prevent disruption of reactor operation.

Element II:

Credible institutional mechanisms for meeting the policy goals.

The basic institutional conclusion of OTA's review of the history of the Federal waste management effort was that substantial changes in the Federal Government's management approach would be needed to give credibility to the central component of Element I—the commitment to the development and operation of a complex technological system, faced with technical and institutional uncertainties, on a firm schedule over a period of decades. NWPA included many of the most important institutional changes that were included in the integrated waste management policy identified by OTA, although certain key issues were not addressed at the time the Act was passed. The pro\' isions of NWPA are discussed below in the context of the three key institutional provisions of the integrated policy.

A: Congressional approval of a binding Mission Plan, developed by the administration, that spells out the technical and institutional actions and the financial and managerial resources required to meet the policy goals.

[8] See issue *4*, app. B.
[9] DOE, op. cit., p. 3-D-7.

NWPA requires DOE to submit a detailed Mission Plan to Congress, although no provision is made for formal congressional approval. The Mission Plan is needed to perform two key functions. [10] First, it must lay out a long-term waste management program, based on the authority in the Act, that fills in those details of the operation of the high-level waste management system that are not specified in the Act; that is, a repository loading plan, a post-1998 interim storage plan, and a backup facility plan.

Second, it must present an implementation program that DOE believes will be sufficient for achieving the goals of the waste management plan. A credible commitment to a long-term plan requires a credible implementation program for effecting it. To be credible in the face of the history of problems and delays in past Federal waste management efforts, an implementation program must identify the major possible sources of technical and institutional failure, provide measures that minimize the likelihood that these failures will occur, and include contingency plans for dealing with those failures that do occur. Such a program will likely involve an expansion of ongoing DOE programs to ensure that backup sites and technologies are available with minimum delay if problems develop with the principal candidates.

While a sound technical implementation program is necessary to the success of the waste management program, it may not by itself be sufficient because of the many institutional challenges that must also be met in siting and operating waste management facilities. Thus the Mission Plan should also contain an institutional implementation program showing how the activities of all the involved Federal agencies will be coordinated; how DOE will carry out the NWPA's many requirements for interactions with States and Indian tribes; and how DOE will provide for peer review of the technical programs and for public involvement (discussed below).

This comprehensive waste management plan and implementation program is needed to build confidence that the goals of the Act can and will be achieved, to provide a basis for estimating the resources needed to do so, and to pinpoint clear milestones that can be used to hold the responsible agencies accountable for timely progress.

OTA's study concluded that formal approval of the Mission Plan is a key issue to be addressed in any future congressional consideration of possible changes in the institutional arrangements for the waste management program, because the Mission Plan could play a central. role in oversight and control of an independent waste management agency (discussed further below). Congressional approval would put teeth into the milestones in the Plan and would demonstrate congressional commitment to the Plan. Approval of the Plan on a multiyear basis would also give Congess a way to exert long-term control over the waste management program while allowing it the independence from the annual budget and policymaking process needed to ensure steady progress.

Without a formal mechanism for approving the Plan, there could be great value to developing a Mision Plan that is as broadly supported by the key interested parties as possible. Finally, the initial Mission Plan should include explicit provisions for further revisions of the Plan as required by developments during the implementation of the program.

B: Assured funding through a waste management fund financed by a mandatory user fee based on the Mission Plan and paid by utilities at the time the waste is generated.

Stable, adequate funding is essential if the Federal commitment to a firm schedule is to be met. The traditional annual budget and appropriations process appears inconsistent with such a commitment, since it lays great stress on keeping immediate costs as low as possible and thus will tend to cut back on the expanded aspects of the implementation program (e. g., development of backup sites and technologies) that arc vital to building confidence that the target date can be met.

Prepaid Fee. —A major institutional provision of NWPA is creation of a Nuclear Waste Fund financed by a fee initially set at 1 mill (O. 1 cent) per kilowatt-hour on nuclear-generated electricity .11 Shifting the front-end funding of the waste management program directly to utility ratepayers at the time the waste is generated provides a large and

[10] The Mission Plan is discussed in detail in ch. 6.

[11] Funding is discussed at length in ch. 7.

stable source of funds, independent of annual competition with other Federal priorities, This should allow implementation of the expanded and more expensive program needed to give confidence that steady progress can be maintained over a period of decades. This arrangement also puts the total costs of waste management on the users of nuclear electricity rather than on the Federal taxpayer.

NWPA requires the Secretary of Energy to review the fee annually and to adjust it as needed to ensure that the full costs of the program are recovered. This provision allows funding levels to be determined by the program needed to meet desired goals, rather than having the achievable goals limited by the availability of funds, as occurred in the past.

Assured funding requires not only a reliable source of revenues, but also assurance that the funds will be made available to the waste management agency as needed to carry out the program. Thus, any future deliberations concerning the institutional arrangements for waste management need to consider ways of providing greater budgetary independence than is now the case under the Act, which continues annual appropriation control over the Nuclear Waste Fund. Greater independence, with continued congressional control, could be obtained through multiyear appropriations based on an approved Mission Plan, rather than through annual appropriations. This is discussed further in chapter 7.

C: Assurance of adequate managerial resources through creation of an independent, single-purpose waste management organization whose sole responsibility would be to carry out the waste management program.

Need for a Single-Purpose Agency .—The assurance of adequate management resources is as important as the assurance of adequate funds. For this reason, NWPA established within DOE a single-purpose Office of Civilian Radioactive Waste Management, whose sole task is to implement the provisions of the Act. The office, which is separate from the other nuclear activities of DOE, is headed by a Presidential appointee who reports to the Secretary of Energy. This step should stabilize the waste management organization at a higher policy level, insulate it from competition with other nuclear policy areas or future Federal reorganizations, and help provide the degree of central, integrated planning and management capability needed to meet a long-term Federal commitment on schedule.

NWPA also set in motion a process to ensure that institutional questions are addressed in more detail in the future by requiring DOE to submit to Congress a report on alternative institutional approaches for managing the radioactive waste program, including the option of establishing a private corporation. OTA's analysis of the history of the Federal radioactive waste management program concludes that the credibility of the central component of NWPA—a commitment to the development and operation of a complex technological system, faced with technical and institutional uncertainties, on a firm schedule extending over a period of decades—could be enhanced by the establishment of an independent waste management agency with more funding and management flexibility than is usual with a typical Federal program. The creation of such an agency may be the best way to ensure that other fiscal or political priorities of the Federal Government do not adversely affect progress in the waste management program. [12] Because the program is now funded entirely by fees paid by utilities for disposal services, rather than by appropriations from general Federal revenues, any additional costs involved in establishing and operating a new, single-purpose agency would be borne by the users of nuclear power rather than by the Federal taxpayer.

Establishment of an Effective Oversight Process. —The more independent an institution and its funding are, the surer the guarantee that a comprehensive program will be carried out on schedule. But such an institution raises a crucial and difficult question: how to ensure the congressional oversight and public accountability that a democratic society demands. ***Achieving an acceptable balance between independence and accountability will be one of the central challenges in designing an independent waste management authority.***

As noted earlier, a major conclusion of OTA'S study is that congressional approval of the Mission Plan could play a central role in achieving that bal-

[12] The questions involved in establishing an independent agency are discussed in ch. 7.

ance. In fact, OTA's analysis suggests that it may not be possible to gain broad support for the creation of an independent institution with independent funding until a generally accepted Mission Plan has been developed. If decisions about an institutional structure (including the oversight mechanism) are made after the Mission Plan has been submitted, the decision about the appropriate degree of independence for such an institution would be made in light of an explicit agreement about precisely what that institution would be expected to do. The Mission Plan can then serve as, a yardstick by which Congress—and a board of directors or any other body, including the public—can oversee the activities and expenditures of the waste management agency and measure its progress.

Relationship to Defense Waste Programs.-The separate program office established by NWPA focusses on civilian radioactive waste management. Programs for dealing with wastes generated by DOE defense-related activities are managed under the Assistant Secretary for Defense Programs. However, NWPA also requires that the Secretary of Energy make arrangements to use the repositories developed pursuant to the Act for disposal of defense high-level waste unless the President determines, after a study required by the Act, that separate repositories for such wastes are needed. The draft report from that study, released in 1984, concludes that placing the defense waste in the commercial waste repositories will be the most cost-effective option.[13] Such an arrangement could also reduce concerns that separation of the civilian and defense waste disposal programs could lead to indefinite deferral of progress on disposal of defense waste. However, if the civilian waste management program must accept defense waste as well, provisions may be required to ensure that the agency's ability to keep to the schedule for repositories—and thus to fulfill the commitments made in the contracts with nuclear utilities—does not depend on the Federal appropriations needed to fund the defense side of the program. Specifically, the Mission Plan must show how the defense and commercial disposal activities will be integrated.

[13]U.S. *Department* of Energy, *An Evaluation of Commercial./ Repository Capacity for the Disposal of Defense High-Level Waste,* DOE/DP-0020 (DRAFT), July 1984.

Element III:

Credible measures for addressing the specific concerns of the States and the various publics.

Because of the legacy of distrust, explicit measures and guarantees are needed to give confidence about the integrity of decisions concerning the siting, construction, and operation of waste disposal facilities. Concerns about the safety and equity of Federal waste management activities by affected States, localities, and the general public could become a source of increasingly effective opposition to implementation of a waste management program unless specific measures are adopted to deal with these concerns. Efforts to proceed without dealing with these concerns may simply provoke greater resistance, confrontations, and failures to achieve program objectives on schedule. Recognition of these concerns in the waste management program is 1ikely to broaden support for it in the first place, reduce opposition during implementation, and remove grounds for complaint.

A: Development of explicit plans and provision of assured funds for involvement of the lay and technical publics.

Public Involvement.--An effective program of public involvement and information may be essential for developing the broad public support needed for a waste policy to succeed.[14] On this point, NWPA recognizes that "public participation in the planning and development of repositories is essential in order to promote public confidence in the safety of disposal. Public involvement may be particularly important in the creation of an independent agency with independent funding, which could be regarded as less responsive to public concerns than the existing institutional structure. Although considerable opportunity for public involvement in Federal activities is already required by existing law and administrative procedure, NWPA provides a number of specific opportunities for public input to siting considerations, such as public hearings in the vicinity of potential repository sites, before key decisions are made. However, public confidence that an adequate and sustained level of resources will be devoted to public involvement during the development and implementation of a waste management program could be increased if DOE in-

[14]Public involvement is discussed further in ch. 8.

eluded a comprehensive plan for public involvement as part of the Mission Plan.

Peer Review.—Because confidence that a geologic repository will perform as desired over a period of millenia must ultimately rest on confidence in the soundness of the underlying scientific analysis, extensive peer review of this analysis at each step can play an important role in assuring the public that waste will be disposed of safely. While the responsible Federal agencies generally recognize the importance of peer review, public confidence that it would, in fact, take place could be enhanced by including a peer review plan in the Mission Plan.

B: Development of a regulatory process that makes ample allowance for the first-of-a-kind nature of the problem of demonstrating that a disposal system will provide the desired degree of isolation for millenia.

Many believe that, with a first-of-a-kind problem such as radioactive waste isolation in general, and the first geologic repository in particular, an effective regulatory process is perhaps the most vital element for assuring the ultimate safety of waste disposal.

Developing the "Technology of Prediction. '— What must be demonstrated to show that waste can and will be safely disposed of is not just the physical technology of disposal, but the institutional capability of the Federal Government to make a regulatory decision that a repository at a specific site can be expected to provide the required degree of waste isolation for a required period of time (10,000 years in tentative criteria under consideration by the Environmental Protection Agency). In addition to the physical technology, therefore, a broader "technology of prediction' is needed to show in a formal licensing process that a proposed repository is likely to meet established standards.

Since the ability of a geologic repository to isolate radioactive waste for millenia cannot be directly demonstrated, there must be heavy reliance ***on*** predictions of repository performance that are based on the use of mathematical models embodying scientific understanding of the behavior of the repository and its environment. Since such long-term prediction has never been done in a formal regulatory process, problems can be expected to arise the first time it is attempted. In addition, many analytic procedures to be used in the licensing process remain to be developed, including data collection and validation techniques, methods for verifying and validating scientific models, and the formal procedures for using such models to predict repository performance. Inclusion in the Mission Plan of a clear plan for the actions to be taken by both DOE and NRC for resolving these uncertainties about procedures before the first formal licensing proceeding begins could avoid unnecessary delays at that critical stage of the waste disposal program.

Integrity of the Repository Licensing Process. —For many who question the credibility of the Federal waste management program, confidence in the safety of waste disposal will depend on their confidence in the NRC repository licensing process. Several measures that would be included in a Mission Plan, in order to give it a high probability of success, would also increase confidence in the integrity of the licensing process. First, use of a conservative schedule for full-scale repository operation, one that can be met even if the first site submitted for licensing is rejected by NRC, should reduce concerns that pressures to meet the schedule could unduly influence the first licensing decision. Second, planning to achieve initial repository operation with a small amount of waste packaged during the R&D program, before packaging facilities are built at the repository site, could allow the 1998 deadline to be met even if NRC requires more than the minimum time allotted by NWPA for its decision on a construction authorization. This would further reduce the pressure on the licensing process. Finally, a high-confidence Plan would carry more sites than the minimum required by NWPA through two crucial steps in the siting process—site characterization and NRC construction authorization—to ensure that enough good sites would be available at the end of each stage to proceed to the next without major delay. This should reduce the concerns that a marginal site might be approved because of lack of any timely alternative. These measures are discussed in detail in chapter 6.

C: Provision in law of measures dealing with State and local concerns.

A broadly supported policy will require assurances that State and local concerns about safety and equity will be addressed, and written into law, to be credible. [15] The stronger the guarantees in law, the more willing the States are likely to be to cooperate with the Federal Government. Some argue that State opposition is so strong that only Federal preemption can overcome it. It can also be argued, however, that any eventual attempt to deal with State restrictions will be more likely to succeed if strong efforts have been made to meet States' legitimate concerns.

NWPA includes two particularly important types of provisions addressing State and local concerns. First, it requires DOE to engage in an extensive process of consultation with States and affected Indian tribes throughout the site selection and development process. It also gives the State or tribe the right to veto the President's selection of a repository site, a veto that can only be overridden by joint action of both Houses of Congress. Similar provisions apply to other waste management facilities addressed by the Act.

Second, NWPA requires DOE to make payments to States, affected Indian tribes, and in some cases local governments to compensate for the socioeconomic impacts of development and operation of waste management facilities. Confidence that these payments will be forthcoming more than a decade from now is enhanced by the stipulation that the necessary funds be provided from the Nuclear Waste Fund, rather than from appropriations from general revenues.

Some elements of a high-confidence Mission Plan would also address some of the substantive concerns of the States about the waste management program. For example, State concerns that the first repository may end up being the only one would be addressed by a requirement that a second licensed repository begin operation within a relatively short fixed period after the first. An explicit backup siting plan would also help reduce concerns that a lack of alternatives could compromise the fairness and integrity of the site selection process, as noted earlier.

[15] State and local issues are discussed in ch. 8.

CONCLUSION

NWPA contains most, but not all, of the policy elements OTA identified as being central to a broadly supported waste management policy. The Act resolved the major issues that had dominated the radioactive waste debate during several Congresses by committing to a schedule for developing geologic repositories, giving utilities the primary responsibility for interim storage until a repository is available, and clearly defining the role and powers of States and affected Indian tribes in siting waste facilities. In addition, it contains several key provisions that OTA had identified as being of particular importance to implementation of a repository program: financing through a mandatory fee on nuclear-generated electricity; and provisions for financial compensation to States and affected Indian tribes that host waste management facilities. ***In OTA view, the provisions of NWPA contain suficient authority for a feasible waste management program based on geologic repositories.***

Certain major questions were left to be addressed later, either in the Mission Plan or in subsequent legislation dealing with the institutional arrangements for managing the radioactive waste program. The principal questions to be addressed in the Mission Plan concern the plan and schedule for repository development and operation, the scope of the implementation program (especially the siting program) for meeting that schedule, and the role of MRS facilities in the waste management program. As noted earlier, OTA's analysis suggests that a broadly supported policy would include a commitment to a conservative repository operation schedule that can be met despite the remaining technical and institutional uncertainties, backed up by an implementation program that places greatest emphasis on increasing the confidence that the schedule can be met without compromising safety, rather than on holding down the expected front-end program costs. While NWPA does not require

this approach, it provides sufficient authority for its use in the Mission Plan, and provides a source of funding that can be adjusted if needed to cover the costs of a conservative program.

Other important elements not addressed in NWPA all relate to the concept of an independent waste management agency with more funding and management flexibility than is usual with a typical Federal program. These elements are: 1) establishment of such an agency; 2) funding through multiyear appropriations from the Nuclear Waste Fund; and 3) a procedure for congressional approval of the Mission Plan as the principal mechanism for balancing the need for adequate congressional control of the agency with the need for increased flexibility of operation. As noted earlier, the history of the Federal waste management program suggests that these changes could substantially increase the likelihood that a Federal commitment to a schedule for repository operation can be kept. These changes are discussed in more detail in chapter 7.

At the time NWPA was being debated, alternatives to the existing institutional structure for waste management had been studied less thoroughly than the technical options. It was felt to be unnecessary and premature to attempt to make major changes before a long-term technical program had been adopted. Instead, Congress chose to correct some of the most obvious institutional problems by establishing the Office of Civilian Radioactive Waste Management within DOE. Congress chose to leave the question of more basic structural changes for consideration following submission by DOE of a study of alternative institutional arrangements for managing the waste program.

OTA's analysis indicates that development by DOE of a Mission Plan that is widely viewed as achievable and as responsive to the principal concerns of the major affected parties is the crucial next step, both for stabilizing the waste management Program and for establishing the level of confidence that would be needed before a more flexible and independent waste management organization could be established. If the Mission Plan leaves some affected parties strongly dissatisfied with the way that the major questions left open by NWPA are resolved, the risk of future policy shifts such as those that have characterized the program in the past will continue, and the credibility of long-term commitments will suffer. In addition, it is likely that such dissatisfaction would lead to strong opposition to giving the waste management program any greater managerial and financial independence than it already has. The following chapter presents the basic elements of a Mission Plan that is consistent with the authority provided by NWPA and that will be, in OTA's opinion, feasible and responsive to the principal concerns of the major affected parties.