IMPLICATIONS OF MONITORED RETRIEVABLE STORAGE FOR GEOLOGIC DISPOSAL OF SPENT NUCLEAR FUEL AND HIGH LEVEL RADIOACTIVE WASTE

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ABSTRACT

The integral monitored retrievable storage (I-MRS) proposal has major implications for geologic disposal. This paper reviews the positive and negative implications from the standpoint of a potential repository host state. Recommendations for improving the I-MRS proposal include: eliminate provisions restricting I-MRS backup role; add provisions to prevent I-MRS from becoming a permanent disposal facility; optimize reactor-to-I-MRS transportation system; further shift preclosure operations from repository to I-MRS; defer decision on rod consolidation; repeat the I-MRS site selection process; eliminate any potential linkage between I-MRS and nuclear weapons programs; and incorporate I-MRS in the repository siting program.

INTRODUCTION

In December 1985, the U.S. Department of Energy (DOE) published a preliminary construction proposal, environmental assessment, and program plan for a monitored retrievable storage (MRS) facility.[1,2,3] DOE's proposal for an "integral" MRS differs significantly from earlier versions of the concept, in which MRS was viewed as a back-up system to be constructed only in the event of serious delay in the geologic repository program. In order to distinguish DOE's proposal from the original concept, we have adopted the convention followed by the Office of Technology Assessment[4] and will refer to the integral MRS as the I-MRS. DOE's I-MRS proposal has major implications for the geologic repository program, although DOE has not yet determined whether the I-MRS would serve both the first and second repositories, or the first repository only. There are positive implications in the areas of schedule flexibility, back-up system for geologic disposal, mitigation of major transportation concerns, and shift of preclosure operational impacts from the repository to the I-MRS facility. There are negative implications resulting from DOE's apparent commitment to rod consolidation; the defective siting process used to designate the Clinch River site near Oak Ridge, Tennessee; and uncertainties about the role of the I-MRS in handling of defense waste and potential nuclear weapons program linkages. The purpose of this paper is to assess the positive and negative implications of I-MRS, and to recommend changes to the proposal to improve the overall civilian high-level radioactive waste management program.

STATE OF WISCONSIN INTEREST IN MONITORED RETRIEVABLE STORAGE

The State of Wisconsin is vitally concerned about DOE's proposal to construct an I-MRS facility. Wisconsin is a major nuclear state. Four commercial reactors are located in Wisconsin, and another four are located along our borders in Minnesota and Illinois. At the present time, between 25 and 30 percent of Wisconsin's electricity is generated by nuclear units. More than 2,800 spent nuclear fuel assemblies, containing more than 1,100 metric tons of uranium (MTU), currently reside in the storage pools of these eight reactors. This quantity is expected to triple by 1998. Wisconsin's interest in I-MRS reflects our concern that DOE begin preparing to assume title to the spent fuel from these reactors in 1998, as required under contracts with the operating utilities. Further, Wisconsin is a major corridor for commercial spent fuel shipments to and from other states. The primary rail route in western Wisconsin is currently being used for the largest commercial spent nuclear fuel shipping campaign in the history of the nuclear industry, and the same route may be heavily used in the future for shipments to the I-MRS facility, and to one or more geologic repositories. We are, therefore, concerned about the potential transportation implications of DOE's I-MRS proposal. Finally, Wisconsin is one of seven states being considered for the second geologic repository. We are, therefore, directly concerned about the implications of the I-MRS proposal for geologic disposal in general, and specifically the implications of I-MRS for the siting of a geologic repository in granite.

In late 1981, the Wisconsin Legislature created the Radioactive Waste Review Board to monitor DOE's civilian high-level radioactive waste management program. The Board has followed the MRS concept closely since the passage of the Nuclear Waste Policy Act (NWPA), and MRS has frequently been discussed at meetings of the Board and its technical and policy advisory councils. The Board first became aware of DOE's proposal for an integral MRS after a meeting of the National Governor's Association Task Force on Nuclear Waste in December, 1984. The Board, in March 1985, directed its Technical Advisory Council to monitor development of the proposal, review the preliminary need and feasibility report, and report back to the Board prior to DOE's submission of the I-MRS report to Congress. The Technical Advisory Council filed detailed comments on the I-MRS preliminary need and feasibility report in July 1985, and is currently completing a review of I-MRS technical issues and policy implications.

I-MRS WILL ACCOMMODATE THE ANTICIPATED DELAY IN OPERATION OF THE FIRST GEOLOGIC REPOSITORY

One of the major implications of I-MRS is sufficient schedule flexibility to accommodate anticipated delays in the operation of the first repository. The current schedule in DOE's Mission Plan calls for the first geologic repository to begin operations in 1998. Repository operations would be scaled-up over a five year period, with full-scale emplacement (3,000 MTU per year) beginning in 2003. The current schedule also calls for a second geologic repository to begin operations in 2006.[5]

DOE's schedule is overly optimistic and perhaps unrealistic. The Mission Plan details possible delays of up to 24 months in recommendation of sites for characterization, up to 69 months in site characterization, up to 28 months in site selection and approval, up to 81 months in the NRC licensing process, and up to 24 months in construction and testing.[5] The possible delays identified by DOE could add 226 months, or 18.8 years, to the reference schedule. Other potential delays include current litigation over the siting guidelines, and potential litigation over the environmental assessments (EAs), the repository environmental impact statement, and the NRC licensing process. Litigation by states, local governments, and citizen organizations, could add years to the reference schedule.

Because of DOE's difficulty meeting early milestones on the reference schedule, the possible delays identified in the Mission Plan, and potential litigation, it appears that full-scale operation of the first repository will be delayed between five and ten years beyond the reference schedule. At the present time, DOE is already six months late issuing the final environmental assessments and will probably be six months late in recommending sites for characterization. Site characterization is likely to require an additional three years, and based on experience with the EAs, revision of the final environmental impact statement is likely to require one additional year. Additional delays appear likely as a result of State or Indian tribe disapproval, additional NRC licensing review time, and litigation.

The I-MRS appears to be the best available mechanism for accommodating a five to ten year delay in the beginning of geologic repository operations. A ten year delay would require an additional 15,000 MTU in I-MRS capacity. There are a number of alternatives including expanded at-reactor storage by reracking, rod consolidation, dry storage or multi-purpose (storage/ transportation) casks, or interim storage at existing federal facilities. However, each of these alternatives involve serious institutional, economic and, in some cases, technical uncertainties.

I-MRS WILL PROVIDE A BACK-UP SYSTEM IN THE EVENT THAT GEOLOGIC DISPOSAL PROVES TECHNICALLY INFEASIBLE

Perhaps the best argument in favor of an I-MRS is that geologic disposal is not yet a proven technology, and cannot be proven feasible until site-specific data from at-depth testing is available at the end of the site characterization period. Under current NRC regulations, candidate sites are assumed unsafe until demonstrably proven safe. DOE must follow the siting process carefully, with full state consultation, in order to avoid an automatic siting veto and litigation. There will probably be no opportunity for DOE to short-cut the site characterization process. If anything, site characterization could take three or more years than presently anticipated. Site characterization for the first repository is presently scheduled for completion in 1991. By DOE's own analysis, site characterization could be delayed five or six years, or until 1996. The reference schedule for the second repository calls for the completion of site characterization by 1998, but this process, too, is vulnerable to delay.[5] Even without delays in site characterization, site approval, or licensing, phase one construction of the first repository is not scheduled to be completed until 1998. The very real possibility exists that fatal flaws at the preferred site may not be discovered until an advanced stage of construction. At that point, it will be too late to begin planning an alternative management system. The best way to accommodate the inherent uncertainties about the technical feasibility of geologic disposal and the suitability of specific repository candidate sites is to begin planning now for an I-MRS system which will improve the overall performance of the geologic disposal system and, in the worst of circumstances, will provide a safe and economical, if temporary, back-up.

I-MRS WILL MITIGATE STATE CONCERNS ABOUT SPENT NUCLEAR FUEL TRANSPORTATION TO A REPOSITORY

DOE claims that I-MRS will reduce transportation risks by reducing system-wide spent fuel transportation requirements, as measured in cask-miles, or shipment miles. DOE places too much emphasis upon rod consolidation as a means of achieving transportation benefits, and does not specifically address the way in which transportation risk is evaluated by the potential repository host states. In fact, DOE's I-MRS would increase total shipments, since all spent fuel would have to be shipped once from reactors to the I-MRS facility, and then again from the I-MRS to a repository.

Many potential corridor and respository host states do not accept DOE's transportation risk assessments based on the RADTRAN model. The states have repeatedly challenged the technical basis of the RADTRAN model in written comments, and at DOE-sponsored workshops in Oak Ridge, Tennessee (November 1984), in Albuquerque, New Mexico (February 1985), and in Denver, Colorado (December 1985). A major concern expressed by the states is the way in which RADTRAN evaluates the risk of severe transportation accidents. Specific criticisms of the model are: 1) it systematically understates the probability and consequences of a credible worst-case accident; 2) it uses unit risk factors based on national aggregate accident data, rather than route-specific data; and 3) it uses estimated rather than actual population densities along transportation routes to calculate potential exposures and health affects from both normal operations and accidents.

In general, potential transportation corridor and repository host states are primarily concerned with reducing the risk of severe accidents. Radiation exposures during normal transport operations, and nonradiological injuries and fatalities, are important but secondary concerns. DOE's I-MRS proposal addresses the primary state concerns by reducing the need for truck transportation to a repository, by reducing the number of rail shipments to a repository, by facilitating selection of the safest route(s) for shipments between the I-MRS and a repository, and by facilitating state, tribal, and local emergency response planning. The following analysis is based on DOE's proposal, but the advantages described here would be even greater if

spent fuel from both eastern and western reactors were to be shipped to the I-MRS, and if all defense high-level wastes were to be shipped directly from federal facilities to the repository in dedicated trains.

First, the I-MRS will reduce the need for truck transportation to a repository. Under DOE's reference case (Scenario 1 in Table I), without an I-MRS, there are 725 truck shipments per year from eastern reactors to a repository. This number may be reduced to 109-250 truck shipments annually by system improvements such as greater use of rail and larger cask capacities (Scenarios 2 and 3 in Table I). Elimination of truck shipments requires first shipping from reactors to an intermediate facility, because some reactors lack rail access or cannot handle rail casks. The I-MRS serves this purpose. DOE's I-MRS does not, however, eliminate truck shipments from western reactors to a repository. There could be more than 200 such shipments annually (Table II), because six of the 14 western reactors do not have full rail capability.[2]

Truck shipments to a repository could be completely eliminated by having the I-MRS serve both eastern and western reactors. This would increase system transportation requirements by 2 to 6 million shipment-miles (an increase of 7 to 17 percent), and increase system transportation costs by 100 to 200 million dollars (an increase of 8 to 13 percent), depending upon the location of the first repository.[7] Truck shipments might also be eliminated by expanding the DOE demonstration project at Idaho National Engineering Laboratories (INEL) to prepare western reactor fuel for rail shipment to a repository. DOE should consider using the INEL facilities as a western I-MRS.

Second, the I-MRS proposal will allow maximum use of dedicated or unit trains, which will substantially reduce the total number of shipments to a repository. Under DOE's proposal, eastern reactor fuel shipments would be reduced to 15 to 28 dedicated trains per year. While some reduction is possible without an I-MRS, through use of larger casks and marshalling of casks, full reliance on unit trains requires an intermediate facility. The I-MRS serves this purpose. The greatest reduction occurs when the I-MRS originates all shipments to a repository, including western reactor fuel (Table III). This substantially reduces the total number of shipments, regardless of whether spent fuel is intact or consolidated and/or packaged for disposal at the MRS, to between 18 and 37 dedicated trains per year.

Third, the I-MRS will facilitate route-specific risk and hazard assessment. Relatively few routes will be needed for rail shipments between the I-MRS and a repository, between western reactors and a repository (assuming DOE's reference plan), and between the three major defense waste facilities (Savannah River, INEL, and Hanford) and a repository. Minimizing the number of prospective transportation corridors will facilitate the assessment of route-specific hazards, historical accident data, and projected route conditions, which can in turn be used to select the route(s) which offer(s) the greatest overall safety.

Fourth, the I-MRS will facilitate federal, state, tribal and local emergency response planning. The reduction or elimination of truck shipments will allow emergency response planning to focus on the rail system. The narrowing of prospective routes will allow emergency response organizations at all levels of government to more effectively identify potential hazard areas along specific routes, and develop emergency response plans tailored to specific locations and equipment and personnel requirements. This will facilitate training of emergency response personnel and the staging of periodic drills and exercises. Also, the reduced number of total shipments will facilitate shipment tracking and improve the overall ability of emergency response personnel to deal with any accidents which do occur.

TABLE I
Estimated Average Annual Shipments of Spent Nuclear Fuel
From Eastern Reactors to a Repository in Salt (2500 MTU Per Year)

Scenario	Truck Casks Spent Fuel	Rail Casks Spent Fuel	Rail Casks Hardware	Shipments
1. No MRS, 70% Rail/30% Truck	725	250	0	975
2. No MRS, 90% Rail/10% Truck	250	321	0	571
3. No MRS, 90% Rail (150-Ton Casks)/10% Overweight Truck	109	136	0	245
4. MRS, 150-Ton Casks, Intact Fuel	0	142	0	28*
5. MRS, 150-Ton Casks, Consolidated Fuel, Packaged for Disposal	0	101	57	21*
6. MRS, 150-Ton Casks, Consolidated Fuel	0	72	57	15*

*Assumes dedicated trains, with a maximum of five spent fuel casks and four hardware casks per train.

Scenarios 1, 2 and 4-6 based on References 1 and 2. Scenario 3 based on Reference 6.

TABLE II
Estimated Average Annual Shipments of Spent Nuclear Fuel
From Western Reactors to a Repository in Salt (450 MTU Per Year)

Scenario	Truck Casks Spent Fuel	Rail Casks Spent Fuel	Shipments
1. Direct Shipment, 50% Rail/50% Truck	218	33	241
2. Direct Shipment, 70% Rail/30% Truck	131	45	176
3. Direct Shipment, 70% Rail (150-Ton Casks)/ 30% Overweight Truck	59	20	79

Scenarios 1 and 2 based on References 1, 2, and 7. Scenario 3 based on Reference 6.

TABLE III
Estimated Average Annual Shipments of Spent Nuclear Fuel
to a Repository (3000 MTU Per Year)

Scenario	Truck Casks Spent Fuel	Rail Casks Spent Fuel	Rail Casks Hardware	Shipments
1. No MRS, 70% Rail/30% Truck	871	300	0	1,171
2. No MRS, 90% Rail/10% Truck	291	386	0	677
3. No MRS, 90% Rail (150-Ton Casks)/10% Overweight Truck	131	164	0	295
4. MRS, 150-Ton Casks, Intact Fuel	0	182	0	37*
5. MRS, 150-Ton Casks, Consolidated Fuel, Packaged for Disposal	0	122	69	25*
6. MRS, 150-Ton Casks, Consolidated Fuel	0	87	69	18*

*Assumes dedicated trains, with a maximum of five spent fuel casks and four hardware casks per train.

Scenarios 1, 2 and 4-6 based on References 1, 2, and 7. Scenario 3 based on Reference 6.

I-MRS WILL REDUCE ADVERSE IMPACTS OF PRECLOSURE OPERATIONS AT THE GEOLOGIC REPOSITORY SITE(S)

The I-MRS proposal would shift certain preclosure operations from the respository to the I-MRS facility and would significantly reduce adverse impacts resulting from these operations at the repository site. DOE's proposal would shift lag storage, inspection, and consolidation of Eastern reactor spent fuel to the I-MRS facility. Western reactor spent fuel (about 1/6 of the total) would be shipped directly to the repository and canistered there. Final packaging for disposal would occur at the repository.[1] The following analysis of preclosure operational impacts is based on DOE's December 1985 proposal.

From the standpoint of a potential repository host state, it would be more advantageous to have all spent fuel from both eastern and western reactors, shipped to the MRS for packaging, storage, and eventual shipment to the repository; and to have defense high level waste prepared for disposal at the three federal storage facilities and shipped in unit trains directly to the geologic repository. In this way, the receipt and inspection of transportation vehicles, unloading and decontamination of shipping casks, and inspection of waste packages would all be simplified since the repository would receive only standardized waste packages delivered by unit trains, operating on predetermined schedules. It might also be advantageous to carryout final packaging for disposal at the I-MRS, although this would increase the number of shipments.

DOE's I-MRS proposal would substantially reduce the number, size, and complexity of surface facilities which must be constructed at the repository, reduce the construction labor requirements, and reduce adverse environmental impacts of construction such as dust, noise, and solid waste generation. DOE's Task Force on the MRS/Repository Interface estimates that a maximum shift of preclosure operations results in a 60 to 70 percent reduction in the areas and volumes of waste handling and support facilities required at the repository sites. Reductions in site support facilities would also occur, ranging from 10 to 40 percent in terms of building areas and building volumes.[7] Most of this reduction would be achieved by eliminating the large hot cells required for rod consolidation and encapsulation.

If the labor force analyses in the draft environmental assessments for the I-MRS and the Deaf Smith, Hanford, and Nevada repository sites are accurate, it should be possible to reduce the peak year construction labor requirements by up to 800 positions. This would reduce repository peak construction employment by 25 to 55 percent,

depending upon the repository site chosen,[2,8,9,10] diminish the potential for a local boom-bust economic cycle, and make the resulting standard socioeconomic impacts more manageable. This reduction would be particularly beneficial during the construction phase, when nonresidents may comprise 75 percent or more of the labor force.

The I-MRS propoal would also substantially reduce labor requirements and associated standard socioeconomic impacts during the 25 to 30 year operational life of the repository. Based on the draft environmental assessments, it appears that between 200 and 600 jobs would be shifted from the repository to the I-MRS. A shift of 600 jobs could be equivalent to a 40 to 70 percent reduction in the average annual repository operating labor force, depending upon the site selected.[2,8,9,10] Such a reduction in labor force requirements would substantially reduce adverse socioeconomic impacts, particularly in rural areas. Most of the sites under consideration for repository development are located in sparsely populated areas. In some instances, communities near candidate sites may react negatively to a shift of jobs. To the extent that a community demands economic incentives as the price for accepting a repository, incentives can be provided through direct payments.

Shifting preclosure operations from the repository to the I-MRS will reduce occupational radiation exposures at the repository and routine radiation releases to the atmosphere. Elimination of rod consolidation and the need to handle bare spent fuel assemblies will reduce the anticipated annual occupational exposures by about 70 to 80 percent.[2] The shift of preclosure operations to the I-MRS would eliminate the anticipated atmospheric releases resulting from normal operations (venting of spent fuel shipping casks and consolidation of spent fuel). DOE estimates that normal operations, plus one fuel assembly drop accident per year, will release tritium (290 curies per year), krypton (9,600 curies per year), and iodine (0.03 curies per year) to the atmosphere via the receiving and handling building stack.[2] While the anticipated occupational exposures and atmospheric releases are within allowable regulatory standards, both exposures and releases could be substantially greater if a higher than anticipated percentage of spent fuel is damaged in transport, if there is a greater than anticipated frequency of rod rupture during consolidation, or if there is more than one fuel assembly drop per year.

The shift of preclosure operations to the I-MRS also reduces the likelihood of more serious accidents, such as a shipping cask drop, cutting through fuel rods during disassembly, or dropping fuel rods after they have been pulled from the assembly. Drop accidents involving canisters should have smaller releases than those involving bare fuel assemblies. The elimination of the rod consolidation operations would greatly reduce the consequences of a catastrophic accident at the repository surface facilities involving fire, explosion, earthquake, tornado, airplane impact, sabotoge, or terrorist attack. The probability of a serious accident during preclosure operations is extremely low, but the potential consequence of such an event may be very high.[11,12,13]

The shift of preclosure operations could make repository siting and licensing less complex and possibly less difficult, although siting and licensing of a repository will not be easy under any circumstances. To the extent that preclosure operations can be shifted to the I-MRS, the result will be a reduction in the calculated radiological risk of repository preclosure operations. The I-MRS proposal, with the changes recommended in this paper, could reduce the radiological risks associated with routine preclosure operations, preclosure accidents at repository surface facilities, and transportation accidents. This in turn, may diminish the perceived risk associated with the repository.

I-MRS SHOULD BE SEPARATED FROM ANY DECISION REGARDING ROD CONSOLIDATION

A casual reader of DOE's I-MRS proposal could conclude that a commitment to consolidated spent fuel as the preferred waste form for geologic disposal is an inherent part of the proposal. DOE's reservations about such a commitment are found in Appendix B of Volume 2 of the draft environmental assessment.

> "The preceeding discussion was based on the assumption that consolidation of spent fuel would be performed somewhere within the waste management system. However, it has not yet been determined whether consolidation will be a required part of the system. While there appear to be some system benefits resulting from consolidtion at an MRS facility, the principal system benefit provided by an MRS facility would be the decoupling of the receipt of spent fuel into the system from the disposal of spent fuel at the repository, a benefit that would continue whether or not spent fuel is consolidated."[2]

DOE should emphasize this point prominently in Volume 1 of the I-MRS proposal.

The I-MRS proposal has established neither the need for, nor the desirability of, rod consolidation, regardless of whether consolidation is performed at the I-MRS, at the repository, or at reactor sites. A final decision regarding rod consolidation should be deferred at least five years for the following reasons:

1. There is no conclusive evidence that rod consolidation will result in better post-emplacement waste package performance, and some evidence that rod consolidation could adversely affect waste package performance. One DOE-sponsored assessment of the comparative performance of waste form alternatives concluded that "the best waste form/stabilizer combination is the intact assembly with or without end bells, vented or unvented, with solid stabilizer."[14] Other reports note that consolidated fuel may increase thermal loading to host rock, increase potential for radiation exposures to repository workers, and increase consequences of postclosure human intrusion by drilling into a canister buried in the repository.[11,12]

2. The data necessary for determining the preferred waste form for each repository candidate site will not be available until the completion of site characterization. Site characterization is not scheduled to be completed until 1991.

3. DOE has systematically overstated the technical maturity of commercial scale rod consolidation. There is no commercial experience with large-scale rod consolidation in a dry environment. Although several

at-reactor rod consolidation demonstration projects using in-pool techniques show promise, DOE has not proven the transferability of these techniques. DOE will not complete its own rod consolidation demonstration project at INEL until at least 1989. The data necessary for meaningful safety and economic analyses will probably not be available before 1990.

I-MRS SITING PROCESS IS UNACCEPTABLE

The way in which the Department of Energy selected the preferred and alternative sites for the I-MRS facility has had a significant detrimental affect on the way in which the potential repository host states view DOE's commitment to a technically objective repository siting process and has further eroded state confidence in DOE's commitment to the consultation and cooperation provisions of the NWPA.

First, the absence of early state consultation and cooperation in the I-MRS siting process has reinforced DOE's reputation for poor state involvement, and eroded the gains achieved through extensive state participation in the second repository program. DOE did not notify Tennessee or other affected states prior to consideration of potential sites in those states. Until the I-MRS site designations became public knowledge, DOE continued to tell the repository states, and members of Congress, that the I-MRS proposal would contain generic site recommendations, not specific site designations. The result is a further decline of state confidence in the consultation and cooperation process, and greater reliance upon litigation.

Second, DOE's failure to employ an objective methodology for I-MRS comparative site evaluations has undermined state confidence in the technical objectivity of the repository siting process. The I-MRS siting report describes the final decision:

> "In the fourth step of the siting process, the OCRWM Director, in consultation with his Executive Assistant Associate Directors and their Deputies, selected from among the sites those at which he believed an MRS facility could most successfully be deployed. Among the factors considered were: the desirability of existing federal ownership; existing proximate nuclear infrastructure and an experienced technical community; current, substantial data bases; simplicity of construction at the site; low relative capital cost and proximity to existing interstate highway and rail networks. The Director identified the Clinch River site as the preferred site and the DOE Oak Ridge Reservation and the TVA Hartsville Nuclear Plant site has alternative sites for further evaluation."[15]

The process described above not only undermines state confidence, but provides a major basis for the State of Tennessee's legal challenge.

Finally, DOE's I-MRS location decision process completely ignored the second repository program. *Failure* to consider the role of I-MRS in a two-repository system weakens DOE's argument that the I-MRS will improve system economics and transportation planning.

I-MRS RAISES PUBLIC CONCERN ABOUT DIVERSION OF CIVILIAN SPENT FUEL TO NUCLEAR WEAPONS

The I-MRS proposal has triggered surprisingly strong and widespread public apprehension that DOE might be planning to facilitate the use of civilian spent fuel for nuclear weapons production. While there is no public evidence that DOE plans to use the I-MRS facility in such a way, DOE must acknowledge and respond to this public concern. DOE will have to convince the Congress on this point as well.

The following factors seem to account for this public concern:

1. A belief that the current administration's nuclear weapons program will require more plutonium than can be produced by military production reactors;

2. A belief that the I-MRS proposal will weaken the federal commitment to geologic disposal;

3. A belief that disassembly and consolidation of spent fuel at the I-MRS would facilitate reprocessing, based in part on the assumption that the technology proposed for the I-MRS was originally developed for the proposed Barnwell nuclear reprocessing plant; and

4. A belief that selection of the Clinch River site near Oak Ridge was based in part on past weapons work at Oak Ridge and the close geographic proximity of Oak Ridge to the Savannah River Plant.

Fear of an I-MRS military linkage also appears to be related to a general belief that there is little meaningful separation between the military and civilian nuclear programs at DOE, a view reinforced by the recent Presidential decision in favor of co-disposal of defense high-level waste in civilian repositories. There is also concern that the current statutory prohibition on military use of civilian spent fuel may not apply after DOE formally assumes title to the spent fuel. If the I-MRS proposal is to succeed, DOE must provide assurances to the Congress and to the public that civilian spent fuel from the I-MRS will never be used for weapons production.

RECOMMENDATIONS

The following changes to DOE's I-MRS proposal are recommended to improve the integration of the overall high level radioactive waste management system; to facilitate the siting and licensing of a geologic repository; and to provide a backup system in the event that geologic disposal proves technically infeasible.

1. Eliminate those provisions of the DOE proposal that restrict the availability of the I-MRS as a backup system for geologic disposal. Increase the I-MRS capacity limitation to 45,000 MTU. Eliminate the linkage between waste acceptance at the I-MRS and U.S. Nuclear Regulatory Commission issuance of a construction authorization for the first repository.

2. Establish new restrictions to prevent the I-MRS from becoming a permanent disposal facility. Institute a maximum residence time limit of 15 years for spent fuel storage at the I-MRS. Limit the operating life of the I-MRS facility to 40 years, with no provision for license renewal and a requirement that decommissioning begin at the end of the operating life.

3. Optimize the transportation system for shipment of spent fuel from reactors to the I-MRS. Make maximum use of rail transportation, develop larger rail shipping casks, and marshall shipments where practical to reduce the total number of shipments.

4. Maximize the shift of preclosure operations away from the repository to the I-MRS. Ship western as well as eastern reactor fuel to the MRS for canistering and storage. Reconsider final packaging for disposal for all civilian spent fuel at the I-MRS. Package all defense high level radioactive waste for final disposal at the defense facilities prior to direct shipment to the repository by dedicated trains.

5. Defer any decision on rod consolidation until 1991. Continue to plan for an I-MRS facility which would have rod consolidation capability. Make no decision on rod consolidation until sufficient site specific data is available to justify selection of a preferred waste form.

6. Repeat the site selection process for the I-MRS. Reexamine and possibly expand the original list of sites. Comparatively evaluate sites according to a technically objective screening methodology. Involve potential I-MRS host states fully in the site evaluation process. Consider location of the proposed potentially acceptable sites for the second repository, as well as the candidate sites for the first repository.

7. Elmininate all linkage between the I-MRS and DOE nuclear weapons programs. Prohibit military use of any spent fuel stored at the I-MRS. Eliminate any I-MRS involvement in the packaging, storage, or transportation of defense high level nuclear waste.

8. Incorporate the I-MRS proposal in the repository siting program. Address the implications of I-MRS for repository site selection in the environmental assessments for the first repository and in the area recommendation report for the second respository. Reconsider the relative weight placed upon pre- and post- closure siting guidelines, and re-evaluate rail transportation routes between the I-MRS and repository sites.

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