THE MONITORED RETRIEVABLE STORAGE PROPOSAL

IN THE CONTEXT OF THE NUCLEAR WASTE POLICY ACT OF 1982

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ABSTRACT

The Department of Energy plans to submit to Congress a proposal for an integral monitored retrievable storage (MRS) facility located in the eastern United States to serve as the main waste receiving and packaging facility for the geologic repository. This integral role for the MRS is substantially different from the backup storage role previously discussed for Federal storage facilities. The debate over this proposal offers an opportunity for Congress to address and resolve issues that were not dealt with in passage of NWPA, in a way that will enhance the consensus about the waste program. Compared to the no-action option (the authorized system), approval of the integral MRS would probably increase the front-end political and economic costs of developing the waste management system, but could enhance prospects for success and reduce costs in the long run.

BACKGROUND

Legislation

The Nuclear Waste Policy Act of 1982 (NWPA) requires the Department of Energy to submit to Congress a site-specific proposal for a monitored retrievable storage facility. Consideration of that proposal marks the first major Congressional programmatic decision point mandated by NWPA. (Other than voting on annual appropriations for the waste program, the next explicit Congressional decision about the course of the waste program would not come until a possible Congressional review of a state or tribal veto of a repository site recommendation.) Thus it is the first major fork in the road, at which there is a clear option of taking a significantly different path than that initially authorized in NWPA.

Some are concerned that a MRS might represent a divergent path that will lead DOE ultimately away from a permanent repository. Indeed, this concern has been a major source of opposition to Federal storage facilities in the past. The history of waste management policy debates suggests that unless this concern can be alleviated, the MRS is unlikely to gain a broad basis of support.

But the MRS can also be seen as a different path to the same goal -- operation of a geologic repository. It can be argued that construction of a MRS will increase confidence that the repository will operate without major delay, since it would provide early institutional learning that could be applied to siting the repository, and would allow system integration and transportation planning to be tackled and resolved independently of the uncertainties about the location and timing of the repository.

The MRS provision in NWPA has a long history that reveals the divergence of views in Congress on Federal storage in general and the role of a MRS in particular. In the 96th Congress, ending in 1980, the Senate passed a bill that provided for a Federal away-from-reactor (AFR) storage facility to be made available as quickly as possible, to be followed by a MRS for long-term waste isolation. The geologic repository program was a secondary focus. The House, on the other hand, passed a bill that contained no storage provisions at all -- either for an AFR or a MRS -- and focused entirely on siting a geologic repository.

The difference represented a basic disagreement between those who emphasized the obligation of the Federal government to get on with the job of providing for safe long-term isolation of radioactive waste using whatever facilities (storage or disposal) were needed and available to do the job; and those who felt that the responsibility of the Federal government was to provide for a permanent disposal system that would not place a burden of continued care and maintenance on future generations. The former group believe that Federal storage would be an acceptable (perhaps preferable) next step, while the latter are concerned that provision of a Federal storage facility would undermine the efforts to site and construct a permanent repository by making it easy for the Federal government to defer the politically difficult and expensive steps required to do so.[1]

In the 97th Congress, the Senate passed a bill which once again provided a Federal AFR, but placed the MRS on a parallel (rather than preferential) track with the geologic repository. In general, the Senate bill emphasized the obligation of the Federal government to get on

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with accepting high level waste from utilities with all deliberate speed; it included a provision requiring DOE to accept waste by 1996 at either a MRS or a repository. The House, on the other hand, included a provision for a very limited amount of last-resort Federal storage (rather than a large scale AFR). While it contained a requirement for a MRS proposal, it did not authorize construction of a facility. After some amendment by the Senate, the House provisions were adopted.

Thus by the time the NWPA was passed, both Houses had converged somewhat from the widely different positions they held at the end of the 96th Congress. However, there was still considerable disagreement about what role, if any, MRS facilities should play in the waste management system.[2] This is reflected in the fact that the MRS is given more tentative treatment than any of the other facilities dealt with by the Act: geologic repositories, test and evaluation facilities (TEFs), and Federal interim storage facilities.

The strongest commitment in the Act is to geologic repositories. The Act requires DOE to site and license two geologic repositories. While the Act authorizes the construction of only the first repository, it sets a limit of 70,000 metric tons on the amount of waste that can be loaded into the first before the second is operating, a limit which implicitly will require construction of the second if all of the waste now expected to be generated is to be disposed of as directed by the Act. The Act authorizes one test and evaluation facility, but does not require DOE to construct one; instead, the determination of need is left to DOE. The Act also authorizes use of existing Federal facilities for a limited amount (1,900 metric tons) of interim storage to be made available to utilities that can demonstrate that they are unable to provide their own additional spent fuel storage in time to avoid disruption of reactor operations.

In contrast to these other types of facilities, MRS facilities are neither authorized nor required. In addition, the Act requires that disposal in a repository proceed even if MRS facilities are built, and also requires DOE to accompany the MRS proposal with an analysis of how any such facility would be integrated with the other facilities authorized by the Act.

DOE View of the MRS

DOE's own thinking about the MRS has undergone a significant shift since the Act was passed. In the 1984 Draft Mission Plan, DOE proposed using the MRS only as a backup storage facility to allow the Federal government to accept spent fuel from utilities in the event of major delays in the repository program.[3] The MRS proposal was to analyze only generic sites, rather than specific actual ones, and DOE planned to ask only for authority to proceed with a site selection and licensing process to identify and license a specific site by about 1990. After the first Director of the Office of Civilian Radioactive Waste Management was appointed, DOE reexamined the potential role for the MRS, and adopted a significantly different approach. In this new approach, the MRS would play an on-line role in the waste management system, serving as a centralized packaging and handling facility that would process most of the spent fuel ultimately destined for the repository. While it would also provide interim storage capacity, this would be only one of a number of potential system benefits provided by the facility.

In May of 1985 DOE released a preliminary MRS needs and feasibility study[4] and siting study[5], proposing that an integral MRS facility be constructed at the site of the cancelled Clinch River Breeder Reactor near Oak Ridge, Tennessee. DOE subsequently provided grants to the State of Tennessee and the local communities to perform their own reviews of the proposal. The local group, the Clinch River MRS Task Force, concluded that the facility could be made acceptable to the local communities, provided that specified conditions dealing with safe operation and impact mitigation were met by DOE[6]. After a lengthier review at the State level, the Governor of Tennessee, Lamar Alexander, concluded that although the MRS could be operated safely, it was not really needed, and that in any case Oak Ridge was exactly the wrong site.[7] He therefore opposed the proposal and urged Congress to reject it.

In parallel with its review of the proposal, the State of Tennessee also sued DOE on the grounds that the State had not been adequately consulted during the site selection process. On February 5, a Federal court upheld the State's position, finding that DOE had not complied with the requirements of NWPA.[8] On February 7, the court enjoined DOE from submitting to Congress any part of the MRS proposal having to do with siting. DOE has appealed this action on constitutional, jurisdictional, and substantive grounds. At the time of writing of this article, the appeals process was still underway. However, the recommendation for construction of an integral MRS at the Clinch River Site was also included in the President's budget, submitted to Congress before the court decision, so that the proposition (although not the formal MRS proposal required by the Act) is already before Congress.

However the process resolves itself, sooner or later DOE will present to Congress a site-specific proposal. Congressional consideration of that proposal offers the opportunity to address and resolve three broad issues concerning the future of high-level waste management. One of these -- the question of whether the Federal government is obligated by NWPA to take spent fuel beginning in 1998 even if a repository is not available -- was sidestepped in NWPA and left to later to resolve. As noted earlier, there is still considerable difference of opinion on this question. The other two -- how best to proceed towards development of the repository required by NWPA, and how much predisposal waste management activities should take place at reactor sites -- are issues that have been raised by the specific proposal that the MRS serve as an integral central packaging facility rather than just as a backup storage facility and that were not addressed during the debate on the Act. Each is discussed below.

OBLIGATION OF DOE TO ACCEPT SPENT FUEL

Despite the convergence in views between the two Houses of Congress that had occurred by the time of passage of NWPA, there still remained a significant issue that was essentially unaddressed, and thus unresolved, in NWPA: who should be responsible for spent fuel storage after 1998, if the repository is significantly delayed? While there was general agreement among the parties that the utilities would have the primary responsibility for storage at least until 1998 (no one really expected the repository to be available much earlier), the views diverge about the post-1998 period. During the debate on the Act, there was little discussion of the possibility of extended delays in the repository schedule that might require substantial amounts of additional spent fuel storage capacity. Even after passage of the Act, there remained substantial disagreement among members of Congress about whether the basic commitment of the Federal government is to provide a geologic repository or to provide waste isolation by a date certain using whatever technology -- storage or disposal -- could be made available by that time[2].

The Act itself is less than completely lucid on this point. On the one hand, section 302(a)(5)(A) requires DOE to take title to spent fuel "after commencement of operation of a repository." On the other hand, section 302(a)(5)(B) requires the repository to be available by January 31, 1998. Some point to the former requirement and argue that NWPA requires utilities to provide interim storage for as long as is necessary until a repository is available. Others point to the latter provision and argue that the explicit deadline for a repository, plus the fact that utilities are now paying fees for disposal services, obligates the Federal waste program to take responsibility for spent fuel beginning in 1998, even if the repository is delayed. In response to a query from the Senate, DOE has taken the position that it has the legal obligation and authority to take title to spent fuel in the event that a repository has not commenced operation by January 31, 1998.[9] The only problem is where to put it, given that the first geologic repository is the only facility now authorized by the Act that DOE could use to take possession of spent fuel.

If Congress decides that DOE is obligated not only to take title to spent fuel beginning in 1998, but also to start taking physical possession of it even if the repository is delayed, then construction of a MRS is probably necessary to meet that obligation. Thus in a sense this question of interpretation of the obligation of the Federal government expressed in the Act as passed in 1982 logically precedes the questions of whether or not an integral MRS would improve the operation of the waste management system.

Debate about whether a MRS is needed to enable DOE to start accepting spent fuel even if the repository is delayed will probably raise the concern that has undermined past proposals for Federal storage facilities -- the concern that by relieving the reactor storage problem, availability of Federal storage capacity would make it all too easy to defer the politically and financially costly steps involved in siting a geologic repository. However, the MRS proposal differs from previous proposals in that the passage of NWPA has created a new context for the debate by including provisions that could reduce concerns that the repository might be indefinitely deferred.

Commitment To a Repository

Prior to passage of NWPA, there was no commitment in law to development of a permanent disposal facility in a timely manner. DOE had already decided to develop geologic repositories promptly instead of pursuing alternative disposal technologies or deferring a decision until better alternatives became available. However, the repository schedule was a matter of administration policy, subject to modification with changes in administration. In addition, there was no clear Congressional commitment to any particular schedule, or indeed even to development of geologic repositories as the prime focus of the waste management program. Passage of NWPA changed that by (1) clearly stating that the Federal government has the responsibility for permanent disposal of high level radioactive waste, (2) defining disposal as emplacement in a deep geologic repository, (3) requiring contracts between DOE and the utilities that obligate DOE to begin disposal in such a repository no later than January 31, 1998, and (4) specifying that "disposal of high-level radioactive waste and spent nuclear fuel in a repository developed under this Act should proceed regardless of any construction of a monitored retrievable storage facility." Thus, although construction of a MRS would allow DOE to accept spent fuel, it cannot substitute for the first repository in meeting the requirements of the Act. Siting and licensing of two repositories, and operation of the first, are required to continue independent of any decision about the MRS, and the utilities will continue to make payments into the Waste Fund for the repository program even if a MRS is provided.

Despite the Act's commitment to development of geologic repositories on schedule, it is possible that debate about the MRS proposal might reopen the issue of whether the repository program ought to be pursued with all deliberate speed, or whether as an alternative the MRS ought to be used as a way to allow extended deferral of repository siting decisions. (A discussion of this issue is found in Ref. 1, pp. 245-253). If this occurs, it will likely exacerbate the concern that the MRS will wind up being a substitute for geologic repositories rather than a complement to them, thus increasing the chances for acrimony and reducing the chances for approval of a MRS with the broad base of support that could ensure stable policy and funding over the period needed to construct the facility.

Nonetheless, there may be some value to providing additional time in the repository schedule for site characterization and licensing, because the slippages that have already occurred in the repository schedule are putting increasing pressure on those critical steps. An important question, therefore, is whether the requirements

of the Act allow any room for the MRS to be used to provide flexibility in the repository schedule. Clearly, abandonment of the 1998 deadline for beginning disposal in the repository would go beyond the boundaries set by the Act. OTA has suggested that some additional time during site characterization and licensing could be gained by planning to meet the 1998 deadline with demonstration-scale disposal using a small amount of high level waste and spent fuel packaged elsewhere (e.g. the MRS) for disposal. Because initial loading would not have to await construction of a packaging facility at the repository, as DOE now plans, this should minimize the time between the construction authorization and NRC approval for permanent emplacement of some quantity of waste. Reducing the time between the construction authorization and initial disposal should increase the time available for site characterization and licensing, while still retaining the commitment to begin disposal in 1998.

Provision of an integral MRS as proposed by DOE might broaden support for this approach by allowing some deferral of full-scale repository loading without increasing the utilities' burden of spent fuel management. Without a MRS, pressures for DOE to accept spent fuel will translate directly into pressures to hurry up full scale operation of the repository.

Funding Provisions

The second way in which passage of NWPA has reduced the risk that a Federal storage facility would derail the repository program lies in the funding provisions. One basis for concern that a storage facility could supplant the repository is the fear that it would be seen as a low-budget alternative having significantly lower development and operating costs [1]. Thus it was feared that budget pressures could tend to favor expansion of a storage facility and deferral of the high costs of repository development.

The Act radically changed the funding provisions for the Federal waste management program by shifting the source of funds from Federal taxes to a mandatory fee on nuclear-generated electricity. The MRS, like the repository, can be paid for out of the Nuclear Waste Fund that is financed by that fee. Since the Act requires the Secretary of Energy to review the adequacy of the fee annually and propose any revisions necessary to assure full recovery of all costs of the waste management program, in theory the fee could be adjusted as needed to ensure that there are sufficient revenues for MRS to be built and operated without diverting resources from the repository program.

However, while provision of adequate revenues into the Waste Fund is probably necessary to avert competition between the repository and MRS programs, it is not sufficient. The appropriations from the Nuclear Waste Fund must also be increased by the amount needed to implement the MRS program without affecting the repository program. It is here that the implications of the Gramm-Rudman-Hollings bill could be quite serious, since the bill appears to apply to expenditures from the Waste Fund despite the fact that the Fund is financed through a fee on nuclear electricity rather than by Federal tax revenues. If constraints on expenditures from the Fund have the effect of putting the MRS program in direct competition with the repository program for appropriations from the Fund, it could cause precisely the sort of conflict that opponents are worried about, thereby making initial approval of the MRS and stable funding over time more difficult.

Precedents for Limits on Facility Loading

Finally, the Act contains precedents for limiting DOE's ability to continue loading waste into a facility. Such limitations could reduce concerns that the MRS could be expanded indefinitely while the repository is delayed. In this regard, the Clinch River MRS task force expressed concern that the MRS might become a long-term storage facility by default, and asked for a linkage between operation of the MRS and progress on the repository. Specifically, they recommended (a) that no more than 300 metric tons of spent fuel should be received at the MRS before a construction authorization is granted for the repository, (b) that no more than 10,000 metric tons of spent fuel should be received before shipments to the repository begin, and (c) that any expansion of storage capacity beyond 15,000 metric tons be subject to the same review and notice of disapproval procedures followed to initially authorize the MRS.

In its draft proposal to Congress, DOE proposed limiting the storage capacity to 15,000 metric tons with no explicit procedure for dealing with any subsequent increase; and also proposed precluding any waste acceptance at the MRS facility until a construction authorization for the first repository is received from the Nuclear Regulatory Commission -- a restriction that goes beyond the Task force recommendation, which would have allowed receipt of 300 tons prior to construction authorization for reasons of facility testing.

It should be recognized that such limitations on the use of the MRS are well within the precedents already established by the Act for other facilities. As noted earlier, the Act already precludes emplacement of more than 70,000 metric tons of waste in the first repository before the second begins operation -- a limitation that is intended to force the operation of the second repository in precisely the same way that the proposed 15,000 metric ton limitation on the MRS is intended to force operation of the first. In addition, the Federal interim storage provisions of the Act strictly limit the amount of such storage to 1,900 metric tons, and give the host state of any such storage facility the right to object to the expansion of the capacity of the facility beyond 300 metric tons, an objection which -- like a state objection to a repository -- becomes effective unless overridden by passage of a joint resolution by both Houses of Congress. The Clinch River Task Force's recommendation appears to be that precisely the same provisions be applied to any proposed expansion of the MRS beyond 15,000 metric tons.

There may be advantages to this approach compared to the absolute limit of 15,000 metric tons proposed by DOE, since it may ultimately prove desirable to be able to use the MRS to defer full-scale loading of the repository for some period after the initial disposal has taken place (e.g. in order to cool the waste before emplacement). Once the repository is operational, the State's concern that storage at the MRS might delay the repository should be greatly reduced, so that at that point the State may be more willing to consider additional storage at the site. Such storage would not increase the amount of spent fuel passing through the facility, and might reduce the peak annual transportation impacts on the state by shortening the period during which waste would be shipped both into and out of the facility at the same time. Thus provision of a veto over expansion, subject to Congressional override, may afford the State an adequate degree of protection without requiring amendment of the Act to allow expansion of the capacity.

NEW ISSUES

The DOE proposal for a new role for the MRS as the central packaging facility for the repository takes the MRS somewhat outside of the context of the debate surrounding passage of the Act, since the integral role simply was not one that was the subject of discussion at the time. In a sense, the term "monitored retrievable storage facility" is a bit of a misnomer for a facility that is intended to serve an online packaging and handling function. Use of the term has already caused some confusion (see Ref. 7) and brings along a lot of baggage from the earlier debates about Federal storage facilities. Unfortunately, the NWPA does not provide any siting process for a centralized packaging and handling facility separate from the repository itself. Thus DOE's only readily available avenue for pursuing this approach is through the MRS provisions of the Act. And since those provisions also require a plan for integrating the MRS with the other facilities authorized by the Act , DOE's proposal for an integral MRS appears fully consistent with the purpose of that section.

The new role for the MRS raises two ideas that were not discussed at the time of passage of NWPA: (1) the possibility that predisposal waste management activities (rod consolidation, and packaging for disposal, as well as interim storage) might take place at the MRS or at reactor sites rather than at the repository; and (2) the possibility of separating the system operation problems of waste transportation and handling at large scale from the long-term geologic isolation problem, allowing the former to be pursued and perhaps resolved earlier than the latter.

Site of Predisposal Waste Management Activities

There have been a number of important developments since passage of NWPA that create a new context for debate about the MRS. As recognition has grown that full-scale repository loading could be delayed significantly beyond 1998, so has the realization that waste management will now involve storage of large amounts of spent fuel for many decades. In addition, several developments in the past few years indicate that the potential storage capacity of reactor pools is considerably greater than previously thought. These are: NRC approval of burnup credit reracking, use of better analytical techniques for determining maximum allowable pool loadings, and the potential for in-pool rod consolidation. Thus it appears that much of the additional storage could take place in the pools themselves, without requiring construction of new out-of-pool facilities of any kind. Neither the amount of additional storage that might be required, nor the possibility that most of it might be provided in reactor pools, was considered in any depth in the debates about NWPA.

Finally, the idea of using the MRS to move most predisposal waste packaging and handling away from the repository and nearer the reactors has raised the question of whether the same or even greater benefits might be obtained by moving those activities all the way to the reactor sites, since it appears to be technically feasible to consolidate fuel assemblies and seal them into canisters in the reactor pools. Thus the suggestion has been made that if consolidation is desirable for transportation and disposal reasons, it might offer the greatest net savings if performed at reactors.

All of these developments raise an issue that was simply not addressed during the debate on NWPA: how much of predisposal spent fuel management activities (storage, consolidation, packaging) do we want to occur at reactor sites as a matter of national policy? It appears possible that the initial financial and political costs of the waste management system could be minimized by consolidating and storing spent fuel directly in the reactor pools. At the same time, there may be long-term consequences that need to be given careful consideration before a decision is made whether to conduct these activities at reactor sites or at a MRS. For example, accidents during consolidation could affect reactor operations. Since a policy of maximizing consolidation at reactors would involve processing hundreds of thousands of assemblies in reactor pools, the likelihood of accidents in some pools must be considered.

In addition, large accumulations of spent fuel in the reactor pools could exacerbate other problems that might arise at reactors in the future, such as an accident similar to Three Mile Island or a terrorist attack. The potential consequences of encouraging increased in-pool storage need to be carefully considered before large accumulations are allowed to develop, since those accumulations could not be removed quickly if it were decided later that they were not desirable. Finally, conducting predisposal waste management activities at reactor sites will inevitably divert some management attention from the primary task of reactor operation.

In sum, the desirability of conducting extensive predisposal waste management activities at reactor sites was not discussed during passage of NWPA and has not been subject of thorough analysis or of Congressional debate since then. Debate on the MRS proposal offers the opportunity

to address that question explicitly and to develop a clear national policy on the subject. From this perspective, an important feature of the integral MRS is that it would minimize at-reactor waste waste handling activities, so that the only waste management responsibility of the utilities would be storage of intact assemblies in the pool for a period of perhaps 10 years until the fuel can be shipped to the MRS.

A debate on the subject of the desirability of extensive predisposal waste management operations at reactor sites could be interesting. For example, some critics of Federal storage facilities prefer at-reactor storage until the repository is available -- but they want that storage to be done outside of the existing pools, preferably in some type of dry storage technology.[10] Yet cost considerations may well lead to the maximum possible expansion of in-pool storage before more expensive out-of-pool dry storage is used. Even if utilities might prefer to avoid the chore of licensing additional rerackings and consolidation, it is not clear that public service commissions would be willing to approve substantially more expensive dry storage just for the convenience of utility management. Thus if cost becomes a major argument against the MRS, the same argument could be applied to favor maximum in-pool storage at reactors -- a result that may not be generally approved by critics of the MRS proposal.

Comparison of the at-reactor and MRS approaches to predisposal waste management should also consider the institutional requirements in each case. A decision to perform such activities at the reactors would, at a minimum, divert at least some utility management attention and effort away from the primary task of operating reactors. On the other hand, there is concern that an effort to site and construct a MRS could divert DOE energies away from the task of developing a permanent repository.

The at-reactor option may also raise some institutional issues that DOE may not be able to deal with within the current authority of the Act. These relate to the problem of ensuring that the spent fuel management steps taken by the utilities are fully compatible with later stages of waste handling and final disposal. The potential difficulty is that the actions that would minimize total system cost may not be those that would minimize the cost to the individual utility. For example, some utilities might conclude that rod consolidation is not cost-effective or otherwise desirable; yet participation by most utilities may be needed for at-reactor consolidation to provide a significant cost savings compared to use of a central facility.[11] Similarly, recent analysis indicates that there may be significant cost savings from consolidation into half-square cans; yet the individual utilities would gain no direct benefit from doing so (except in limited storage situations).[12]

One approach to induce utilities to take the steps that would reduce total system costs would be to offer to rebate to the individual utility some percentage of the cost savings. However, it is not clear that that would provide sufficient motivation to undertake any actions that might involve risks of adversely affecting reactor operation. For example, a recent analysis suggests that the savings that might be rebated to a utility for consolidating 25 metric tons of spent fuel per year could amount to about $85,000 annually, even in the favorable case in which 75 percent of the utilities have committed to consolidation (Ref. 11). While this is a significant fraction of the consolidation costs, it is small compared to the cost of makeup power of $500,000 to $1,000,000 per day that might be required if at-reactor consolidation led to a reactor outage.

The important question is whether that level of financial incentive is sufficient to induce enough utilities to consolidate to provide a significant system cost savings. If financial incentives do not do the job, the question arises of whether DOE would have the authority to require certain waste management steps to be performed by the utilities as a condition for waste acceptance.

The analysis of these questions to date is very limited. The little that is available, however, suggests that the institutional task involved in conducting all predisposal management steps at reactors -- and ensuring that they are done in a way that is fully compatible with the rest of the system -- would be considerably more complex than the option of performing these operations at the MRS.

Strategic Path to a Repository

The preceding discussion has considered the MRS issue as a choice between two distinct approaches to managing spent fuel before emplacement in a repository. However, it can also be seen as a choice between two distinct paths towards development of the capacity for permanent disposal at operational scale.

Permanent disposal of the projected U.S. inventory of high-level radioactive waste will require unprecedented technical and institutional capabilities. Technically, it involves development both of a repository that can provide adequate waste isolation for millenia and of the ability to process, package, transport, and emplace highly radioactive materials at rates for which there is no previous experience. Institutionally, it requires that the Federal political system be able to site facilities for handling and disposing of a hazardous material that is viewed very negatively by the public. None of these requirements are simple tasks.

Because the integral MRS proposed by DOE would perform most of the predisposal processing functions for the repository, a decision to proceed along that path would provide an early test of DOE's ability to deal with all of these challenges except that of ensuring long-term isolation. Technically, it would provide an early focal point for system integration and transportation planning, one that is independent of the uncertainties about the timing and location of the repository. This would allow DOE to develop and verify the techniques for large-scale waste transportation and handling before

construction and operation of full-scale facilities at the repository, so that any unexpected problems that are encountered can be taken into account in the design of the repository's own receiving and handling facilities. This should increase confidence that the repository will actually be able to load at its target rate. If the at-reactor path is chosen, the first experience with handling and transporting high-level waste at large scale will not come until the full-scale facilities of the repository are constructed, at which time retrofitting to deal with unexpected problems could be quite expensive.

Institutionally, the MRS path will provide an early test of the ability of both DOE and the Congress to deal with a potential host state's concerns within the context of the siting provisions included in NWPA. DOE will have to attempt to negotiate a consultation and cooperation agreement with the state, and work out impact compensation arrangements. Congress may have to decide whether to override a state veto using the procedures provided in NWPA. Without the MRS, these steps would all be attempted for the first time at the first repository.

In addition, the MRS option would give the Office of Civilian Radioactive Waste Management its first direct experience with NRC licensing procedures and with managing the construction and operation of a large facility.

Thus the MRS path, by allowing DOE to bite off a major piece of the waste management problem well before a repository is sited, represents a "walk-before-you-run" strategy. This has several potential benefits. First, it could allow DOE to resolve certain important issues, such as waste transportation and impact compensation, before they can complicate repository siting decisions. Second, it can give DOE technical and institutional experience that could make it easier to site, license, construct, and operate the repository without major problems. In general, it can provide an early warning of technical or institutional problems so that they can be dealt with before they can impede the repository effort.

Staying with the currently authorized system involves lower financial and political costs in the near term, since it does not require siting and constructing a large-scale facility in addition to the repository. On the other hand, it can be seen as an "all-the-eggs-in-in-one-basket" approach in which every major challenge in high-level waste management is faced for the first time in the effort to site, construct, and operate the first repository. Whether that poses a greater or lesser threat to the success of the repository program than would the construction and operation of an integral MRS is a major question that needs to be addressed in the debate about the MRS proposal.

CONCLUSION

The MRS proposal represents the first major Congressional decision point built into the NWPA. It offers an opportunity for Congress to address a major issue that was left unresolved by the passage of NWPA -- the degree of responsibility of the Federal government to accept spent fuel beginning in 1998 even if the repository is delayed. In addition, it presents a clear choice between distinct paths towards a repository, and between decidedly different systems for handling predisposal waste management activities once the repository is operating. All of these decisions require discussion and analysis that goes beyond the confines of the debate that led up to passage of NWPA, and merit the same level of attention that was devoted to the Act.

REFERENCES

1. Office of Technology Assessment, Managing the Nation's Commercial High-Level Radioactive Waste, pp. 245-253, Washington, D.C. (1985).

2. B.S. Cooper, "Monitored Retrievable Storage - A Congressional Perspective," Waste Management '85, Proceedings of the Symposium on Waste Management, Tucson, Arizona, March 24-28, 1985, Vol. 1, pp. 375-378 (1985).

3. U.S. Department of Energy, Draft Mission Plan for the Civilian Radioactive Waste Management Program, DOE/RW-0005 DRAFT, Washington, D.C. (1984).

4. U.S. Department of Energy, The Need for and Feasibility of Monitored Retrievable Storage -- a Preliminary Analysis, DOE/RW-0022, Washington, D.C. (April 1985).

5. U.S. Department of Energy, Screening and Identification of Sites for a Proposed Monitored Retrievable Storage Facility, DOE/RW-0023, Washington, D.C. (April 1985).

6. Clinch River MRS Task Force, "Position on the Proposed Monitored Retrievable Storage Facility," Oak Ridge, Tennessee (October 10, 1985).

7. Statement of Governor Lamar Alexander, Governor's Information Office, Nashville, Tennessee (January 21, 1986).

8. State of Tennessee v. John Herrington, Secretary of Energy, Civil Act. No. 3-85-0959 (U.S. D.Ct. M. Tenn.).

9. U.S. Department of Energy, Mission Plan for the Civilian Radioactive Waste Management Program, DOE/RW-0005, Vol. 2, p. 97, Washington, D.C. (1985).

10. Marvin Resnikoff, The Next Nuclear Gamble, Ch. VII, Council on Economic Priorities, New York, New York (1983).

11. N. B. McLeod, "Disposal System Incentives for the At-Reactor Consolidation of Spent Nuclear Fuel," Proceedings of the Institute of Nuclear Materials Management Spent Fuel Storage Seminar III, Washington, D.C. January 22-24, 1986.

12. Y. M. Park, C. A. Heath, and N. R. McLeod, "An Assessment of the Use of Half-Square Cans on the Management of Spent Fuel," Proceedings of the Institute of Nuclear Materials Management Spent Fuel Storage Seminar III, January 22-24, 1986.