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REVIEW OF DRY SPENT FUEL STORAGE EXPERIENCE

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SUMMARY

Spent fuel integrity may be affected by a series of operations: initial fuel fabrication; reactor service; wet storage; rod consolidation; handling; transport; interim dry storage; packaging; and monitored retrievable storage (MRS). As spent fuel moves through this series of operations toward disposal and/or reprocessing, it is important to assess how each operation affects the integrity of the fuel because its integrity must be preserved to the extent that the fuel is retrievable and meets acceptance criteria of successive storage, reprocessing, or disposal system installations.

Wet storage is presently the only licensed method in the United States for storing light-water reactor (LWR) spent fuel. Rod consolidation and dry storage concepts are currently being evaluated in the United States. Spent fuel integrity in interim dry storage and MRS is approached by maintaining the fuel temperature below conservative limits established by tests and demonstrations with spent fuel performed by U.S. and foreign organizations. The spent fuel is stored in a nonreactive gas environment to prevent oxidation of the UO_2 fuel. The storage system is monitored to assure that the protective environment is maintained, until the temperature is too low for significant UO_2 fuel oxidation. These operational procedures assure that acceptance criteria for repositories and/or reprocessing will be met. Directions in interim dry storage concepts in the United States are being formulated by cooperatively conducted DOE and utility demonstrations. These demonstrations provide valuable experience for verification of the integrity of spent fuel during dry storage.

This paper summarizes current experience with spent fuel integrity during fuel cycle operations.

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INTRODUCTION

Spent fuel integrity in storage is an important consideration, bearing on retrievability and handling, if spent fuel is repackaged or reprocessed. The significance of cladding integrity, if fuel is placed in repositories, is still the subject of investigation. Spent fuel integrity during subsequent operations may be affected by each operation to which spent fuel is subjected. Fabrication specifications may affect fuel condition after reactor service and the stresses and potential for degradation during storage. Reactor service also determines the fuel condition as it enters storage. Time in wet storage affects the ability of the spent fuel to meet acceptance criteria, such as thermal loads, for interim dry and monitored retrievable storage (MRS).

This report reviews interactions between spent fuel operations and describes how issues are being resolved. Pacific Northwest Laboratory (PNL) work that is described is sponsored by the Commercial Spent Fuel Management Program Office and supported by the U.S. Department of Energy (DOE) under Contract DE-AC06-76RLO 1830. PNL is operated for DOE by Battelle Memorial Institute.

SPENT FUEL OPERATIONS

Spent fuel progresses through several operations from initial fabrication to final disposal or reprocessing. The integrity in each operation depends on characteristics imposed in preceding operations. Potential operations affecting spent fuel integrity are shown in Figure 1 and include:

- fuel fabrication
- reactor service
- wet storage
- rod consolidation
- fuel handling
- transport
- interim dry storage
- packaging
- monitored retrievable storage
- reprocessing
- repository disposal.

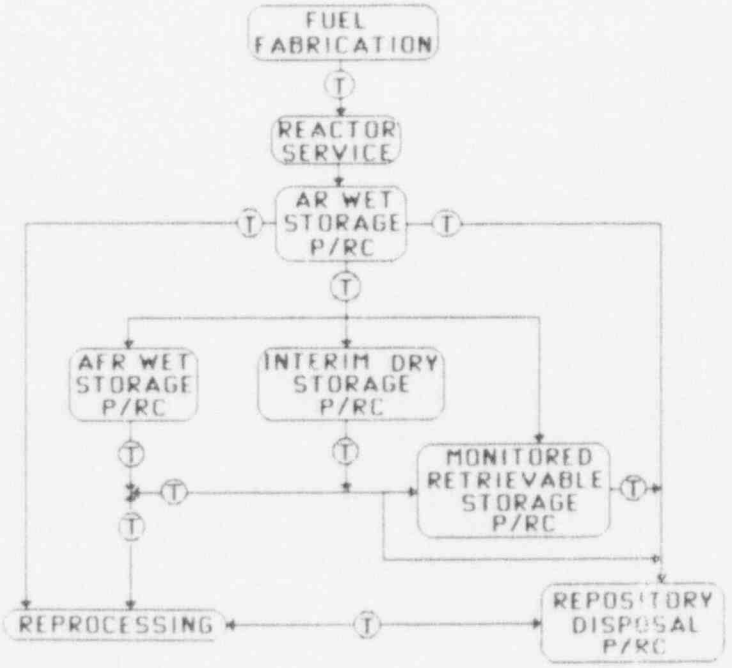


FIGURE 1. Spent Fuel Operations

Spent fuel integrity is determined by the sum of the events that occur in all preceding operations. All spent fuel assemblies are not subjected to the same operations. This paper summarizes integrity considerations in each operation.

FUEL FABRICATION

Procedures followed during fuel fabrication have a significant effect on fuel integrity from reactor service to reprocessing or repository disposal. Cladding mechanical properties differ from vendor to vendor based on procedures for Zircaloy tube manufacturing. Zircaloy cladding properties are controlled by composition (Zircaloy-4 is more resistant to hydriding than Zircaloy-2), thermal treatments (annealed Zircaloy has lower strength than stress-relieved Zircaloy), and prefilm treatment. As indicated in Figure 2, fuel rod internal pressurization was increased from 1 atmosphere (atm) to 20 to 35 atm for pressurized water reactor (PWR) fuel in the early 1970s and from 1 atm to 4 to 6 atm for boiling water reactor (BWR) fuel in the late 1970s. The higher pressures in the later spent fuel increases the hoop stresses on the cladding. These stresses are too low to produce creep rupture in cladding without large incipient cracks at interim dry storage and MRS temperatures. The addition of gadolinia burnable poison affects properties of the UO_2 fuel.

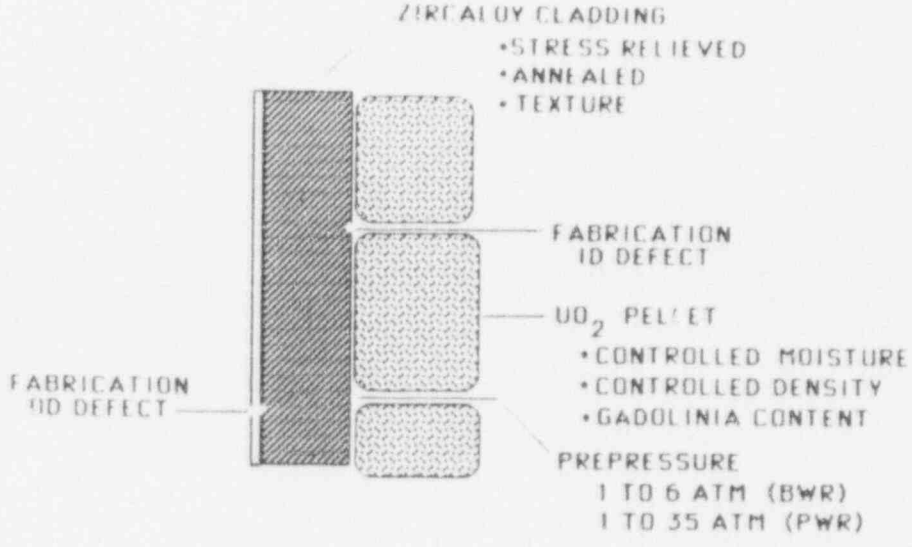


FIGURE 2. Fuel Rod and Fabrication Considerations

REACTOR SERVICE

Irradiation produces changes in the properties and integrity of spent fuel that may affect storability. The cladding strength is increased while the ductility is decreased by irradiation. The rod internal pressure increases by 20 to 35 atm for typical BWR and PWR fuel due to fission gas formed during irradiation. Approximately 2 at.% fission products develop in the fuel for each 10,000 MWd/MTU of burnup. UO_2 pellets crack due to thermal stresses associated with changes in reactor power. Localized fission product releases at fragment/cladding interfaces can lead tc incipient or through-wall cracks in the cladding if localized stresses become sufficiently high. Early fuel rod failure rates approached averages on the order of 1% (Garzarolli, von Jan, Stehle 1979). Currently, the rates are typically four or five rods per year for a 1000-MW (electrical) reactor (Bailey et al. 1981; Roberts 1980). It is estimated from published information (Funk and Jacobson 1979) that there are over 2500 light-water reactor (LWR) fuel assemblies that contain one or more defective fuel rods (Bailey et al. 1984). Most of these cladding breaches are pinhole leaks or small cracks. A few rods contain large cladding defects that are easily detected and can be given special consideration during handling and packaging prior to shipment and storage. Failed rods have greater potential for radioactive release during shipping and storage.

Oxide coatings up to 100 microns thick and radioactive deposits up to 75 microns thick (principally oxides of iron and nickel) form on the cladding during irradiation (Figure 3). These coatings carry fission products adsorbed from the reactor coolant that can be released during heating in a dry storage atmosphere (Johnson and Gilbert 1983).

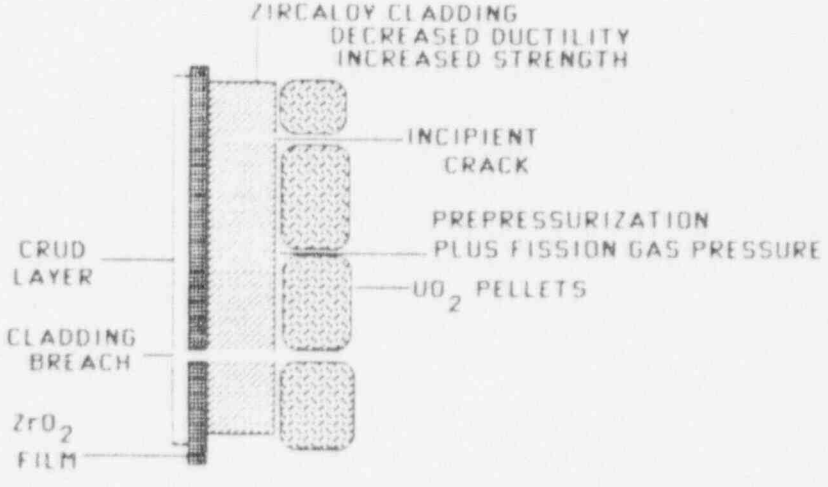


FIGURE 3. Effects of Reactor Service on LWR Fuel Rods

WET STORAGE

Wet storage is currently the only licensed management method for LWR spent fuel in the United States. It is expected to remain the primary mode for storage of spent fuel, as freshly discharged fuel replaces older fuel that is removed for dry storage and eventually for reprocessing or disposal in repositories (U.S. Department of Energy 1984). The projected requirements for domestic LWR spent fuel storage beyond pool storage is shown in Figure 4.

No significant integrity issues have surfaced from wet storage of spent fuel. As shown in Figure 5, a reactor-induced defect examined over a 7-year period in wet storage showed that the defect did not enlarge. The principal source of radiation dose to pool operators is particulate species in the pool water. There is some evidence that crud layers (radioactive oxide deposits overlaying the zirconium oxide film on the cladding exterior) loosen during wet storage (Johnson et al. 1982). The loosening appears to be enhanced by dry shipment, dry handling, or dry sipping (i.e., leak testing under dry conditions) (Bailey et al. 1984). Pool cleanup systems control the mobile radioactive species to satisfactory levels. All types of LWR spent fuel have been stored in pools, including fuel with reactor-induced cladding breaches (Johnson et al. 1982.) No cladding or fuel degradation has been detected by surveillance activities for storage times up to 23 years (Bailey et al. 1984; International Atomic Energy Agency 1982).

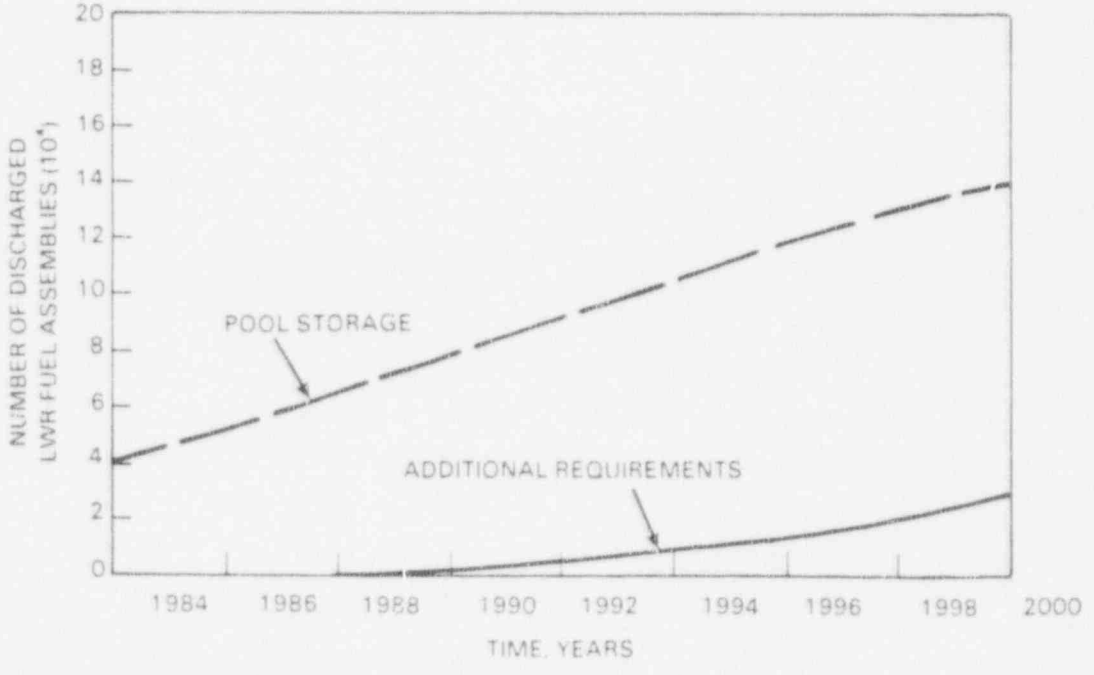


FIGURE 4. Projected Requirements for Domestic LWR Spent Fuel Storage Beyond Pool Storage (EIA midcase: maximum at-reactor capacity; U.S. Department of Energy 1984)

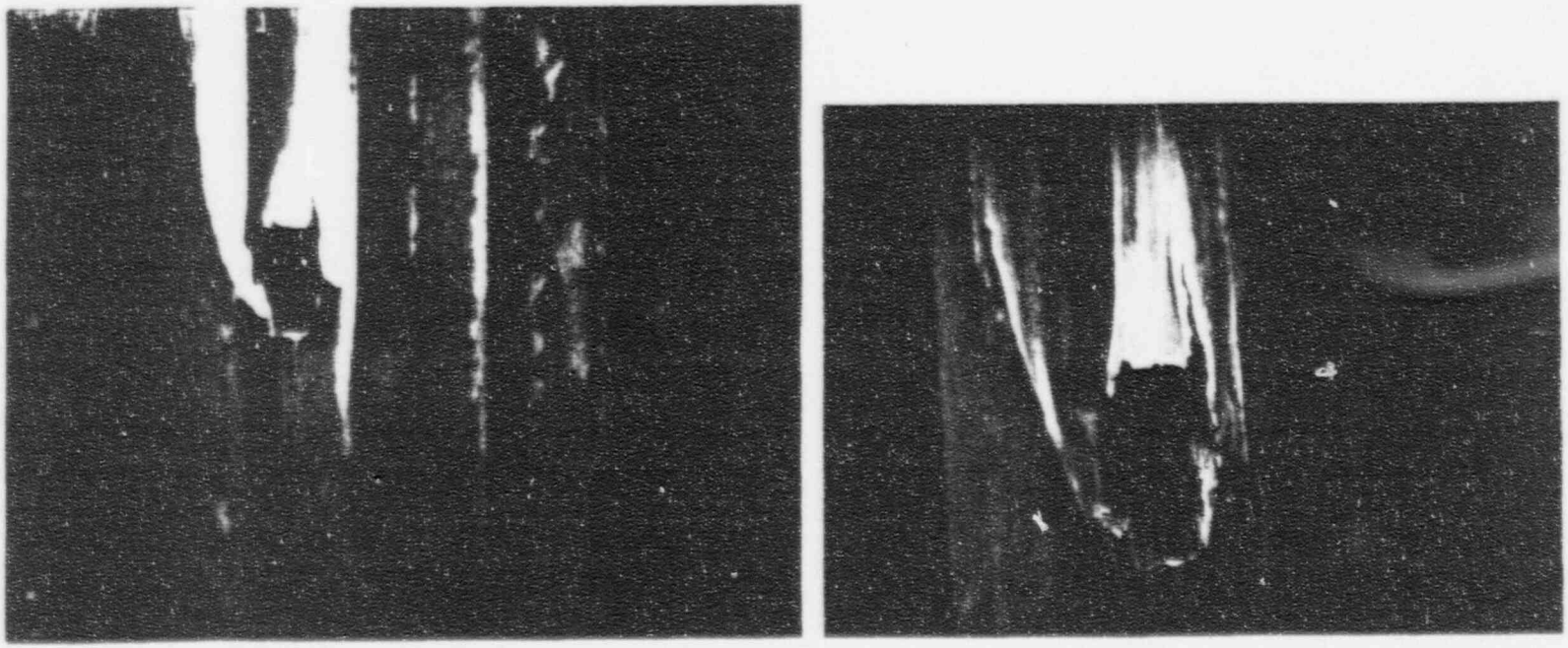


FIGURE 5. Photographs of Reactor-Failed PWR Fuel Showing No Breach Enlargement During 7 Years of Wet Storage

Minor problems that have been encountered during wet storage of LWR spent fuel have been associated with cask and fuel assembly handling operations, pool maintenance operations, and aging of pool components such as liners, racks, and piping (Bailey et al. 1984). Intergranular stress corrosion cracking (SCC) of Type 304 SS sleeves welded to the top nozzle and mechanically joined to Zircaloy control rod guide thimbles was identified by Westinghouse Electric Corporation as the cause of separation of the top end fitting (nozzle) from the remainder of a PWR (Prairie Island-1) fuel assembly as it was being lifted from a storage rack in the pool. No radioactivity was released, and no fuel damage occurred. Extensive examination of similar assemblies of this type at various plants revealed that this failure was an isolated occurrence. The U.S. Nuclear Regulatory Commission (NRC) concluded that the Prairie Island fuel assembly corrosion is an isolated incident and does not have generic impact (Denton 1983). A detailed compilation of notable License Events Reports (LERs) has been prepared (Bailey et al. 1984).

Surveillance of spent fuel integrity during wet storage is being continued by U.S. utilities through the Electric Power Research Institute (EPRI) to determine possible effects on handling and storage of spent fuel from: 1) extended burnup, hydrogen injection at BWRs, and rod consolidation operations; 2) extended pool exposure of neutron-absorbing materials; 3) cracking of spent fuel storage pool piping at PWRs; and 4) control of impurities in spent fuel pool waters.

ROD CONSOLIDATION

Reconstitution operations are routinely performed on BWR and PWR fuel in the United States. Several thousand domestic and foreign assemblies have been successfully reconstituted. During handling operations in the United States and other countries, 35 assemblies were dropped, a few fuel rods were broken, and some fuel rods were dropped. These occurrences have been infrequent, and nearly all resulted in only minor or negligible effects on spent fuel storage operations (Bailey et al. 1984). This experience has favorable implications for rod consolidation.

As shown in Figure 6, rod consolidation involves removing fuel rods from the LWR assembly and placing the rods in a close-packed array in a canister. The first U.S. consolidation of spent fuel was demonstrated with four PWR fuel assemblies at the Oconee Nuclear Station in 1982 (Bassler 1984). Consolidation of a PWR Maine Yankee fuel assembly was completed in 1983 (Westinghouse Electric Corporation 1984). The NRC granted approval to Maine Yankee to consolidate up to 20 fuel assemblies (Heitner 1984). Four rod consolidation demonstrations are planned involving spent fuel (Daily 1984). Twelve spent BWR fuel assemblies will be consolidated at the Browns Ferry Nuclear Power Plant under a cooperative agreement between DOE and the Tennessee Valley Authority (TVA). Northeast Utilities Service Co. (NUSCO), supported by EPRI and Baltimore Gas & Electric Co., plans to consolidate 5 to 10 spent PWR fuel assemblies at Millstone-2. DOE/utility cooperative dry storage demonstrations with consolidated spent fuel are being planned (McKay and Smith 1984; Kunita and Massey 1984).

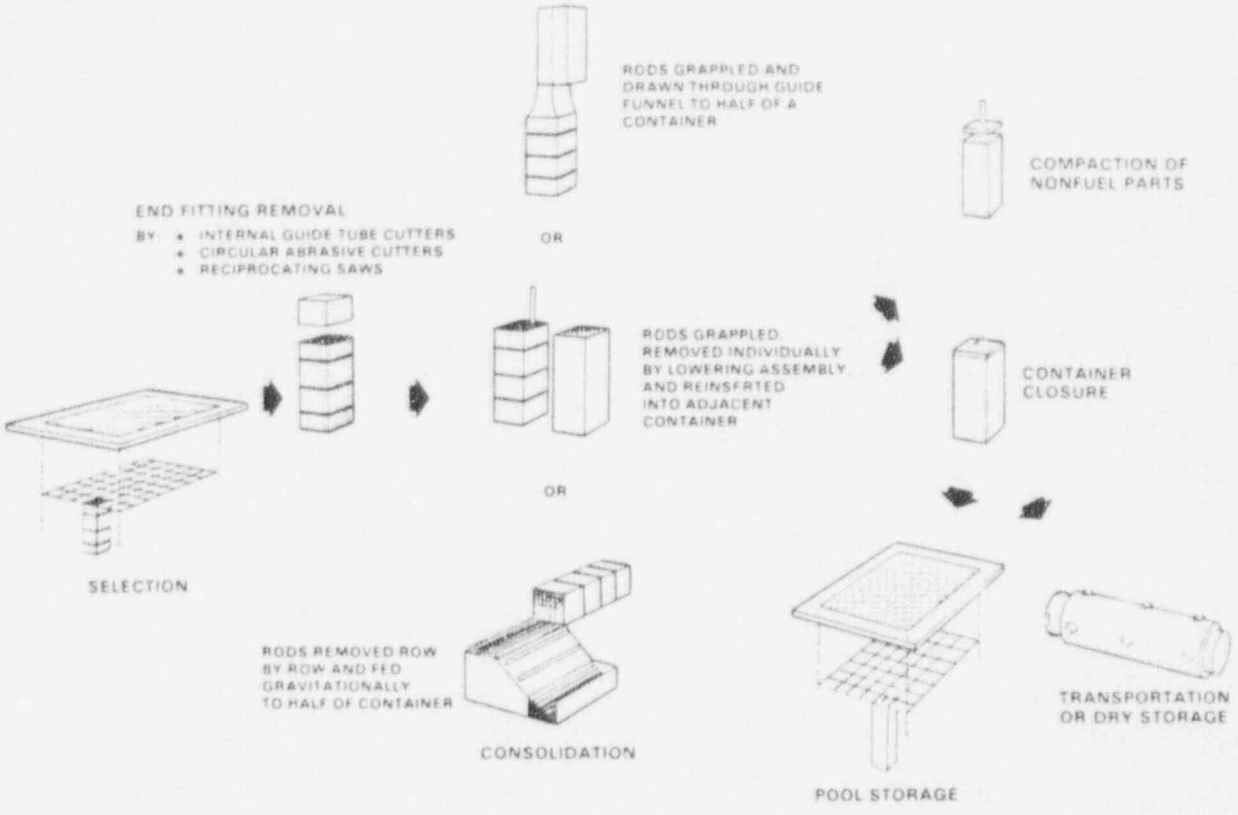


FIGURE 6. Removal of LWR Spent Fuel Rods from Assembly Configuration and Placement into a Close-Packed Array in a Canister

The single most significant issue regarding rod consolidation is not fuel integrity, but economics. Consolidated spent fuel is the reference configuration for MRS and for repositories. Whether it will be economically attractive for wet and interim dry storage may depend on development and demonstration of low-cost consolidation processes. Spallation of crud from Oconee-2 fuel rods during the rod consolidation demonstration by Duke Power Company and Westinghouse Electric Corporation (Bassler 1984) retarded operations until a cloud of crud dispersed. Crud could have an adverse effect on rod consolidation operations if it were sufficiently loose to accumulate on and/or abrade the surfaces that guide the fuel rods into the consolidated rod container (Bailey and Johnson 1982). During a fuel reconstitution campaign in Sweden (Vesterlund and Olsson 1978), a vacuum device was used to collect the crud that came loose when the fuel rods were drawn through the spacer grids. Whether fuel accountability can be on a canister basis or has to be on a rod basis is a rod consolidation issue that remains to be resolved with the regulatory agencies. Rod breakage and criticality questions appear to be manageable. Increased temperatures due to closer packed rods are being addressed by thermal analyses and both wet and dry storage demonstrations with spent fuel.

FUEL HANDLING

Tens of thousands of LWR fuel assemblies have been moved during normal handling operations at commercial power reactors and independent spent fuel storage facilities in the United States (Bailey 1983). Very few assemblies suffered significant mechanical damage from handling operations or are known to have sustained damage from normal transport. Experience with handling operations at spent fuel storage pools demonstrates that reactor-failed fuel and inadvertent broken rods can be accommodated (Bailey et al. 1982). As shown in Table 1, most of the unusual occurrences were associated with reactor refueling operations. Less than 10% were associated with spent fuel storage pools. Very few assemblies suffered major mechanical damage due to handling operations and very few assemblies suffered damage from normal transporting operations. Most fuel damage during handling occurred with no breaching of the cladding, only minor damage to fuel bundle components, and no release of radioactive gas or solids.

TABLE 1. Fuel Damage During Spent Fuel Operations (Bailey 1983)

Operation	Fuel Bundles	
	BWR	PWR
Receiving new fuel	-	<7
Refueling reactor core	>21[a,b]	232[c,d]
Spent fuel pool storing and handling	16	13
Transporting spent fuel	-	<14
Post-shipment handling	>4	>5
TOTAL	>41	271[e]

[a] Includes one new fuel bundle.
[b] Includes >17 foreign fuel bundles.
[c] Includes 7 new fuel bundles.
[d] Includes >39 foreign fuel bundles.
[e] Spacer grids were damaged in >173.

TRANSPORT

One dry shipment of four SS-clad PWR fuel assemblies from SENA (Chooz) in France resulted in radionuclide releases. The spent fuel assemblies appeared to be intact prior to shipment but were from a lot that had experienced fuel failures during reactor service (Johnson et al. 1980; Bailey et al. 1982; Bailey and Langstaff 1980). Airborne contamination was released during underwater unloading of a shipment of a Connecticut Yankee (Haddam Neck) fuel assembly that contained reactor-failed fuel rods (Klingensmith

1980). Further degradation of the fuel was believed to have occurred from oxidation during transit. The NRC has imposed requirements to can reactor-failed fuel and inert dry spent fuel shipping casks to prevent UO_2 oxidation from releasing radionuclides within shipping casks (Davis 1984; Teer 1984).

Approximately 1000 dry shipments (2000 tU) of Zircaloy-clad spent fuel have been completed in Europe and from Japan to European reprocessing plants. Some of these have extended up to nearly 4 months with cladding temperatures up to 385°C (Teer 1984). About 4550 BWR and PWR assemblies have been moved without incident, using nitrogen as the shipping cask atmosphere. During sea transport, the fuel remains horizontal for 2 to 3 months. Within the United States, there have been over 1500 LWR fuel shipments (about 900 tU; over 4100 fuel assemblies).

INTERIM DRY STORAGE

Interim dry storage (20 to 40 years) is a viable storage mode that complements wet storage. It has been licensed in the Federal Republic of Germany (FRG), Switzerland, and Canada. It requires less maintenance than pool storage and provides the option of modular expansion. Uncertainty about creep rupture of spent fuel cladding due to the internal gas pressure and UO_2 oxidation appeared as issues concerning allowable dry storage conditions; however, recent assessments (Johnson and Gilbert 1983) and experimental studies (Gilbert, White, and Knox 1984; Einziger and Strain 1984; Olsen 1984) have helped to resolve uncertainties and define conditions for acceptable dry storage.

Experience with dry storage in concrete silos, dry wells, metal casks, and vaults is described in Tables 2 through 5. Fuel conditions are shown schematically for a metal storage cask in Figure 7. A conservative cladding temperature guideline of 380°C has been recommended for interim dry storage in inert gas (Johnson and Gilbert 1983). An inert cover gas prevents fuel rod degradation of reactor-breached fuel as shown in Figures 8 and 9. No mechanisms are known for fuel to degrade in a nonreactive atmosphere. Over 15,000 spent fuel rods have been included in dry storage tests and demonstrations, with over 6000 rods monitored for cladding breaches. Only one spent fuel rod has failed during dry storage (Johnson and Gilbert 1983). The cause of that failure is under investigation.

Temperatures up to 450°C are not expected to lead to unacceptable cladding degradation. Dry storage tests and demonstrations involving Zircaloy-clad fuel are under way to determine if cladding temperatures above 380°C during dry storage can be supported. Temperatures up to 450°C during fuel drying and dry storage insertion operations are considered to be conservative since these operations require only short periods of time and impose acceptably small increments of cumulative creep rupture damage to the cladding. The storage system is monitored to assure that the protective environment is maintained until the temperature is too low for significant UO_2 oxidation.

TABLE 2. Dry Storage Experience in Concrete Silos

LOCATION	FUEL TYPE	OPERATIONAL HISTORY
		64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84
NEVADA TEST SITE - EMAD	PWR	
WASHINGTON-HANFORD	ELECTRIC	
CANADA-WNRE	WR-1	
(13 CONCRETE CANISTERS	PHWR	
IN PLACE - 1984)	ELECTRIC	

TABLE 3. Dry Storage Experience in Dry Wells

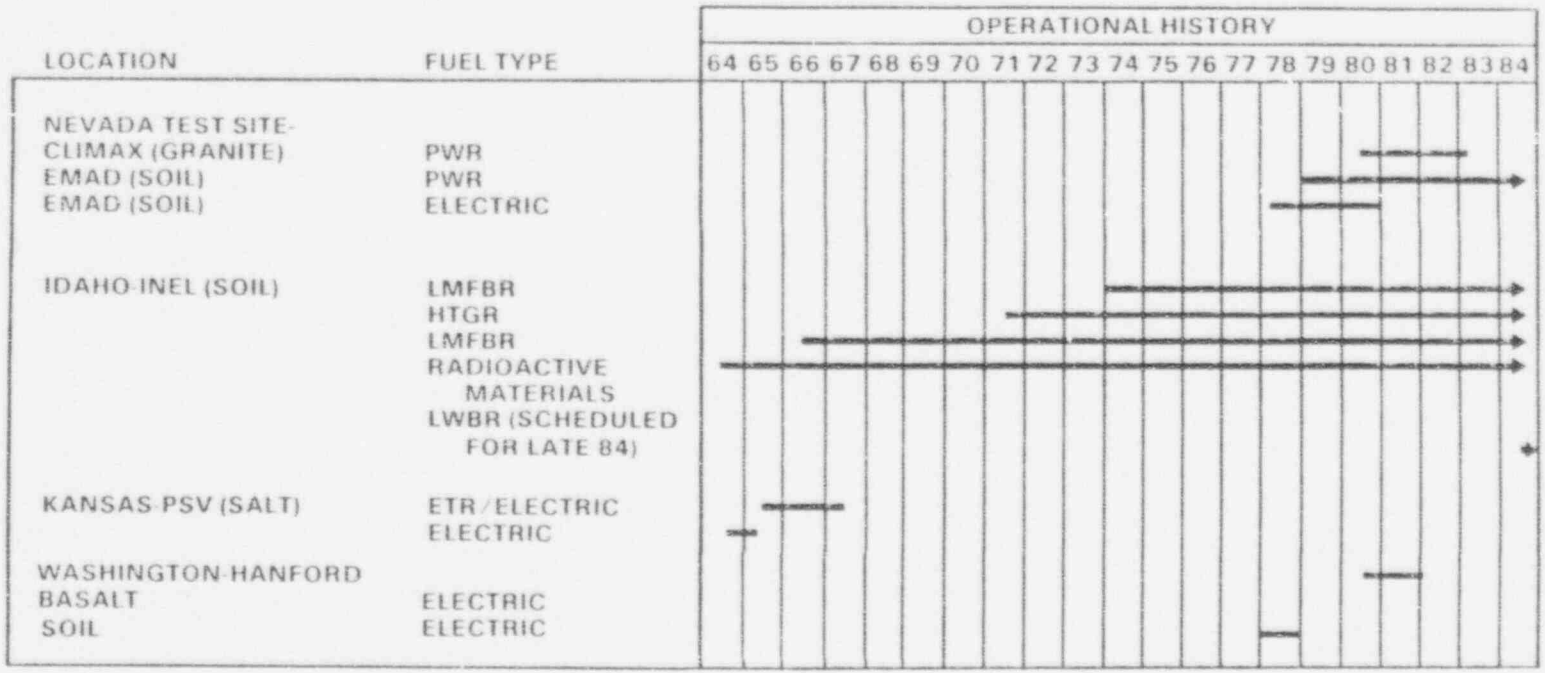
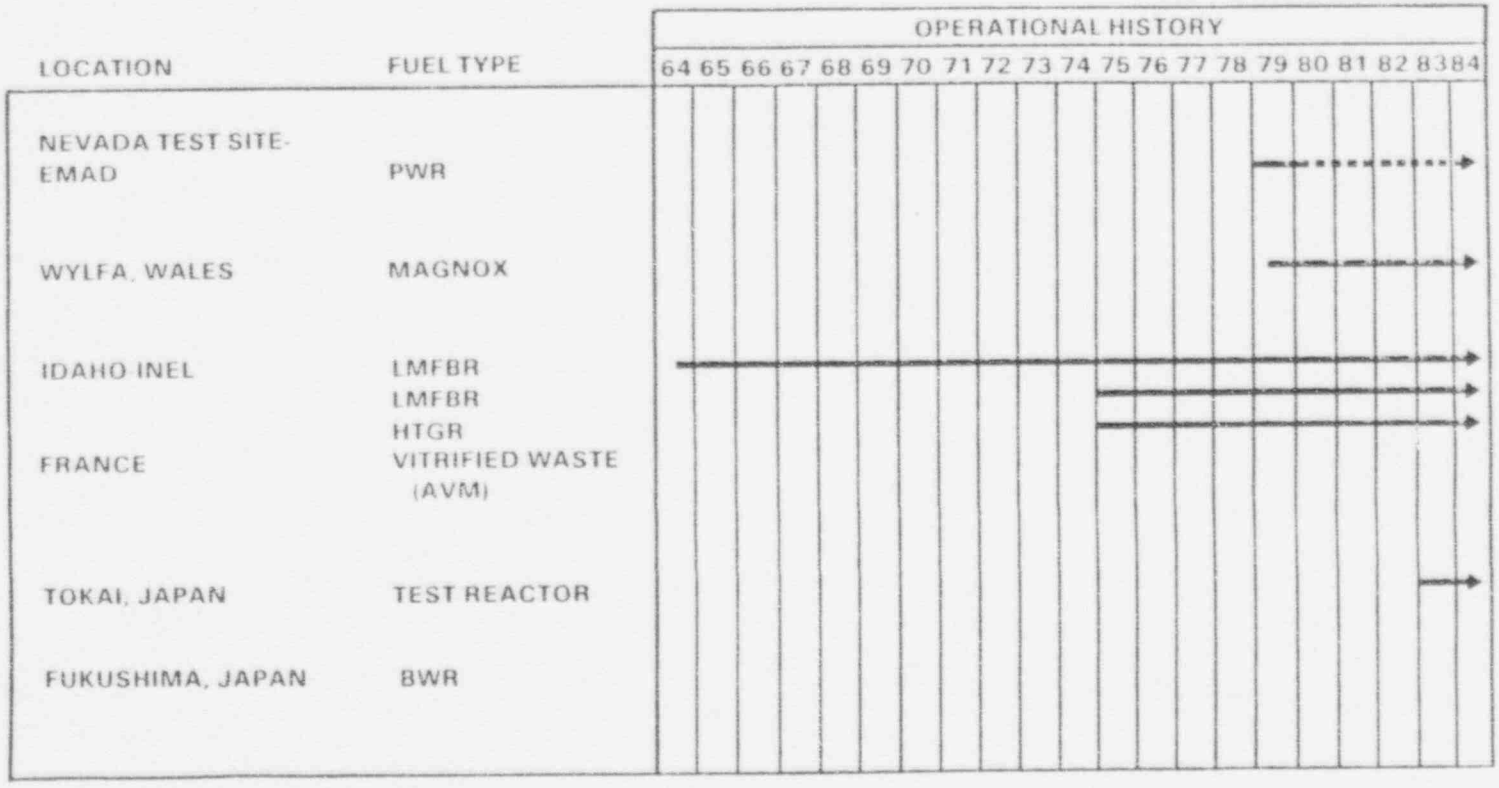


TABLE 4. Dry Storage Experience in Metal Casks

LOCATION	CASK TYPE	FUEL TYPE	OPERATIONAL HISTORY 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84
FRG WUERGASSEN	CASTOR Ic	BWR	
FRG JULICH	TN	GCR (AVR)	
FRG JULICH	CASTOR Ia	PWR	
FRG KARLSRUHE	CASTOR Ib	PWR	
FRG BIBLIS	TN 1300	PWR	
FRANCE	CASTOR SPX	FBR	
USSR LENINGRAD	CASTOR V	PWR	
USA - GE MORRIS	REA 2023	BWR	
SWITZERLAND WUERENLINGEN	CASTOR Ic	TEST REACTOR	

TABLE 5. Dry Storage Experience in Vaults



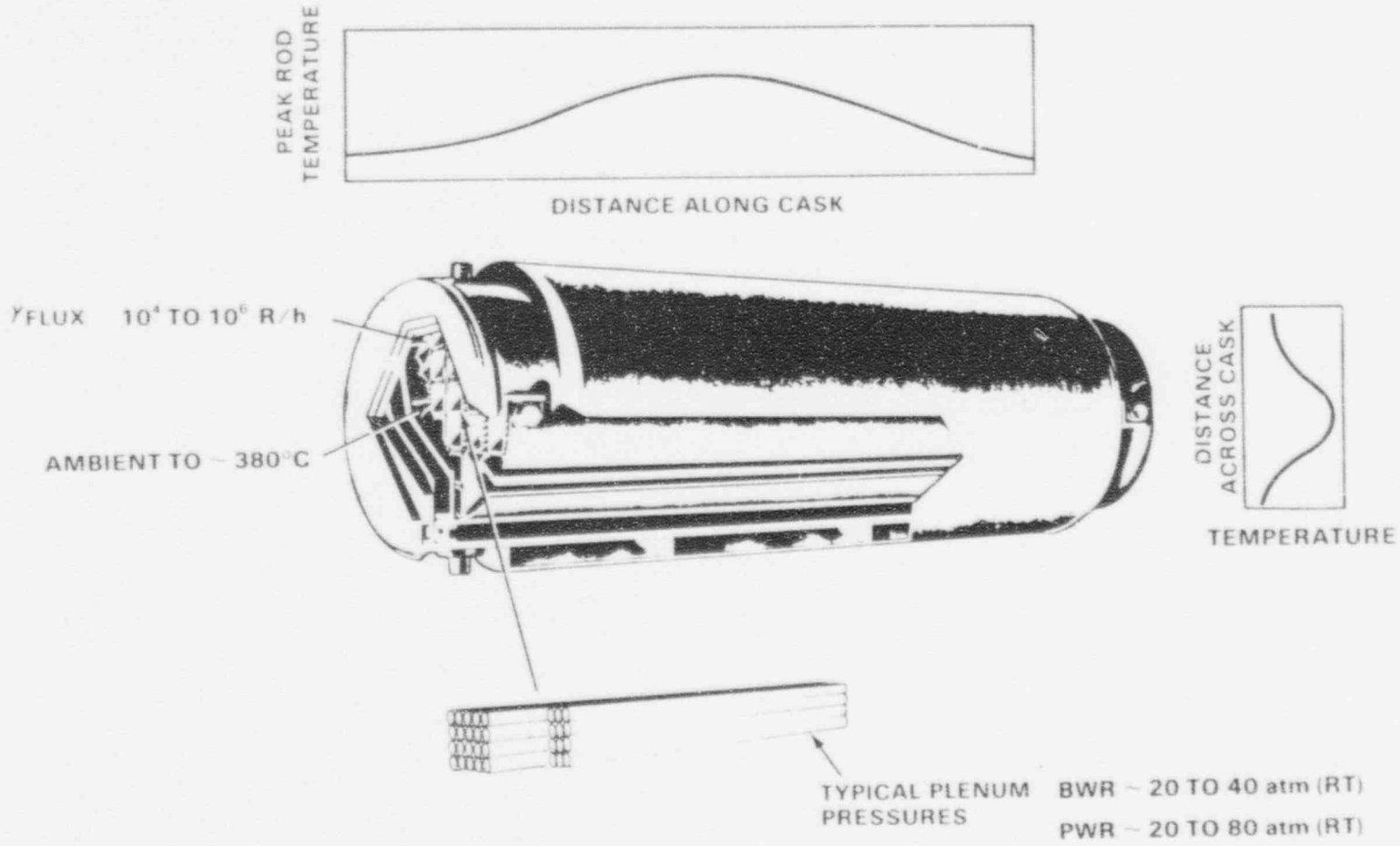
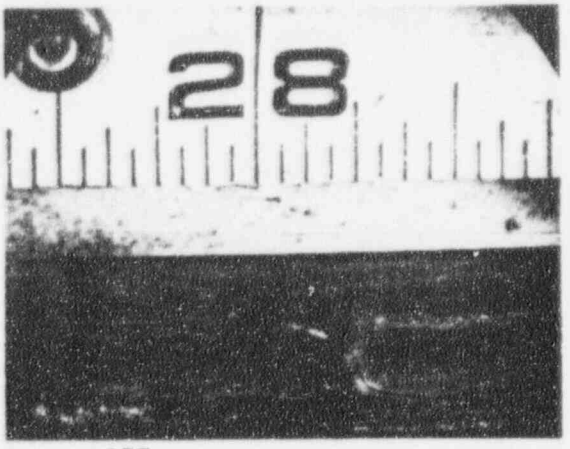


FIGURE 7. Conditions in Metal Storage Casks



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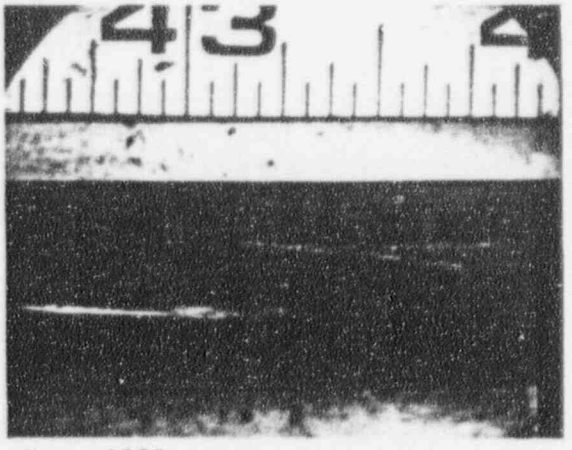
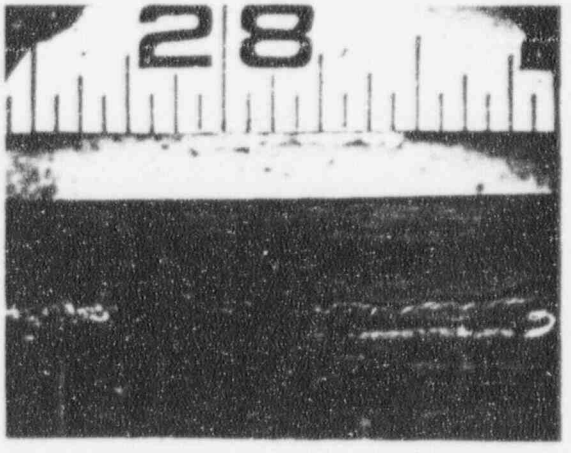


Neg. A383

a) Before Testing in Argon



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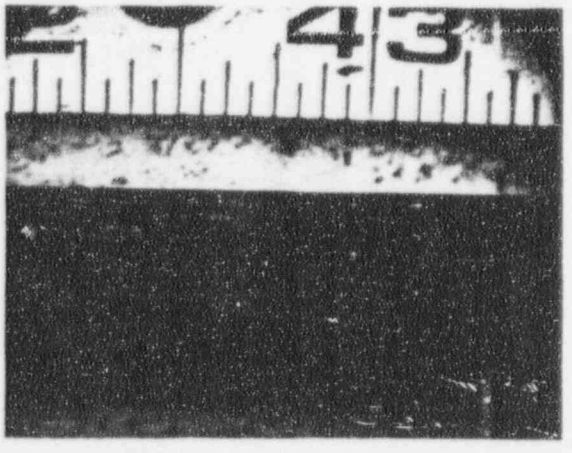

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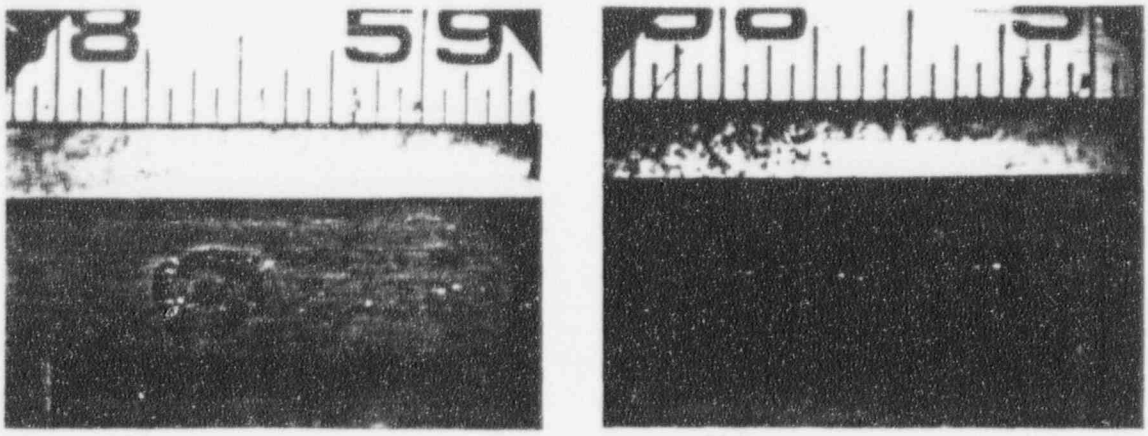
b) After Testing in Argon

FIGURE 8. Test Demonstrating Integrity of Reactor-Induced Breaches in Spent Fuel Rod Before and After Testing in Argon for 2100 h at 325°C



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a) Before Testing in Argon b) After Testing in Argon

FIGURE 9. Test Demonstrating Integrity of Reactor-Induced Hydride Breach in Spent Fuel Rod Before and After Testing in Argon for 2100 h at 325°C

PACKAGING

Canned spent fuel is the reference configuration for MRS, repositories, some interim dry storage concepts (Kunita and Massey 1984), and shipping of failed spent fuel (Davis 1984; Teer 1984). Spent PWR fuel placed in SS canisters (Figure 10) filled with He has been stored at the Nevada Test Site since 1978 (Dobbins 1983). At least two away-from-reactor pools, the Savannah River RBOF pool and the Windscale B-27 pool, store defective and nondefective fuel in semiclosed canisters (IAEA 1982). Special packaging is being considered to assure that total containment is achieved during the first 1000 years after repository closure.

MONITORED RETRIEVABLE STORAGE

The Nuclear Waste Policy Act of 1982 required the preparation of a proposal to develop MRS facilities to store commercial spent fuel and high-level waste. MRS facilities are being designed to accommodate spent fuel in the dry mode for 40 years: the life of the facilities can be extended by maintenance and replacement of components. The potential for fuel oxidation during MRS is precluded by storing the spent fuel in sealed canisters containing an inert cover gas. A 375°C cladding temperature limit has been proposed to prevent creep rupture. MRS system designs include sealed concrete storage casks and field dry wells.

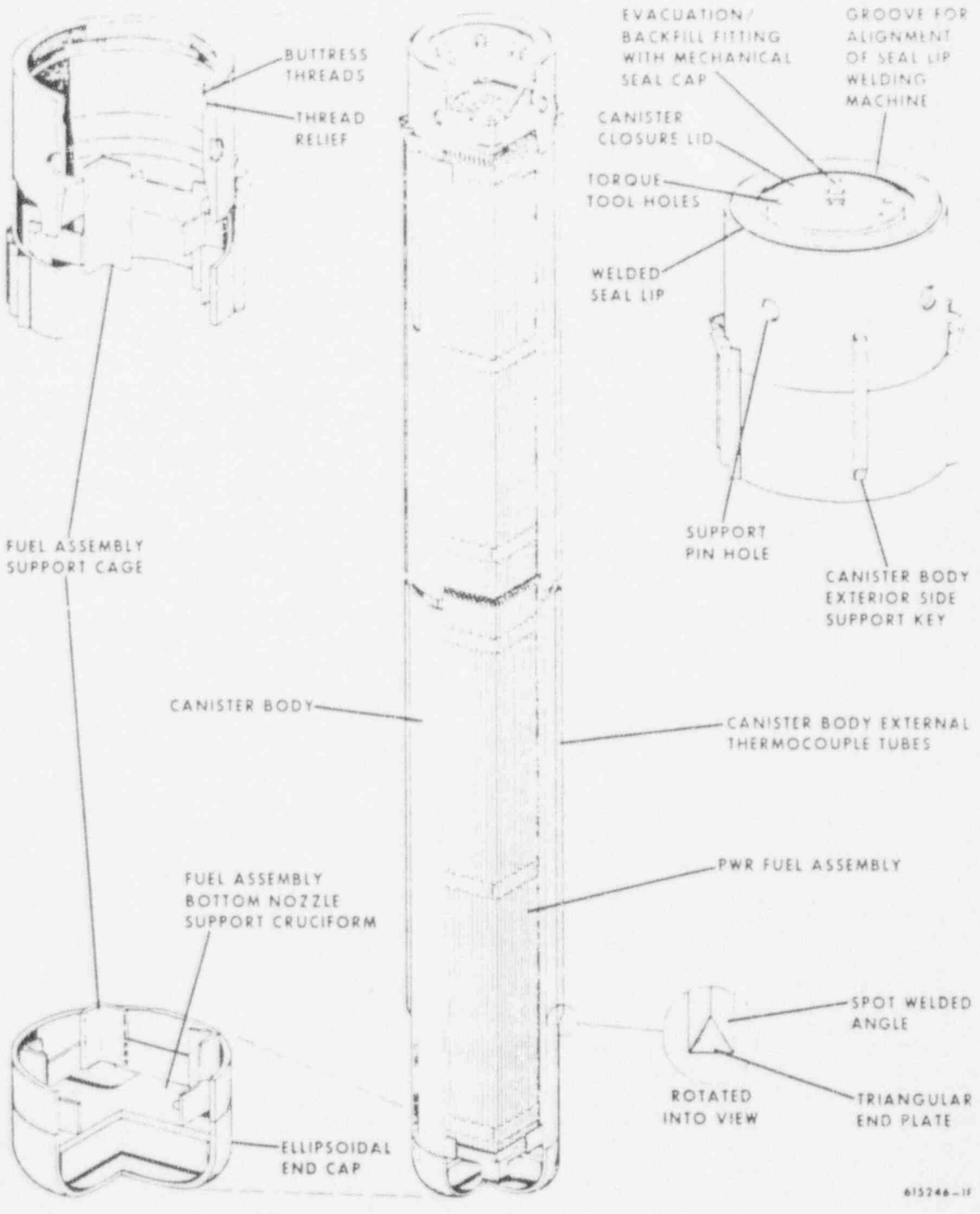

FIGURE 10. Spent Fuel Canister Used for Dry Storage of LWR Spent Fuel at the Nevada Test Site (Unterzuber and Hanson 1981)

REPROCESSING

Spent fuel is reprocessed in several countries (Mellinger, Harmon, and Lakey 1984) including Japan (Sasaki and Kitano 1982), the United Kingdom, and France (Gloaguen and LeSoeur 1984). Commercial spent fuel has not been reprocessed in the United States during the last decade. Reprocessing facilities can be designed to accept canistered fuel if the canister design and materials are properly selected. Fuel shearing equipment is available to handle a SS canister of square cross section with 1/8-in. (3-mm) thick walls, even with consolidated fuel. Low alloy steel canisters would contaminate reprocessing solutions with iron, complicating the storage of waste processing solutions. Stainless steel, however, has low corrosion rates in reprocessing solutions and thus does not add aggressive ions to the solution.

The effect of degraded spent fuel on reprocessing depends on how the fuel is handled at the reprocessing facility. Failed fuel with SS cladding has been accepted for reprocessing by the Nuclear Fuel Services reprocessing plant. Reprocessing of commercial spent fuel in the United States does not appear to be likely in the near term and will probably not be implemented until the economics appear favorable.

REPOSITORY DISPOSAL

Geologic disposal of unreprocessed spent fuel has been authorized by the Nuclear Waste Policy Act of 1982. Repositories must meet restrictive regulatory criteria regarding radioactive releases to the environment. Engineered barriers are designed to prevent releases during the first 1000 years following closure. Integrity of spent fuel cladding will assist in achieving complete containment of radioactive isotopes during the first 1000 years after closure of the repository.

CONCLUSIONS

1. Integrity of spent fuel in dry storage is potentially influenced by earlier operations in the fuel cycle. Fuel integrity assessments must consider whether impacts from operations (fabrication; reactor service; wet storage; transportation; possible rod consolidation and/or interim dry storage; and, eventually, one or more of the options: MRS, reprocessing, or repository disposal) are significant.

2. Recent foreign and U.S. dry storage tests and demonstrations, emphasizing LWR fuel but including other fuel types, provide the technical basis for U.S. licensing of dry storage.

3. A small percentage of defects, within acceptable limits, are present in fabricated fuel rods. Reactor service causes lower cladding ductility, increased strength, and a low level of through-wall and incipient defects. Wet storage appears to impose only minor effects on LWR fuel integrity, including a few instances of fuel damage during handling operations. Shipping has likewise produced a few cases where fuel integrity was perceptibly compromised. Rod consolidation currently has a small experience base (four irradiated PWR assemblies), but numerous successful assembly reconstitution campaigns provide basis for optimism.

4. Fuel integrity in dry storage has a favorable history to date. Over 15,000 spent LWR rods have been included in tests and demonstrations; more than 6,000 have been monitored. To date, monitoring has suggested that only one rod has failed in a dry storage test.

5. It appears that rods with reactor-induced defects can be stored without further degradation in inert gas but are subject to degradation in air cover gases if the temperature is sufficiently high to promote UO_2 fuel oxidation.

REFERENCES

Bailey, W. J., et al. 1981. Assessment of Current Onsite Inspection Techniques for Light-Water Reactor Fuel Systems. NUREG/CR-1380, PNL-3325, Pacific Northwest Laboratory, Richland, Washington, Vol. 1 (July 1980) and Vol. 2 (January 1981).

Bailey, W. J., and A. B. Johnson, Jr. 1982. "Current Experience with Fuel Handling and Reconstitution: Relationship to Rod Consolidation." Proceedings of Am. Nucl. Soc. International Topical Meeting on Spent Fuel Storage Options, September 26-29, 1982, Savannah, Georgia.

Bailey, W. J., et al. 1982. Arrival Condition of Spent Fuel After Storage, Handling, and Transportation. PNL-3582, TTC-0165, Pacific Northwest Laboratory, Richland, Washington.

Bailey, W. J. 1983. "Experience with Fuel Damage Caused by Abnormal Conditions in Handling and Transporting Operations." Proceedings of the Seventh International Symposium on Packaging and Transportation of Radioactive Materials, PATRAM '83, New Orleans, Louisiana, May 1983. CONF-830528, 1:802-807, PNL-SA-10648.

Bailey, W. J., et al. 1984. Surveillance of LWR Spent Fuel in Wet Storage. EPRI NP-3765, Copyright 1984, Electric Power Research Institute. Reprinted with permission.

Bailey, W. J., and D. C. Langstaff. 1980. "Experience with Fuel Damage from Abnormal Conditions in Handling and Transport." Proceedings of the Sixth International Symposium on Packaging and Transportation of Radioactive Materials, PATRAM '80, November 1980, West Berlin, Federal Republic of Germany. pp. 1113-1120. (PNL-SA-8505; TTC-0177).

Bassler, E. A. 1984. "Westinghouse Fuel Consolidation Experience." Institute of Nuclear Materials Management Seminar, January 11, 1984, Washington, D.C.

Daily, J. L. 1984. " Utility/DOE Nuclear Waste Policy Act Cooperative R&D." Trans. Am. Nucl. Soc. 46:99-100.

Davis, J. D. 1984. "Shipments of High Level Nuclear Power Plant Waste." Director's Decision Under 10 CFR 2.206, U.S. NRC, April 19, 1984

Denton, H. R. 1983. " Potential Contamination of the Spent Fuel Pool and Primary Reactor System." Memorandum for C. J. Heltemes, Jr. (NRC), August 16, 1983.

Dobbins, J. C. 1983. Histories of Spent Fuel Assemblies at the EMAD Facility. DOE/NV/10250-6.

Einziger, R. E., and R. V. Strain. 1984. "Effect of Cladding Defect Size on the Oxidation of Irradiated Spent LWR Fuel Below 360°C." Presented at the

International Workshop on Irradiated Fuel Storage Experience and Development Programs, October 17-18, 1984, Toronto, Ontario, Canada.

Funk, C. W., and L. D. Jacobson. 1979. Inventory and Characterization of Spent LWR Fuel. HEDL-TME 77-82, Hanford Engineering Development Laboratory, Richland, Washington.

Garzarolli, F., R. von Jan, and H. Stehle. 1979. "The Main Causes of Fuel Element Failure in Water-Cooled Power Reactors." Atomic Energy Review 17:31-128.

Gilbert, E. R., G. D. White, and C. A. Knox. 1984. "Oxidation of UO_2 at 150 to 350°C." Presented at the International Workshop on Irradiated Fuel Storage Experience and Development Programs, October 17-18, 1984, Toronto, Ontario, Canada.

Gloaguen, A., and P. LeSoeur. 1984. "The French Utility's View on Irradiated Fuel Management." Presented at the International Workshop on Irradiated Fuel Storage Experience and Development Programs, October 17-18, 1984, Toronto, Ontario, Canada.

Heitner, K. L. (U.S. Nuclear Regulatory Commission). 1984. "Spent Fuel Pool Modification." Letter to J. B. Randazza (Maine Yankee Atomic Power Co.). Docket No. 50-309. April 2, 1984. (Amendment No. 75 to Operating License No. DPR-46 for the Maine Yankee Atomic Power Station.)

International Atomic Energy Agency. October 1982. Storage of Water Reactor Spent Fuel in Water Pools - Survey of World Experience. Technical Report Series 218, Vienna, Austria.

Johnson, A. B., Jr., et al. 1980. Annual Report FY-1979, Spent Fuel and Fuel Component Integrity. PNL-3171, Pacific Northwest Laboratory, Richland, Washington.

Johnson, A. B., Jr., et al. 1982. "Materials Behavior in Interim Storage of Spent Fuel." Trans. Am. Nucl. Soc. 43:314-315.

Johnson, A. B., Jr., and E. R. Gilbert. 1983. Technical Basis for Storage of Zircaloy-Clad Spent Fuel in Inert Gases. PNL-4835, Pacific Northwest Laboratory, Richland, Washington.

Klingensmith, R. W. 1980. "Airborne Contamination Released During Underwater Unloading of A Failed PWR Spent Fuel Assembly." Proceedings of Sixth International Symposium on Packaging and Transportation of Radioactive Materials, PATRAM '80, November 10-14, 1980, West Berlin, Federal Republic of Germany, pp. 646-653.

Kunita, R. K., and J. V. Massey. 1984. "Carolina Power & Light s Licensed At Reactor Dry Storage Demonstration Program." Trans. Am. Nucl. Soc. 46:100-101.

McKay, H. S., and M. L. Smith. 1984. " The VEPCO/DOE/EPRI Dry Cask Storage Cooperative Demonstration Program." Trans. Am. Nucl. Soc. 46:101-102.

Mellinger, P. J., K. M. Harmon, and L. T. Lakey. 1984. A Summary of Nuclear Fuel Reprocessing Activities Around the World. PNL-4981, Pacific Northwest Laboratory, Richland, Washington.

Olsen, C. S. 1984. "Fuel Rod and Crud Behavior Under Long-Term Fuel Storage Conditions." Presented at the International Workshop on Irradiated Fuel Storage Experience and Development Programs, October 17-18, 1984, Toronto, Ontario, Canada.

Roberts, J.T.A. 1980. "Nuclear Fuel NDE." The Third International Conference on Nondestructive Evaluation in the Nuclear Industry. February 11-13, 1980, Salt Lake City, Utah.

Sasaki, S., and A. Kitano. 1982. "Temporary Spent Fuel Storage by Japanese Utilities." International Topical Meeting on Spent Fuel Storage Options, September 26-29, 1982, Savannah, Georgia.

Teer, B. R. 1984. "Transport/Storage in Dry Casks." ASTM Nuclear Fuel Cycle Committee C-26 Seminar on Spent Fuel Storage in Metal Casks, July 30, 1984, Colorado Springs.

U.S. Department of Energy. 1984. Spent Fuel Storage Requirements. DOE/RL-84-1, Richland Operations Office, Richland, Washington.

Unterzuber, R., and J. P. Hanson. 1981. Spent Fuel Dry Storage Technology Development: Thermal Evaluation of Isolated Drywell Containing Spent Fuel. DOE/NV/10171-2, Westinghouse Electric Corporation, Advanced Energy Systems Division, Pittsburgh, Pennsylvania.

Westinghouse Electric Corporation. 1984. Spent Fuel Consolidation Optimization Study for the Monitored Retrievable Storage Facility Receiving and Handling Building. MRS:RJS:84-022.

Vesterlund, G., and T. Olsson. 1978. Degraderings-mechanismer Vod Bassanglagering och Hantering av Utbrant Kraftorbransle. RB-78-29, ASEA-ATOM, Vasteras, Sweden. (English translation: Degradation Mechanisms During Pool Storage and Handling of Spent Power Reactor Fuel. BNWL-TR-320, Pacific Northwest Laboratory, Richland, Washington, April 1978.)

ROUTING AND TRANSMITTAL SLIP

Date: 1/10/85

TO: (Name, office symbol, room number, building, Agency/Post)	Initials	Date
1. John Davis, NRC		
2.		
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	Action		File		Note and Return
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REMARKS

Attached is a copy of the Ted Harris letter with enclosure.

DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances, and similar actions

FROM: (Name, org. symbol, Agency/Post)	Room No.—Bldg.
Keith A. Klein Deputy Associate Director Storage and Transportation Systems	Phone No. 252-9433

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OPTIONAL FORM 41 (Rev. 7-76)
Prescribed by GSA
FPMR (41 CFR) 101-11.206

Department of Energy
Washington, D.C. 20585

JAN 7 1985

Mr. Theodore K. Harris
President
Energy Research Foundation
2530 Devine Street
Columbia, South Carolina 29205

Dear Mr. Harris:

The enclosed answers complete our response to your questions of July 27, 1984. These answers elaborate on summary statements I made sometime ago regarding my views of the role of Monitored Retrievable Storage in an integrated waste management system and are consistent with my recent public remarks on this subject.

We appreciate your interest in this area and will be pleased to provide any further clarification you may desire.

Sincerely,

Ben C. Rusche

Ben C. Rusche, Director
Office of Civilian Radioactive
Waste Management

Enclosure

QUESTION:

1. A Please define the role of MRS in an "integrated" waste system and include a discussion of the specific services and functions an MRS facility would provide.

ANSWER:

1. A In the Draft Mission Plan, the MRS was proposed as a backup to the repository in the event of major delays. We continue to believe this is an appropriate role for an MRS facility, but have also become increasingly appreciative that this may not be the only appropriate role for an MRS. There are other total system needs that need to be further evaluated, particularly functions of the total Federal waste management system that can or should take place away from the repository. Once these needs are better understood, it can be determined how an MRS could or should relate to these functions.

In evaluating possible MRS roles, several factors are being considered. First and foremost is the guidance provided in the Nuclear Waste Policy Act of 1982. In Section 141, Congress directed a "detailed study of the need for and feasibility of" the construction of one or more MRS facilities and directed that the Secretary propose a "plan for integrating (these facilities with) other storage and disposal facilities."

We interpret this as direction to consider the need for MRS in the context of the overall Federal waste management system from the various utility storage pools, where our responsibilities to accept fuel begin, to final disposal. We feel it is important to optimize this waste system to the extent practical in terms of safety, cost-effectiveness and schedule, taking into account transportation, packaging, system reliability, overall ratepayer costs and the logistic and interface problems associated with serving over a hundred different "customers." We are considering whether certain required actions such as packaging can be taken at locations other than the repository that would increase our ability to achieve the mandated target repository schedule and otherwise contribute to the above system optimization goals without compromising the repository development process.

We are mindful of the Congressional finding that "the long-term storage of high-level radioactive waste or spent fuel in Monitored Retrievable Storage facilities is an option for providing safe and reliable management of such waste or spent fuel," and that such facilities should be designed "to permit continuous (management) in the foreseeable future" and "to safely store such spent fuel and waste as long as may be necessary." (Emphasis added). In this

regard, it should be recognized that some storage capacity is needed to operate any large, dynamic system with some degree of reliability.

An additional major consideration will be the contractual obligations to our "customers" balanced against the uncertainties regarding the repository schedule. In exchange for payments of substantial annual fees, we have a contractual obligation to utilities and ratepayers throughout the country to deliver a service on a predictable schedule. Yet successful repository deployment on a fixed schedule cannot be guaranteed if a credible process is to be maintained.

It should also be clear that any Federal waste management system will include many waste preparation activities that must precede final repository emplacement. Considering overall safety, overall ratepayer costs, our contractual obligations and just common sense, we believe it may be appropriate to proceed with many of these activities in the event of repository delays. Regardless, such activities for disposal must be carried out, and proceeding with them in the event of repository delays could help provide a firmer planning base for utilities with no additional risk and little or no added cost to ratepayers. These activities should not and need not detract from continued priority attention to successful repository development.

We expect to arrive at tentative conclusions regarding our proposed role for the MRS by the end of this calendar year when the MRS need, feasibility and integration studies will be nearing completion. At this time, we will be prepared to discuss preliminary findings regarding services and functions that an MRS facility would provide.

QUESTION:

1. B Which of these functions and services could not be technically or economically provided at the power plant or repository site?

ANSWER:

1. B See answer 1. A above. We will be prepared to discuss these functions and services at the same time.

QUESTION:

2. Who will pay for the MRS program and through what mechanism?

ANSWER:

2. As specified in the Act, "the generators and owners of the high-level radioactive waste and spent nuclear fuel to be stored in such (MRS) facilities have the responsibility to pay the costs of the long-term storage of such waste and spent fuel." The Act further specifies, in discussions on the 1.0 mil per kilowatt hour equivalent fee for fuel discharged prior to 90 days following enactment, that "In paying such a fee...(the utility)...shall have no further financial obligations to the Federal Government for the long-term storage and permanent disposal of such spent fuel...". Lastly, the Act authorizes expenditures from the Waste Fund for costs associated with "the transportation, treating, or packaging of spent fuel...to be stored in an MRS..." and the "costs associated with acquisition, design, modification, replacement, operation and construction of facilities at an MRS site...".

QUESTION:

3. A Why has DOE made the policy determination that it must begin to accept utility spent fuel after January 1998 even if a repository is not in operation?

ANSWER:

3. A The rationale for this determination is discussed in the letter to Senator Johnston which is referenced in Question and Response 3. C.

QUESTION:

3. B What is the Department's legal justification for this determination?

ANSWER:

3. B The legal authority for this determination is discussed in the letter to Senator Johnston which is referenced in Question and Response 3. C.

QUESTION:

3. C Has the Department responded to Senator Johnston's letter of June 21, seeking clarification of this matter? If not, why not? If so, what was the response?

ANSWER:

3. C Senator Johnston's letter of June 21 was answered by Secretary Hodel on September 7, 1984. A copy of this letter is attached.

THE SECRETARY OF ENERGY
WASHINGTON, D.C. 20585

September 7, 1984

Honorable J. Bennett Johnston
Ranking Minority Member
Committee on Energy and
Natural Resources
United States Senate
Washington, D. C. 20510

Dear Senator Johnston:

I am writing in response to your letter of June 21, 1984, which dealt with disposal of spent nuclear fuel under the Nuclear Waste Policy Act. In your letter, you expressed dissatisfaction with the completeness of the General Counsel's response of May 30, 1984, and stated you had requested "an opinion on the legal obligation of the Department and the Department's authority to take title to spent nuclear fuel in the event that a repository has not yet commenced operation" by January 31, 1998.

In our original letter, the Department stated a firm commitment to accept for disposal, on an orderly schedule, high level radioactive waste and spent nuclear fuel not later than January 31, 1998. The Nuclear Waste Policy Act provides clear intent and direction for acceptance and disposal of spent fuel and high level radioactive waste by the Department. The Department is authorized to implement the Act through contractual commitments. To this end, the Department plans to incorporate into its contracts provisions which specify the minimum amount of spent fuel and waste which the Department will be obligated to accept, not later than January 31, 1998. Since these contracts have not yet been modified, it would be premature for the Department to speculate on particulars that might ultimately be incorporated in any or all of the contracts. However, unless waived, the usual remedies and defenses provided to parties contracting with the government would be available. Pursuant to my authority, it is my intention that this commitment in the contracts, together with the overall thrust of the Act, will create an obligation for the Department to accept spent fuel in 1998 whether or not a repository is in operation. This should enable utilities to plan for their projected waste disposal needs with confidence and certainty.

With regard to your question concerning whether the Department has the authority to accept spent fuel and high level radioactive waste in the event a repository is not yet fully operational, I have been advised by the General Counsel that section 302(a)(1) of the Act vests the Department with the necessary authority to accept spent fuel and high level radioactive waste beginning January 31, 1998, in such a circumstance.

As you know, there is much to be done between now and the 1998 date to ensure that we meet this deadline. I would like to personally assure you that the Department is totally committed to achieving this objective.

I hope this information has been helpful and responsive to your request. If I may be of any additional assistance, please do not hesitate to call upon me.

Sincerely,

Donald Paul Hodel

DONALD PAUL HODEL

cc: Honorable James A. McClure
Chairman, Committee on Energy
and Natural Resources

QUESTION:

4. A What does the Department regard as the chief private and Federal alternatives to the deployment of MRS?

ANSWER:

4. A The private and Federal alternatives to the deployment of MRS naturally depend upon the role of the MRS. In general, we consider that our responsibilities begin at the time we accept title to fuel at the reactors for disposal. In discharging these responsibilities, we believe it desirable and appropriate to rely on the private sector to the maximum extent practical. We would not plan to interfere with, and would in fact encourage, private sector initiatives that would complement or take the place of activities that will be required to implement an overall waste system. As our thinking evolves on what will be needed between the reactor sites and final emplacement, we will consider each function and whether and how the private sector can be relied upon to perform that function.

QUESTION:

4. B Is it the Department's view that the Federal Interim Storage program and provisions of the NWPA which provide technical assistance and cooperation to develop at-reactor storage are inadequate? If so, why?

ANSWER:

4. B No. The Department believes these provisions of the NWPA are in fact adequate. Considerable progress is being made in assuring that an adequate data base and operating experience will be available to assist utilities in adding storage capabilities prior to Federal acceptance of fuel for disposal. For example, the Department is actively cooperating with several utilities and the NRC to develop and demonstrate the safe and cost effective use of rod consolidation and metal and concrete storage modules. The licensed demonstration of these technologies should be completed over the next two to four years, in ample time to provide some basic options to meet the needs of most, if not all, utilities.

QUESTION:

4. C How does the Department respond to criticism that the intent of the Act is not to permit the use of MRS as an interim storage method?

ANSWER:

4. C The Act clearly states that MRS is an option for long-term storage for as long as may be necessary and that disposal should proceed whether or not Congress authorizes construction of an MRS. Hence, we do not consider it a substitute for final disposal. Neither is it being considered as an alternative for solving utilities' interim storage problems. Section 131(a)(1) indicates "the persons owning and operating civilian nuclear power reactors have the primary responsibility for providing interim storage of spent nuclear fuel." We interpret the term "interim" as meaning prior to Federal acceptance of fuel for disposal beginning when the Federal waste management system becomes operational.

QUESTION:

5. A Please discuss the Department's interpretation of Section 131(a)(1) of the Act and the relationship between that interpretation and the policy decision to accept spent fuel in 1998 whether a repository is operating or not.

ANSWER:

5. A Section 131(a)(1) makes it clear that the owners and operators have the primary responsibility for providing storage for spent fuel until the Federal system is in place and capable of receiving it. However, by obligating the Federal Government to begin accepting fuel on January 31, 1998, DOE has given the industry valuable guidance as to how best to carry out its responsibilities under Section 131(a) to provide for interim storage. Utility planning for interim storage facilities can now proceed with substantially less uncertainty regarding their goals and objectives.

QUESTION:

5. B Please discuss how DOE weighs institutional factors such as industry's desire to pass spent fuel storage responsibility to the Federal government against the same industry's apparent technical ability to manage spent fuel until repository operations are underway?

ANSWER:

5. B We interpret industry comments you refer to as desires for a more specific commitment and schedule for the transfer of spent fuel to the Federal Government for disposal. Given the provisions of the NWPA, utility funding of the program and uncertainties and limit in our control over the repository schedule, we believe this desire to be understandable and with some merit. In response, we feel obliged to provide the utilities and their ratepayers with as firm a planning base as is realistically possible.

QUESTION:

5. C In a recent briefing with the Nuclear Regulatory Commission, you stated that "Our objective is to get spent fuel and/or high-level waste from utilities and places where it is into more secure storage." Taking into account transportation issues, please describe what technical or institutional factors cause at-reactor storage to be less secure than away-from-reactor storage options.

ANSWER:

5. C My remarks should not be construed as implying that storage at any particular reactor site is now, or might in the future be, less secure than away-from-reactor storage options. I was simply contrasting a facility designed and operated specifically for storage as a primary mission to many smaller installations performing the same function but more as a support function to reactor operations. In the case of at-reactor storage, it should be noted that many utilities will be storing significantly more fuel than was anticipated in their original planning and design.

QUESTION:

6. A With the MRS proposal deadline set for June 1985 how will the Department meaningfully assess the potential of the integrated dry cask storage system to affect the "need" for MRS?

ANSWER:

6. A The multi-purpose cask (integrated dry cask) for the storage, transportation and possibly disposal of spent fuel offers many potential benefits to the waste system. Such casks could be used to store spent fuel at the various reactor sites or at a centralized location, such as an MRS. They could store varying amounts of waste ranging from a few metric tons to thousands of tons. Another advantage could be reduced packaging and handling throughout the waste system, thereby lowering the radiation exposure risk to the operators and lessening the possibility of a handling accident that could damage fuel rods.

We believe the importance of the multi-purpose cask concept is linked more to the means for providing a possible MRS capability than the need for such capability in the waste management system. As discussed in answer to Question 1. A, the need for and role of an MRS will be determined based upon its potential benefits to the waste management system as a whole. Once its role is clear and its functional capabilities agreed upon, the technologies most suited for its implementation can be determined and further optimized as new advances are made.

The MRS facility designs being developed for the proposal to Congress are highly flexible in recognition of the various functions that an MRS could be called upon to perform. These designs have provision to handle and utilize several different types of storage modules, including metal storage casks which would evolve into multi-purpose casks.

The advantages of the multi-purpose cask in terms of its benefits to the whole waste system will not be fully assessed until the end of 1986. This will still allow sufficient time for the orderly integration of this concept into all aspects of the waste management system.

QUESTION:

6. B Is DOE doing enough to advance the work on this system?

ANSWER:

6. B DOE is moving as quickly as possible to fully assess the multi-purpose cask concept. DOE issued a Program Research and Development Announcement in May 1984 soliciting unique ideas from industry and utilities for improvements to the waste management system as a whole. As a result, six contracts were awarded in September 1984, and feasibility studies should be completed by September 1985. Assuming that the feasibility studies are successful, conceptual designs would be undertaken and completed by the end of 1986.

This schedule will allow for orderly integration of this concept into final repository and MRS designs and other parts of the waste program.

QUESTION:

6. C In your post confirmation response to a written question from Senator Evans, you stated that "both MRS and repositories will probably be needed." Have you prejudged the results of the June report?

ANSWER:

6. C I deliberately used the term "probably" in order not to prejudge the results of the MRS Proposal to Congress. As discussed in response to the first question, there are many important factors to consider in determining an appropriate role for the MRS.

QUESTION:

6. D Are there other options which could affect the review of need for MRS but which might not be appropriately assessed given the 1985 deadline?

ANSWER:

6. D We believe our current study of alternative MRS roles is covering all the major options. The preliminary results of these studies should be available for public comment around the end of the calendar year, providing an opportunity for others to identify any major options that may have been overlooked. This should allow sufficient time for their consideration prior to submission of the Proposal to Congress.

QUESTION:

6. E Can DOE comply with the 1985 deadline? Will the proposal be available for review by the public, State governments, and Indian tribes prior to its submission to Congress?

ANSWER:

6. E DOE does plan to provide opportunity for review of the Proposal by the public, State governments, and Indian tribes, as well as the Nuclear Regulatory Commission and the Environmental Protection Agency, before its submission to Congress. Because of this and because current studies are concluding that changes in previous DOE assumptions regarding the role of the MRS should be considered, DOE may require more time to complete its Proposal.

QUESTION:

7. A Does DOE anticipate opposition to MRS authorization in Congress or to siting of the facility?

ANSWER:

7. A There have, in the past, been various constituencies within the technical community, executive agencies and the Congress both for and against the traditionally studied MRS roles in resolving this Nation's civilian nuclear waste issues. Some of this division may have been a result of different perceptions as to the role of the MRS. We are hopeful that the conclusions reached in the MRS needs and feasibility study directed by the Nuclear Waste Policy Act will be sufficiently documented and presented so as to promote a consensus on MRS. Any potential benefits and problems associated with such facilities will be clearly articulated to allow for informed decisionmaking. We would note, however, that Congress rarely reacts unanimously toward any proposals by the Executive Branch.

A certain amount of opposition must be presumed in the siting of any large nuclear waste installation. Should Congress authorize the Department to proceed with an MRS facility, the Department will work closely with potentially affected States and/or Indian tribes in the facility siting activities, to help assure that the concerns are fully understood, considered and acted upon.

QUESTION:

7. B Is DOE likely to recommend the construction of more than one MRS?

ANSWER:

7. B As stated in the Draft Mission Plan and in our response to the first question, the DOE has not finished evaluating the potential roles of any MRS system and, hence, is not prepared to take a position on the need for more than one MRS.

QUESTION:

7. C When will the Department name specific sites it has under consideration?

ANSWER:

7. C We are not prepared at this time to identify a schedule for naming specific sites.

QUESTION:

7. D For what period of time would an MRS facility operate?

ANSWER:

7. D The MRS operating lifetime would depend primarily on the MRS role in the waste system. If the MRS were to be an integral and active part of the fuel handling and packaging portion of the waste system, it would operate for as long as spent fuel and waste were being received. If the MRS was to be simply a means to accommodate a repository delay, it would need to operate sufficiently long to allow the repository to recover schedule. If the MRS were to be a longer term option but not a substitute for final disposal, it would have to operate for as long as necessary to meet the storage role intended (e.g., aging fuel prior to emplacement in the repository, preserving fuel for reprocessing, or allowing time to monitor repository performance over a required retrieval period).

QUESTION:

7. E To what extent has the Department considered and planned for delays in the MRS program caused by opposition to the program or to specific site selections?

ANSWER:

7. E The Department recognizes that the applicable State and tribe participation provisions in NWPA, the NEPA process, the NRC licensing process and litigation all provide opportunities for those opposed to an MRS to create delays. Attempts will be made during the final planning process to anticipate what activities might be delayed and when in order that the potential impacts of such delays and potential compensatory measures may be understood beforehand.

QUESTION:

7. F As you know Michael Lawrence told Governor Riley in March 1983 that South Carolina was no longer under consideration as a host State for the FIS program. Why are you unable to provide a similar assurance regarding the siting of MRS?

ANSWER:

7. F The only restrictions in the NWPA with regard to MRS siting is that it cannot be in a State approved for repository site characterization.

QUESTION:

7. G Does the presence of the Barnwell Nuclear Fuel Plant or the Savannah River Plant make South Carolina in any way a more attractive host State for MRS?

ANSWER:

7. G As well as satisfying the safety and licensing requirements, there are numerous factors that need to be considered in judging the desirability of a particular site for an MRS. These factors include the environmental impacts, socioeconomic impacts, transportation impacts, demography, site physical characteristics and overall systems costs.

The presence of an available skilled labor force and a community receptive to and familiar with nuclear operations would certainly be considered positive factors in evaluating potential host sites. If the communities at or around the closed Barnwell Nuclear Fuel Plant or the Savannah River Plant wish to be viewed in this manner, it could make South Carolina potentially attractive for this endeavor.

QUESTION:

7. H Does DOE believe that an MRS facility will be easier to site than a repository?

ANSWER:

7. H For the MRS designs that DOE has been studying, the dry-well and sealed storage casks (concrete silo), safe storage is assured through engineered design features and performance monitoring. Thus, there is not a safety dependence on special subterranean geologic features or conditions as is the case for geologic disposal. Because of this, there is considerably more flexibility in siting an MRS facility. This certainly makes finding "technically acceptable" sites easier. However, finding "institutionally acceptable" sites could be just as difficult. Because many of the same State and Indian tribe participation provisions that apply to the repository activities apply to the MRS, the Department will need to work closely with the potentially affected communities, States and Indian tribes in the siting process.

QUESTION:

8. A Recognizing that you have indicated that the waste program should be "neutral" on the question of reprocessing, to what extent is your current interest in MRS a result of the linkage between MRS deployment and the future prospect of reprocessing and recycle?

ANSWER:

8. A Our current interest in MRS has nothing to do with the future prospect of reprocessing and recycle. We are proceeding on the basis of spent fuel as a waste form with flexibility to handle varying amounts of solidified high-level waste should the need ever arise. We would consider the need to store large quantities of spent fuel for future reprocessing to be very speculative at this time and as such would not expect it to be a dominant consideration in our MRS proposal.

QUESTION:

8. B What Federal responsibilities, actions, and expenditures could arise from the draft Mission Plan statement that "the Department will consider proposals from industry dealing with reprocessing spent fuel that will require Federal acceptance and solidification of the resulting liquid high-level waste prior to ultimate disposal by the Department."

ANSWER:

8. B DOE is obliged by the enabling legislation to dispose of only solidified high-level radioactive waste (HLW), although the agency will accept HLW in all forms. DOE could provide the required solidification facilities and service under appropriate financing arrangements. The costs of solidification activities are not included in the Department's estimate of total-life cycle program costs, however.

QUESTION:

8. C Earlier this year in written responses to questions from Senator Johnston you stated that "The draft Mission Plan also indicates DOE would provide solidification capability for liquid reprocessing wastes...I believe that this meets both the requirements in the Act and the Administration's position on reprocessing," and "The need for reprocessing for waste consolidation and resource recovery needs to be based on the marketplace rather than waste disposal issues."

Is it your view that Allied General Nuclear Services did not intend to provide a privately financed solidification facility at its Barnwell Nuclear Fuel Plant? Why does the Federal Government now believe it is proper to provide such a facility? Why is the "marketplace" unable to provide such a facility?

ANSWER:

8. C First, I would note that your quotation of my statement was incomplete. The full text of my comment was "the Draft Mission Plan also indicated DOE would provide solidification capability for liquid reprocessing wastes in accordance with the provisions in the Act." According to the Nuclear Waste Policy Act, the Secretary is directed to take title to high-level radioactive waste or spent fuel. High-level radioactive waste is defined as "the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing...." Further, use of the Waste Fund is authorized for any costs incurred in the connection with the transportation, treating or packaging of spent fuel or high-level radioactive waste. Liquid high-level wastes would have to be solidified prior to transport.

Second, I believe Allied General Nuclear Services did, in fact, originally intend to privately finance a solidification facility at Barnwell.

QUESTION:

9. To what extent is your current advocacy of MRS driven by your belief that sufficient progress on terminal disposal has not been made and that significant benefits could result from a program that "buys time" with MRS?

ANSWER:

9. My views on MRS as part of an integrated system are not driven by what might be perceived by others as a lack of progress to date on terminal disposal. In fact, I believe remarkable progress has been made to date leading to repository development, especially since passage of the Nuclear Waste Policy Act. I have yet to discern any insurmountable technical obstacles to establishment of a repository and believe the institutional obstacles can each be overcome with time, persistence and education. Nonetheless, the time schedules in the Act are recognized as tight and many elements of the process are without precedent. Many entities other than DOE have considerable influence on these schedules, which limits DOE control over them. My opinions regarding a possible MRS system are driven in part by a belief that we should try to provide as firm a planning base as practical, hence we should attempt to minimize the impacts of a delay in any one element of the overall waste system on the remainder of the system. But the major basis is the purely programmatic recognition that the capabilities of a facility like an MRS will probably prove to be essential for an effective, safe waste disposal system. The studies currently under way will provide a basis for a conclusion on this point.

"The 20 billion dollars and 40 years we will invest in a permanent solution deserves a chance to succeed. The 70,000 metric tons interim measure stands in the way of success. South Carolinians, with 30 years of experience with 'temporary storage' of nuclear wastes, are concerned that the repository effort may lose the attention of those required to make a success of the Act: elected officials, Federal and State agencies, the nuclear power industry, citizens, and researchers."

In response, we disagree that the Draft Mission Plan placed the Federal nuclear waste temporary storage on an equal footing with the permanent repository. The MRS activities envisioned in the Draft Mission Plan included siting, final design preparation of an EIS and licensing of the design and site. Construction of such a facility would be pursued only in the event of significant delay in the repository program. The MRS concepts that the Department has been designing are modular so that facility storage capacity can be easily expanded to satisfy the demand. The 70,000 MTU maximum capacity was assumed in the designs to develop adequate cost estimates to cover contingencies if such a facility had to substitute for a repository.

QUESTION:

10. What is your response to South Carolina's contention that the "Mission Plan appears to have placed the Federal nuclear waste temporary storage program on an equal footing with the permanent repository program, thereby significantly increasing the effort, funds required, and the handling of the country's nuclear wastes?"

ANSWER:

10. The following is the specific statement from the State of South Carolina:

"The Mission Plan appears to have placed the Federal nuclear waste temporary storage program on an equal footing with the permanent repository program, thereby significantly increasing the effort, funds required, and the handling of the country's nuclear wastes. The Department proposed an approach to the monitored retrievable storage (MRS) concept which would provide for a program to store up to 70,000 metric tons of spent fuel - the equivalent of the first repository under the Act. If the Department attempts to establish such an MRS program for spent fuel and nuclear waste, it will find interested parties in conflict regarding the siting and design of this interim measure. The Department risks losing the consensus achieved with the Act when it departs from this program's most important goal - a permanent repository for this country's nuclear waste.

MORGAN COUNTY, TENNESSEE
A Sound and Scenic County
OFFICE OF
MORGAN COUNTY MRS STUDY GROUP
WARTBURG, TENNESSEE 37887

June 19, 1986

Mr. Bernard C. Rusche
Director Civilian Radioactive
Waste Management
Department of Energy Room 5-A085
Forrestal Building
1000 Independence Avenue, S. W.
Washington, D. C. 20585

Dear Mr. Rusche:

As co-chairmen of the Morgan County MRS study group, I am pleased to inform you that the Morgan County Executive Commission unanimously endorsed our report recommending the Monitored Retrievable Storage (MRS) facility being built and operated in Morgan County.

This past February, our County Executive, Tony A. Duncan, appointed a group of Morgan County residents to study the capability and desirability of locating the proposed MRS facility in Morgan County. After a comprehensive review of the previous reports and studies dealing with the potential safety, economic, and social impacts of an MRS facility being located in other areas of Tennessee, we reached the conclusion that if certain recommendations and provisions are met, the people of Morgan County would welcome this facility and would provide a congenial, continual stable, and cooperative partner in this vital operation. (The report containing this conclusion and the related recommendations and provisions is attached.) Upon approval by the Morgan County Commission and the two incorporated towns within the County, the report was transmitted to Governor Lamar Alexander for his agreement and support in our attempts to locate this facility in our County.

Mr. Rusche, in furtherance of our efforts, we are requesting your support in locating the MRS in Morgan County. We realize your department has spent significant time and manpower in an attempt to site the MRS. In so doing, your department chose Oak Ridge, Tennessee with first choice being the Clinch River Breeder Reactor site. We respect your efforts and recognize the advantages the site in Oak Ridge presents the Department of Energy. However, for some of the very same reasons, we believe that Morgan County should be the preferrable host for the MRS. We encourage you to review our report to better understand the unique benefits Morgan County offers for this facility.

Finally, Mr. Rusche, we would like to request a meeting in the near future with you and the members of our MRS study group in order for you to have a clean and thorough understanding of our position regarding the MRS. A trip to Washington can be easily arranged and we look forward to our meeting. Should you or your staff have any questions concerning our report or other issues involving the MRS in Morgan County, please feel free to call either of us at (615) (Duncan) 346-6288; (Freytag) 346-3101.

Yours very truly,

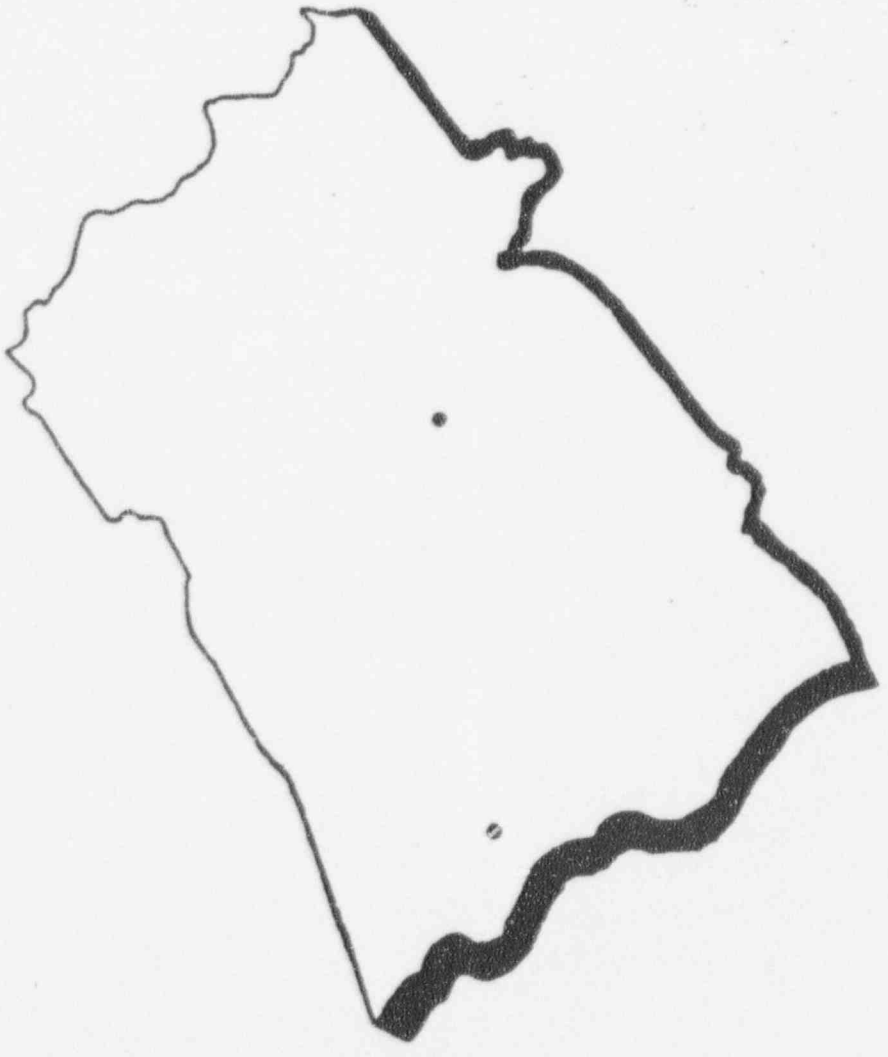
Tony A. Duncan
CO-Chairman/Mrs Study Group

Floyd E. Freytag
CO-Chairman/Mrs Study Group

TAD: eed
FEF:
pc: Office File

MORGAN COUNTY

MRS TASK FORCE



Morgan County, Tennessee

MRS STUDY GROUP COMMITTEES

CO-CHAIRMEN:

Tony A. Duncan
Morgan County Executive

Floyd E. Freytag
President/Plateau Utility District

Jeanette Powers
Mayor of Oakdale

Rodney McPeters
Mayor of Wartburg

Roger B. Long
Morgan Co. Superintendent of Highways

Joe Judkins
Morgan County Attorney

Dr. Clayton Weaver
Oak Ridge Accociated University

John Galloway
Administrator/Morgan Co. Health Council

Fred Roettger
Engineer, Martin Marietta

Stone Hennessee
Morgan Co. General Sessions Judge

Conrad Strand
Chairman, Abner Ross Community Center

Dudley Freels
Morgan County Assessor of Property

Roy McNeal
Wartburg City Councilman

Allan Nance
Morgan Co. Superintendent of Schools

Royce Cross
President, Morgan Co. Education Assoc.

Guy Underwood
Local Businessman

SAFETY COMMITTEE:

Dr. Clayton Weaver, Same as above
Guy Underwood "
Lester Heidel, Technician Martin Marietta
Tom White, Emp. TVA Nuclear Plant

SITE COMMITTEE:

Roger B. Long, Same as above
Conrad Strand, "
Mike Hall, Student Roane State C.C.
Ron Lee, TVA Safety Department

PUBLIC ACCEPTANCE:

Jeanette Powers, Mayor of Oakdale
Wanda Smith, Local Businesswoman
Rodney McPeters, Mayor of Wartburg

MORGAN COUNTY MRS STUDY GROUP
FEASIBILITY AND DESIRABILITY
OF
MONITORED RETRIEVABLE STORAGE SYSTEM
LOCATING IN
MORGAN COUNTY. TENNESSEE

On February 19, 1986, Morgan County Executive, Tony Duncan, appointed a group of Morgan County residents to study the capability and desirability of locating the proposed Monitored Retrievable Storage Facility in Morgan County.

It was originally proposed that this facility be located in the Oak Ridge-Roane County area; however, strong oppositions to its placement there surfaced. It was perceived that this facility would do immeasurable harm to the future development of the Oak Ridge-Knoxville area by, causing prospective industry which the Oak Ridge-Knoxville area is imminently qualified to service, to bypass, or to avoid the Oak Ridge-Knoxville area. It was pointed out that the state is investing hundreds of millions of new dollars in the technology corridor from the Knoxville airport to the Oak Ridge National Laboratory, for a new technical institute, a science alliance, an interstate quality highway, and an improved University of Tennessee. It was thought that the placement of the MRS storage facility adjacent to this corridor would seriously erode and damage its image as a technological center.

These concerns are well founded and are supported by industry surveys which indicate the majority of the more desirable industries would avoid or hesitate coming to the Oak Ridge-Knoxville area if the MRS facility was also located there. There is every indication, that in the final analysis, the Oak Ridge-Knoxville area would lose many more jobs, payrolls, and trade advantages than gained from the temporary advantages of the MRS facility.

The objections to placing the MRS facility in the Roane County part of Oak Ridge do not exist or apply to Morgan County, beacuse the Morgan County area is not desirable to the same kind of industry that would possibly locate in the Oak Ridge area. Therefore, it has been suggested that serious consideration be given to placing this facility in adjoining Morgan County. For this reason, the Morgan County study group was implemented.

This group has conducted an investigation and study to ascertain if it would be desirable or provide any economical value to have the MRS facility locate in Morgan County. The study group also wanted to know the impact an installation of this kind would have on the Morgan County area. Could this facility be constructed and operated with reasonable safety, and would it be acceptable to the people of Morgan County, and on what terms? All of these questions have been addressed, and the groups findings and conclusions are explored on the ensuing pages of this report.

The Nuclear Waste Policy Act of 1982 requires the Department of Energy (D.O.E.) to provide for the development of Deep Geological repositories for the disposal of spent nuclear fuel and other high level radioactive waste, and to submit for Congress's consideration, a proposal on the need for one or more Monitored Retrievable Storage facilities. Although initially, the M.R.S. was considered as a backup for a repository, D.O.E. determined that the facility would perform a more effective role as a receiving, packaging, and temporary storage for fuel assemblies enroute to a permanent repository.

In April of 1985, the D.O.E. announced that three (3) Tennessee sites were under consideration for the proposed Monitored Retrievable Storage facility. Shortly afterwards, Governor Lamar Alexander initiated a review of the proposal. This review was to be coordinated by his Safe Growth team, as the primary and secondary sites suggested, and seemingly favored by the Department of Energy when located in Tennessee, with two of them located in the Oak Ridge part of Roane County. These three localities were invited to participate in the state's review of the M.R.S. proposal. To activate their participation in the review, the Clinch River M.R.S. Task force was devised, and was subsequently given a $100,000.00 grant to defray their expenses.

At this time, no one was aware of the potential sites a short distance away in the adjoining Morgan County. Therefore, the desirability of placing this facility in Morgan County was not explored. Later various business and industrial surveys were made that revealed the potential damage the location of this facility in the Oak Ridge-Roane County area could do to the future development of the Oak Ridge-Knoxville area. Morgan County was then considered as a possible site.

The negative views and mis-givings expressed by valuable and important industrial people toward locating a MRS facility in the Oak-Ridge-Knoxville area alarmed Governor Lamar Alexander and members of the business community of the Oak Ridge-Knoxville area. It was during this time that officials and public-minded citizens of Morgan County were invited to study the possibility of locating this facility in Morgan County.

One of the problems addressed by the Morgan County M.R.S. study group was the desire of all participating agencies to get this project underway. We were advised by a D.O.E. official that a change in location to a Morgan County site would require them to make a new site study and evaluation that could delay this project as much as six months.

According to the Department of Energy, construction of this project has not been scheduled to begin until July 1991 and would go into pilot operation on December 1995, and full operation, October 1996.

According to this schedule, a beginning of plant construction is approximately five years away. We assume this interim would be used to complete plans and designs for this facility. We see no reason why the planning and designing of this facility could not be carried on simultaneously with the site and study evaluation which would permit them to maintain their original schedule.

One of the group's most serious concerns throughout this study has been, "Can this facility be operated with reasonable safety?" This group has not, themselves, conducted any test or in-depth study as to the safe construction and operation of the MRS plant. We have, however, made a diligent search for information pertaining to the safety, both during construction and follow-up operations. We have tapped many qualified sources in the state, and have relied heavily on studies and tests conducted by other very reliable groups that have the facilities, competent personnel, and finances to make the extensive tests and studies necessary to evaluate the safety of this operations.

We have carefully reviewed information, studies, and tests assembled by the Clinch River MRS Task Force, the Tennessee Department of Health and Environment, the Department of Energy of the United States, and the Sandia National Laboratories. The Tennessee Department of Health and Environment and the United States Department of Energy have been especially cooperative and generous of their time and facilties.

We were especially interested in the recommendations prepared by the Clinch River MRS task force.

We made an exhaustive review and study of this document and were tremendously impressed by this group's study of every phase of this facility having to do with safety. We were unable to find any areas that had not been covered, explored, analyzed, and evaluated in a very efficient and business like manner. The entire study by the Clinch River MRS task force was made with the assumption that this facility would be located in the Oak Ridge part of Roane County; however, we find that their conclusions pertaining to safety were equally applicable to the proposed sites available in adjoining Morgan County. Their final conclusion was that this facility could be operated with safety.

Based upon all the information we have acquired to date, the Morgan County Study Group concurs with the finding of the Tennessee Department of Health and Environment, the United States Department of Energy, and the Clinch River MRS Task Force that this facility can be constructed and operated safely without serious environmental damage or hazard to health.

Indications are that area residents believe that this facility can be constructed and operated safely in Morgan County. However, at the same time, they exhibit skepticism that this facility will actually be constructed and operated in a safe manner.

The Clinch River M.R.S. Task Force has addressed this concern and has made numerous suggestions regarding safeguards. Rules and regulations, if adopted by the D.O.E. and practiced in the operation of this facility would not only allay the public concern, but would improve the Nuclear industry and Department of Energy's public image.

The Morgan County MRS Study Group endorses and concurs in all the safety rules, conditions, and recommendations made by the Clinch River MRS Task Force and incorporates all of them into our study and makes them part of our report. But with the further stipulation that if the facility comes to Morgan County, all the safety features recommended by the Clinch River Task Force that can be adapted to the Morgan County site, become a part of the terms for acceptance of this facility.

To further allay the public's concern and to improve the public perception of the Nuclear Industry and the Department of Energy as a whole, and to allay any apprehension local citizens may have, we would emphasize the importance of creating a "Citizen's MRS Environment, Safety, and Health Review Board" consisting of 7 members. This board would represent the areas of interest during the construction, operation, a decommissioning of the proposed MRS facility.

We would suggest that the membership of this board be composed of one person from each of the two incorporated towns selected by the city council; three persons from unincorporated areas selected by county commission; and two persons to be appointed by the State of Tennessee.

The membership of this Citizen's MRS Environment, Safety, Health Review Board would operated under normal arrangements with the responsible federal and state agencies. We would not supplant Regulatory Agencies responsible for the activities of the proposed MRS to the greatest extent possible. We would make use of data collected by these agencies; however, the board would have the authority to conduct its own inspection and collect additional data as needed.

The board should also participate in the environment, health, and safety performance standards and criteria by the MRS facility. Also, the board should have access to all information on the condition of shipments arriving at the MRS, effluents released to the outside environment; radiation to the exposed workers and to the surrounding population; and accidents and incidents as classified by the N.R.C.

Also, procedures should be developed whereby the board could suspend operations, if releases at the MRS are above action levels jointly pre-established by the Department of Energy and regulatory agencies.

Further, all information on radiation releases and accidents should be made available immediately to the proposed Citizen's MRS Environment, Health, and Safety Review Board, as well as to the general public.

We would further recommend that transportation safety be enhanced by means of strict inspection performed at the originating point of each spent fuel shipment, and again at the MRS facility. Shipments out of the MRS to the permanent repositories should be subject to identical inspections, and these inspections conducted by personnel independent of the Department of Energy, should guarantee

compliance with rigid standards relating to radiological vehicles and personnel safety. Those conducting such inspections should have authority to detain non-complying outgoing shipments and levy stiff penalties for non-compliance with applicable standards.

As the NRC licensee by the MRS facility, the Department of Energy should assume the lead role in developing emergency response procedures to be followed by local and state personnel in the event of an accident involving spent nuclear fuel. First responders from local and state agencies should be trained and equipped by the federal government with associated costs including full operation funding born by the MRS nuclear waste fund.

We would further insist, to insure prompt planning, site selection, and construction of a permanent storage for nuclear waste that no more than 10,000 metric tons of spent fuel should be received before the outshipment of consolidated fuel rods begins to the permanent repository.

Any proposed extension of the MRS facility beyond the proposed 15,000 metric tons currently envisioned should be subject to the same review and notice of disapproval procedures followed to initially authorize the MRS.

Any spent fuel stored at the MRS longer than 15 years shall be subject to a significant overdue removal penalty levied by the state.

The Morgan County MRS Study Group is aware that this facility in Morgan County, or in any other location would encounter many possible problems; accessability of railroads, interstate route, density of population, would or could create problems.

The Morgan County MRS Study Group has defined and located 5 sites (Exhibit#1) in Morgan County which the group feels the Department of Energy should investigate. The 5 suggested sites are located on State owned property that is available as a site for this facility. The proposed Morgan County sites would probably incur less problems than sites outside the county but would not be entirely problem free.

The suggested Morgan County sites are located in the same general area and have the same general characteristics as the Clinch River Breeder Reactor site which the Department of Energy indicates has many qualities that are desired in the location of this facility.

All five of these sites were presented for evaluation and consideration to the Department of Energy and their selection was based upon criteria established by the D.O.E. Considerations were given to the following:

1. Geology of the area
2. Site relief in relation to topography
3. Access to rail facilities
4. Access to interstate highway system
5. Proximity to populated areas
6. Environmental settings
7. Geotechnical site characteristics

The site we feel is especially adaptable and suitable for the MRS plant location is the site which we list as Number 1, (Exhibit #2). It is located approximately 5.6 miles southwest of Wartburg, 3.88 miles to a Class IV railroad, and 11 miles to the I-40 interchange which has already been approved by the Tennessee Department of Transportation, and has been scheduled to be completed in 1989.

Access to the MRS to this site from I-40 and from I-40 to I-75 would require the construction of approximately 11 miles of roadway. This road would be, for the most part, through and over state owned land. It would be located in a very sparsely populated area and few, if any, families would be displaced by its construction and use.

Its use would be almost exclusively for the transportation of the nuclear fuel rods coming to the MRS facility.

Construction of approximately 4 miles of railroad, which should be equivalent to a Class IV railroad, would connect this facility with an existing Class IV railroad. This also would be through a sparsely populated area.

U.S. Highway 27, state route 20, is scheduled for improvement under the Tennessee Highway Improvement Act from Oneida south. The scheduled beginning of this project should be expedited with priorities given to the elimination of curves and the three-laning of hilly sections.

A new section of highway should be constructed linking Highway 27 at Wartburg to the MRS site and to the Rockwood interchange. This can be accomplished with a few miles of new construction linking Hwy 27 to the MRS site, and the access road to the interstate I-40 would be through a very

sparsely populated area of State owned property. Few, if any, families would be displaced on this construction. This would give access from Northern areas to the MRS facility.

We would, also, recommend that Hwy. 62 from Wartburg to the intersection of State Route 289 and the section 289 to the I-40 interchange of Crossville should be upgraded.

Costs for necessary improvements and new construction to state and local routes listed above, or in any other route improved for the purpose of transporting nuclear spent fuel rods to and from the MRS facility, should be born by the Federal government, or should be authorized as an expenditure by the MRS funds.

Morgan County is a rural county with a population of approximately 16,000 people. Morgan County has two incorporated towns, Wartburg and Oakdale. The majority of the population is located in the general vicinity of Wartburg which is the county seat. The county has a tax rate of $6.60 and a bonded indebtedness of approximately $13,000,000.00 with an assessed value of approximately $54,000,000.00. About 24% of our land area is owned by the State of Tennessee and approximately $3.00 of our tax rate is necessary to service the bonded indebtedness.

Unemployment is about 14% and mean income is small. At one time, timber and coal were our main industries. Both of these sources of income and employment no longer exist to any degree. Our sources of employment at the present time are a woven label plant, 2 garment plants, a transformer plant, and Pioneer industries. All of these are low paying industries and do not make as significant an impact on our economy as the MRS would.

Funds for the construction and maintenance of rural roads are inadequate; therefore, they are badly in need of improvements and maintenance. Four utilities are presently operating small water system, the largest being Plateau Utility District and service Wartburg with 1200+ connections. All of the utilities are in need of expansion and improvement.

We have a school population of about 3200. To provide facilities, utilities, structures, maintenance, and other educational material creates a special burden on a county with our limited tax base. The result is that our educational system is under-financed and our young people are trying to obtain an education in a substandard educational system.

We are confident that this MRS facility can be constructed and operated safely and would cause no undue harm or hazard to the health of the people of Morgan County.

We are also confident that any of the Morgan County sites we have suggested to the Department of Energy to examine are equal to, or superior over all, to any sites they have considered elsewhere. Also, we believe that this facility can be operated more economically in Morgan County than any other site, without sacrificing any of the safety rules, regulations, and conditions set out in our study, or by the study of the Clinch River MRS Task Force.

Our investigation indicates that the people of Morgan County would welcome this facility into Morgan County if they perceived that it would be of economic value, or helpful in solving many of our problems.

In our efforts to determine if this MRS facility would be acceptable to the citizen's of Morgan County, we found its acceptance rested on three questions:

1. Could, and would, this facility be constructed and operated with reasonable safety?
2. Would its location in Morgan County be of any economic value to Morgan County?
3. What impact would its location in Morgan County have on our tax funded facilities, such as; schools, law enforcement, rural roads, utilities, including water, sewage, power, etc.?

We have already addressed the first question and our conclusion that this facility could be operated and constructed safely are stated in the forefront of this report. These conclusions are based upon the combined conclusions and reports between all agencies and groups we encountered in making this study, "That this facility could be constructed and operated safely".

The best information available to us indicated that something like 700 employees would be required during the construction phase of this project; and after construction, approximately 400 to 500 employees would be required to operate this facility.

We realize that due to our proximity to Anderson and Roane counties a large share of this employment would go to these two counties. Nevertheless, we are confident that substantial number of these jobs would come to citizens of Morgan County. To a county of a 14% unemployment rate, these jobs would be extremely valuable.

To insure our citizens receive a fair share of jobs generated by this facility, we would recommend that a training program be instituted in the Morgan County Vocational School for the purpose of training local citizens for job placement.

This program would operate under the supervision of the Department of Energy and would involve the following programs:

1. Health and safety monitoring
2. Remote handling system operation, safety, and maintenance
3. Communications operation, safety, and maintenance
4. Storage cask manufacturer
5. Transportation, cask service, and maintenance

The entire cost for this training program would be funded by the Department of Energy from MRS funds.

We are advised that the construction of the MRS facility, itself, would cost approximately one-billion dollars. Cost of on-site storage cask would eventually add another three-hundred-million dollars, and many additional millions from associated activities connected with the operation of this plant.

The release of the above dollars into this area would certainly have an impact, not only our economy, but would boost the economy of Anderson and Roane counties. Oak Ridge, in Anderson County, and Harriman and Rockwood in Roane County are trade centers for people of Morgan County; and naturally, many of these additional new dollars would find their way into Anderson and Roane counties.

After a careful examination of the likely impact a Monitored Retrievable Facility would have on Morgan County, we were able to identify a number of concerns or potential liabilites beyond our present capacity to handle without financial assistance.

Certainly a facility of this kind would increase activities on every level; and the natural increase demand upon our facilities, would strain them beyond their present capacity.

Every phase of public service furnished by local, county, and city government would need to be expanded and upgraded. To finance these projects on our limited tax base would create an impossible burden on local tax payers and this facility, instead of being a blessing, could become a disaster.

To make the location of the M.R.S. facility in Morgan County acceptable to Morgan County people, the following conditions would need to be acted on favorably.

In order to enable the D.O.E. to financially assist local governments, we would recommend that the MRS authorization include a section similar to Nuclear Waste Policy Section (116c) "to permit tax equivalency payment on real and person property, and other financial incentives to units of local government."

We would recommend a schedule of annual impact-assistance-payments to be made to state and local governments from authorization until operation; and from cessation of operation until full decommissioning and decontamination; such payments to be equal to the tax equivalent grants generated by a one-billion-dollar facility.

We would further recommend that during operation, the MRS facility would provide annual grants to local governments in amounts equivalent to all state and local taxes.

Due to Morgan County's limited tax base, the 13 million dollars bonded indebtedness outstanding against Morgan County now requires $3.00 of the total tax rate just to service this indebtedness. We would recommend that the Congress authorize the MRS facility to either liquidate or assume the payment of this indebtedness. This would reduce Morgan County's tax rate to slightly less than $4.00 dollars and would reduce, substantially, the impact assistance to be paid to Morgan County under these recommendations.

We would solicit a pledge to construct, staff, operate, and promote a MRS Visitor's Center in the vicinity of the MRS facility for the purpose of explaining MRS and its role in the integrated nuclear fuel cycle, and to esthetically design and landscape the entire MRS complex.

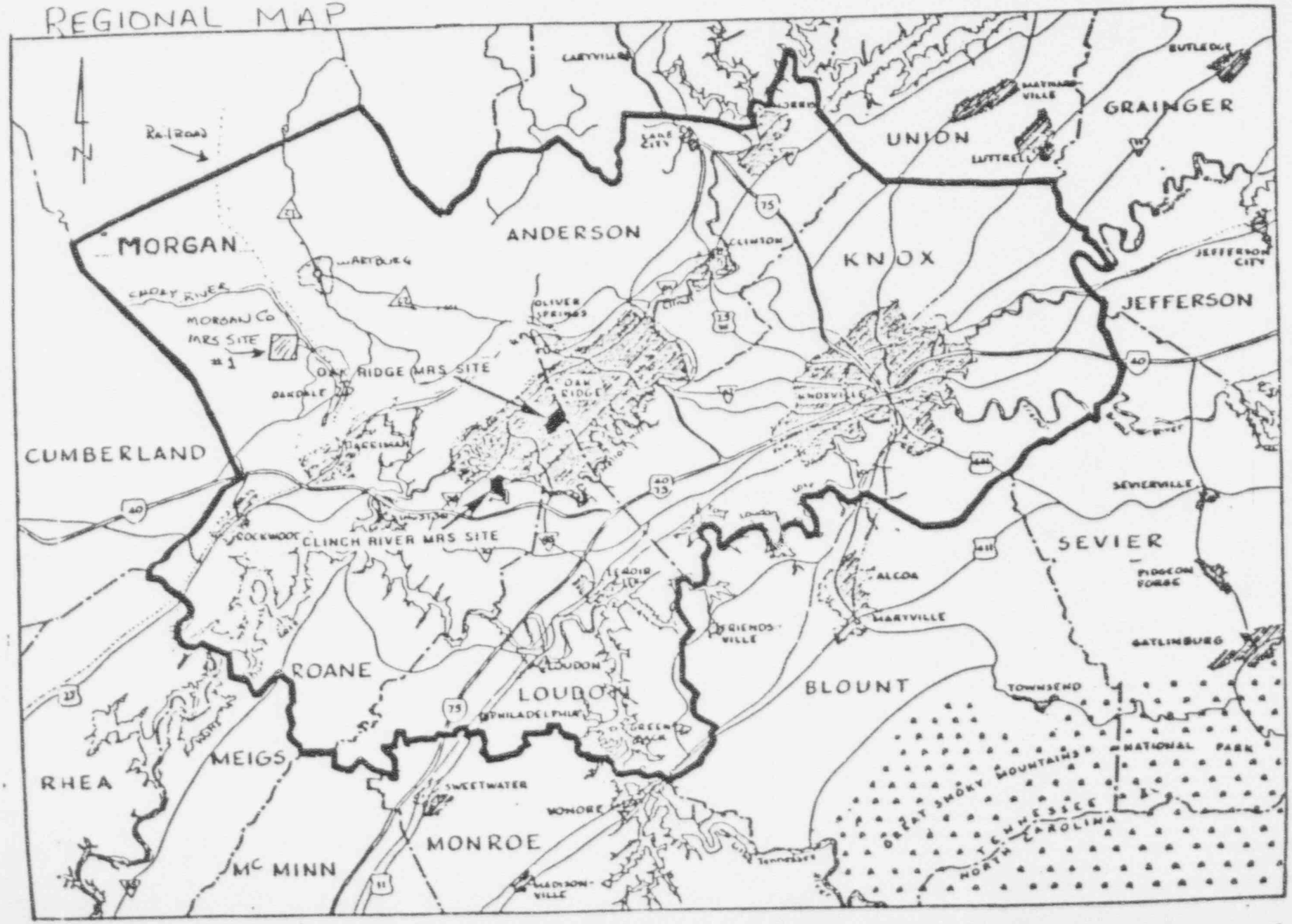
We recommend that MRS provide a decommissioning and decontamination immediately upon completion of MRS's mission in such a manner as to restore the MRS site to unrestricted use.

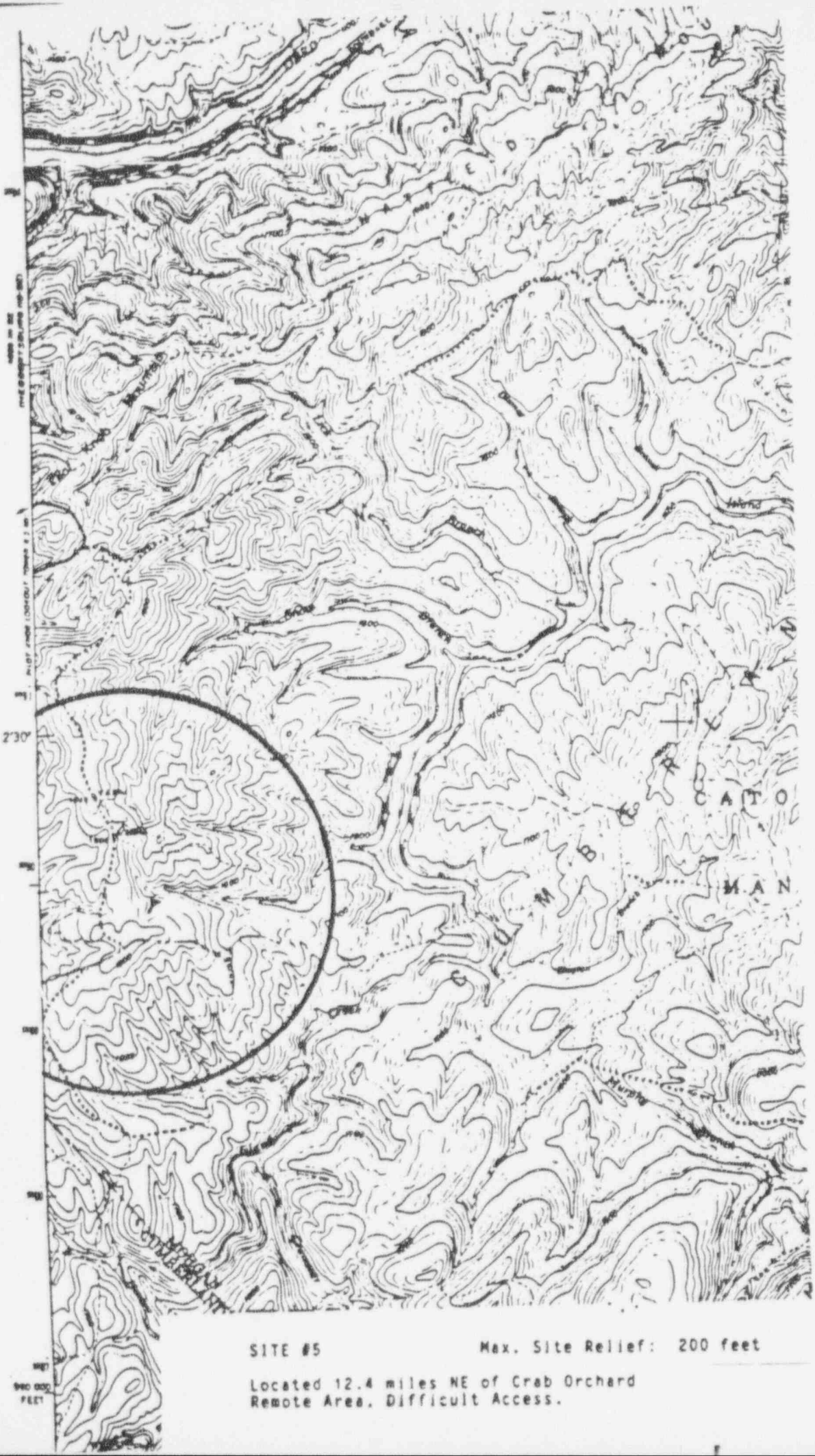
The location of this facility in Morgan County, as in in any other county, would create a strain and special burden financially on local facilities and utilities; such as law enforcement, schools, sewer and water systems, rural roads and feeder roads. We would recommend that the Department of Energy be authorized with Morgan County officials, including Oakdale and Wartburg city officials, and any utility districts that provide any of the above services to make a joint study to determine what financial assistance these facilities would need to enable them to meet present and additional responsibilities. Also, that the

MRS be authorized to provide grants for the purpose of upgrading these facilities.

If these recommendations are met, the people of Morgan County would welcome this facility to Morgan County and would provide a congenial, continual, stable, and cooperative partner in this vital operation.

REGIONAL MAP





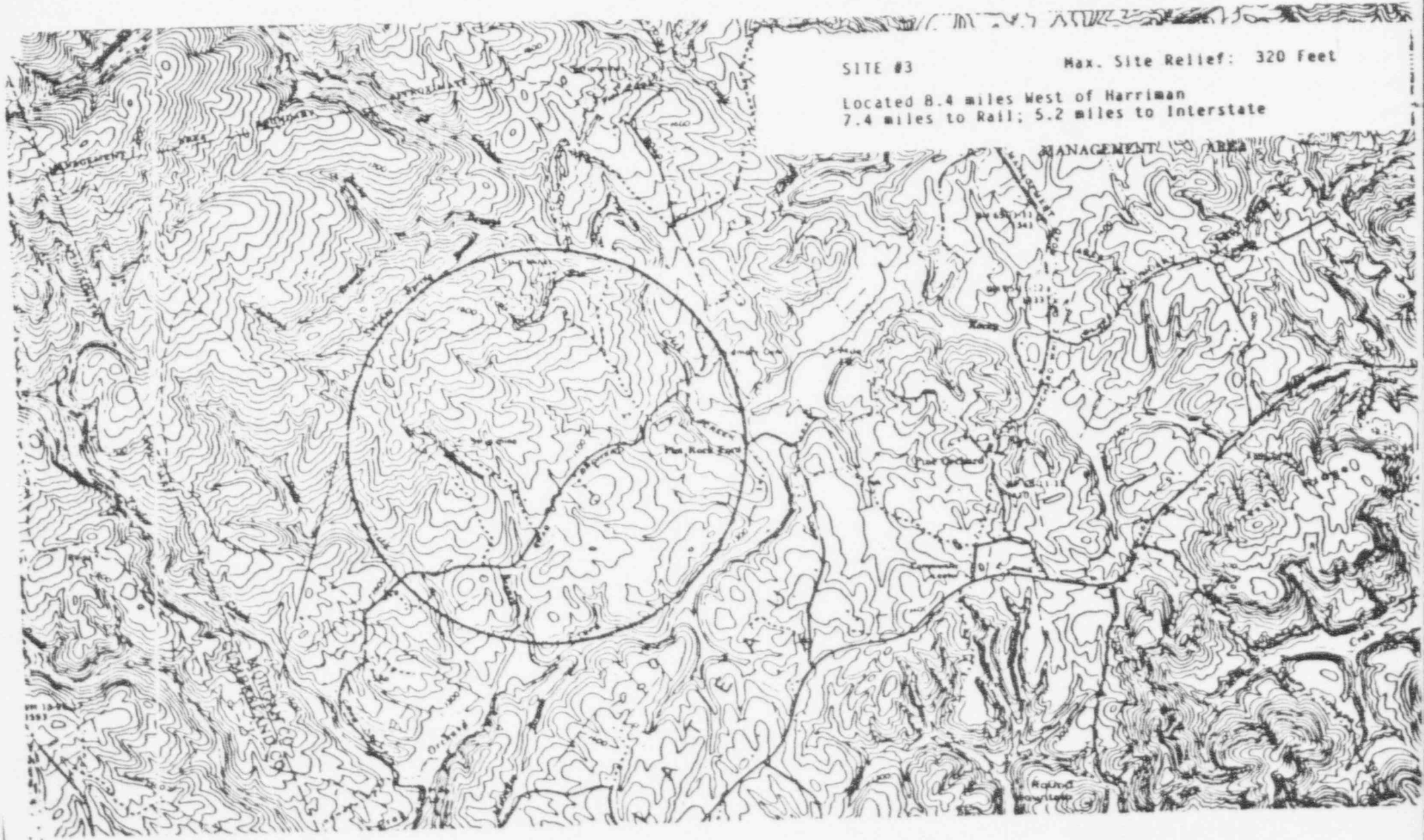
SITE #5

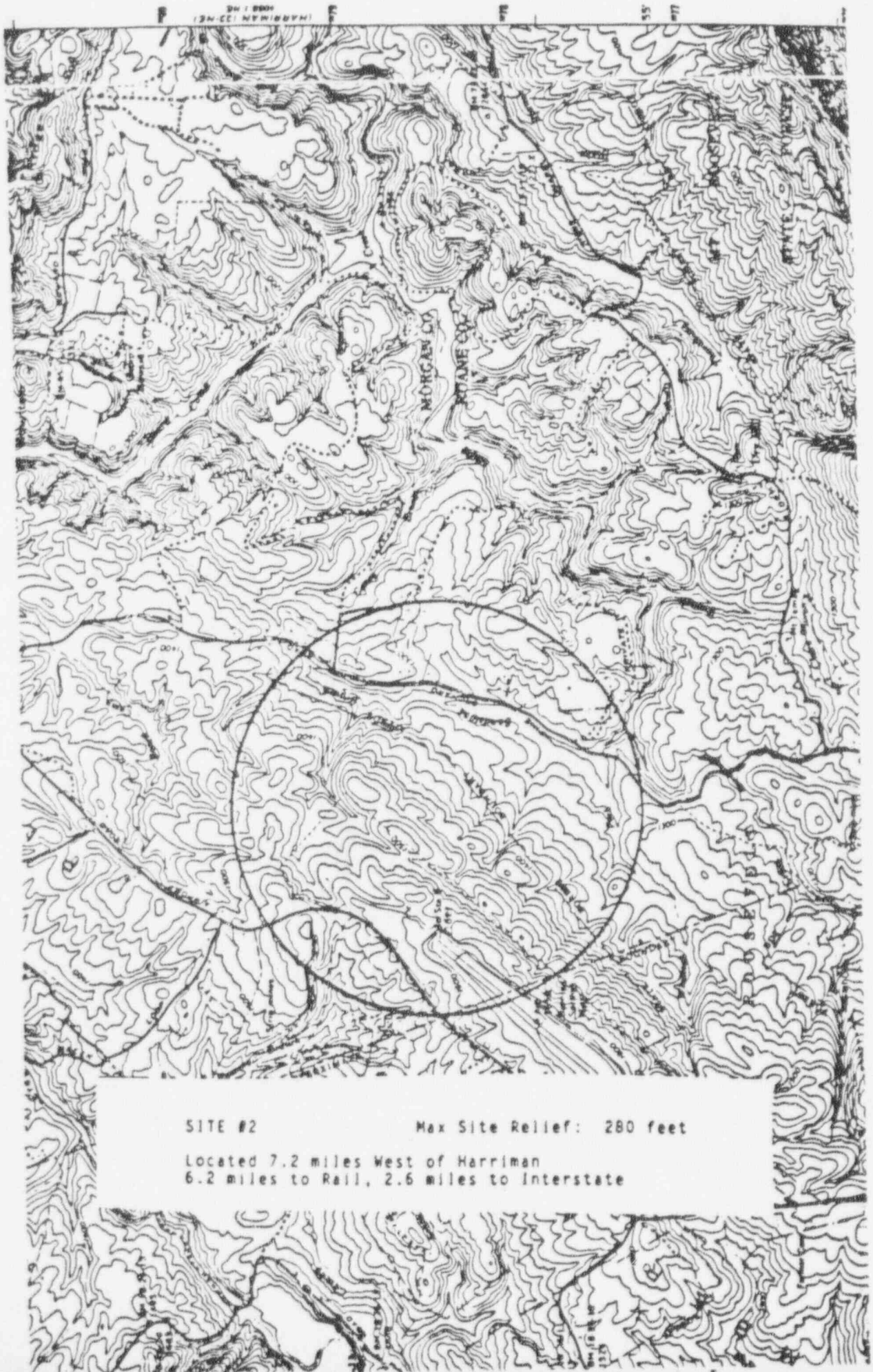
Max. Site Relief: 200 feet

Located 12.4 miles NE of Crab Orchard
Remote Area. Difficult Access.

SITE #4 Max. Site Relief: 440 feet

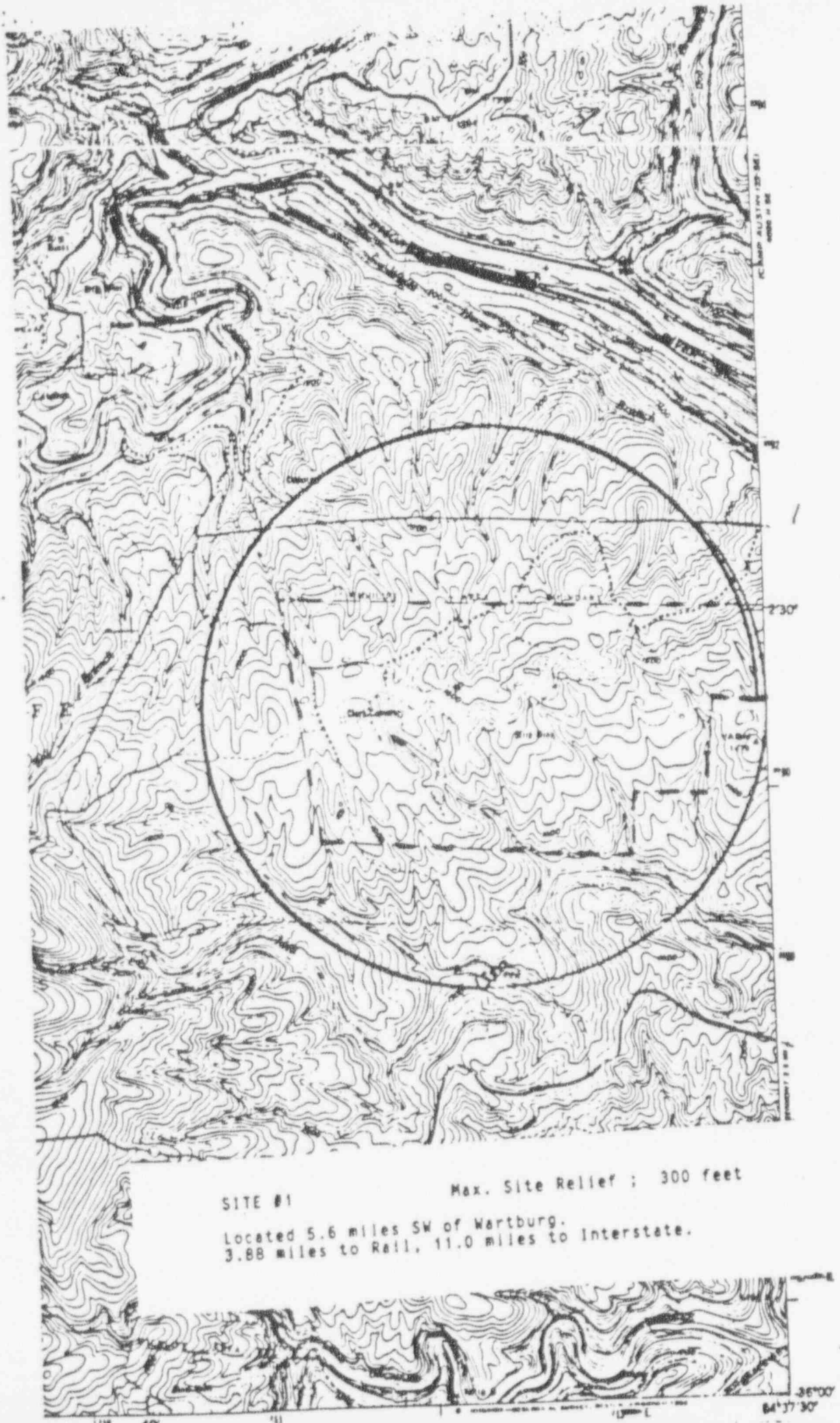
Located 4 miles south of Wartburg


SITE #3
Max. Site Relief: 320 Feet
Located 8.4 miles West of Harriman
7.4 miles to Rail; 5.2 miles to Interstate
MANAGEMENT
AREA



SITE #2 Max Site Relief: 280 feet

Located 7.2 miles West of Harriman
6.2 miles to Rail, 2.6 miles to Interstate



Max. Site Relief ; 300 feet

SITE #1

Located 5.6 miles SW of Wartburg.
3.88 miles to Rail. 11.0 miles to Interstate.

QUESTION 10. Will defense HLW be received and handled at the MRS?

ANSWER.

There are no plans to receive defense HLW at the MRS.

Simpson/NMSS
85/10/28

QUESTION 11. What will happen to spent fuel from power reactors in the far west of the country?

ANSWER.

There are several alternatives being considered by DOE, including shipping back to the MRS or shipping direct to the repository for packaging and disposal without rod consolidation.

Simpson/NMSS
85/10/28

QUESTION 12. Why can't spent fuel be stored at power reactor sites until a repository is ready?

ANSWER.

Pursuant to NWPA, DOE has firm contract obligations to begin accepting fuel from utilities in 1998. There do not appear to be any technical reasons why necessary additional storage capacity cannot be added at the reactor sites for a reasonable time beyond 1998 using methods such as rod consolidation and/or dry storage technologies. Of course, DOE could be contractually obligated to bear the cost of such additional storage. There is less certainty that one could expect each reactor site to prepare packages of spent fuel in the manner and configuration acceptable to the repository, as proposed for the MRS. If not, the packaging operations planned for MRS would have to be performed at the repository site. DOE believes that the integrated MRS provides confidence that it can begin receiving fuel from reactors by 1998 in accordance with its contractual commitments with utilities.

Simpson/NMSS
85/10/28

QUESTION 13. What is the NRC position on the need for an MRS?

ANSWER.

The Commission holds a neutral position on the need for an MRS, but agrees with the position expressed in the NWPA that MRS should not interfere with repository development.

Simpson/NMSS
85/10/28

9/06/85

MONITORED RETRIEVABLE STORAGE (MRS)
QUESTIONS/ANSWERS

DOE MISSION PLAN

QUESTION 1. WHAT IS THE NRC POSITION ON THE NEED FOR AN MRS?

ANSWER.

THE COMMISSION HOLDS A NEUTRAL POSITION ON THE NEED FOR AN MRS, BUT AGREES WITH THE POSITION EXPRESSED IN THE NWPA THAT MRS SHOULD NOT INTERFERE WITH REPOSITORY DEVELOPMENT.

DOMENICI/NMSS
85/09/06

QUESTION 2. WILL THE MRS AS NOW CONCEIVED BY DOE DELAY COMMISSIONING OF THE FIRST REPOSITORY?

ANSWER.

DOE STATES THAT IT WILL NOT. TO HELP SHOW THIS, WE UNDERSTAND THAT DOE WILL SEEK AUTHORITY FOR STORAGE OF NOT MORE THAN 15,000 METRIC TONNES OF SPENT FUEL AT THE MRS, WHICH IS ROUGHLY EQUIVALENT TO ABOUT 5 YEARS OF SPENT FUEL AT THE GENERATION RATE PROJECTED FOR THE 1998-2000 TIMEFRAME.

DOMENICI/NMSS
85/09/06

QUESTION 3. WHAT WILL HAPPEN TO SPENT FUEL FROM POWER REACTORS IN THE FAR WEST OF THE COUNTRY?

ANSWER.

THIS IS UNDECIDED. THERE ARE SEVERAL ALTERNATIVES BEING CONSIDERED, INCLUDING SHIPPING BACK TO THE MRS OR SHIPPING DIRECT TO THE REPOSITORY FOR PACKAGING AND DISPOSAL WITHOUT ROD CONSOLIDATION.

DOMENICI/NMSS
85/09/06

QUESTION 4. WHY IS A ONE-STEP LICENSING PROCEDURE ADEQUATE TO ASSURE THE SAFETY OF AN MRS?

ANSWER.

IT IS A PELATIVELY SIMPLE PLANT, BASED ON CONVENTIONAL NUCLEAR ENGINEERING PRACTICES, WITH LIMITED ACCIDENT POTENTIAL. TECHNICAL SPECIFICATIONS CAN BE INVOKED TO ASSURE PROPER CONSTRUCTION AND OPERATION.

DOMENICI/NMSS
85/09/06

QUESTION 5. HOW LONG WILL THE ONE-STEP REVIEW TAKE?

ANSWER.

IT COULD TAKE AS LITTLE AS ONE YEAR WITH A HIGH QUALITY APPLICATION. EIGHTEEN MONTHS HAVE BEEN USED FOR PLANNING; AN ADDITIONAL YEAR IF A HEARING IS NECESSARY.

DOMENICI/NMSS
85/09/06

QUESTION 6. WHAT SITING CONCERNS DOES THE NRC HAVE FOR THE MRS.

ANSWER.

THE MRS IS SOMEWHAT SITE INDEPENDENT AND COULD BE LOCATED IN ANY REGION OF THE COUNTRY. THE PLANT WOULD HAVE TO MEET SITING CRITERIA IN PART 72 FOR WHATEVER REGION IT WAS IN. THE PREFERRED SITE, RECENTLY SELECTED, IS THE CLINCH RIVER BREEDER REACTOR SITE AT THE OAK RIDGE FEDERAL RESERVATION. THIS SITE HAD ALREADY BEEN REVIEWED AND APPROVED BY NRC STAFF FOR THE LICENSING OF CRBR.

DOMENICI/NMSS
85/09/06

QUESTION 7. WHY CAN'T SPENT FUEL BE STORED AT POWER REACTOR SITES UNTIL A REPOSITORY IS READY?

ANSWER.

THERE DO NOT APPEAR TO BE ANY TECHNICAL REASONS WHY NECESSARY ADDITIONAL STORAGE CAPACITY CANNOT BE ADDED AT THE REACTOR SITES FOR A REASONABLE TIME BEYOND 1998 USING METHODS SUCH AS ROD CONSOLIDATION AND/OR DRY STORAGE TECHNOLOGIES. THERE IS LESS CERTAINTY THAT ONE COULD EXPECT EACH REACTOR SITE TO PREPARE PACKAGES OF SPENT FUEL IN THE MANNER AND CONFIGURATION ACCEPTABLE TO THE REPOSITORY, AS PLANNED FOR THE MRS. IF NOT, THE PACKAGING OPERATIONS PLANNED FOR MRS WOULD HAVE TO BE PERFORMED AT THE REPOSITORY SITE. DOE BELIEVES THAT THE INTEGRATED MRS PROVIDES CONFIDENCE THAT IT CAN BEGIN RECEIVING FUEL FROM REACTORS BY 1998 IN ACCORDANCE WITH ITS CONTRACTUAL COMMITMENTS WITH UTILITIES.

DOMENICI/NMSS
85/09/06

QUESTION 8. WHEN WILL PART 72 BE REVISED TO ACKNOWLEDGE MRS LICENSING?

ANSWER.

IT SHOULD BE ISSUED ~~FOR COMMENT~~ IN FINAL FORM IN THE EARLY FALL.

DOMENICI/NMSS
85/09/06

QUESTION 9. WHERE WILL NON-HLW FROM THE MRS GO?

ANSWER.

LLW WILL GO TO COMMERCIAL SHALLOW LAND BURIAL, IF AVAILABLE.
OTHER WASTES ARE NOW INTENDED FOR THE REPOSITORY.

DOMENICI/NMSS
85/09/06

QUESTION 10. WILL DEFENSE HLW BE RECEIVED AND HANDLED AT THE MRS?

ANSWER.

THERE ARE NO PLANS TO RECEIVE DEFENSE HLW AT THE MRS. TRAINS TRANSPORTING DEFENSE HLW COULD BE STAGED WITH MRS OUTPUT NEARBY ON THEIR WAY TO THE REPOSITORY.

DOMENICI/NMSS
85/09/06

QUESTION 11. WILL THE MRS PROVIDE AN OVERPACK IF NEEDED BY THE REPOSITORY?

ANSWER.

THE MRS IS BEING DESIGNED TO PROVIDE CELL SPACE AND OPERATIONAL FLEXIBILITY FOR PACKAGING SPENT FUEL AND HLW IN SEALED CANISTERS TO MEET REPOSITORY REQUIREMENTS, INCLUDING OVERPACKS THAT MAY BE REQUIRED, IF THE ADDITION OF THE OVERPACKS AT THE MRS IS PRACTICAL FROM THE TRANSPORTATION STANDPOINT.

DOMENICI/NMSS
85/09/06

QUESTION 12. WHAT WILL HAPPEN TO SPENT FUEL WHICH HAS ALREADY BEEN CONSOLIDATED AT A REACTOR SITE?

ANSWER.

IT IS LIKELY THAT SUCH FUEL WILL HAVE TO BE RE-CANISTERED IN THE MRS IN ORDER TO BE COMPATIBLE WITH REPOSITORY REQUIREMENTS.

DOMENICI/NMSS
85/09/06

INSERT FOR THE RECORD
SUBCOMMITTEE ON ENERGY RESEARCH AND PRODUCTION
OF THE
HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY
NOVEMBER 6, 1985

Insert for page 76, line 1786

At the hearing before the House Subcommittee on Energy Research and Production held on November 6, 1985 concerning progress and problems associated with the Nuclear Waste Policy Act of 1982, a question was raised regarding the possibility of licensing the surface waste handling facilities in advance of the licensing proceedings for the repository. Mr. Dircks indicated that he would provide this information for the record.

With respect to surface waste handling facilities and waste packaging, the proposed integrated monitored retrievable storage facility (MRS) that Mr. Rusche has described is being designed to provide for many of the waste handling and packaging operations that otherwise would have to be performed in surface facilities at the repository site. If authorized by Congress, one of the benefits attributed to MRS by DOE is that the surface handling facilities at the repository would be simpler. Licensing of MRS would be independent of the repository process and, as contemplated by DOE, would precede repository licensing action. The DOE conceptual design for MRS is based on current technology and conventional nuclear engineering practices, and the NRC agrees that the licensing process should be completed within the time-frame projected by the DOE proposed schedule for MRS. The proposed MRS is a facility separate from the repositories and as such the licensing would be separate and distinct from licensing of a repository. On the other hand, the NRC would not license surface handling facilities, as such, at a repository since they would be an integral part of the repository application. Under section 202 of the Energy Reorganization Act of 1974, NRC only would license the repository as a whole. This cannot be done until a license application is submitted.

QUESTION 13. What is the NRC position on the need for an MRS?

ANSWER.

The Commission holds a neutral position on the need for an MRS, but agrees with the position expressed in the NWPA that MRS should not interfere with repository development.

Lloyd/NMSS
85/11/05

QUESTION 10. Will defense HLW be received and handled at the MRS?

ANSWER.

There are no plans to receive defense HLW at the MRS.

Lloyd/NMSS
85/11/05

QUESTION 34. Will the MRS as now conceived by DOE delay commissioning of the first repository?

ANSWER.

DOE states that it will not. To help show this, we understand that DOE will seek authority for storage of not more than 15,000 metric tonnes of spent fuel at the MRS, which is roughly equivalent to about 5 years of spent fuel at the reactor generation rate projected for the 1998-2000 timeframe.

Lloyd/NMSS
85/11/05

QUESTION 35. Why is a one-step licensing procedure adequate to assure the safety of an MRS?

ANSWER.

Under 10 CFR Part 72, the applicant is required to submit essentially final design level of detail in the application with a quality assurance program that includes monitoring and inspection of construction activities. The MRS design is based on conventional nuclear engineering practices and passive storage systems. Such a facility has limited accident potential.

Lloyd/NMSS
85/11/05

QUESTION 37. What siting concerns does the NRC have for the MRS.

ANSWER.

The MRS is somewhat site independent and could be located in any region of the country. The plant would have to meet siting criteria in Part 72 for whatever region it was in. DOE's preferred site, recently selected, is the former Clinch River Breeder Reactor site at the Oak Ridge federal reservation. Much of the site technical data developed for the CRBR application would be acceptable for meeting Part 72 siting criteria.

Lloyd/NMSS
85/11/05

QUESTION 38. When will Part 72 be revised to acknowledge MRS licensing?

ANSWER.

It should be issued for comment in early CY 1986.

Lloyd/NMSS
85/11/05

QUESTION 39. Where will non-HLW from the MRS go?

ANSWER.

LLW will go to commercial shallow land burial, if available. Other wastes (and LLW if disposal capacity is not available) will be packaged and held in storage at the MRS until ultimate disposition is determined.

Lloyd/NMSS
85/11/05

QUESTION 40. Will the MRS provide an overpack if needed by the repository?

ANSWER.

The MRS is being designed to provide cell space and operational flexibility for packaging spent fuel and HLW in sealed canisters to meet repository requirements, including overpacks that may be required, if the addition of the overpacks at the MRS is practical from the transportation standpoint.

Lloyd/NMSS
85/11/05

QUESTION 41. What will happen to spent fuel which has already been consolidated at a reactor site?

ANSWER.

It is likely that such fuel will have to be re-canistered in the MRS in order to be compatible with repository requirements.

Lloyd/NMSS
85/11/05

QUESTION 42. Does NRC agree with the procedure by which DOE selected Tennessee as the preferred site for the MRS.

Answer.

NRC has taken no position on this issue. Congress, under NWPA, assigned the responsibility for site selection for an MRS to DOE. The Commission is awaiting DOE's formal proposal.

Lloyd/NMSS
85/11/05

QUESTION 43. Must NRC prepare an EIS for the MRS? How does this NRC EIS interface with the DOE EIS?

Answer.

Our environmental protection regulations embodied in 10 CFR Part 51 would require that an EIS be prepared by the NRC. (If Congress authorizes and MRS, the NWPA specifies that the provisions of NEPA shall apply except for the question of need for the facility.) DOE has stated in the Mission Plan that it intends to prepare an EIS if Congress authorizes an MRS. This sequence of actions (both agencies preparing an EIS) is unlike the procedure stipulated in the NWPA for repository licensing where the NRC is explicitly directed to adopt the EIS prepared by DOE, to the extent practicable. In the case of the MRS, some coordination and tiering may be possible as contemplated by NRC regulations, but it is premature to consider detailed procedures at this time.

Lloyd/NMSS
85/11/05

QUESTION 44. What is the NRC's perspective of DOE's projected schedule for MRS licensing?

Answer.

If Congress authorizes MRS in FY 1986, DOE plans to initiate final design effort in FY 1987 leading to preparation of a license application for submittal to NRC in early FY 1989. The DOE schedule projects 30 months for the NRC licensing process. With continuing interaction and consultation between the agencies during the final design phase and assuming a high quality license application, the NRC staff considers the schedule to be reasonable. The staff projects that its safety and environmental reviews and documentation can be completed within 18 months from receipt of the application, thus allowing one year for completion of the hearing process that is initiated soon after filing of the application. Issuance of the license in mid to late FY 1991 would provide DOE with the projected four years for construction, followed by preoperational testing, to enable pilot-scale operations to begin in early 1996.

Lloyd/NMSS
85/11/05

QUESTION 45. What are the NRC resource requirements for MRS licensing?

Answer.

The NRC has budgeted about one staff year in FY 1986 for review of the DOE proposal and pre-licensing interaction with DOE. For FY 1987 the NRC has budgeted 3 SY and $300K program support funds with similar resources projected for FY 1988 for pre-licensing interaction with DOE and the review of DOE topical reports on selected design topics. These efforts should assist DOE in preparing a high quality application and provide a degree of confidence that DOE efforts are meeting regulatory requirements. Upon receipt of the application form DOE, NRC staff estimates that its safety and environmental reviews will require about 5 SY and $750K program support funds over an 18 month period. Completion of the hearing process may require an additional 1-2 SY.

Lloyd/NMSS
85/11/05

COMMENTS

ON THE

U.S. DEPARTMENT OF ENERGY

MONITORED RETRIEVABLE STORAGE

SUBMISSION TO CONGRESS

FROM THE

U.S. ENVIRONMENTAL PROTECTION AGENCY
FEBRUARY 1986

U.S. NUCLEAR REGULATORY COMMISSION
FEBRUARY 1986

STATE OF TENNESSEE
FEBRUARY 1986 & MARCH 1987

COMMENTS

OF THE

U. S. ENVIRONMENTAL PROTECTION AGENCY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

January 31, 1986

Mr. Ben C. Rusche, Director
Office of Civilian Radioactive Waste Management
U. S. Department of Energy
1000 Independence Avenue
Washington, D. C. 20585

RE: Environmental Assessment for the Integral Monitored Retrievable Storage Facility, Submission to Congress
EPA Log No. A-DOE-E109-TN

Dear Mr. Rusche:

Pursuant to Section 141(b)(3) of the Nuclear Waste Policy Act of 1982 (NWPA), the Environmental Protection Agency (EPA) has reviewed the Environmental Assessment for the Monitored Retrievable Storage Facility (MRS) Submission to Congress. Based on reviewing the information provided, EPA concurs with the Department of Energy's (DOE's) conclusion that spent fuel and high-level wastes (HLW) can be safely and economically stored in dry storage facilities without significant degradation of the stored materials or risks to the public and the environment. However, EPA believes that permanent geologic disposal is far more preferable than long-term storage and therefore urges DOE to proceed expeditiously with siting the geologic repositories so that the need for a MRS is minimized. (40 CFR 191, Environmental Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes). The NWPA of 1982 specifies that the disposal of spent fuel and HLW in a repository should proceed regardless of the existence of a MRS facility (NWPA Section 141(a)(5)).

The EA and supporting documentation is adequate in explaining the need and advantages of the MRS as an integral part of the total nuclear waste management system. However, we continue to believe in the importance of a clear scientific, technical explanation of the need for the facility based upon credible data, and thereafter in a continuous public exploration of this information. This submission indicates that such a facility for retrievable storage of spent fuel and HLW can be designed, constructed and operated using state of the art design and engineering practices. EPA, therefore, concurs with DOE's proposed linkage of the MRS to the schedule of the geologic repository.

Based on our review of the environmental assessment and the accompanying technical documentation, EPA concurs with DOE's recommendation to construct a MRS facility as an important element of the nuclear waste system. We believe from our review of the proposal and our knowledge of the required technology for the MRS that this action can be accomplished within acceptable regulatory and environmental standards. However, this determination is subject to EPA's review and comment on the Environmental Impact Statement required for construction and licensing, (and the subsequent applicable environmental permitting), which will be prepared pursuant to NEPA if MRS is approved by Congress.

As required by Section 141 of the NWPA, DOE considered three siting alternatives and two design concepts for the MRS in the EA. Per Section 141(c)(1), the site characterization was limited to existing available information. Consequently, EPA's review of the presented alternatives was based on previously generated site data and our knowledge of the sites as well as preliminary design criteria for the MRS. EPA believes that of the alternatives evaluated, the construction of the MRS facility at the Clinch River site using the above-ground, sealed storage cask technology is the preferred option. We reached this conclusion because of the considerable site data and evaluation already available and the fact that much of this site has already been disturbed by CRBRP activities. However, because the CRBRP site investigation did not extend to the proposed cask storage area for the MRS, detailed site evaluation including geotechnical and hydrological investigation will be mandatory during the next phase of the project in order to finalize siting and facility design. Our additional technical comments relating to the Environmental Assessment are attached.

We appreciate the opportunity of reviewing and commenting on the EA for the Monitored Retrievable Storage Facility. Should you have any questions regarding our comments, please contact Heinz J. Mueller of my staff at FTS 257-7901 or (404) 347-7901.

Sincerely yours,

Jack E. Ravan
Regional Administrator

Attachment
Detailed Technical Comments

cc: Mr. Robert N. Browning
Director, Division of Waste Management
Nuclear Regulatory Commission
Washington, D. C. 20555

Commissioner James E. Word
Department of Health and Environment
Chairman, Safe Growth Cabinet Council
Room 360
Cordell Hull Building
Nashville, TN 37219

DETAILED TECHNICAL COMMENTS

RADIOLOGICAL

- There should be no significant radiation exposure to the public resulting from MRS operations. The minimal exposure which will occur will be due to transportation of spent fuel elements. Accordingly, the more centrally located the MRS with respect to the nuclear plants it will serve, the shorter the distance to the MRS, and the smaller the radiation doses to the public. The projected population doses of <1% of radiation background in Tennessee is realistic.

- The primary radiation dose to people will be occupational due to operations at the facility. However, this should be well within acceptable radiation exposure levels because the high-level radioactive materials will be handled remotely and all released material will occur in well shielded and filtered hot cells.

- We disagree with the preciseness of the statement on page 6.6 of Volume 2 of the MRS Environmental Assessment - "...because of these design features, a nuclear criticality is not considered possible". While the possibility may be extremely remote, it is not impossible. Accordingly, it is recommended that this subject be included as an accident scenario in the overall accident analysis discussion, along with fuel assembly drop, shipping cask drop, storage cask drop and canister shearing scenarios.

- Reprocessing of spent fuel is not currently planned but is a possible waste management option. Logically, storage capacity should be provided at the reprocessing site to preclude unnecessary handling and transportation. DOE should declare whether or not reprocessing is envisioned in the near term (10-20 years) as a possible adjunct to MRS operations, design and potential environmental impact.

- The major radiological uncertainty in justification of an MRS facility is the operational management and maintenance of spent fuel and HLW for the long term; i.e., will need for storage capacity exceed the 40 year projected operational lifetime of the facility?

GEOTECHNICAL

° Section 5.1.3 Geology and Hydrology

The southern portion of the Clinch River site, which is proposed for the major MRS facilities, was investigated in detail as part of the CRBR project. The northern portion, however, which is proposed for the cask storage area was not part of the CRBRP site investigation and therefore has received only limited evaluation. This part of the site is underlain by the Knox Group, a geologic unit characterized by solution activity and sinkhole features. We have concerns about the lack of geotechnical data on this part of the site, although at this time, based on an examination of the topographical map of the area, there appears to be no basis for sinkhole collapse. Detailed geotechnical testing and analysis will be required during the environmental evaluation phase (and documented in the EIS) to address the geologic integrity and the potential for sinkhole collapse and solution feature activity on the site. This should include borings to investigate the geologic and hydrologic conditions underlying the site storage area to determine the potential impacts of these conditions on water quality and use. Specific mitigation techniques should also be designed at that time to deal with any identified problems.

WETLAND AND FLOODPLAINS

° Section 6.5.10.5 Ecological Impacts and Land Use - Based on the EA data, the Clinch River and Hartsville sites would appear to have the least involvement with natural areas since both sites have already been disrupted by construction activity. However, a more detailed analysis of any floodplain/wetland and natural area impact and mitigation required should be addressed in the environmental evaluation phase.

AIR QUALITY

° Section 6.2.2.1 Preconstruction and Construction Page 6.34 - Based on air quality analysis in the EA, the estimated 24-hour total suspended particulate concentration (TSP) may exceed the NAAQS standards during construction activities at the Clinch River and Oak Ridge sites. More stringent dust control measures therefore should be addressed in the EIS to reduce the levels.

° Section 6.2.2.2 Operation p. 6.36 - Based on the preliminary data presented in the EA, the operation of the MRS facility would be able to comply with ambient air quality standards.

NOISE

° Section 6.2.8.1 Noise Levels - Based on the experience of the CRRR project, construction noise levels at the perimeter of the site are expected to be in the Ldn range of 50 to 57dB. Because of the attentuation of physical barriers and and distance, noise levels at the nearest residences are not generally expected to exceed 55dB, which is within acceptable limits for quiet rural areas. However, blasting activity may exceed these levels. Use of smaller charges and scheduling during late afternoon hours will reduce the interference and annoyance on nearby residences.

Although, based on an analysis of noise emissions from equipment proposed for the MRS, acceptable noise levels (Ldn of 55dB) are not exceeded, a more in-depth study of noise impacts should be conducted in the environmental evaluation phase (and documented in the EIS).

GROUND AND SURFACE WATER

° Section 3.3.1, Design of the MRS Facility, page 3.7 - An extensive environmental data base for the Clinch River and the Hartsville Sites has been generated by the TVA (as a member of the team for the Clinch River site). The narrative should acknowledge this information and DOE's plans to fully utilize this data base by conducting the necessary field studies to up-date and verify the continued representativeness of the information.

° Section 5.1.3.2, Ground Water, page 5.18 - The section should address sinkholes and solution activity at the site, including the field storage area where data is very limited.

° Section 5.2.3.2, Ground Water, page 5.83 - The reference should be corrected to indicate that Figure 5.16 shows the location of some monitoring wells in Bear Creek Valley.

° Table 5.31, page 5.84 - The drinking water standards listed in the table for arsenic, cadmium, and lead are inconsistent with the 40 CFR Part 141. Also, the EPA has recently proposed maximum concentration levels (MCL) and promulgated recommended maximum contaminant levels (RMCL) for the following volatile synthetic organic chemicals:

	RMCL (1)	Proposed MCL(2)
1,2-Dichloroethane	Zero	0.005 mg/l
Trichloroethylene	Zero	0.005 mg/l
1,1-Dichloroethylene	0.007 mg/l	0.007 mg/l
1,1,1-Trichloroethane	0.20 mg/l	0.20 mg/l

(1) 50 Fed. Reg. 46,880, Nov. 13, 1985
(2) 50 Fed. Reg. 46,902, Nov. 13, 1985

The agency is also developing RMCLs for Toluene, cis-and trans-1,2-Dichloroethlenes, and numerous other synthetic organic chemicals (50 Fed. Reg. 46,936, November 13, 1985). Finally, the RMCL for fluoride is 4.0 mg/l (50 Fed. Reg. 47,142, Nov. 14, 1985). This concentration is also proposed as the MCL for fluoride.

- Section 5.2.3.2, Ground Water, page 5.83 - The last paragraph may not be valid for surface water supplies located on the Clinch River downstream of its confluence with Popular Creek. Note that it was reported that Bear Creek is contaminated with volatile organic compounds, metals, nitrates, and uranium. The narrative could be reworded to specifically address drinking water supplies relying exclusively on ground water as its source.

- Section 5.3.3.2., Surface Water Quality, page 5.100 - It is doubtful that the lowest temperature reported in the Cumberland River was 60°F. (would expect a low near 33°F. consistent with the Clinch River page 5.16).

- Section 6.1.3., Preconstruction, Construction, and Decommissioning, pages 6.15 - 6.17 - This discussion fails to address the management of the wide range of liquid and solid waste and substances during construction of the facility. Specifically:

    - Point Source Discharges
        - Sanitary Waste
        - Concrete Mixing Plant Waste
        - Metal Cleaning Waste

    - Solid Waste Management
        - Clearing Waste
        - Construction and Demolition Waste
        - Domestic Solid Waste
        - Hazardous and Toxic Waste
        - Water Treatment Plant Sludge

    - Other Construction Related Water Quality Impacts
        - Oil and Hazardous Substance Spill Prevention
        - Fuel Transfer
        - Dredging and Shoreline Activity
        - Specific Erosion Control Procedures
        - Use of Herbicides, Insecticides, etc.

Also, the discussion does not address monitoring activities and the regulatory requirements applicable during construction, operating and decommissioning.

° Section 6.1.3.2, Operation, pages 6.16-6.17 - The discussion does not address monitoring, spill prevention and control outside the R & H Building, and the use of herbicides/insecticides during plant operation. Also, the management and use of toxic substances for metal cleaning, as cooling water additives, and other uses should be addressed.

° Sections 6.2.3, 6.3.3, and 6.4.3, Water Quality and Use Impacts - The assessments of impacts fail to address the significance of sinkholes and the sites' susceptibility to the development of solution cavities as they relate to pollutant transport resulting from spills and other potential accidents. Mitigative measures should also be addressed.

° Section 6.3.3, Water Quality and Use Impacts, pages 6.80 and 6.81 - The assessment must address the site-specific effects of the various construction, operational, and post-operational discharges of treated waste on the currently poor water quality of Bear Creek. Note that the poor water quality conditions in the creek are further aggravated by characteristic low flows (minimum observed flow of 0.1 cfs and mean annual flow of 2 cfs). Thus, the use of this stream as a receptor for treated wastewater discharges may be severely limited. This issue should be addressed as it relates to compliance with the designated stream classification and applicable water quality standards established by the State of Tennessee.

° Section 6.3.4, Ecological Impacts, page 6.81 - Site-specific aquatic ecological effects of construction, operational, and post-operational discharges on the stressed Bear Creek must be addressed.

° Section 6.5.3, Water Quality and Use Impacts, page 6.124 - The dams located on the Cumberland River are operated by the Corps of Engineers and not by TVA as indicated. More importantly, this section does not compare the environmental effects associated with the six design combinations. Specific discussion is necessary to address the potential ground-water consequences of above ground versus below ground storage; i.e., capability to detect container/liner degradation and potential consequences due to accidental leakage from the casing.

Appendix I

The listing of "Potentially Applicable Federal Laws and Regulations" could suggest that items not listed are not applicable. Since this is not likely, we suggest a statement that the appendix lists "significantly applicable laws..." We also suggest the following be added to the list as significant.

A. Water Quality
   - 40 CFR Parts 110, 112, 117, 125, 133, 136, 300, and 302.

B. Solid/Hazardous Waste Recycling, Storage, Treatment, and Disposal
   - The facility will be subject to State of Tennessee statutes and regulations addressing the generation, transport, storage, treatment, and disposal of hazardous waste since the Federal program has been delegated to the State of Tennessee.
   - 40 CFR Parts 260-264 and 270, Generation and storage of hazardous waste; Specific to the 1984 RCRA amendment provisions not authorized to the State of Tennessee.
   - 40 CFR Part 241, On-site disposal of non-radiological clearing, construction, and decommissioning waste; Mandatory for Federal agencies.
   - 40 CFR Part 243, Storage and collection of commercial/institutional solid waste; Requirements sections mandatory for Federal agencies.
   - 40 CFR Parts 244, 246, 247, 249 (Reuse/Recycling).
   - 40 CFR Part 280, Underground storage tanks.

Volume III

Section 3.3.1, Background, page 3.10 and Section 3.3.2, EPA, page 3.14 - The list of applicable Federal laws and regulations is provided in Appendix I, Volume II (not Appendix C).

COMMENTS

OF THE

U. S. NUCLEAR REGULATORY COMMISSION

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

CHAIRMAN

February 5, 1986

Mr. Benard C. Rusche, Director
Office of Civilian Radioactive Waste Management
U.S. Department of Energy
Washington, D.C. 20585

Dear Mr. Rusche:

We are pleased to provide our comments to the Department of Energy (DOE or the Department) on its proposal to Congress for monitored retrievable storage (MRS). Our comments are based on the information provided to us by the Department in our consultative role as required by the Nuclear Waste Policy Act of 1982 (NWPA). This information has been provided primarily in the form of conceptual design information for the MRS. Some comments stem directly from the Commission meeting at which you briefed us on the MRS proposal on January 23, 1986. The review schedule issued by DOE did not accommodate an extensive review of the environmental assessment information provided. We note, however, that two of the three specific sites selected by the Department for consideration for the MRS have previously been subject to environmental analysis and evaluation for nuclear power plants by our agency in accordance with the National Environmental Policy Act of 1969. In addition, the NWPA stipulates further environmental evaluation should the Congress approve the DOE proposal for an MRS.

Our comments are limited to our role as a regulatory agency. In this regard the principal regulation governing the licensing of an MRS is 10 CFR Part 72. We are currently considering modifications to that regulation to clarify procedures and requirements the Department will be following if the Congress approves the proposal.

With respect to our review from a regulatory standpoint, we offer the following observations.

1. Siting - The preferred site identified by DOE for the MRS is the site of the former Clinch River Breeder Reactor Plant, which has already been shown to be a qualified site from the standpoint of public health and safety for a nuclear power plant. Moreover, based on present information, the staff knows of no information which would disqualify the alternate sites. DOE, however, has recognized the need for further investigations and evaluation of the designated site as related to the particular characteristics of the MRS design.

2. Design - The MRS conceptual design appears reasonable from the standpoint of public health and safety. Although an in-depth review would be required before the facility could be licensed, it appears from the conceptual design that each requirement in 10 CFR Part 72 can be met.

3. Cask Certification - DOE must design a safe and reliable transport system, including durable transport equipment. You have indicated that transport casks developed under NWPA for transporting commercial spent fuel to a repository will be certified by NRC. Based on experience to date, spent fuel can be moved safely in NRC-certified casks.

4. Demonstration of Consolidation - The consolidation of spent fuel needs to be adequately demonstrated to assure that this operation can be performed on the production-scale contemplated for the MRS. To date, a few spent fuel assemblies have been taken apart and the rods consolidated, and a significant number of fuel assemblies have been reconstituted (i.e., the rods have been removed and replaced within assemblies). In this sense the consolidation process is feasible. You have indicated in the Design Verification Plan (Appendix C to the Program Plan) your intent to test and demonstrate disassembly/consolidation equipment, principally at the Idaho National Engineering Laboratory.

5. Safeguards - The NRC staff's analysis of the MRS safeguards provisions at the conceptual design stage indicates that all NRC safeguards requirements can be met.

In addition to the above considerations having a bearing on the health and safety of the public, our observations are offered on the procedures and institutional relationships to be followed by the Department.

a. License Application - For DOE to meet its planned schedule, the license application you submit to NRC would have to be complete and technically sound, meeting all NRC requirements. The NRC staff will continue to consult with DOE during the preparation of its application.

b. Coordination with Repository Organizations - Because the MRS would prepare spent fuel to be compatible with repository requirements, DOE must closely coordinate efforts with each candidate repository organization. Your schedule indicates submittal of a license application in 1989 for the MRS, approximately two years prior to the selection of the first repository site from the slate of candidate sites. The materials required for the disposal packages produced at the MRS might be

different for each candidate repository site according to the different physical and chemical properties of each repository environment. Therefore, the application for the candidate MRS facility will need to show how DOE will be able to accommodate each design. Another essential aspect to the preparation of the package is the close coordination required between the repository and MRS organizational quality assurance programs to assure that the repository requirements are met. At this time, the staff foresees no impediment at the MRS that would foreclose repository options for package requirements.

c. Transportation Requirements - You have clearly indicated that you intend to use NRC-certified casks, but there remains a degree of uncertainty regarding your commitments to other NRC transportation requirements. The DOE Draft Transportation Institutional Plan states that, "Further, when shipping commercial waste to facilities developed under the NWPA, the DOE has made the commitment to comply with DOT and NRC regulatory requirements that pertain to the transportation of nuclear materials." However, except to the extent required by NWPA, DOE is exempt from NRC transportation regulations. At the January 23 meeting, you indicated your intention to follow all NRC transportation regulations applicable to the commercial sector. Therefore, you should clarify your transportation plans accordingly in the MRS proposal.

The above comments relate to the NRC staff's technical evaluation of the MRS proposal. There are, however, some difficulties and uncertainties associated with the procedural approach the MRS would follow. For example, integration of the Commission's NEPA responsibilities with its licensing responsibilities presents some conceptual difficulties. The DOE proposal assumes that DOE would submit an environmental report with its MRS application, and the NRC would prepare the environmental impact statement (EIS). While Section 141(d) of the NWPA relieves the Commission of the responsibility for considering the need for the facility, it is silent concerning alternative sites, the NEPA comment process, and cost-benefit analysis. This creates an anomalous situation where the Commission would be considering such factors after the Congress had approved the MRS and, perhaps, DOE's preferred site. How these procedural matters are resolved will significantly affect whether the 30-month licensing schedule suggested by the DOE MRS proposal is reasonably achievable. We suggest, and you agreed at the January meeting, that Congress could address the NEPA issues in legislation authorizing the MRS.

In addition to the above, the NRC staff is preparing a report which provides additional detail on its evaluation of the design concepts for the MRS, principally from the perspective

of the requirements of 10 CFR Part 72. If the MRS is to be constructed and operated, it would be licensed pursuant to this regulation. For this reason, the staff used 10 CFR 72 as its primary guidance. Minor changes to this rule are being proposed to explicitly cover licensing of an MRS, should it be authorized by Congress. This evaluation refers to the current version of 10 CFR 72; however, the changes the Commission has under consideration may affect a few requirements. These areas are noted within this report. The report, which will soon be available, should be useful to DOE in developing its definitive design, if Congress approves its proposal.

Sincerely,

Nunzio Palladino

Nunzio J. Palladino
Chairman

COMMENTS

OF THE

STATE OF TENNESSEE

State of Tennessee

NED McWHERTER
GOVERNOR

March 25, 1987

The Honorable John P. Herrington
Secretary of Energy
1000 Independence Avenue, S.W.
Washington, DC 20585

Dear Secretary Herrington:

Your department is seeking congressional authorization for a monitored retrievable storage (MRS) facility in Tennessee. Currently, a federal court injunction brought about by our litigation has blocked the formal submission of such a proposal to the Congress. However, your recently issued Draft Mission Plan Amendment makes it clear that the MRS has become a primary objective of your department's nuclear waste strategy. In fact, the proposed schedule revision for the first repository program places the MRS in the forefront to receive waste by 1998 to meet your department's agreements with utilities.

We plan to submit full comments on the Mission Plan Amendment later, but I will take this early opportunity to let you know that I oppose the use of an MRS as a solution to the nation's nuclear waste problems. The primary emphasis should be on a permanent solution, isolating the waste from our environment in a deep geologic repository.

Your department should seek to minimize the movements of nuclear waste across the country. The MRS proposal does not do this. There is agreement from many sources that an MRS is not necessary to meet the objective of permanent waste disposal. Tennessee citizens should not be asked to pay the high costs and to suffer the negative impacts of an unnecessary project.

The MRS proposal documents have not yet reached Congress and the time has not arrived for me to issue a formal notice of disapproval, but you should know that it is my intention to vigorously oppose the MRS project.

Sincerely,

Ned McWherter

/dd

State of Tennessee

LAMAR ALEXANDER GOVERNOR

February 5, 1986

Honorable John P. Herrington
Secretary of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Dear Mr. Secretary,

When your Department announced last April the plans to build a major nuclear waste plant in Tennessee, hundreds of questions were raised. In fact, the unexpected announcement touched off strong reactions and brought forth widely varying opinions from one end of the state to the other. The name chosen for the plant only added to the confusion. The name (Monitored Retrievable Storage Facility) totally obscures the fact that this is primarily a repackaging plant for spent fuel rod assemblies.

Because of the date chosen by your Department for submission of the proposal to the Congress, Tennessee government was called upon to organize and conduct an evaluation over a seven month period. Our evaluation was intensive and brought forth the considerable expertise on nuclear issues available in our state.

We sorted through all the questions and put a higher priority on some. As we conducted our evaluation, these questions were brought to the attention of DOE staff members assigned to the project. Our detailed review of the proposed three volume submission to Congress is based upon our priority questions.

After evaluating the material provided by your Department and after comparing this to independent analyses, we have become more convinced that questions about the need for and feasibility of the project should receive more attention by the Department of Energy and the Congress. We also feel that your Department and the Congress should re-think the procedures for siting the plant if its construction is found to be necessary. Location of this plant in the Knoxville-Oak Ridge Area would seriously harm the promise of economic strength developing there.

Our review elevates our priority questions for your further consideration and can provide some guidance to the Congress for its review. We have also drawn some further conclusions from our studies which I ask you to consider. All of our major concerns are summarized in the attached "COMMENTS OF THE STATE OF TENNESSEE."

We found that many improvements could be made to the waste management system and that most of these significant changes could be made without the high costs of introducing the central repackaging plant into the system. We are convinced that the benefits of an optimized waste management system can be achieved at lower costs without the repackaging plant.

A positive benefit has been achieved by the exchange of views on the repackaging facility. Your staff members have commented that planning for the repackaging plant has tended to sharpen the thinking and focus attention on development of an improved waste management system. For example, an optimized transportation system will reduce both costs and the risks to workers and the public.

Attached is my statement of January 21, 1986, which sets out my conclusion more specifically. I communicated these views directly to you that day.

Please consider this letter and the attached "comments", "key question analysis", and "appendices" as our official response to the DOE Submission to Congress. We ask that you forward these documents to the Congress with your submission and that you give them full consideration in your further development of the nation's nuclear waste management and disposal system.

Sincerely,

Lamar Alexander

Lamar Alexander

LA/bsc

Enclosures

NEWS FROM THE OFFICE OF THE GOVERNOR

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STATEMENT OF GOVERNOR LAMAR ALEXANDER (R. - Tenn.)

JANUARY 21, 1986

The U.S. Government wants to put in Oak Ridge a repackaging plant for fuel rods that nuclear power plants use to make electricity.

The repackaging plant (and any short term storage) could be operated safely, but the U.S. doesn't really need it and Oak Ridge is exactly the wrong place for it.

Therefore, during a visit today in Washington, I told the U.S. Secretary of Energy and our Congressional delegation today that I will veto the federal plans and will urge Congress not to override my veto.

* * * *

For six months, the state's Safe Growth Cabinet Council -- with the help of 45 staff professionals -- has studied the proposed repackaging plant. Its 2000-page report has been available to the public since December.

Here are my conclusions, based on their findings:

1. "MRS" IS A REPACKAGING PLANT -- The government has given the plant a ridiculous name (Monitored Retrievable Storage Facility) that confuses almost everyone, and nuclear power opponents have given it an undeserved reputation that scares almost everyone. "MRS" is a place to rebundle into larger containers the fuel rods used at about 100 power plants in the Eastern U.S. After short-term storage, the containers then will be shipped on one train to a final resting place out West.

2. IT IS OUR PROBLEM, TOO -- Ten percent of all the fuel rods that need repackaging will come from four TVA power plants. These plants, by the year 2000, will be producing one third of all the electricity most Tennesseans use in their homes and on their jobs. So, if we don't solve the national problem of packing and storing the stuff, ten percent of it will continue to pile up at the four TVA plants. And, because we are so centrally located, there is no way to escape having the spent fuel shipped through Tennessee.

3. THE REPACKAGING PLANT CAN BE OPERATED SAFELY -- That, of course, depends upon the U.S. Government's competence as a manager and regulator. But it is the same material being used everyday to make electricity. It will be carried in containers that have never broken, even when test-crashed at 100 miles per hour. The fuel cannot explode and cannot be made into a bomb. More than ninety percent of it will be carried by train, not on highways. The task force of citizens and experts from Oak Ridge and Roane County also conclude that it can be designed and operated safely.

4. IT IS UNNECESSARY AND THEREFORE A WASTE OF MONEY - The Government concedes the plant is only desirable, not essential. And our study concludes that the government overestimates the need and the benefits. The plant's net cost to taxpayers will be $1 to $2 billion. Since TVA produces ten percent of the spent fuel rods, that means the plant will add an unnecessary $100 to $200 million to TVA electric bills.

5. OAK RIDGE IS EXACTLY THE WRONG PLACE FOR IT - It makes no more sense to put this repackaging plant in Oak Ridge than it would to put it on the Vanderbilt or Georgia Tech campuses or in a Memphis City Park or at the edge of Washington, D.C. It may be safe but it is not the kind of thing many people want in a nice front yard.

Oak Ridge is not the remote site on Black Oak Ridge it was 45 years ago when the secret Manhattan project began. It is an integral part of a three county "Knoxville area" which is becoming one of the most attractive magnets in America for good, new jobs. Rand McNally has rated it as the best place to live in America. Manufacturing companies are discovering that -- as the population moves South -- Knoxville is at the center of the market. The State is investing hundreds of millions of new dollars in the Technology Corridor from the Knoxville airport to the Oak Ridge National Laboratory for a new technical institute, for a Science Alliance, for an interstate quality highway, for an improved University of Tennessee. The corridor for the next 20 years will be the focus of new jobs for the Knoxville area, just as the Research Triangle is for much of North Carolina. Already High Technology reports that the 97 businesses along the corridor make it the largest high technology research park in America associated with a major university, even ahead of Stanford Industrial Park and Yale's Science Park.

It has taken 25 years of hard work for Knoxville to go from being called the ugliest city in America to being called the best place to live. It has taken 45 years for the U.S. Government to get serious about cleaning up waste in Oak Ridge and for the state government to invest in and connect the futures of Knoxville and Oak Ridge. Never before has the Knoxville area been in the center of the U.S. Market.

In short there could not be a worse time to drag the Knoxville-Oak Ridge area into what promises to be a several year national argument about a poorly-named, unwanted fuel rod packaging plant. Fairly or unfairly, "MRS" would be all anyone would remember about Knoxville-Oak Ridge. It would blot out the Smoky Mountains, the Best Place to Live Award, the fine energy laboratory, the clean-up efforts and the Technology Corridor. In short, it would run away many, many more jobs that it could ever attract. My common sense and a University of Tennessee survey both say that is the case.

The law requires the U.S. Government to consult with the state before it decides where to put its repackaging plant. They did not do that and, if they had, this is what I would have told them about Oak Ridge as a site.

COMMENTS OF THE STATE OF TENNESSEE ON THE MONITORED RETRIEVABLE STORAGE SUBMISSION TO CONGRESS BY THE U.S. DEPARTMENT OF ENERGY

FEBRUARY 1986

COMMENTS OF THE STATE OF TENNESSEE ON THE MONITORED RETRIEVABLE STORAGE FACILITY SUBMISSION TO CONGRESS BY THE U.S. DEPARTMENT OF ENERGY

FEBRUARY 1986

The State of Tennessee submits the following comments on the Department of Energy's three volume Submission to Congress which proposes the construction of a Monitored Retrievable Storage facility at one of three sites in Tennessee.

The state will offer general comments on the scope and content of the proposal and its supporting documents. The general statement will be supported by more detailed comments on Volume 1, Volume, 2, Part 1 (and supporting Appendices) and selected sections of Volume 2, Part 2. The State will also comment on selected legal and procedural issues. The State reserves the right to submit supplemental comments to DOE and the Congress, when our review has been completed. Specific comments from state agencies and the two local government review organization are included as attachments.

1. The Department of Energy has not adequately demonstrated the need for an MRS in its national radioactive waste management system.

DOE readily acknowledges that the MRS is not absolutely necessary in order to manage and move spent fuel from the reactors to a permanent repository. The Congressional Office of Technology Assessment concurs. After a comprehensive independent technical evaluation of the DOE proposal, the State has concluded that all of the functions proposed for an MRS can be adequately carried out in a no-MRS system--and at substantially lower cost.

The Department of Energy has continually changed its justification for the MRS. In April 1985, DOE placed great emphasis on the reduction of transportation impacts. By November 1985, DOE stressed the potential of an MRS to relieve many utilities from providing supplemental on-site storage. By December, the major justifications for an MRS were programmatic--to accelerate system development and improve the flexibility of the waste system.

As the quantifiable benefits grow progressively smaller and system costs increase, the subjective, non-quantifiable benefits claimed for the MRS grown in importance and emphasis. This changing justification goes far beyond the refinement of clearly defined goals which might be expected in successive revisions of the same document.

The State finds it disturbing that the Department has carried out comprehensive analyses of options for improving the authorized system--but have not used the results in their planning. These analyses are summarized in Appendices A through D and Appendix F. None of the substantial system improvements found in the DOE analysis are uniformly incorporated into either the MRS or the MRS system, as described in Part 1. A few improvements have been selectively used in the MRS case.

To cite a specific example, in Appendices A and F, DOE describes transportation alternatives that could be deployed to improve the performance of the no-MRS system. DOE reported that increasing the proportion of fuel carried by rail, increasing the size of the transportation casks, and marshalling multi-cask shipments could substantially reduce transportation impacts--whether measured in numbers of shipments, distances traveled, or the more technical units of shipments-miles, cask-miles or ton-miles. None of these options are used in the description of a no-MRS system.

Similarly, the analysis described in Appendix A indicates that the need for at-reactor supplemental storage could be reduced to manageable levels by extended burnup, transshipment, or virtually eliminated by in-pool rod consolidation. But these options are not incorporated into the no-MRS system. DOE rejects the possibility of extended burnup, and assumes that there will be no increase in burnup between now and the late 1990's. In-pool rod consolidation is not even considered in Appendix B (which considers the alternative distribution of functions in the waste management system). The Department did not consider the potential for combining two or more of these options to improve the authorized waste management system.

The state has carried out an independent review of the need for an MRS in the national high level radioactive waste management system. The state's analysis has demonstrated, one by one, that the quantitative benefits claimed for adding an MRS to the system have been overestimated. When readily available, cost-effective improvements are incorporated into the no-MRS system, the benefits claimed for an MRS diminish, or disappear.

2. The programmatic benefits claimed for an MRS system are highly conjectural and subjective; they have not been quantified. The State does not concur that they are sufficient to justify the additional commitment of staff, energy and money required.

The non-quantifiable benefits proclaimed by the DOE have grown in importance and emphasis in the proposal to the Congress. The non-quantifiable benefits that DOE perceives include improvements in the reliability and flexibility of the waste management system, institutional benefits gained from experiences with the State of Tennessee, the ability of the DOE to demonstrate responsible corporate citizenship, the likelihood of successful system implementation and operation of the system and meeting the schedule in the Nuclear Waste Policy Act (NWPA). These benefits are highly subjective and must be subjected to critical review in assessing their qualitative worth. The DOE has failed to accomplish this by not adequately considering and comparing alternative systems. By providing sufficient emphasis on coordination and control, the no-MRS case could be designed to have the non-quantifiable benefits and the advantage of the DOE's MRS.

The State's assessment of the non-quantifiable benefits received by the construction of an MRS facility as perceived by the DOE are addressed more completed in the State's Key Questions Analysis.

3. The Department of Energy has not performed a fair comparison between the MRS and the no-MRS system.

The agency has persisted in comparing a technically optimized integral-MRS system with a no-MRS system in which none of the available technologies to expand on-site storage or reduce transportation impacts are deployed by the utilities.

In the MRS system, DOE assumes that rod consolidation in a dry environment will be performed at the MRS, reducing the volume of fuel to be transported cross country. This technology is still in the development phase, with major uncertainties regarding its technical feasibility at the 3,000 MTU/year throughput required at an MRS, and even greater uncertainties about its costs and potential for worker exposure.

On the contrary, in the no-MRS system, DOE assumes that no utility will undertake in-pool rod consolidation at the reactor site in spite of the fact that this technology is close to commercial acceptance and licensing, and that several utilities plan to consolidate their fuel before 1996.

DOE's assumptions about transportation logistics are also inconsistent. DOE assumes that there will be no improvement in the transportation system for a no-MRS system, or indeed, in the reactor-to-MRS leg of an MRS system. Fuel is shipped in single shipments, in legal weight truck casks and small current-generation rail casks. But a full range of transportation improvements--large rail casks, 100% rail transports, multi-cask shipments, dedicated trains--are postulated for the long, cross-country leg of the trip from an MRS to a western repository.

The difference in assumption used for the two alternative systems can account for nearly all the transportation benefits assigned to an MRS system.

4. The Department of Energy has not demonstrated the technical feasibility of the MRS, as designed.

DOE contends that the MRS is technically feasible because it is based on mature technology. The state agrees that this statement is true for cask receiving, fuel handling, storage, monitoring, and shipping technologies.

The state does not agree with DOE's contention that the technology for disassembly and consolidation of spent fuel rods in a dry environment is a mature technology. DOE is now conducting a five-year crash development program to design equipment, fabricate a prototye, demonstrate its use with cold and hot fuel, and determine unit costs for dry consolidation. Results will not be available until 1989. The state agrees that more research is needed, but does not concur with DOE's description of the technology as "mature".

The State's independent technical evaluation team conducted a state-of-the-art review of rod consolidation technology. The consultant team concluded that "DOE's research, analysis and studies to date do not support the position that rod consolidation should be conducted at an MRS." The state's Technical Advisory Panel also expressed serious reservations about DOE's proposal to use laser cutting to remove the supporting hardware, and the use of a shredder to reduce the volume of zirconium alloys. All are promising technologies, but need further engineering development.

5. The Department of Energy has not demonstrated the economic feasibility of the MRS.

Adding an MRS to the national high level radioactive waste management and disposal system adds from 1.4 to 2.0 billion dollars to its cost. These costs are offset by quantifiable benefits to the system ranging from $.15 to $.45 billion in avoided utility storage costs. In addition, adding an MRS to the system could result in possible savings of as much as $.2 billion in transportation costs, or have no effect, depending on the site of the first repository.

At best, this is close to a 1:4 benefit:cost ratio. DOE may have difficulty in convincing Congress and the utility ratepayers that this is economically feasible in a time of severe budgetary constraints and huge federal deficits.

The state's independent economic analysis found that DOE had underestimated costs and overstated utility storage costs savings. DOE's estimate did not include compensation costs. If Congress were to approve the state and local compensation outlined in the Proposal, it could add as much as $.8 billion to the cost of the integral MRS system. The consultant found avoided storage costs to be only $.1 billion (instead of the $1.5 billion to $.45 billion claimed by DOE) if the repository is on schedule.

To sum up; the state analysis estimated that the net cost of adding an MRS to the system would range from $2.2 to 2.8 billion, about a billion dollars more than DOE has estimated. The MRS option is not cheap. The State questions whether an MRS is an economically feasible project in today's economic climate.

6. The Department of Energy has proposed a conceptual design for the MRS facility which appears to be safe: the State has some reservations.

DOE's conceptual design, using the ALARA concept, appears to be adequate to protect people and the environment from radiation. However, the state has learned that state-of-the-art design can not guarantee safety if there is mismanagement or a lack of commitment to environmental and occupational safety. DOE's past performance at its Tennessee plants has taught the state a healthy scepticism.

The state foresees potential difficulties and delays in licensing an MRS facility because it is a big, complex, and first-of-a-kind facility, and its planning and construction will be spread over an extended period of time. The 27 months allocated for licensing appears overly optimistic. The state anticipates recurring problems at an MRS during start up and operation because of DOE's inexperience as a NRC licensee.

DOE has not adequately addressed the question of a criticality accident, especially during rod consolidation operations.

The projected risk related to the transportation of spent nuclear fuel is very small. If transportation equipment and shipments are adequately inspected, monitored and tracked (or escorted) the risk from transportation of fuel is not a major concern.

7. The Department of Energy has not considered all the options authorized by Congress in designing a National Waste Management System.

Most notably, DOE has not incorporated interim storage in its system. The NWPA directs DOE to encourage and expedite all measures to extend at-reactor spent fuel storage capacity, and allows DOE to provide a limited amount of federal interim storage to serve those utilites who have exhausted existing in-pool storage and cannot--because of site or structural constraints--expand capacity to accommodate their discharges between the present and 1998.

If the supplemental storage requirements are reduced by one or more of the at-reactor options discussed by DOE, then federal Interim Storage could provide a buffer to offset possible delays in the repository schedule. Use of an already-authorized storage option might be more expenditious and cost effective than adding an integral MRS to the system. The analysis has not been performed or, if it has, it has not been reported. Interim storage should not be arbitrarily rejected.

8. The State finds serious deficiencies in the scope and content of the environmental assessment prepared by the Department of Energy.

The scope and content of the Environmental Assessment prepared by DOE for the MRS is quite different from the usually Environmental Assessment prepared under CEQ quidelines. DOE's analysis has not considered a full

range of systems alternatives. DOE has interpreted the NWPA narrowly by using only existing data. The "NWPA/EA" process disjoins the consideration of need from the consideration of environmental impacts. By deferring collection of new data and preparation of a full Environmental Impact Statement until after authorization (when the need for the facility can no longer be questioned) DOE effectively subverts the "full disclosure" intent of the NWPA process.

9. The Department of Energy has provided no assessment of the environmental impacts of a no-MRS system, or even discussed what the components of such an analysis might be.

This is true, even though EA's have been prepared and released for review and comment for each of the candidate repository sites. DOE has not even made it clear that the environmental impacts for each of the six MRS site/design combinations discussed in Volume 2 are incremental environmental impacts--in addition to those which would result from a no-MRS system.

DOE has not considered major transportation corridors to be apart of the affected environment. This is a serious omission, because an MRS would increase transportation of spent fuel into and through Tennessee for all combinations of repository and MRS locations.

10. The Department of Energy has arbitrarily eliminated consideration of the backup-MRS alternative from its analysis and environmental assessment.

A third option, a backup-MRS, to be constructed and used if there were a lengthy delay in the repository program, was described and considered in the Department of Energy's Preliminary Need and Feasibility Report (DOE/RW 0022). This alternative was not considered in the Environmental Assessment released in December 1985.

The state's review of the legislative history of the NWPA suggests that a backup-MRS was what Congress had in mind when it directed DOE to study the need and feasibility of a monitored retrievable storage facility. The backup-MRS system differed from the integrated MRS in several respects. It should have been retained and examined as an alternative.

11. The Department of Energy has not provided the State of Tennessee with the same opportunity for review and comment on the MRS EA as it has afforded to repository states.

In the instance of the repository site EA's draft EA's were released for formal public review and comment and DOE conducted public hearings in the affected states. By denying these public participation options to Tennessee, DOE may not have met the letter of the NWPA, and clearly has not met the spirit of the law, which calls for an open and participatory process, analogous to that mandated for first and second repository states.

12. The Department of Energy has not provided sufficient time for full review of its final MRS proposal and supporting documents.

In delivering the Review Drafts (Volume 1, 2, and 3) to the state on December 24, the DOE effectively reduced the available review time for the state by approximately 10 days because of the Christmas and New Year's Holidays. The multi-volume Conceptual Design documents were not delivered to the state until the first week in January 1986--hardly time enough for our technical staff to complete a thorough and competent review.

For this reason, the state reserves the right to supplement this statement when its review has been completed.

13. The Department of Energy failed to address several long term issues related to the future role of an MRS in a national high level radioactive waste management and disposal system.

In briefing and workshops, state officials have repeatedly asked DOE to discuss its plans for an integral-MRS waste system in the context of long-range and broad-based "futures" planning. These issues are not discussed in the Proposal and its supporting documents. They include the following:

- potential Congressional removal of the 15,000 MTU storage limit, and expansion of an MRS if the permanent repository program is significantly delayed or cancelled;

- possible federal reprocessing of spent nuclear fuel after DOE takes title to the fuel after 1998;

- adequate liability coverage (Price-Anderson) for state and local communities in the event of a serious accident at the MRS or in the transportation of high level wastes;

- adequacy of the Nuclear Waste Fund, and equity issues related to it;

- post authorization changes in the MRS design, or functions to be performed;

- the consequences of possible reclassification or redefinition of certain classes of high level radioactive wastes by NRC;

- safety and environmental assessment of barge transportation of spent nuclear fuel.

The state's earlier questions on these broader subjects were not addressed in the proposal and its supporting documentation.

14. The Department of Energy's site selection process was subjective and based on personal judgement; the technical basis for selecting the Oak Ridge site is very weak.

The Proposal and its supporting documents do not revisit the siting process.

The state has questioned the legality, the fairness and the objectivity of the process by which three candidate sites were chosen in Tennessee. The state categorically denies that the selection was made through a "rigorous screening and selection process" or that screening criteria were applied uniformly.

The state's review of the siting process concluded that the technical basis of the process is very weak, or nonexistant. The screening was based on data of varying quality. Some was good, some was adequate (but 10 years old) and for some sites there was no data. In the state's view, DOE placed too much emphasis on location in a "preferred region", federal ownership, and availability of 1,100 acres.

The state's consultant concluded that DOE selected the Oak Ridge site because of its perception that "...Tennessee, and Oak Ridge in particular, provide a relatively hospitable climate for ... a controversial project."

15. The Department of Energy has consistently refused to consult and cooperate with the State of Tennessee in site selection, in timely delivery of information, and in the review of the proposal and its documentation.

The state has filed a lawsuit in the United States District Court addressing the Departments failure to consult and cooperate with the State in site selection. It is inappropriate to comment further until the case has been adjudicated.

16. The Department of Energy's proposal does not fully meet state/local concerns about linkage, compensation and oversight.

The state commends DOE's efforts to address some of the state's criticisms of the earlier proposal, and to meet many of the conditions of the Clinch River MRS Task Force. Specifically, the Proposal recognizes and addresses state/local concerns in three respects:

- linkages and limits;
- full and adequate compensation;
- active state/local involvement in monitoring and oversight.

The state agrees that, in order to assure the state that the MRS will not become a defacto repository, that it is necessary to link the schedule for design, construction and operation of the MRS to corresponding milestones in the first repository schedule. The state is not certain that a single linkage is sufficient. We agree that the amount of spent fuel that can be stored at an MRS must be limited in the authorizing

legislation. The state continues to recommend explicit contractual or licensing limitations on the type of fuel that can be received and handled, the age of fuel to be accepted and stored, and the length of time that fuel can be stored at an MRS. These specific restrictions were not to incorporated into the proposal.

The state also commends DOE for recognizing that compensation to the state/local governments for the adverse effects of hosting an MRS must go beyond conventional "impact assistance". We agree that if an MRS is authorized, compensation must include direct reimbursement of state/local expenses related to monitoring, regulation and oversight of the facility. Grants-in-lieu of taxes to state and local government entities are a requirement, beginning with authorization and continuing until the facility is decommissioned. A third element of compensation should be regional development assistance.

The state's economic impact study suggested that a broad and complex regional compensation scheme would be needed to offset the adverse effects of an MRS on industrial recruitment and/or tourism in east Tennessee.

The state notes that all of these proposed compensations are subject to Congressional approval. DOE lacks the legal authority at present to go beyond the local impact assistance provided in the NWPA.

DOE's proposal to establish a Steering Committee is an attempt to establish a vehicle for ongoing DOE/contractor/state/local interaction and oversight. More specific comments on this element of the proposal are included in the Key Question Analysis. DOE has not granted the Steering Committee all of the authorities suggested by the Clinch River MRS Task Force--in fact the description of powers and authorities are vague, and all of them are contingent upon Congressional approval. If DOE is unwilling to share real power, then the Steering Committee is little more than a forum for the exchange of views--useful, but far short of the innovative proposal made by the Clinch River Task Force.

THE MRS PROPOSAL: KEY QUESTIONS ANALYSIS

INTRODUCTION

The Safe Growth Staff, with the assistance of a consultant team (made up of experts from the University of Tennessee, Oak Ridge Associated Universities, Vanderbilt University and the Nuclear Assurance Corporation) and a Radioactive Waste Technical Advisory Panel, (made up of nationally recognized nuclear experts) compiled a list of key questions to be addressed by the Department of Energy in their MRS proposal. The questions deal primarily with the need and feasibility of an MRS, the Proposal, and the site selection process.

The state and its consultants have carefully reviewed the Department of Energy's response to each question as set forth in the Submission to Congress in order to determine whether the question was addressed, and if the response was adequate. The DOE's responses will be evaluated in the Key Questions Analysis below. The state's evaluation of the Submission to Congress has been judged, in part, on the response of the DOE to these questions.

I. Examination of Need and Feasibility

Question 1.

a) To what extent could "extended burn-up", transshipment, and at-reactor rod consolidation reduce DOE estimates of supplemental spent fuel storage requirements (i.e., storage needs in excess of reactor pool capacity) between 1990 and 2010?

b) To what extent would low nuclear growth projections reduce supplemental spent fuel storage requirements?

Answer: a) DOE considered extended burnup, transshipment, and at reactor consolidation in Volume 2, Part 1, Section 2.3 and in Appendix D.

State Comment.

The analysis of extended burnup in Appendix D indicates that if utilities increase burnup by 2%/year, the projection of spent fuel discharges are consistently reduced. The discharges are reduced by about 10% in 1998; reductions amount to an estimated 22% in 2010. (Figure D.1, page D.5) It follows that extended burnup reduces the need for additional at-reactor storage. Comparison of the cumulative spent fuel storage needs for an extended burnup scenario (Table D.3) indicates that a modest increase in burnup can reduce storage needs by a total of 3,232 MTU, a reduction of 44%.

Examination of Table 2.5, page 2.19 indicates that extended burnup can reduce storage requirements for both the no-MRS and MRS systems. Adding an MRS to the EIA mid case can reduce storage needs by 4,100 MTU while extended burnup can reduce these needs by 3,300 MTU. Extended burnup can provide three quarters of the storage benefits claimed for an MRS.

DOE did not apply this analysis in defining alternative waste systems. The additional annual at-reactor storage capacity for both the no-MRS and MRS system are based on the EIA mid-case which assumes constant fuel burnup levels throughout the planning period (Volume 2, Part 1, Section 2.3, Table 1.1).

DOE's analysis of in-pool consolidation in Appendix D is summarized in Figure D.3, page D.10. The analysis indicates that if all utilities consolidate fuel, residual storage needs could be eliminated through 1990, and reduced by an estimated 90% in 1996, 85% in 1998, and could displace about 2/3 of the additional requirements by 2010--the last year shown on the graph.

Doe makes no attempt to define the potential reductions in additional storage requirements if several improvements options were combined.

The potential of extended burnup, and in-pool consolidation for reducing supplemental storage requirements was addressed in the State's independent Technical Review. Using a conservative set of assumptions based on actual reactor-by-reactor data, the State's consultants calculated that the cumulative additional spent fuel needs in 1997 (the last year before DOE is scheduled to begin accepting fuel from the utilities) will be 685 MTU. This represents a reduction of nearly 85% from the DOE reference case projection of 4,536 MTU, (Colglazier, Appendix A, page 24.) If fuel is consolidated, the cumulative additional spent fuel storage needs do not exceed 1,900 MTU until sometime after 2000.

The state study did not analyze extended burnup as a separate factor. However, in projecting spent fuel dischages, the state study team assumed that between now and 1995, fuel burnups will increase linearly from current levels to a level of 43,000 MWD/MTU for PWR's, and 36,00 MWD/MTU for BWR's. DOE assumes no increase in burnup in its EIA midcase forecast. Extended burnup was a factor in the state team's lower projections of spent fuel discharges, and needs for additional at reactor storage.

b) DOE did not analyze the effect of low nuclear goruth projections on the rate of spent fuel dischage and supplemental storage requirements.

The state team's independent analysis projected consistently lower cumlative fuel dischages than the EIA mid case. The difference is partially attributable to lower nuclear growth projections, and partially to extended burnup. (Colglazier, Appendix A, p. 16.)

Question 2.

a) In what ways could DOE support, assist and encourage utility efforts to expand at-reactor spent fuel storage capacity?

b) Could DOE provide storage/transport casks for temporary use by utilities?

c) Could DOE accept ownership of spent fuel at reactor sites by leasing land to implement dry storage until spent fuel could be shipped to the repository?

Answer: DOE does not address any of these questions in the Submission to Congress.

State Comment.

a) With the exception of a few cursory descriptions of ongoing research and demonstration work under PRDA initiatives, DOE fails to discuss ways in which DOE could support, assist and encourage utility efforts to expand at-reactor spent fuel storage capacity DOE does not consider technical assistance, financial incentivies/credits, or possible regulatory changes.

This is a significant omission since the Nuclear Waste Policy Act, in Section 132, specifically directs DOE to "...encourage and expedite ...necessary additional storage at the site of each commercial reactor..."

The state concludes that a whole universe of practical and cost effective options have been overlooked by the Department.

Question 3.

If the transportation risks and costs are not very different with or without the MRS, why has DOE placed great emphasis on reducing the number of shipment miles in justifying and siting the MRS?

Answer: Siting: Volume 1, Section 3.2.1.
Justification: Volume 2, Part 1, Sections 1.1.2, 2.2.3, 2.3.3, and 2.4.3.

State Comment.

Siting. DOE describes its siting procedure in Volume 1, Section 3.2.1. The Department acknowledges that location within the "preferred region" constituted the first step in screening. The brief description does not explain why DOE placed such enormous importance on the reduction of shipment-miles.

The state's independent review of the screening procedure concluded that "...the technical basis for the selection of Oak Ridge to host an MRS facility is very weak indeed. There is no convincing argument that the site offers advantages in the way of transportation risk or cost." (Colglazier, Appendix E, p 25.)

Justification. The Department of Energy claims significant transportation benefits accrue from adding an MRS to the waste system.

In Section 2.2.3, DOE claims that including an MRS in the waste system allows an "early start" on transportation planning if the MRS site is known. If an MRS is authorized, DOE claims that route selection for the first leg of the transportation system would be advanced, cask-fleet procurement would be accelerated by 36 months, and that the entire transportation system would begin to operate earlier.

Some of these claims are exaggerated. Examination of the DOE transportation planning schedule in Figure 2.2 indicates that including an MRS in the system will advance the beginning of operations by only 15 months--a relatively small acceleration. But inclusion of an MRS in the system shortens the time available for cask design, testing and procurement by 15 months and increases the required rate of delivery of casks. An MRS will start up 15 months sooner and accept more fuel during its first five years of operation than a repository would accept.

The net gain in route selection/logistics planning is 42 months (but only if all route/logistics planning for a no-MRS system is deferred until a site is nominated). DOE's preliminary routing/logistics planning is underway. Moreover, additional time may be needed to resolve the growing institutional problems between DOE and corridor states.

There is no reason why logistics planning cannot begin at once--particularly if DOE intends to design, test, and license bigger transortation casks and/or take steps to increase the use of rail transport. If DOE adopts a storage/transport cask, then start-up dates become less critical.

In Section 2.3.3, DOE claims that addition of an MRS to the system would improve management and control of transportation, and effect substantial reductions in several transportation parameters, including: reduction of the number of casks and shipments; reduction in total shipments miles; reduction of cross country shipments by 95%, and a decrease of 50% in transportation activity (i.e., number of days in transit). DOE further claims that with an MRS, the management, scheduling and monitoring of shipments would be simplified.

All of these reductions are inherent in the assumptions used by DOE in the analysis. DOE has assumed no improvements over the current transportation system for a no-MRS system, or for the reactor-to-MRS leg of the MRS system. This means reliance on truck transport for 30% of the spent fuel in small casks holding only 2-5 assemblies. However, for the MRS-to-repository leg, DOE has fully optimized the system by assuming use of large rail casks, 100% rail transport, and dedicated trains carrying at least 5 cask-cars per train. These factors alone account for nearly all of the calculated transportation benefits.

The state conducted an extensive independent analysis of transportation logistics. The team first defined an improved transportation system, using larger casks for all shipments, and increasing the ratio of rail to truck from the 70%/30% split assumed by DOE to 87%/13%. This split was

derived from a reactor-by-reactor analysis of rail shipment capability. (It is noteworthy that in Appendix F of the EA, DOE described many of the system improvements postulated by the state, but did not assume that any of them would deployed in the transportation system.)

The consultant team examined the transportation impacts of 12 scenarios, incorporating different assumptions about fuel discharge, the use of at-reactor consolidation, and an MRS as well as different transportation system. The team calcuated shipment-miles, cask-miles, and ton-miles, for Tennessee and for the U.S., for every combination of first repository and MRS locations.

For all combinations of repository and MRS locations, (with the exception of one anomalous case) and for all units measured (average annual cask-miles, ton-miles and shipment miles) transportation was lowest in the three scenarious which assumed no-MRS and employed the teams' improved transportation system. The two lowest cases used at-reactor consolidation and transported consolidated fuel; the third did not.

The state study concluded that national transportation impacts (measured in cask-miles) can best be reduced by improving the entire transportation system--with or without an MRS. U.S. cask miles can be reduced more by improving the transportation scheme than by adding an MRS to the system. Adding an MRS to a system after transportation improvements have been made may reduce cask-miles slightly, but not significantly. (Colglazier, pp. 10-14; Bronzini)

With no improvements in the system, transporation impacts for Tennessee are much greater with an MRS than without one. If the transportation system is improved, the transportation impacts on Tennessee are still higher with an MRS in the system, but not significantly so.

DOE plans to improve the transportation management and monitoring function by use of advanced scheduling, tracking and communication technology. With such powerful management tools as computer scheduling, satellite tracking and transponders added to the existing network for control and monitoring, DOE could manage the waste system efficiently with or without an MRS.

Section 2.4.3 discusses transportation cost effects of an MRS in the system, concluding that an "...MRS facility could result in either a net increase or decrease in system transportation costs." Implementation of some of the system improvements recommended by the state consultants, or considered by DOE in Appendix F might result in cost savings.

The state strongly urges DOE to consider these currently available, cost effective improvements in the final design of the national system whether the MRS is authorized or not.

Question 4.

What are the increases in transportation risks, shipment-miles, cask-miles and ton-miles for Tennessee caused by having an MRS?

Answer: DOE did not perform this analysis and provides no Tennessee-specific transportation data of this nature.

State Comment.

In Part 1, Section 2.3.3, page 2.29 - 2.30, DOE concedes that "Spent fuel shipments would be more concentrated near the MRS facility compared with the no-MRS system" and added that "including an MRS facility in the waste management system would...redistribute radiological ...risks to different populations."

Question 5.

a) What is the increase in the total system cost due to the MRS?

b) How large would the cost disadvantage of the MRS have to be for this factor to override the benefits that DOE perceives for the MRS?

Answer: Volume 2, Part 1, Section 2.4, especially Table 2.13, page 2.38, Figure 2.7, page 2.39 and Figure 2.8, page 2.40.

State Comment

DOE's analysis indicates that adding an MRS to the waste system increases its net costs from $1.4 to 2.0 billion.

The state's independent cost analysis found that DOE had underestimated costs and overstated potential savings to the utilities. The state estimates that adding an MRS to the system will produce a net cost of $2.2 to 2.8 billion, about $1 billion more than DOE has estimated. The MRS is not cheap! (Colglazier, Appendix C, page 7.)

DOE does not address the second question. Is there no point at which a cost disadvantage factor would override the perceived benefits?

Question 6.

a) How important is the MRS for meeting a DOE commitment to begin accepting utility spent fuel in 1998?

b) Is DOE legally required to begin accepting spent fuel from utilities in 1998?

c) If neither the MRS nor the repository is ready to accept spent fuel in 1998, will utilities be reponsible for ensuring adequate spent fuel storage capacity?

d) If the MRS is restricted to 15,000 tons capacity, how much of a delay in the repository schedule could be accommodated?

Answer: Volume 1, Section 3.3.1: Volume 2, Part 1, Section 1.1-1.4; Section 2.3.2

State Comment.

The Department of Energy interprets the NWPA as requiring it to accept spent fuel from the utilities by January 31, 1998. DOE has systematically amended its contracts with the utilities to incorporate that date. DOE and the utilities agree that until January 31, 1998, the utilities bear full responsibility--legal and fiscal, for storage of their spent fuel inventories.

In Volume 2, Section 2.3.2 DOE discusses the role of an MRS in accommodating delays in the repository schedule. The DOE concludes that, with a 15,000 MTU limitation on the storage capacity, the MRS could accommodate a 5-year delay in repository licensing, construction and/or start-up.

An analysis of Table 1.1, page 1.15 does not support DOE's contention that an MRS can accommadate a five year delay in repository start up. It appears that a 15,000 MTU limit at the MRS will be exceeded before that time.

An MRS may be an exceedingly costly way to accomodate a year delay in repository schedule. In Appendix A and D, DOE analyzed several options to expand at-reactor storage. DOE has not calculated the costs to the system of providing 15,000 MTU of contingency storage, by using one or more of these options. It seems likely that some of them, or some combination of them, may be less costly than an MRS.

THe Office of Technology Assessment has considered this question. In their March 1985 assessment of the nation's nuclear waste program, OTA suggests that in the event of the major delay in the repository schedule, DOE could meet its legal commitments by "...rulemaking, by modifying contracts with utilities to provide that the Federal radioactive waste program would pay the costs of additional storage beyond the contractural delivery date..." (p. 6)

DOE still has the option of implementing the Interim Storage provisions of the NWPA, which was designed to provide interim storage for utilities that are unable to expand their storage capacity.

Question 7.

a) Will DOE examine a no-MRS option that has been optimized to reduce shipment miles?

b) What is the difference in costs between the MRS system and this optimized no-MRS system?

c) What is the difference in risks and transportation shipment-miles for Tennessee and the nation?

Answer: a) Appendix A
b) and c) These analyses were not performed.

State Comment.

In Appendix A, DOE considers four options for improving transportation: increased use of rail transport; use of extra-large rail casks; multi-cask shipments; and the use of overweight truck casks. DOE acknowledges that "Implementing these improvements could reduce the total shipment miles in the no-MRS system"--as well as in the MRS system--(Appendix A, page A.16).

In spite of this admission, DOE fails to incorporate any of the options into the no-MRS system, and assumes these improvements will be used only in the second leg of the trip in an MRS system. Consequently, DOE continues to compare a MRS system in which the long, cross-county MRS-to-repository leg of the transportation system has been "optimized" (by assuming 100% rail transport, use of extra-large casks and multi-cask shipments) to a no-MRS system which assumes no improvements over current transportation logistics. This is not a fair comparison.

DOE has concluded "...No single improvement, or combination of improvements provides the same total system performance improvements as does deploying an MRS facility." It is difficult to understand how DOE arrived at this conclusion, since no "combination" of improvements were discussed--even in a qualitative way.

Table A.1 on page A.3 is illegible and incomprehensible.

DOE fails to give adequate attention to "soft"--i.e., management solution for the improvement of the transportation system. With current sophisticated data management capabilities, it is difficult to believe that DOE could not acquire the data and design a code which would allow the agency to schedule fuel discharges and delivery in accordance with repository operations, combine shipments from regional reactors, make up unit trains, and monitor shipments in the absence of an MRS facility.

To sum up: DOE did examine an optimized no-MRS transportation system. It did not use what it learned in that examination.

The State's independent analysis of the transportation system indicated that national transportation impacts can best be reduced by improving the transportation system. Increasing the proportion of shipments by rail and using a family of larger casks can provide reductions entirely comparable to an MRS. (Colglazier, page 14, and Appendix B.)

Question 8.

a) To what extent could spent fuel from reactors that lack rail access be shipped in trucks to a nearby railhead for transfer to rail cars?

b) To what extent could reactor transportation interfaces be upgraded?

Answer: DOE addresses these questions in Volume 2, Appendix A, Section A.4.

State Comment.

DOE discusses intermodal transfers between trucks and rail briefly in the context of the Dry Cask Transfer and Heavy Haul option for improving transportation (Appendix A, page A.20).

A DOE sponsored study cited in Appendix A, Section A.4 indicates that 41 of 127 reactors are now unable to utilize rail transport. Of these, 12 reactors could not ship by rail without extensive structural modification. Another 29 lack rail access. A reactor-by-reactor survey indicated that 17 of these reactors were likely candidates for upgrades. For 12 reactors, upgrades were possible, but unlikely. If all of these 29 reactors did, in fact, upgrade then the fuel from 115 of 127 reactors, or roughly 90% of the total, could be shipped by rail.

The State's independent analysis agrees with the DOE analysis described above. The state team concluded that the percentage of spent fuel transported by rail could be increased to 87% by making currently available, cost-effective improvements to the authorized (no-MRS) system. (Colglazier, page 10 and Appendix B for reactor-by-reactor analysis).

DOE does not carry this analysis further than reference in the Appendix nor discuss its implications for improving a waste transportation system--with or without an MRS.

Question 9.

a) What advantages and disadvantages does DOE perceive for rod consolidation in reactor pools?

b) To what extent will reactors implement rod consolidation through their own management initiatives prior to 1996?

c) How many of the nation's reactors could accommodate rod consolidation on site?

Answer: a) Appendix A, Section A.3.2. b) and c) These questions are not addressed in the Submission.

State Comment.

a) DOE acknowledges that in-pool rod consolidation has been successfully accomplished on a demonstration scale, at costs comparable to rod consolidation at an MRS. Advantages and disadvantages are listed, but the DOE analysis does not weigh them or draw any conclusion. DOE implicitly rejects the at-reactor rod consolidation, as it is neither considered in The Proposal (Volume 1) nor brought forward from Appendix A into Volume 2, Part 1 of the EA.

In its independent review, the state conducted a thorough state-of-the-art review of rod consolidation. The study concluded that rod consolidation is a promising technology, and that DOE should continue to support the development of both dry and in-pool consolidation. Consolidation is not yet a fully established technology, and there are major uncertainties about costs and worker exposures.

In-pool rod consolidation may prove to be more cost-effective than dry-cell consolidation at an MRS. DOE estimates dry consolidation to cost approximately $35-40/kg. The state consultant team reported that several nuclear servcie companies are currently offering to consolidate fuel in a storage pool, under contract, at a price in range of $10-15/kg.

b) DOE is apparently not convinced that utilities will use in-pool rod consolidation to extend their at-reactor storage capabilites.

The state's Technical Advisory Panel was more sanguine. The panel, whose membership includes managers from public and investor owned utilities, believes that in-pool consolidation technology has developed to the point of commercial viability and that it is an attractive option to the utilities-particularly if DOE provides some economic incentives to consolidate fuel before delivery. The Panel stressed the advantages of performing rod consolidation as early as possible in the waste management system.

Question 10.

What experiments and demonstrations will DOE undertake in the near term to overcome the lack of experience with dry rod consolidation at the throughputs required by the MRS.

Answer: Volume 2, Part 1, Section 3.1.2.

State Comment.

DOE acknowledges the fact that operating experience with dry rod consolidation in the U.S.--and elsewhere--is limited. Dry rod consolidation has not been demonstrated at the mass-production, assembly-line throughputs projected for an MRS.

DOE has provided a description of its intensive 5-year research and dvelopment program for dry rod consolidation equipment and technology. The existence of this research program reinforces the state's conclusion that dry rod consolidation is not yet an established technology, and that there are major uncertainties about worker exposure, efficiency of the process at high throughputs, potential for accidents, and costs.

Question 11.

a) What would be the total system costs of providing rod consolidation at reactors compared to doing so at an MRS?

b) How much is the cost changed if rod consolidation is not utilized anywhere in the system, (i.e., shipment and disposal of intact fuel)?

Answer: a) This question is not directly addressed in the Submission. Appendix A, Section A.3 performs a related analysis

b) This question is not addressed.

State Comment

In Appendix A, Section A.3, DOE compares unit costs of in-pool consolidation and storage to the unit costs for dry consolidation and contingency storage at an MRS. The costs of consolidation are not broken out of the unit costs. Unit costs for in-pool consolidation and storage are equal to unit costs for storage at an MRS. According to the state's consultants and Technical Advisory Panel in-pool consolidation costs may be lower than DOE's estimate, depending on the storage method selected. Current wet consolidation costs are estimated to be $10-15/kg. (Colglazier, Appendix D, page 3).

DOE has not reported the costs of shipping and disposing intact fuel assemblies--with no consolidation anywhere in the waste system.

Question 12.

Could the concept of dedicated trains be implemented independent of the MRS concept?

Answer: Volume 2, Appendix A, Section A.4.3.

State Comment

The option is briefly and inconclusively discussed in Appendix A, Section A.4.3., on pages A.23 and A.24. DOE admits that it could be implemented, but foresees instutional difficulties. It is not pursued further. See previous state comments on management options (Question 7).

Question 13.

To what extent could a family of casks be designed to minimize shipment-miles from reactors to a repository?

Answer: Volume 2, Appendix A, Section A.4.2.

State Comment.

DOE concedes that "The use of extra-large rail casks (150 tons loaded) in the no-MRS system would significantly reduce the total cask-miles traveled as well as the total number of shipments required." (page A.21). However, DOE has not assumed the use of the large casks discribed in Appendix A, in its description of the no-MRS system described in Part 1. DOE's failure to improve the logistics in the no-MRS sytem is difficult to understand.

The state's independent transportation studies confirm DOE's conclusions. Use of a family of casks (ranging in size up to 125 tons loaded) and increasing the proportion of rail transport reduced the shipment-miles, cask-miles and ton-miles for a no-MRS system to levels that were equal to or lower than the reductions resulting from adding an MRS to the waste system. (Colglazier, page 14, and Appendix B).

Question 14.

What is the additional occupational radiological dose caused by the extra handling steps in an MRS system?

Answer: Volume 2, Part 1, Section 2.5.2 and Appendix E.

State Comment.

DOE reports that an MRS would "...increase the occupational dose from operations at the fixed facilities primarily because of an additional handling step with an MRS facility in the system." (page 2.43). Figure 2.9 indicates that an MRS would increase the total occupational exposure by about 10 person-rems/1000MTU.

The question is addressed more thoroughly in Appendix E. The addition of an MRS to the waste system would require at least two additional handling steps--shipment of the fuel from the MRS to the repository, and receiving the canistered fuel at the repository. If fuel is stored at the MRS, two additional steps are added: loading fuel into and retrieving it from the storage silo.

DOE reports an increase in occupational dose of 9 person rems-1000 MTU's "...because of the extra step of shipping out the spent fuel at the MRS facility". The additional step of receiving the consolidated fuel shipment at the repository adds 16 person rems-1000MTU. If the fuel is

stored at the MRS, there is an estimated additional dose of 20 person-rems/1000 MTU, plus 2 person rems/1000 attributed to maintenance/monitoring of the spent fuel.

If the MRS handles 53,000 MTU during its operating life, the cumlative additional occupational dose is 1,325 person-rems for the life of the facility (53,000 MTU X [9 + 16] additional person-rems/1000 MTU). The total additional occupational dose for placing 12,000 MTU into temporary storage, and retrieving it would be 262 person-rems.

The state's independent analysis of rod consolidation concluded that "...the consolidation operation has the greatest potential to generate accidents, unforeseen personnel exposure, byproduct radioactive low-level wastes and embarassing cost overruns." (Colglazier, Appendix D, apge 12).

DOE did not use the estimates calculated in Appendix E in its comparison of the radiological dose in the MRS and no-MRS systems.

Questions 15.

Has DOE examined the costs, risks and benefits of systems that utilize combined storage/transport casks?

Answer: This option is not considered in the Submission to Congress.

State Comment.

A combined storage/transport cask could extend at-reactor storage and provide scheduling flexibility. It is an attractive option that should be evaluated.

Question 16.

a) Will spent fuel from western reactors be sent directly to the repository in the system with the MRS?

b) What packaging and handling facilities will be needed at the repository in this case?

Answer: Western spent fuel is treated in Volume 1, Section 3.3.1, and in Volume 2, Part 1, Sections 1.2.2, 2.4.1 and Appendix C.

State Comments.

DOE has decided that 9,000 MTU of spent fuel from western reactors will not be sent to an MRS: western spent fuel will be stored at the reactor sites until it can be transported directly to the first repository.

The Department has not made it clear what it will do with the western fuel when it arrives at the repository. According to the MRS system described

in Volume 2, Part 1, Section 1.2.2., DOE has decided to forego consolidation of western fuel. Intact spent fuel assemblies will be shipped from reactors to the repositories where it will be "prepared" for final disposal.

But the document is not consistent. In Section 2.4.1, Table 2.11, (page 2.36) clearly indicates that western fuel will be consolidated and canistered at the repository in the MRS system. In Appendix C, which provides a cost analysis, Scenario 5 (characterized as the "MRS system") also postulates consolidation of western fuel at the repository. The concept is confirmed in Table C.1 and Figure C.1.

The question is not academic. DOE's decision about consolidation of western fuel will affect the costs of adding an MRS to the currently authorized no-MRS system. It may also be a factor in western utility managers' decisions about providing at-reactor storage between now and 1998.

DOE should clearly define the functions to be performed at the repository state whether western spent fuel will be consolidated or buried intact, and make the document internally consistent. The economic analysis should be revised, if necessary, to reflect the final decision.

Question 17.

a) Will the MRS be used for the second repository?

b) If DOE could not afford both the MRS and the second repository, which one would be dropped?

Answer: a) Volume 1, page 17.

b) DOE did not address this question.

State Comment.

In Volume 1 of the Proposal, page 17, DOE states that "The relationship of the MRS facility to the second repository is not addressed..." and goes on to say "...any decision to use the facility in this capacity would be based on the potential for reducing transportation impacts..." among other factors. If the second repository is located in the eastern U.S., routing the wastes through an MRS could actually increase shipments and shipment miles, and increase total costs of the system.

The state believes that DOE should define the possible relationship of an MRS to a second repository in an integrated waste system, preferably in the early stages of planning for both.

DOE was asked to express its priorities in the hypothetical--but not unlikely--situation where the Nuclear Waste Fund is not adequate to meet all program costs.

DOE has acknowledge major uncertainities about ultimate program costs and the long term adequacy of the Waste Fund. If fiscal constraints develop, would DOE retain an MRS or the second repository?

Question 18.

Will military wastes be routed to or packaged at the MRS?

Answer: Volume 1, Section 3.3.1.

State Comment.

In the cited section, DOE states that military wastes (some fraction of 8,000 MTU) may be routed through an MRS, but will not be handled or packaged there. The committment is unambiguous.

Question 19.

If the MRS cannot begin receiving spent fuel until the repository is ready to do the same, would DOE still want the MRS?

Answer: The question was not addressed.

State Comment.

No comment.

II. Examination of the "Proposal"

Question 1.

How valid is the claim by the DOE that the MRS facility would allow the separation of a major part of the waste-management process (acceptance, transportation from the reactor sites, consolidation and sealing in canisters) from uncertainties about the repository and to proceed immediately with detailed planning for, and implementation of, that part? It is claimed that this would provide the utilities with a firmer basis for planning the transfer of spent fuel to the DOE. The DOE also claims that the development and specification of the transportation system would also be advanced because the approval of the MRS facility would allow specific routing, logistics, and equipment requirements for shipments from the reactors to be determined up to 5 years earlier. Would the early accomplishment of these separable steps of the waste-management process significantly enhance confidence in the schedule for the operation of the total system? Moreover, would the facility provide a focal point for early system integration?

Answer: State of Tennessee

The State of Tennessee does not agree that the improvements in system development as described by the DOE in the Executive Overview and in Section 3.4.1 of Volume 1 are dependent upon or constitute justifiable cause for the construction of a monitored retrievable storage facility. The programmatic advantages of either the MRS case or the NO-MRS case inevitably involve subjective judgements. Reasonable people can reach different conclusions about which alternative is preferable. With sufficient emphasis on coordination and control, the NO-MRS case could be designed to have many of the advantages and functions as DOE's MRS. For example, consolidation and dry storage could occur at reactors (as well as at the repository) with adequate quality control and standardization. (Private companies are willing to provide consolidation services to utilities.) Buffer storage could occur at the repository to decouple waste acceptance from waste emplacement. Shipments from reactors could be accomplished with dedicated trains.

If the MRS is successfully sited, the institutional arrangements between DOE and Tennessee may be a useful precedent for similar arrangements with the repository host state. This could help reduce potential repository delays. But overall, the MRS will be little help in resolving the major technical issues in repository siting. In order to alleviate the possible concern that the MRS might become a permanent storage facility, DOE has proposed that the MRS not accept significant quantities of spent fuel before the repository receives a construction authorization from the Nuclear Regulatory Commission

(NRC). With this strong linkage between the MRS and repository schedules, some of the flexibility benefits of the MRS may largely disappear. Utilities will still be unable to rely on DOE for a firm acceptance schedule until the repository issues are resolved to the satisfaction of the NRC. If the repository is delayed for a long period of time, the U.S. will likely have to confront the issue of centralized monitored retrievable storage for spent fuel.

Question 2.

Will the MRS facility accelerate waste acceptance from the utilities? By starting in 1996 and reaching full operations by 1998, will the MRS facility allow the system to receive spent fuel at full-scale rates 5 years sooner than does the system without an MRS facility? Will this significantly reduce the need for new temporary storage capacity at reactor sites and the attendant spent-fuel handling operations, licensing efforts, and costs? Will it also provide greater assurance that the Federal waste management system will begin operations by 1998 as prescribed in the Act and specified in the contracts between the DOE and the owners and generators of spent fuel?

Answer: State of Tennessee

The State of Tennessee's studies do not indicate that the construction of an MRS facility will result in an accelerated waste acceptance schedule, that the MRS is the best method for reducing the need for new temporary storage capacity at reactor sites, or that MRS will provide assurance that DOE's contract terms with utilities will be satisfied. DOE has proposed that the MRS not accept significant quantities of spent fuel before the repository receives a construction authorization from the Nuclear Regulatory Commission (NRC). (Page 4, Volume 1). With this strong linkage between the MRS and repository schedules, utilities will still be unable to rely on DOE for a firm acceptance schedule until the repository issues are resolved to the satisfaction of the NRC.

In regard to "reducing the need for new temporary storage capacity at reactor sites and the attendant spent-fuel handling operations, licensing efforts, and costs", the following issues should be considered. The State of Tennessee contracted a study of spent fuel generation and the need for additional storage in the U.S. which was performed by the University of Tennessee, Vanderbilt University, Oak Ridge Associated Universities and Nuclear Assurance Corporation. The study provides estimates of the quantities of spent fuel to be discharged through 2020 and scenarios of at-reactors capacity for spent fuel storage. These capacity scenarios were compared with the spent-fuel discharge estimates to determine estimates of additional storage needs through 2020.

The results of the study indicate that DOE has overestimated cumulative spent fuel discharges from reactors in the future. By

1995 DOE is about 10 percent high on a cumulative basis, with that percentage increasing to 20 percent by 2000. By 2020 DOE's estimate is over 50 percent higher than the State's Study Team figures. (Through 2000, this is due to the inclusion of reactors by DOE that the Team assumes will not be completed, and to DOE's assumption that burn up remains constant at current levels. Through 2020 DOE estimates are higher because of the addition by DOE of new reactors over and above replacement reactors assumed by the Team.)

Storage capacity could be enhanced at reactor sites (as opposed to the removal of spent fuel to an MRS) by encouraging consolidation of spent fuel at the reactors. There are 27 reactors that will have to consider rod consolidation prior to 1998. The technology appears to be within reach, and competitive suppliers providing compacting services appear to be available and a number of utilities appear to be willing to try it. Additionally, at-reactor consolidation minimizes subsequent transportation and storage costs and impacts. The desirability of rod consolidation at certain reactor pools that have limited capacity may be much stronger than the desirability of rod consolidation at an MRS. If many utilities voluntarily elect to consolidate, the incentives to consolidate the residual fuel at an MRS are weakened because unit costs would increase.

Question 3.

Will the MRS facility provide improvements in the reliability and flexibility of the waste management system? Would these improvements be realized by separating the acceptance of spent fuel from reactors from emplacement in the repository and adding significant operational storage capacity to the system? Would the MRS facility produce identifiable improvements in the manageability of the system and allow the DOE to better accommodate the circumstances of the future?

Answer: State of Tennessee

The subjective judgement by the DOE concerning improvements in the reliability, flexibility and the manageability of the system and the ability of an MRS to accommodate circumstances of the future as described in the Executive Overview and Section 3.4.3 of Volume 1 may be better accomplished by methods other than an MRS and involve subjective judgements that should require additional study and analysis. Separating the acceptance of spent fuel from reactors from emplacement in the repository could occur by providing buffer storage at the repository. DOE estimates that 9000 MTU of spent fuel from western reactors and the equivalent of 8000 MTU in defense waste will be shipped directly to the repository (DOE, Volume 1, page 21). This fuel will have to be serviced (consolidated, packaged, etc...) by an MRS-like facility at the repository. If an MRS at a repository is to be utilized to decouple waste acceptance from waste emplacement for the western defense fuel it could serve a buffer/storage function for eastern fuel also.

The DOE contents that significant operational storage capacity would be added to the system by the construction of the MRS facility and that this would provide improvements in the reliability and flexibility of the waste manangement system. This storage function may not be as simple as it appears. Repository interface requirements may change with time so that packages would have to be reworked. With the current trend toward large packages of spent fuel (consolidated or unconsolidated) there may be increased incentives for ex-repository storage of these packages until the heat generation rates have somewhat decayed. Some European countries plan to store spent fuel on the order of 40 years to limit repository heating. DOE has apparently not studied this aspect of the storage/consolidation questions, but consolidated fuel packages tend to have about twice the heat generation of unconsolidated packages. Consequently, at-MRS storage needs may be somewhat greater than currently projected. Additional storage alternatives inadequately acknowledged by DOE included at-reactor-consolidation and storage that could be provided by the MRS at the repository.

Question 4.

Does an MRS facility provide advantages for the repository? By performing waste-preparation functions, will an MRS facility simplify the waste-handling facilities and operations of the repository? Furthermore, will an MRS facility cause the repository to receive fewer shipments; the waste canisters received from the MRS facility to be uniform in size and free from surface contamination with radioactive material; and a large portion of the inventory-accountability function to be performed at the MRS facility? Another important advantage claimed by the DOE is that an MRS facility would cause a constant rate of waste throughput, which would enhance the efficiency of repository operations. How accurate is this contention?

Answer: State of Tennessee

The advantages for the repository as perceived by the DOE and noted in the Executive Overview and Section 3.4.4 of Volume 1 may be accomplished by other practicable measures. By performing at reactor consolidation, using dedicated train shipments and requiring uniform canister usage by the various reactors many of the desired features can be obtained without the cost of an MRS facility. The inventory-accountability functions and a constant rate of waste throughput could be accomplished by the MRS at the respository, which the DOE has announced will be built to facilitate the nuclear waste from western states. The DOE has explored and studied many of these alternatives but has neglected to pull these from the appendices of Volume 2 to be incorporated into the proposal.

Question 5.

The DOE contends that an MRS facility will provide improvements in the specification and performance of the transportation system. DOE claims that since consolidated fuel would be shipped in dedicated trains, the MRS facility would significantly reduce the number of shipments to the repository and minimize the distances of spent-fuel shipments in less-efficient truck-mounted casks. Also by being centrally located for most reactors, DOE proposes that the MRS facility would serve as a hub for transportation operations, and reduce the number of across-country shipping routes. DOE also contends that by allowing early identification of routes to the MRS site, the MRS facility would provide institutional benefits because it would increase the time available to work with the States, Indian Tribes, and the public in route-specific planning. Are these improvements and advantages achievable only by the construction of an MRS facility in Tennessee?

Answer: State of Tennessee

The DOE studies supporting the MRS place considerable emphasis on the transportation advantages which can be gained by consolidating the shipments of spent fuel to permit efficient rail transport in large casks to the Western repository. The case which the MRS alternative is compared to is direct shipment from the reactors to the MRS in existing casks, which results in numerous long haul truck shipments. The State's analysis of transportation requirements does not support the notion that an MRS facility is necessary to reduce the transportation impacts of a spent nuclear fuel disposal system. Even without an MRS facility, much can be done to reduce the transportation requirements by improving the current transportation system. This means consolidating the movement of spent fuel as much as possible by using a new generation of high-capacity casks and shipping the spent fuel from as many reactors as possible in multiple-cask dedicated trains. Some additional reduction in transportation requirements can also be achieved by consolidating the spent fuel rods at the reactors. For all combinations of an MRS and repository locations, the average annual cask miles, ton miles and (with a single exception) shipment miles in Tennessee are less for no MRS scenarios than for the MRS case. (The exception is the Oak Ridge MRS/Texas repository where there are 9 % more shipment miles for the lowest no-MRS case.) Shipments of spent nuclear fuel will increase 2.5 to 7 times in Tennessee with an MRS. (DOE 12-17-85 - Transportation Workshop).

What DOE did not do in its preliminary analysis was to examine what can be accomplished in minimizing transportation impacts without the MRS. (This omission was partially addressed by a revised analysis included as an appendix to the document submitted to Congress.) However, these analyses were not fully considered or adopted as a part of the DOE proposal. A credible comparison of alternatives requires examining a "no-MRS" system that has been optimized to reduce transportation impacts.

Question 6.

The DOE notes various institutional benefits that might occur. Would the development of the MRS facility produce institutional benefits through the experience gained from interactions with the State of Tennessee and by allowing the DOE to demonstrate earlier that it is willing and able to be a responsible corporate citizen and neighbor? By starting with the designation of a specific site and facility construction, would an MRS facility help provide the needed momentum for implementing the entire system, as proclaimed by the DOE?

Answer: State of Tennessee

If the MRS is successfully sited, the institutional arrangements between DOE and Tennessee may be a useful precedent for similiar arrangements with the repository host state. This could help reduce potential repository delays. But overall, the MRS will be little help in resolving the major technical issues in repository siting.

Question 7.

Are the costs and impacts of developing an MRS facility as described by the DOE accurate?

Answer: State of Tennessee

The State of Tennessee contends that the costs of an MRS facility as described in Section 3.5.1 are underestimated and that the savings that would result are overestimated as presented by the Department of Energy. The net incremental system costs of the proposed monitored retrievable storage facility are estimated by DOE to be between $1.4 and $2 billion. This cost, as proposed by the DOE, would be "borne by the waste generators and hence paid from the Nuclear Waste Fund." (Volume 1, page 4). "The revenues collected for this fund are derived from the fees charged to the generators of the waste; at present these include a charge of 1 mill per kilowatt-hour to utilities that generate spent fuel, but this charge may be adjusted by Congress if needed to cover program costs." (Volume 1, page 26). The estimated costs of 1.4 to 2 billion dollars (in constant 1985 dollars) do not include avoided costs or financial assistance payments to state and/or local governments, which could be on the order of several hundred million dollars. DOE has not adequately assessed the costs. The DOE considers the current utility fee "adequate to fund the program in the near term, and it will be reviewed annually to ensure that it is sufficient to cover all program costs and adjustments proposed to Congress if needed." (Volume 1, page 26).

Question 8.

Will the MRS Steering Committee as proposed by the DOE in Section 4.1.1 of Volume 1 provide adequate involvement of State and local governments?

Answer: State of Tennessee

The Department of Energy has proposed the establishment of an MRS Steering Committee to achieve an effective working relationship between all parties. DOE has not granted the Steering Committee many of the authorities suggested by the Clinch River MRS Task Force (CRMRSTF) in their proposed MRS Environment, Safety and Health Review Board. In fact, the description of powers and authorities are vague, and all of them are contingent upon Congressional approval. The composition of the membership is dominated by individuals not representing the State's or local government's interests. The proposed authorities of this committee and the subcommittees include "evaluation, review, promotion, and the ability to recommend." These terms of "authority" represent gratitous concessions and do not allow for true assistance to be provided by the Committee of for any real authority of the Committee. If DOE is unwilling to share real power, then the Steering Committee is little more than a forum for the exchange of views...useful, but inadequate.

Question 9.

Are the assurances about safety and environmental quality adequately addressed by the Department of Energy?

Answer: State of Tennessee

The assurances about safety and environmental quality outlined in Section 4.2 are vague and insufficient. The DOE has suggested that the responsiblity of public acceptance, public knowledge and understanding of the MRS facility, and data collection might be best accomplished by the MRS Steering Committee. The State of Tennessee agrees that data on the environmental, demographic and socioeconomic conditions should be gathered. However, the Department's list should have also included health data and should more fully address "the local communities", and a larger regional area for many of these considerations. The quantity and desired quality of data which would provide the necessary assurances are not specified by DOE.

The discussion of "transportation" in the Proposal addresses some of the issues of concern raised by State agencies. Other issues should be included in any consultation-and-cooperation agreement entered into between the DOE and Tennessee. The DOE should further study an optimized transportation scheme. Additionally, the State of Tennessee would seek further DOE assurances since the applicability of the Price-Anderson Act to MRS operations is uncertain.

Question 10.

Does the DOE adequately address the concerns regarding decontamination and decommissioning?

Answer: State of Tennessee

The DOE notes that the MRS facility would be decontaminated and decommissioned "at the end of its mission". This reference has remained ambiguous throughout discussions between the DOE and the State of Tennessee. To date, the MRS facility's final mission(s) remain indefinite and uncertain. Service to the second repository and reprocessing activities remain as options. The State of Tennessee is not confident that the MRS facility has a single definite mission that will allow it to be decontaminated and decommissioned. The precedent provided at the non-operational K-25 Gaseous Diffusion Plant causes concern.

Question 11.

Does the DOE intend to clean up the contamination and pollution that has occurred in the Oak Ridge area resulting from previous DOE operations?

Answer: State of Tennessee

Only the complete clean up of these past offenses prior to the construction of an MRS facility would be acceptable to the State of Tennessee.

Question 12.

Will the financial assistance that the DOE proposes to provide to the State of Tennessee be adequate to address the associated adverse impacts of an MRS facility?

Answer: State of Tennessee

The State of Tennessee appreciates the DOE recognition that compensation to state/local governments for the adverse effects of hosting an MRS must go beyond conventional "impact assistance". We agree that if an MRS is authorized, compensation must include direct reimbursement of state/local expenses related to monitoring, regulation and oversight of the facility. Grants-in-lieu of taxes to state and local government entities would be a requirement for the state, beginning with authorization and continuing until the facility is decommissioned. A third element of compensation should be regional development assistance. The state notes that these proposed compenstations are subject to Congressional approval. DOE lacks the legal authority, at present, to go beyond the local impact assistance provided in the NWPA.

The direct economic effects of the MRS are positive. The state would gain on- and off-site jobs and sales tax payments. In the case of both jobs and fiscal effects, the benefits are small relative to the size of the existing local economy. The major problem that arises is that most of the direct and indirect benefits appear to be nearly ten years away.

Benefits of the MRS also bring with them potential costs to the state. Costs arise mainly from perceptions about MRS safety. These costs might be felt particularly in such areas as tourism andbusiness location. The effect of these perceptions would increase if the MRS created large agglomeration effects. The more the nuclear waste industry became concentrated in the MRS area, the greater the probability that the area would be shunned by tourists, businesses, and others who are skeptical about being in the vicinity of radioactive and other hazardous materials. There could also be costs associated with the perception that Tennessee is willing to accept any type of hazard in exchange for jobs.

The State's surveys suggest that there are firms and tourists who will not come to Tennessee if an MRS is located here. In these surveys, a significant group felt the MRS would be an absolute deterrent, even for distances of 100 miles. Any future accidents such as the one which occurred at Three Mile Island could make people more wary of the MRS even before it is operational. Of course, it is also possible that a more favorable experience with nuclear activities could make perceptions about the MRS more positive, but any large changes in this direction will likely await favorable operation of the MRS. Eventually, after operations have begun, the perceptions about the MRS should come in line with the actual risks.

In the case of business locations, negative effects are likely to begin as soon as the facility is approved. This creates an imbalance, because costs probably will start immediately, while the benefits will not be realized until well into the future (except for limited agglomeration effects). Because of the time value of money, a future stream of benefits would need to be very large to offset the costs which could begin immediately.

Further, there are risks that the project will be approved and then cancelled at a later date. This means that many of the economic benefits may never be realized, while the lost opportunities for any firms which were not attracted still remain.

A compensation scheme could be devised to offset some of the negative perceptions of the MRS. For example, most business leaders surveyed felt that the MRS would enhance a county's industrial attractiveness if the property tax rate could be significantly lowered. But there are business leaders who said they definitely would not locate in the

MRS county, even with the property tax compensation. It must be recognized that there is a small percentage of people who may not regard any compensation as acceptable. The potential for attracting these businesses would be lost. It is conceivable that other schemes could be developed to offset effects on tourism. Compensation schemes would need to begin when the negative effects of the MRS start--that is, as soon as the facility is approved, and not when construction or operations begin.

The basic principle of economics is that compensation for the effects of an activity should be aimed at all of those affected. Compensation schemes which have been discussed thus far are generally focused on the county or city in which the MRS would be located. The results of the State's surveys indicate that the compensation schemes must be developed for much wider areas than a single county. Industrial location across a broad area could be affected by the MRS. Prospective sites are within reasonable proximity of Tennessee's major tourism areas, and activity at these locations could be affected. Compensation must be targeted to such potentially affected areas.

Development of adequate, efficient, and equitable compensation schemes of the type required is very difficult. Unless these compensation schemes are carefully devised in order to offset the full effects on Tennessee, it appears that the potential costs of the MRS would not be offset by the potential benefits. Precise quantification of the costs is not possible, but acceptance of the MRS brings the state a risk of lost business locations and tourists for a small (relative to the economy) number of jobs which would be created by the MRS. Tennessee's risk of a net loss in economic activity is exacerbated because realization of gains is further into the future than realization of costs. In addition, any gains may be withdrawn by a change in national policy on the handling of nuclear wastes. Thus, Tennessee could be harmed economically by the MRS. The DOE proposal does not adequately address these concerns.

III. Examination of Siting

Question 1.

a) How did the reduction of shipment-miles become an overriding site selection criteria?

b) If the criterion were reduction of transportation costs or transportation risks, could the MRS be almost anywhere and be within the minimum value?

Answer: DOE did not address these questions in the Submission to Congress.

State Comment.

The discussion of siting in the Submission is limited to a brief description of the site selection procedure. (Volume 1, Section 3.2.1) DOE has not revisited the site selection process in its Submission to Congress, nor has it explained the rationale behind the process. The agency has neither revised nor reissued its screening and site selection document. (DOE/RW-0023).

None of the state's Key Questions on Siting have been addressed in the Submission to Congress. They are listed below.

Question 2.

If only the three candidate repository sites were included (rather than the original nine) in determining the preferred region, how many more potential MRS sites would be added?

Question 3.

If the land requirements for the MRS were reduced to accommodate only 15,000 metric tons of storage, how many more potential MRS sites would be added.

Question 4.

a) Why should Federal ownership be an overriding criterion?

b) Was this the only reason for excluding the Alabama site?

Question 5.

What were the main reasons for excluding the Savannah River site?

Question 6.

What was the main reason for choosing all three sites in Tennessee?

REFERENCES

1. Energy, Environment and Resources Center, University of Tennessee, "Evaluation of the Need, Feasibility, and Siting of the MRS in Tennessee," December 16, 1985.

2. Center for Business and Economic Research, University of Tennessee, "an Economic Analysis of a Monitored Retrievable Storage Site for Tennessee," December 10, 1985.

3. Office of the Attorney General, State of Tennessee, "Report of the Attorney General to the Safe Growth Cabinet Council," December 1985.

4. Tennessee Department of Conservation, "Report to the Safe Growth Cabinet Council," December 17, 1985.

5. Tennessee Department of Health and Environment, "Environmental Impacts of Proposed Monitored Retrievable Storage," December 17, 1985.

6. Tennessee Emergency Management Agency, Military Department of Tennessee, Report and Statement of Concerns, December 10, 1985.

7. Tennessee Public Service Commission, "Safety Considerations in the Transportation of Spent Nuclear Fuel and High Level Radioactive Waste," December 1985.

8. Tennessee Department of Transportation, "Transportation Impacts on the Tennessee Highway System Proposed Monitored Retrievable Storage," December 12, 1985.

9. The Five County Research, Evaluation, Analysis and Liaison Group, "Recommendations on the Proposed Monitored Retrievable Storage Facility at the Hartsville TVA Nuclear Plant Site," November 1985.

10. Clinch River MRS Task Force, "Recommendations on the Proposed Monitored Retrievable Storage Facility," October 1985.

11. Monitored Retrievable Storage Submission to Congress, Volume 1, Proposal for the Construction of a Monitored Retrievable Storage Facility.

12. Monitored Retrievable Storage Submission to Congress, Volume 2, Environmental Assessment for a Monitored Retrievable Storage Facility, December 1985.

13. Monitored Retrievable Storage Submission to Congress, Volume 3, Program Plan, December 1985.

14. Managing the Nation's Commercial High Level Radioactive Waste, Office of Technology Assessment, OTA-O-171, March 1985.

APPENDICES

Comments received from various state agencies and local governments highlighting major concerns relative to the Department of Energy's Proposal to locate a Monitored Retrievable Storage facility in Tennessee.

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January 30, 1986

Honorable James E. Word
Commissioner
Tennessee Department of Health
and Environment
340 Cordell Hull Building
Nashville, Tennessee 37219

Dear Commissioner Word:

In response to the January 2, 1986, request of the Safe Growth Cabinet Council, the Office of the Attorney General has prepared this summary of its comments and concerns regarding various legal issues raised by the Department of Energy's (DOE) Monitored Retrievable Storage (MRS) facility proposal. Most of these concerns have also been addressed in Memoranda forwarded to you in December as the "Report of the Attorney General to the Safe Growth Cabinet Council."

Our greatest concern has been and continues to be DOE's refusal to consult and cooperate with the State of Tennessee in the selection of sites for the MRS. The State has filed a lawsuit in the United States District Court for the Middle District of Tennessee requesting that DOE be enjoined from presenting its MRS proposal to Congress until such time as it properly consults and cooperates with the State about the siting decision.

In addition, Commissioner Word, we are concerned about various liability questions that will be raised by locating an MRS in Tennessee. In the near future, a Memorandum from this Office will be sent to the Safe Growth Cabinet Council that expresses our belief that serious issues should be resolved before an MRS is authorized.

Among those concerns are questions regarding the State's liability for a nuclear accident, indemnification practices and procedures, and the effects on liability issues of possible amendments to the Price-Anderson Act.

A third concern of this Office involves deficiencies in the Environmental Assessment prepared by DOE. Our examination of the Nuclear Waste Policy Act (NWPA), 42 U.S.C. § 10101 et seq., and regulations promulgated by the Council on Environmental Quality (CEQ), 40 C.F.R. Part 1508.9, indicates that DOE's analysis has not considered possible alternative technologies for transportation and storage of nuclear waste as statutorily mandated. Without engaging in such analysis, DOE cannot properly assess the necessary environmental impacts of its proposal.

The composition of the MRS proposal itself presents a fourth concern to this Office. In the bound "Supplemental Report of the Attorney General to the Safe Growth Cabinet Council," we have included a Memorandum that concludes that DOE has not followed standard procedures or acquiesced to Congressional intent in the preparation of its proposal. Rather than incorporate and respond to State comments and concerns regarding the MRS, the Department has chosen merely to have Tennessee's suggestions accompany the proposal to Congress. Such a decision by DOE exemplifies not the consultation and cooperation envisioned by the NWPA but rather the DOE practice of allowing only State response to finalized Departmental decisions.

Finally, this Office would like to reiterate its concerns regarding the transportation of spent nuclear fuel through the State of Tennessee. As stated in the Office's December "Report," it is essential that DOE comply with the various statutes involving hazardous materials transportation that include the State in the regulation and inspection processes.

We hope that these comments prove beneficial to you in the compilation of your report. As always, this Office stands ready to assist the Safe Growth Cabinet Council in any way that we can in this matter.

Sincerely yours,

W. J. MICHAEL CODY
Attorney General and Reporter

WJMC:dmm

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CHARLES A. HOWELL, III
Commissioner

MEMORANDUM

TO: Safe Growth Cabinet Council

FROM: Charles A. Howell

DATE: January 29, 1986

SUBJECT: Comments on the Three Volume EA received on December 24 from DOE

The DOC/MRS team submitted a report to you on December 17, 1985. After reviewing that report and the material received on December 24, 1985, the team prepared brief comments for me to make to the Safe Growth Cabinet Council at its January 6th meeting. Those comments continue to represent the department team's concerns with the final EA Proposal, and Program Plan by the DOE. Those comments contain 12 key points.

They are being submitted to you as our continuing concerns with the material and process furnished by the DOE. The DOC team will remain intact through the hearings in Congress. We stand ready when needed.

CAH:dsb

Enclosure

cc: DOC/MRS team

COMMENTS ON MRS

JANUARY 6, 1986

The final EA was delivered to DOC on December 24. In comparing it to the earlier draft of EA, the DOC still has the following concerns:

1. DOE has defined a MRS to serve different functional purposes over time. While it is presently defined as an "integral" part of the waste system, the NWPA does not require a repository commitment before a MRS is authorized.

2. The NWPA seeks retrievability of spent "used" fuel as a goal. The EA has not addressed reprocessing as a part of the waste system and fuel cycle.

3. It is going to be difficult, if not impossible, for Tennessee to negotiate binding agreements relating to the MRS if negotiations do not take place prior to congressional authorization.

4. The state should carefully evaluate the adequacy of the Nuclear Waste Fund and should seek that proper reserves be required against possible scrapping of the MRS.

5. Congress, prior to any site authorization, should provide adequate liability coverage for the MRS and the transportation system either through amending and extending the Price-Anderson Act or through some other mechanism.

6. The state should seek to establish a strong bi-partisan monitoring commission with sufficient powers to veto changes to a MRS. Agreement to such a monitoring body should take place prior to authorization.

7. The estimated 2.5-3.0 billion dollar cost of the MRS as proposed is not offset by the assigned dollar benefits of approximately 400 million dollars.

8. The EA has not adequately addressed mitigation costs and mechanisms for reimbursement.

9. The NRC can change the classification of nuclear waste by rule making procedure.

10. Barge transit of material has not been addressed by the EA.

11. DOC Division of Geology indicates a need for subsurface investigations prior to authorization and feels the geologic situation at Oak Ridge is better than at Clinch.

12. Lack of site specific ecologic data or use of older data could cause delays and additional costs if endangered species are discovered after authorization.

Tennesseans have always been willing to carry their "fair share and more," however, authorization of the MRS without proper financial, organizational and veto safeguards could be much less than fair. DOC agrees with the need for an adequate and safe nuclear waste disposal system.

BRIEFING PAPER

MRS REVIEW TEAM

JANUARY 6, 1986

The Department of Conservation submitted a report to the Safe Growth Council on December 17. At that time, only a partially complete Environmental Assessment Document by DOE was available for review. The completed three volume Environmental Assessment (EA) was not given to the DOC Review Team until December 24. This briefing paper amplifies most of the concerns presented in the DOC's December 17 report either because they were not addressed in the final EA or because the DOC team felt they were insufficiently addressed. These issues are:

1. After reviewing the final EA, DOC still does not feel that DOE has sufficiently demonstrated that the MRS is needed. The MRS has been assigned a number of functions over time by DOE.

   a. As a facility to store spent fuel.

   b. As a back up facility at a repository.

   c. As an "integral" part of the waste handling system to reduce cask shipment miles, to store until a repository is available, and to package and consolidate.

   d. To "decouple" the repository from the reactor and packaging so that repository delays would not delay acceptance of "spent fuel."

   While the final EA has refined discussion on the benefits of an "integral MRS," the cost of 2.5 billion dollars still vastly outweighs the 400 million dollars in assigned benefits.

2. Inclusion of a scenario which would include reprocessing of "spent nuclear fuel." The Nuclear Waste Policy Act directs that "spent fuel" be retrievable. Secretary Herrington and Director Rusche both indicate that reprocessing will occur when the economics of fresh fuel versus reprocessed fuel are at a trade-off. Secretary Herrington indicates that DOE is encouraging extending the operating lives of the light water nuclear reactors, development of package nuclear plants, and promotion of the United States as a world uranium enrichment center. The ban on reprocessing was lifted in 1981 and some have suggested that the United States become a world "reprocessing" center for "spent nuclear fuel."

   The NWPA defines "spent" nuclear fuel to be "fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of

which have not been separated by reprocessing." The most logical site for reprocessing to take place appears to be adjacent to the integral MRS. Since reprocessing is likely to become a part of the nuclear fuel cycle, the DOC team felt that DOE should have addressed the effects on the MRS, transportation risk, and potential environmental impact should it occur.

3. It is going to be very difficult for Tennessee to negotiate a "binding" agreement with the DOE and Congress which can be managed over a long period of time if a site is authorized before such an agreement is negotiated. Some of the factors which dictate that the agreement must occur prior to authorization of a site include the following factors:

   a. If a MRS is developed and long delays occur in completion of a repository or a repository is not completed, then Tennessee and DOE must be prepared to monitor and maintain the MRS for a very long time. The NWPA does not require that repository be done or even agreed to as a requisite for an MRS. The EA still has not addressed the issue of the "integral" MRS becoming a bottleneck if it is delayed or constructed and must be shut down for a period unless DOE continues to encourage system storage buffers. These include continuing encouragement to expanding at reactor storage and developing the 1900 (or larger) MTU storage site implied by NWPA. The GAO has criticized the DOE for putting all its eggs in the MRS or repository basket and for not accounting for the costs of neccessary buffering in the waste system.

   b. The EA discusses a "steering committee" mechanism for monitoring the MRS and waste system development. The DOC team suggests that any binding agreement contain a bi-partisan Tennessee monitoring group with sufficient powers to veto unilateral changes not in the best interest of Tennessee.

   c. The economics of the MRS, the overall fuel cycle costs, and the overall waste system costs dictate that Tennessee demand a more detailed discussion concerning risk and long term reserves or a protected sinking fund to cover any possible default by the Waste Fund.

      The projected life cycle cost for one MRS coupled with one repository has been projected to be in the range of 28-35 billion dollars over a 27 year period. The MRS is estimated to cost 1.5-3.0 billion dollars of that amount. The dollar benefits of the MRS to weigh against its cost are about 400 million dollars against the 3.0 billion dollars. These costs are to be covered by a self-sustaining nuclear waste fund made up of taxing users at the rate of 1 mil per kwhr. It is not clear at this point how much of the fund is based on "IOU's" from the utilities and how the fund will deal with defaults such as occurred in the WPPS (Washington Public Power System) incident. While the 1 mil/kwhr can be indexed, the MRS can stand for many years and should the fund for DOE become bankrupt, Tennessee could have an enormous financial responsibility far out of proportion to its share of nuclear power use. Given the past history of various high cost federal projects to be scrapped

before completion, this could leave Tennessee in a precarious position should this happen to the MRS. Because of the possibility of shortfalls in the fund or other situations which could leave the MRS inadequately protected financially, a more detailed discussion of sinking funds and dedicated reserves should take place before any congressional authorization.

The Price-Anderson Act is presently subject to Sunset. That act provides liability coverage to a variety of potential reactor accidents. At present, it does not cover the MRS and the transportation network. Congress, prior to any site authorization, should provide adequate liability insurance coverage for the MRS and transportation system.

The EA does not adequately address mitigation costs for Tennessee. Any basis for a binding agreement must recognize that Tennessee already contributes to the nuclear waste fund and that contribution must be factored out in any net mitigation cost considerations. As already mentioned, the possible effects of reprocessing have not been considered in th- EA and economic impacts even though it is a major goal of the NWPA.

The NWPA definition of "high-level radioactive waste" contains the phrase "and other highly radioactive material that the Commission, consistent with existing law, determines by rule requires permanent isolation." Any binding agreement must account for a state examination of changes by the NRC which could change impacts and mitigations of the MRS.

The EA does not cover the present argument going on between the Defense Department and the DOE as to the Defense Department's share of nuclear waste system costs. Changes in classification by rule could certainly affect the MRS and waste fund, and should have been covered by the EA.

4. The DOC Division of Geology reviewed the geotechnical information utilized in site selection. The DOC report to the Safe Growth Council indicates that the geologic conditions at the Clinch River site are not as dependable as the conditions at the Oak Ridge site. It is believed that an extensive subsurface investigation should be conducted at the Clinch River site before considering authorization inasmuch as the findings could alter the projected costs to construct a facility that would meet safety requirements on that site. Further, the Clinch River site is subject to the formation of subsurface solution cavities, a condition that does not exist at the Oak Ridge site. There remains some concern that the Clinch River site is only marginally above the elevation that could be flooded by failure of Melton Hill Dam when flood conditions exist on the river. The amount of fill, as well as the hydrologic conditions, should be thoroughly reviewed prior to an authorization decision.

5. Ecological data used in site selection was either 10 years old or not site specific. The concern expressed by the DOC team was that endangered species lists change with time and that discovery of flora or fauna on a list after authorization could cause delay and additional costs.

6. One of the seven factors favoring the Clinch River site listed on page 15 of Volume I of the Environmental Assessment lists barge transport as a favorable site discriminator. Certainly, future potential for Oak Ridge

becoming a world reprocessing or enrichment center would dictate an examination of water transport. The DOC team asked for such an analysis, but the EA does not address barge or water transit of material.

In summary, we all recognize the need for a safe and adequate Nuclear Waste Disposal System, however, many issues remain unaddressed for Tennessee. The DOC team agrees with the findings of the Attorney General regarding the need for consultation and cooperation prior to the selection of all three potential sites in Tennessee. Because the NWPA does not require that a repository exist for an integral MRS to exist, it would seem that Congress certainly intended that there be prior consultation and cooperation so that the state or states chosen would be able to adequately address all concerns.

Tennesseans have always been willing to carry their "fair share" and more, however, the MRS, without proper financial organizational and veto safeguards, could become must less than fair.

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

OFFICE CORRESPONDENCE

FROM	TO	DATE

DATE: January 28, 1986

TO: Ben Smith, Director, Safe Growth Team

FROM: Michael H. Mobley, Director, Division of Radiological Health

SUBJECT:

Attached is a list of our most important comments and criticisms of the DOE's " Monitored Retrievable Storage Submission to Congress, Volumes I-III."

1) Even though we find licensing of this facility by the Nuclear Regulatory Commission a positive item, we foresee potential problems with the DOE as a new licensee. Our experience in the licensing of radioactive materials has proven that with any new licensee and a facility of comparable magnitude to the MRS there are several regulatory problems in the first few years of operation. NUREG 1055, "Improving Quality and Assurance of Quality in the Design and Construction of Nuclear Power Plants," outlines problems in the nuclear power industry related to a lack of quality assurance. We recently attended a seminar in which a paper was presented by the NRC relating the applicability of this NUREG document to the issue of nuclear waste management. The NRC outlined several areas that deserved attention from the DOE in the pre-licensing and operational phases of the nuclear waste program. The NRC cautioned DOE not to rely on the NRC to detect problems in DOE's programs, but to effectively manage and plan for the future in order to resolve problems before they occur. (See Attachment A)

2) The question of a criticality accident has not been adequately addressed by the DOE in any of the documents we have reviewed to date. We feel this is a serious omission. What DOE has calculated in the present design system is basically that a criticality accident is not possible. It is assumed by them that the likelihood of mistakes or multiple failure accidents which could place the material in a critical configuration is so low that it is "not possible." We could not reach that conclusion from the data presented. The possible severity of such an accident warrants emergency and design planning in the area or further analysis should be made to support DOE's original conclusion.

FROM	DATE

10

3) The State is not adequately staffed or funded to cope with a facility of this magnitude. Staff would be needed in the following areas: inspection and enforcement, licensing oversight, emergency planning and environmental monitoring. Other expenses that would be incurred are the training of these personnel and additional equipment and supplies that would be needed. These expenses would begin immediately upon Congressional authorization of the MRS facility since a significant amount of manpower would be utilized in the pre-licensing and licensing oversight of this facility. After licensing that manpower would be utilized in operational oversight, emergency planning and training activities.

PH-60

4) There are certain license conditions that would be needed in order to assure the citizens of Tennessee of the DOE's good faith. Some of these conditions are as follows:

   a) a license condition restricting the length of time the waste could be stored at the MRS;

   b) a license condition restricting the age of the spent fuel that could be accepted at the MRS;

   c) a license condition restricting the amount of waste in metric tons that could be stored at the MRS; and

   d) a license condition authorizing the specific radioactive wastes and amounts of each that could be accepted and/or stored at this facility.

   This last condition is of particular importance since documents presented by the DOE to the State for review have indicated various types of wastes to be handled at this facility. For example, Volume I of the "MRS Submission to Congress" states that the commercial high-level waste New York would be shipped directly to the respository. Volume II of this same proposal indicates approximately 300 canisters of commercial high-level waste would be accepted at the MRS facility. These conflicting statements are just one example of many we have noted during review of the DOE documents.

5) The conceptual design proposed for the MRS facility and outlined in the "Integral Monitored Retrievable Storage (MRS) Facility, Conceptual Design" prepared by the Ralph M. Parsons Company for the DOE appears to be adequate to protect personnel, the surrounding population and the environment from radiation. DOE made use of the ALARA concept (as low as reasonably achievable), a basic premise of health physics protection, to promote an even greater reduction in radiation exposures. However, we have learned from experience that a facility can be designed to promote safety and still encounter very serious problems due to mismanagement or lack of commitment to environmental and occupational safety. If we received such a license application relative to a facility, we would feel confident the company was moving in the right direction but still had a long way to go to become licensed. Much additional detail would need to be provided to us negating the many concerns we would have relative to such a facility.

6) The fuel rod consolidation process proposed for this facility is the activity that causes the most concern since it presents the greatest potential source for occupational exposure. The greatest exposure will not come from the actual operation but from cleanup of hot cell areas necessitated by maintenance or other activities requiring personnel entry into contaminated areas. It is clear that further research and development is needed in the area of rod consolidation. Another concern in this particular process is the criticality accident. Any handling of nuclear fuel must be done with an awareness for the potential of nuclear criticality. DOE has not addressed this issue adequately as previously noted.

7) As several independent studies have concluded, the increased radiation exposure to Tennesseans from the transport of spent nuclear fuel to and from an MRS facility under normal conditions would be miniscule and the projected risk from radiation is less than that from the non-radiological transportation risks. Given the history of transportation of radioactive materials and the proposed escort system for these shipments, the transportation aspect for this facility is not a major concern.

8) The DOE seems to have been receptive to our comments on the Draft EA as we noted some changes in the final EA.

DS/svw 2-10

Attachment A

The lessons learned from the Ford Study (NUREG 1055) apply more broadly than just to power reactor design, licensing, and construction. These lessons apply to any project with the following characteristics:

-large

-complicated

-involves high technology

-has several phases

-involves diversity of technical specialities

-involves a number of interfaces

-cost and schedule pressures

The NRC also feels, as do we, that the following conditions make the lessons of the Ford Study more likely to be repeated:

-state of the art project, first of a kind

-inexperience on the part of the project team

-sense of security in past accomplishments

-organizational & project management tradition

-lengthy project

-inexperience with NRC licensing process

-funded and competent intervenors

Most of the above items apply to the MRS project and these are areas that deserve considerable attention.

TENNESSEE EMERGENCY MANAGEMENT AGENCY
EMERGENCY OPERATIONS CENTER
MILITARY DEPARTMENT OF TENNESSEE
3041 SIDCO DRIVE, P.O. BOX 41502
NASHVILLE, TENNESSEE 37204-1502
(615) 252-3300

January 27, 1986

Mr. Ben L. Smith
Safe Growth Team
Suite 1600, James K. Polk Building
Nashville, Tennessee 37219

Dear Mr. Smith:

The Tennessee Emergency Management Agency has reviewed the Department of Energy's Monitored Retrievable Storage (MRS) submission to Congress as you requested in your letter dated January 2, 1986.

This agency's concerns in DOE's proposal to Congress are the same concerns that have been voiced previously on other DOE documentation presented which are:

1. Adequate and timely emergency planning.

2. Radiological emergency response organizations and training.

3. Adequacy and availability of radiological monitoring instruments.

4. Sufficient communications to maintain command and control.

5. Funding to pay for the above listed requirements.

DOE has indicated in Volume I, Section 4.2.2, Proposal for the Construction of a Monitored Retrievable Storage Facility, that they intend to work with the State in resolving these issues. These items will be of interest to the State for either option that Congress chooses.

If Congress approves the MRS option, it is essential that Radiological Emergency Response Plans for the MRS and transportation be developed and tested for both state and local response forces prior to the MRS being issued an operations permit by the Nuclear Regulatory Commission (NRC).

Sincerely,

David R. Inman
Deputy Director

DRI:HEF:rmt

TENNESSEE PUBLIC SERVICE COMMISSION
CORDELL HULL BUILDING
NASHVILLE, TENNESSEE 37219

JANE ESKIND, CHAIRMAN
FRANK COCHRAN, COMMISSIONER
KEITH BISSELL, COMMISSIONER

BOB DAVIS, EXECUTIVE DIRECTOR
HENRY M. WALKER, GENERAL COUNSEL

MEMORANDUM

TO: Ben L. Smith
Ruth H. Neff
Safe Growth Team

SAFE GROWTH TEAM

FROM: Paul Melander, Manager
Transportation Investigation
Transportation Division

DATE: January 29, 1986

SUBJECT: **Public Service Commission's Comments on MRS Proposal**

The Department of Energy has proposed three possible modes of transportation for spent nuclear fuel shipments; motor carrier, rail and barge. The following items in order of importance are:

(1) Rail - The DOE intends to ship many loads of spent nuclear fuel both inbound and outbound by rail. We currently regulate rail safety only through the participation in a federal-state rail safety program which is administered by the Federal Railroad Administration. This agency has total control over the method of inspection and the processing of violation reports for possible penalities to the railroads. It is one large railroad's contention that the state has been pre-empted from any regulation of walkways and is participating in this program only through a "mistaken view" of its authority to do so. In addition, every year the Federal Railroad Administration and the President remove this program from the budget and every year the Commission must approach our congressional delegation to place this program back into the budget. The continuation is not favored by the FRA and chances of this program surviving on a long-term basis seems unlikely. Therefore, it is imperative that Congress, as a minimum, provide Tennessee concurrent jurisdiction with the FRA over interstate and intrastate rail safety. Failure to do so could result in shipments of spent nuclear fuel through our State not being subject to an adequate safety program.

(2) **Consultation and Cooperation (C&C) Agreement** - The Department of Energy has agreed to a very extensive transportation safety program which it will negotiate in a C&C Agreement after Congress approves the MRS facility for Tennessee. The legislation should provide that if the Department of Energy and the State of Tennessee cannot agree on an adequate C&C Agreement, then the proposal should be frozen and required to return to Congress for further consideration. Will this C&C Agreement be a legally binding contract and what remedies will be available if breached? This C&C Agreement should address as a minimum:

a. Methods of Transport
b. Routing of Shipments
c. Intermodal Transportation
d. Prenotification
e. Transportation of Defense Waste
f. Packaging Requirements
g. Escorting
h. Satellite Tracking and Communication

(3) **Motor Carrier** - The DOE has indicated in its Transportation Business Plan that should an acceptable safety program not be developed among the States and various Indian tribes, that it intends to use federal trucks to transport spent nuclear fuel. These trucks are currently exempt from any safety regulations by the Federal Government and/or the States. It is imperative that the legislation restrict the transportation by government vehicles or place these vehicles under the jurisdiction of the U.S. Department of Transportation and the individual states. The state must be assured of the right to conduct random roadside inspections in addition to what is stated in Vol. 1,4.2.2.

(4) **Barge** - Currently no state agency, that we are aware of, has jurisdiction over barge safety. It is totally administered by the Unites States Coast Guard and some state level of participation should be established.

In closing, we would like to request that the Tennessee Public Service Commission participate on the proposed MRS Steering Committee's Subcommittee on Transportation if indeed it is ever established.

/jhs

SAFE GROWTH TEAM
STATE OF TENNESSEE
Suite 1600, James K. Polk Building
NASHVILLE, TENNESSEE 37219
(615) 741-5782

MEMORANDUM

TO: MRS Task Leaders

FROM: Ben L. Smith
Ruth H. Neff

SUBJECT: State Comments on the MRS Proposal, Environmental Assessment and Program Plan

DATE: January 2, 1986

By now, all of you should have received the Department of Energy's 3-volume draft final Submission to Congress, for review and comment. The Safe Growth staff will compile the state comments. After review by the Safe Growth Cabinet Council, the state's comments will be forwarded to the Department of Energy and the Congress.

You will note in the cover letter from Ben C. Rusche to Commissioner Word, that the Department of Energy plans to submit their final MRS proposal to Congress shortly after February 6. Mr. Rusche states that

> ". . . Any comments from the State of Tennessee that are received by that time will be forwarded directly to the Congress along with the MRS proposal. There will also be ample opportunity for the State to provide additional comments directly to the Congress during the deliberations on the Department's submission."

In order for us to meet the February 6th deadline, we must receive your comments at least a week earlier. Please forward your comments to us as soon as possible, but in no case later than noon on January 30, 1986. In addition to your complete comments on the DOE documents, we ask you to prepare a "short list" of your ten most important comments or criticisms -- those points which you and your review team believe must be made to DOE and the Congress. We ask that these high priority comments be ranked.

There will be a coordination meeting of the task leaders on January 30, 1986, in the large Conference Room of the James K. Polk Building from 8:30 a.m. until 10:00 a.m. Please prepare a brief (five-minute) summary of your agency's most urgent comments to be presented at that meeting.

If you have any questions, please call the Safe Growth office at 741-5782. We appreciate your thorough and professional review of the MRS proposal.

BLS/RHN/axs/ltr2

Ruth
Gay

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
NASHVILLE, TENNESSEE 37219

January 30, 1986

RECEIVED BY
JAN
SAFE GROWTH TEAM

Mr. Ben Smith
Safe Growth Team
Suite 1600 J. K. Polk Bldg.
Nashville, TN 37219

Re: State Comments on the MRS Proposal, Environmental Assessment and Program Plan

Dear Mr. Smith:

The Monitored Retrievable Storage Submission to Congress was reviewed from the standpoint of highway impact only.

I personally feel that Section 4, Volume 1 addresses all the concerns raised, by myself as the representative of TDOT, concerning the potential impact on the State Highway System.

The submittal indicates cooperation in resolving the issues, i.e., highway upgrades, safety, transportation input, etc. THE CONCERN is, to what extent will these indications of intent of cooperation and resolve be implemented in the event of Congressional approval of the MRS.

Very truly yours,

Carl E. Cobble

Carl E. Cobble
Civil Engineering Manager

CEC:lb

The
Five County
Research, Evaluation, Analysis & Liaison
Group
P.O. Box 288 Hartsville, TN 37074 Phone 615-374-3487

M E M O R A N D U M

TO: Safe Growth Team, State of Tennessee

FROM: The Five County R.E.A.L. Group DVL

SUBJECT: Comments on the MRS Proposal, Environmental Assessment and Program Plan

DATE: January 29, 1986

We express appreciation to the U.S. Department of Energy, the Safe Growth Team, and the Department of Health and Environment for permitting our local governments to be involved with the MRS decision making process. We are pleased that the Hartsville site is not being proposed as the location for the MRS facility in this submittal. The following comments are offered for consideration.

1. From a local government view, we were concerned about the impact and in-lieu-of tax payments. These are covered in the documents, but should continue to be closely monitored as the process goes forward. (Ref. 3.5.1. and 4.3.1. Vol. 1.)

2. A negative effect would be the $1.4 to $2.0 billion in construction and operational costs. The TVA ratepayers are paying for sufficient on-site storage space for spent fuel. Would this MRS facility place an additional expense on the TVA ratepayers? (Ref. p. iv, Vol 2.)

3. The transportation impacts of spent fuel are increased for the State of Tennessee, not just in the vicinity of the Clinch River site. (Ref. p. iv, Vol. 2.)

4. The documents present an indication that the Hartsville is readily available. TVA does intend to keep the site. Recently, TVA leased a warehouse to a private firm to commence an industry. (Ref. 5.3.5.1. Vol 2.)

5. Would property owners in the vicinity of the site be compensated for any loss-of-value in their property? If so, how would this be accomplished.

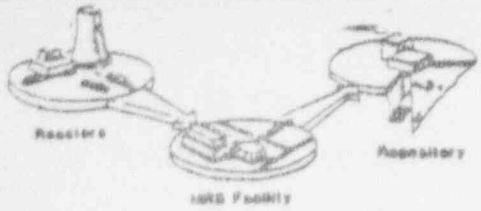
6. Contaminated (radioactive) water would be processed through the radioactive waste treatment system. Obviously, there could be radioactive liquids or water. What are the chances that this radioactive liquid could reach the river or streams in the vicinity of the proposed MRS.

7. Sufficient information is not contained in the documents about the affect on the TVA in-lieu-of tax formula. Since the Hartsville site is not selected, this is probably not too important.

8. It has been pointed out several times that there is no railroad in Trousdale County. The railroad was abandoned, the rails removed, and the right-of-way disposed of. (Ref. Fig. 6.14, Vol 2.)

9. Since DOE is proposing another repository to be located in the Eastern United States, would that not change the factors and/or decisions about a MRS facility in Tennessee.

10. If we do not want this at Hartsville and the Governor does not want it in Tennessee, we need to let the Congress. and the President know how we feel about this.



CLINCH RIVER MRS TASK FORCE

ROANE COUNTY/CITY OF OAK RIDGE, TENNESSEE

615/483-6871 · POST OFFICE BOX 1 · OAK RIDGE, TENNESSEE

January 16, 1986

Mr. Ben C. Rusche, Director
Office of Civilian Radioactive
Waste Management
U.S. Department of Energy
RW-1, Room 5A-085
Forrestal Building
Washington, D.C. 20585

Dear Mr. Rusche:

Monitored Retrievable Storage Submission to Congress

On behalf of the Clinch River MRS Task Force, we wish to congratulate your office on the review copy of the three-volume Monitored Retrievable Storage Submission to Congress distributed December 23, 1985. We believe the DOE has been responsive to many of our concerns, requests and recommendations in drafting the submission. It has been our contention that the MRS could be accepted in the Roane County portion of Oak Ridge provided stringent, but reasonable conditions are met. DOE's support of measures necessary to address local and state concerns and mitigate potentially negative impacts of the MRS provides convincing evidence of its intent to pursue responsible corporate citizenship. We are anxious to learn precisely how these measures will be authorized and implemented.

Our Task Force has reviewed the three-volume submission. In finalizing your reports for submittal to Congress in February, we urge you to consider the enclosed comments. Many relate to editing suggestions and could easily be incorporated into your final draft; others are more substantive in nature. We wish to highlight four items which we consider most important.

Impact Assistance and Tax Equivalent Payments. It is the firm position of the Clinch River MRS Task Force that the State of Tennessee, Roane County, and the City of Oak Ridge must receive annual payments equal to the taxes that would be paid on the MRS were it privately owned, valued at $1 billion, and fully taxed. To mitigate the negative impacts of the MRS, preoperational assistance payments equivalent to such amounts would have to be paid annually beginning with authorization of the facility. Your proposal supports this position, but could be clarified somewhat.

State and Local Oversight of MRS Operations. The Clinch River MRS Task Force applauds DOE's willingness to subject the MRS to the oversight of the proposed MRS Steering Committee. Such a committee could provide a model for the siting of nuclear and hazardous materials handling facilities of all types. The Task

Force recommended an MRS Environment, Safety, and Health Review Board to provide citizen input on a more limited basis than that envisioned in your proposal. As noted in our comments, the approach you have proposed may on balance prove superior to that we suggested. However, we feel state and local representation must receive stronger emphasis than that reflected in your draft proposal. The primary impact of the MRS would be on the local area. Consequently, the primary objective we would hope to accomplish in creation of such a committee is that of providing direct local oversight of MRS planning, construction and operations. While participation of representatives named by DOE and the nuclear utilities would strengthen the committee, the majority of appointed members should be residents of the region and represent State and local interests.

Assurances That Commitments Would Be Met. With regard to the siting of a repository, the Nuclear Waste Policy Act (NWPA) schedule allows a potential host state ample time to negotiate "consultation and cooperation" (C & C) agreements before its opportunity to issue a "notice of disapproval" expires. This will benefit both the host state and DOE in that mitigation of potentially adverse impacts can be considered and negotiated before the state determines whether the issuance of a notice of disapproval is necessary. It has been the experience of the Task Force that, given sufficient time and the willingness of all parties to constructively address problems identified, mitigation of negative impacts relating to the MRS could be similarly accomplished.

The MRS has not yet been formally proposed to Congress, let alone authorized. It was as recently as April 1985 that Tennessee was identified as the location for the MRS. Conceptualization of MRS functions and identification of MRS impacts and benefits have only been finalized during the last of the ensuing months. Given this situation, it is inappropriate that the deadline for the State's notice of disapproval is 60 days after the MRS proposal is presented to Congress, as is currently specified in the NWPA. With this in mind, the Task Force recommended that the MRS authorizing legislation provide for the 60-day period for issuance of a "notice of disapproval" begin six months after C & C agreement negotiations commence.

The Task Force urges DOE to consider means within its own authority of providing assurances to the State and potential host communities that MRS commitments will be honored. A memorandum of understanding (MOU) jointly agreed to by DOE, the State, Roane County, and the City of Oak Ridge should be considered documenting DOE's commitment to pursuit of the objectives outlined in its submission to Congress. The MOU should address all actions that can be implemented administratively without specific Congressional authority; for example, linkage of the receipt of spent fuel at the MRS to progress made on construction of the permanent repository. In our view, such a document formally agreed to by DOE, the State, and the host communities at the time the MRS submission is presented to Congress would ease concerns regarding the likelihood that proposed commitments would be honored.

Negative Regional Impacts of the MRS. In our opinion, the analysis of the proposed MRS undertaken by numerous State agencies acting under the direction of Governor Alexander's Safe Growth Cabinet Council indicates that the facility can be safely constructed and operated. Studies conducted suggest that the MRS could be effectively regulated by those agencies responsible for environmental and transportation safety. Your proposal adequately addresses the socioeconomic impacts of the facility on the host communities; in fact, assuming the mitigative measures proposed are implemented, the MRS will provide a significant net benefit to the local economy. However, potentially negative socioeconomic impacts on the multi-county region beyond Roane County and Oak Ridge identified in the State's analysis remain unaddressed in your proposal. We limited our analysis of impacts to the immediate area but are concerned about the region as well. While the Clinch River MRS Task Force cannot speak for the Governor or State Legislature on this issue, we do contend that means are available to mitigate regional impacts beyond our area. We urge consideration of the following:

Assist the State in Industrial and Tourist Promotion. The University of Tennessee's Center for Business and Economic Research has documented potentially adverse impacts of the MRS on industrial and tourist recruitment in the region. The Task Force recommends provision of direct financial assistance to the State to assist in industrial and tourist promotion efforts. Additionally, it recommends that DOE designate the State as a prime location for its conferences and training sessions and encourage other federal agencies to do likewise. This would tend to offset any tourist revenues lost by virtue of location of the MRS in the Oak Ridge area.

Assist in Development of the Tennessee Technology Corridor. The Oak Ridge/Knoxville metropolitan area, specifically the Pellissippi Parkway (SR-162) which links Oak Ridge to I-40/I-75, has been designated by the State as the Tennessee Technology Corridor. Major existing components of the Corridor concept include the Oak Ridge National Laboratory and the other DOE facilities, the University of Tennessee, and the Tennessee Valley Authority. It is hoped that these institutions will provide the foundation upon which high technology industrial expansion throughout the region will be achieved. The Clinch River MRS Task Force recommends that DOE support development of the Corridor through the following supplemental actions:

- Provision of limited grants to the Tennessee Technology Foundation to assist in infrastructure improvements and industrial recruitment activities;

- Provision of limited grants to the University of Tennessee to extend business services to emerging entrepreneurs seeking to establish firms in the Corridor;

- Assistance in the completion of the Pellissippi Parkway extensions to the Oak Ridge Turnpike (SR-95) and Alcoa Highway (SR-73/US-129);

- Utilization of the Roane State Community College/State Technical Institute-Knoxville facilities currently under construction within the Corridor for MRS-related training programs; and

- Support of the general aviation airport facility now being considered for the Oak Ridge area.

Facilitate the Implementation of "Volume IV." The Task Force would argue that DOE could more than offset any negative socioeconomic impacts of the MRS through Martin Marietta's implementation of community involvement programs outlined in "Volume IV" of its contract proposal. In seeking a primary contractor to replace Union Carbide two years ago, DOE affirmed its continuing program interest in assisting expansion of the region's industrial base. Firms responding to DOE's request for proposals were expected to share DOE's interest in this regard and submit in "Volume IV" of their proposals corporate plans for community involvement. The Martin Marietta Corporation, the primary contractor selected, submitted a proposal featuring the following commitments:

- Investment of 10 percent of its annual fee as venture capital;

- Administration of an aggressive technology transfer program;

- Placement of $15 million of corporate procurement in East Tennessee;

- Construction of a privately-owned headquarters building in the local private sector;

- Development of a large, multipurpose industrial park in Oak Ridge;

- Investment of over $1 million locally in joint university/government/industry research;

- Sponsorship of a Center for Manufacturing Systems Engineering;

- Promotion of industry sponsorship of the American Museum of Science and Energy; and

- Substantial contribution to local educational, cultural, civic, health, and welfare organizations.

The successful implementation of these programs would significantly offset potentially adverse regional socioeconomic impacts of the MRS. DOE's reaffirmation of its interest in broadened industrial development as demonstrated through its support of Martin Marietta's "Volume IV" programs is essential in this regard. Adoption of a similar community involvement policy for MRS contractors would assure continued economic benefits to the region.

In closing, let us once again congratulate DOE on an excellent review draft Monitored Retrievable Storage Submission to Congress. It is our belief that incorporation of the modifications contained herein, as well as those constructive suggestions offered by other interested parties, will further strengthen the submission. DOE has presented convincing evidence that the MRS could be safely constructed and operated in the Roane County portion of Oak Ridge, Tennessee. Favorable consideration by Congress of those measures proposed by DOE to mitigate the potentially negative impacts of the MRS will ensure that the facility provides net economic benefit to the local community. Consideration of supplemental items included herein would extend these benefits to the region and state.

Sincerely,

Kenneth E. Yager
County Executive, Roane County
Executive Committee
Clinch River MRS Task Force

Roy F. Pruett
Mayor, City of Oak Ridge
Executive Committee
Clinch River Mrs Task Force

Robert W. Peelle
Chairman
Environmental Study Group

Larry M. Dickens
Chairman
Socioeconomic Study Group

Shirley P. Hendrix
Chairman
Transportation Study Group

Enclosure

Comments and Suggestions

Relating to DOE's

Monitored Retrievable Storage Submission to Congress

VOLUME 1: Proposal

Section 3.1, Page 11, Paragraph 1. Correct the statement, "The preferred site for an MRS facility is 25 miles west of Knoxville, Tennessee" to read, "The preferred site for an MRS facility is in the Roane County portion of the City of Oak Ridge, Tennessee, 25 miles west of Knoxville."

Section 3.1, Page 11, Paragraph 2. Correct the statement, ". . . and the Clinch River MRS Task Force, which represents the local communities in the area of the preferred site . . ." to read, ". . . and the Clinch River MRS Task Force, which represents the local governments sharing jurisdiction of the preferred site area."

Section 3.2.1, Page 11, Paragraph 4. Correct the statement, "The MRS facility would be constructed on the Clinch River site in the eastern portion of Roane County, 25 miles west of Knoxville and nine miles southwest of the center of the city of Oak Ridge, Tennessee." to read, "The MRS facility would be constructed on the Clinch River site in the Roane County portion of the City of Oak Ridge, Tennessee, 25 miles west of Knoxville.

Section 3.2.2, Page 15, Last Paragraph. The proposal notes that compacted non-fuel-bearing assembly scrap material will be shipped to the repository. Because of the importance of assuring the residents of the state that no waste materials associated with the MRS would remain here permanently, it is the position of the Task Force that all secondary waste items should be disposed of outside Tennessee. This would include such items as contaminated gloves and protective clothing.

Section 3.2.5, Page 20, Paragraph 2. The proposal does not address the Task Force recommendation that a Community Environmental Monitoring Program similar to the one operated at EPA at DOE's Nevada Test Site be established well in advance of MRS operations. It remains the Task Force view that such a program would provide a publicly accepted means for testing and documenting the environmental protection measures utilized at the facility.

Section 3.2.5, Page 20, Paragraph 3. It is noted that the MRS will meet all applicable environmental and land-use requirements of the federal government, the State of Tennessee, and Roane County. Adherence to the City of Oak Ridge codes and regulations should also be referenced.

Section 3.5.3, Page 27, Last Paragraph. The linkage proposed by DOE between the commencement of MRS operations and progress on completion of the permanent geologic repository is even stronger than that suggested by the Task Force. DOE should be commended for making such a commitment. It is possible, however, that even after construction of the repository is authorized by the Nuclear Regulatory Commission, completion of that facility could be significantly delayed or the project terminated altogether. The Task Force, seeking assurances that fuel assemblies not remain at the MRS indefinitely, has taken the position that (1)

no more than 10,000 metric tons of spent fuel should be received at the MRS before out-shipments of consolidated fuel rods to the permanent repository begin and (2) that any spent fuel stored at the MRS longer than 15 years should be subjected to a significant "overdue-removal penalty" levied by the State of Tennessee.

On a closely related issue, DOE recommends that the total MRS storage capacity be limited to 15,000 MTU. The Task Force feels that this limitation would be more meaningful if any future attempt to expand the storage capacity not be simply authorized through NRC licensing procedures. It is for this reason that the Task Force position calls for any proposed extension beyond the 15,000 MTU currently envisioned to be subject to the same review and notice of disapproval procedures followed in the initial authorization of the MRS.

Section 4.1.1, Pages 30 - 32. The Task Force is appreciative of DOE's positive response to the need for some local oversight of MRS planning, operations, and decommissioning. The structure and range of responsibilities of DOE's proposed "MRS Steering Committee" differ from those of the "MRS Environment, Safety, and Health Review Board" recommended by the Task Force. While the approach proposed by DOE may on balance prove superior, the Task Force is concerned that local oversight function is weakened. The following modifications are therefore suggested:

- DOE proposes that the chairman of the MRS Steering Committee be named by DOE in consultation with the Governor of Tennessee. The Task Force feels the reverse would be more appropriate; i.e., the chairman shall be named by the Governor in consultation with DOE.

- The member representing other public interests shall be a resident of the five-county immediate impact area designated in the Environmental Assessment (Anderson, Knox, Loudon, Roane, and Morgan Counties) and appointed by the State.

- A majority of the Steering Committee's membership shall be residents of the State of Tennessee.

- A majority of the members of appointed subcommittees shall be residents of the five-county immediate impact area.

- Chairmen of the appointed subcommittees shall be residents of Roane County and/or Oak Ridge.

- The number of Steering Committee appointees representing Roane County and the City of Oak Ridge should be increased to two each. This would increase the size of the Steering Committee to 11.

- The Task Force recommends that all meetings of the Steering Committee be open to the public.

Section 4.1.1, Page 32, Paragraph 2. The first three sentences which now read, "This subcommittee would recommend and review policies and oversee the execution of programs representing financial commitments of the DOE to the State and local community. In particular, it would oversee the development and execution of the measures for financial assistance described in Section 4.3 of this proposal. These include measures for preventing or mitigating the impacts. . . ." should be amended to read, "This subcommittee would recommend and review policies and measures for preventing or mitigating the impacts. . . ."

The Task Force understands that the description of subcommittees and their functions are provided for illustrative purposes; the final organization plan of the MRS Steering Committee will be an item formalized through the Consultation and Cooperation (C & C) agreements. With regard to the functions described for the "Subcommittee on Financial Matters," the Task Force feels that items relating to impact assistance and grants equivalent to taxes paid to the MRS host jurisdictions and the State should be established through direct agreements and not be subject to oversight by any third party. The role of a subcommittee regarding the items described in Section 4.3 of the proposal should therefore be limited to that of an advisory panel.

Section 4.1.2, Page 32, Paragraph 4. As the MRS has not yet been authorized, it is inappropriate that the deadline for the State's notice of disapproval is 60 days after the MRS proposal is presented to Congress as currently specified in the NWPA. The Task Force strongly recommends that the MRS authorizing legislation provide for the 60-day notice of disapproval period to begin six months after C & C agreement negotiations commence.

Section 4.1.2, Page 33, Paragraph 7. The Clinch River MRS Task Force recognizes that the NWPA calls for C & C agreements between DOE and the states hosting its facilities. However, the Task Force contends that certain issues of strictly local concern should be subject to direct agreements between DOE and the local governments. The communities hosting the MRS must be assured a direct role in resolving local issues. The leading sentence of this paragraph, "It would be up to the State of Tennessee to ensure that local interests are accommodated in the consultation-and-cooperation agreement." appears to absolve DOE from any responsibility to see that local concerns are addressed. While we agree it would be inappropriate for DOE to interject itself between the State of Tennessee and Roane County or the City of Oak Ridge, the Task Force feels it important for the proper tone to be set in the proposal narrative. The leading sentence of this paragraph should be deleted.

Section 4.2.2, Page 35, Paragraph 2. The transportation items listed will require expenditures on the part of the State and local governments. It is the position of the Task Force that funding would be provided by DOE. The following changes are suggested:

Item 1. The item should be concluded as follows: "The DOE will support the funding of indicated road improvements without affecting federal funds regularly allocated the State for transportation system improvements."

Item 3. The first sentence which reads, "Assistance will be provided to the State of Tennessee. . . ." should be modified to read, "Assistance and sufficient funding will be provided to the State of Tennessee. . . ."

The proposal does not specifically address the Task Force's Transportation Study Group recommendation that a training center for emergency responders similar to that operated in Nevada be established in Tennessee. Such a center located here would improve accessibility to training for eastern corridor states, as well as relieve the burden on the Nevada facility.

Section 4.2.4, Page 36, Last Paragraph. While the Task Force understands that environmental cleanup activities scheduled for the Oak Ridge Reservation over the coming years will be subject to Congressional authorization of funds, it considers success in bringing existing DOE facilities into compliance with applicable State and federal environmental regulations prior to commencement of MRS operations to be of critical importance. If the issue of so doing is to be addressed separately by the DOE Oak Ridge Operations (DOE/ORO) Office, the Task Force requests that a memorandum from the Secretary of Energy outlining such plans, schedules and commitments accompany and be made a part of the final draft of the Monitored Retrievable Storage Submission to Congress.

Section 4.3.1, Page 38, Paragraph 5. It is important that all concerned understand that impact assistance payments made during the preoperational phase to Roane County and Oak Ridge would equal taxes paid on a $1 billion operational MRS facility. It is suggested that the leading sentence be modified to read, "It is proposed that the payments made annually during the preoperational phase to the State and local governments would equal the taxes and grants equivalent to taxes paid to those governments by a fully operational MRS facility valued at $1 billion."

VOLUME 2: Environmental Assessment

The Task Force is appreciative of DOE's willingness to make corrections suggested following State and local review of the initial Environmental Assessment draft.

Executive Overview, Page v, First Paragraph. The last phrase in the first sentence should read, ". . . at the Clinch River site in the Roane County portion of Oak Ridge, Tennesse.

Executive Overview, Page vi, Last Full Paragraph. The paragraph does not address the fact that the Oak Ridge area is heavily impacted by the federal government. The socioeconomic impacts of the MRS extend beyond the loss of a site for industrial development purposes.

Section 6.2.9.2, Page 6.65, Paragraph 4. Both SR 95 and SR 58 are experiencing problems with regard to traffic congestion. It is the opinion of the Task Force that both will require upgrading if they are designated primary routes for spent fuel shipments.

Various Maps. While earlier maps have been corrected to accurately depict the primary and secondary MRS sites as being within the Oak Ridge city limits, the labeling of the maps remains misleading. The highlighted areas now labeled "Oak Ridge" should be modified to indicate "Population Center" or "Urbanized Area."

VOLUME 3: Program Plan

Section 3.7, Page 3.25, Footnote (a). Beyond this footnote, little mention is made of the possibility of use of the MRS in waste retrieval operations. It is the view of the Task Force that such activities should occur only after full consultation with the State and host communities and specific authorization of Congress.

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October 3, 1986

Mr. J. C. Haugen
U.S. Department of Energy
Chicago Operations Office
Technical Management Division
Building 201
9800 South Cass Avenue
Argonne, IL 60439

Dear Joel:

The monthly report of activities of the Materials Characterization Organization (MCO) during August 1986 is attached for your information. This report is distributed to help maintain good communications between the MCO and other participants of Nuclear Waste Programs with which the MCO interfaces.

Questions regarding the attached report may be addressed to me, to J. Mendel, MCC (FTS 509-375-2905), or to M. Steindler, MRB (FTS 972-4314).

Sincerely yours,

Sy Vogler
Materials Integration Office
Technical Support

SV:cew

Attachment: Monthly Report

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MATERIALS INTEGRATION OFFICE MONTHLY REPORT

AUGUST 1986

SUMMARY

MILESTONE STATUS

The following MCC milestones were completed this month.

OGR 2B/11 Report PNL-5577-11 "Fabrication and Characterization of MCC Approved Testing Material ATM-11" has been completed and is awaiting DOE/RL clearance.

SRP 07G MCC submits a draft of SRP-BNL-1 Salt Irradiation Test Method to the SRP.

As of September 2, 1986, M. R. Kreiter is the Manager of the MCC.

A draft FY 1987 Statement of Work (SOW) in support of the West Valley Demonstration Project (WVDP) was submitted to L. R. Eisenstatt.

The FY 1986 SOW, Rev. 1, in support of the Transportation Technology Center was sent to and approved by Marcella Madsen.

A request for approval for the MCC to participate in the CEC Round Robin of a Repository System Evaluation Test was submitted to J. D. White DOE/RL.

W. M. Bowen, the MCC Statistician, is involved with ASTM Committee C26. He reviewed and is currently assisting in the revision of "Standard Guide for Qualification of Laboratory Technicians." He also assisted in the review of the procedure "Determining Elements in Waste Streams by ICP-AE Spectroscopy."

Two QA audits of the MCC were conducted during August, one an internal PNL audit and a second by Sandia National Laboratory. The Sandia review yielded one finding and one observation. West Valley representatives also reviewed the MCC activities for conformance to QA requirements.

Activities continued for upgrading the QA performance of all MCC groups.

GEOLOGICAL REPOSITORIES

Negotiations continued for the acquisition of stainless steel clad spent fuel assemblies.

Retrieval of rods of spent fuel ATM-106, -104, and -103 has been started and should be completed in September. These rods are to be characterized.

SALT REPOSITORY PROJECT

The draft of SRP-BNL-1 Salt Irradiation Test Method and the dated Perspective and Test Experience documents were revised and submitted to the

SRP. The drafts of two additional methods were prepared: SRP-WPP-31 Determination of Different Oxidation States of Plutonium and Neptunium Using Solvent Extraction Techniques and SRP-WPP-39 Standard Practice for the Preparation and Analysis of Simulated Permian Basin Brines and Dry Salts.

BASALT WASTE ISOLATION PROJECT

Preliminary testing of new vessels with dip-leg samplers for the MCC-14.4 test method was begun. These vessels should permit sampling at experimental temperature rather than cooling the vessel before obtaining samples. First drafts of two reports were started, BWIP/MCC 105.4 Flowby Test Report at Reference Conditions (300-day, 100°C) and BWIP/MCC-105.5 Air/Steam Test Report at Reference Conditions (30- and 120-day, 300°C).

Initiation of the BWIP/MCC-105.1 Radiation Corrosion Test will be two months behind schedule because of delays in getting heaters for the test vessels.

DEFENSE HIGH LEVEL WASTE

Durability testing with ATM-11 (an actinide doped SRL glass) was started using the pulsed flow method (Catholic University).

Revisions are being made to MCC-1 before resubmittal to the MRB. One major change is to include a glass cutting procedure for sample preparation. Testing will be instituted to determine the effect of the sample preparation by different experimenters upon the leach results.

A new method has been proposed, MCC-17 Recommended Practice for Assuring the Quality of Chemical Analyses. The method will deal with general practices to assure quality of results, i.e., use of standard materials.

The literature review of published aqueous-dissolution studies of nuclear waste forms continued. Preparation began on the draft progress report (milestone OGR-09B) due in September that summarizes the dissolution properties of waste forms.

Preliminary results for Cladding Removal Waste grout leach tests indicate that soil does not significantly retard the migration of I and Tc leached from the grout. The tests also indicated that Sr and Cs leached from the grout are adsorbed by the soil.

TRANSPORTATION TECHNOLOGY CENTER

Run plans have been prepared for the development of the flaw leak-test procedure and for the impact testing of the two full-scale DWPF canisters. The flaw leak-test procedure will measure the waste form leakage from a hypothetical canister flaw.

WEST VALLEY DEMONSTRATION PROJECT

MCC-1 leach testing of CTS glass was completed through 28 days, including leachate analyses.

Pulsed-flow testing of the CTS glass was initiated.

MCC-1 testing of CTS glass for the SRP will begin in September using a saturated brine leachant.

The preparation of ATM-10 continues. Current analyses are being evaluated and discussions are under way to decide upon the most effective way of completing the preparation successfully.

MATERIALS REVIEW BOARD

Additional backup material in support of the MCC-3 submission was forwarded to the Procedures Panel.

MATERIALS INTEGRATION OFFICE MONTHLY REPORT

AUGUST 1986

I. Program Objectives

The objectives of the Materials Integration Office are to assure that waste package materials data from RW, DP, and NE programs, identified as key to waste acceptance and licensing, are of sufficient quality to be capable of showing that the waste package will meet NRC and EPA criteria. These data, and the test procedures by which they are obtained, are published in the Nuclear Waste Materials Handbook for use by the Programs in assuring compliance with waste acceptance criteria and in supporting repository license applications.

II. Milestone Status

The following MCC milestones were completed this month.

OGR 2B/11 Report PNL-5577-11 "Fabrication and Characterization of MCC Approved Testing Material ATM-11" has been completed and is awaiting DOE/RL clearance.

SRP 07G MCC submits a draft of SRP-BNL-1 Salt Irradiation Test Method to the SRP.

III. Materials Characterization Center Activities

A. MCC Program Administration

Program Planning - A draft FY 1987 Statement of Work (SOW) in support of the West Valley Demonstration Project was submitted to L. R. Eisenstatt 8/15/86.

The FY 1986 SOW, Rev. 1 in support of the Transportation Technology Center was sent to and approved by Marcella Madsen.

A request for approval for the MCC to participate in the CEC Round Robin of a Repository System Evaluation Test was submitted to J. D. White, DOE/RL.

As of the end of August, J. E. Mendel is no longer Manager of the MCC. M. R. Kreiter assumes that position on 9/2/86. Mendel will remain with the MCC in a dual role as Chief Scientist and Task Leader for Task 3 Spent Fuel Characterization. J. O. Barner, present Leader of Task 3, has accepted a Section Manager position in the newly formd Reactor Technology Center. Barner will continue to be involved with the MCC as a technical consultant.

ASTM Activities - After returning from the meetings of ASTM Committee C26 in Seattle, W. M. Bowen reviewed the procedure "Standard Guide for Qualification of Laboratory Technicians." The procedure is primarily based upon a sequence of standards analyses performed by a technician and the data from these analyses are compared with an existing "data base" by performing a series of statistical tests. Although the author collaborated with a person who is "knowledgeable" in statistics, the procedure is plagued with incorrectly applied statistical concepts, misused "buzz-words," and incorrect

formulas. After discussing these problems with other members of the Statistics Subcommittee (C26.06), W. M. Bowen agreed to collaborate with the author, D. E. Sandberg of RHO, in rewriting the procedure. This work will be done during September and early FY 1987.

The procedure "Determining Elements in Waste Streams by ICP-AE Spectroscopy" is still under review by the Statistics Subcommittee, primarily by W. M. Bowen. Although many recommendations were made by W. M. Bowen and M. Hume to R. W. Morrow during April 1986, none of them had been incorporated in the revised draft that was handed out at the Seattle meeting of the Plasma Emission Task Group (C26.05). W. M. Bowen attended one C26.05 session for the purpose of raising some of the statistical issues for discussion. Many members of the Task Group seemed to agree that changes in the procedure are needed. During September or early October, a letter to R. W. Morrow will be prepared specifying the changes that should be made.

In one of the meetings of the Statistics Subcommittee, the secretary, L. Bruckner of LANL, strongly recommended that W. M. Bowen review any procedures prepared by MCC staff before they are submitted for ASTM review and/or balloting. This could save an iteration or two in the approval process.

VARIANCE EXPLANATION

The total MCC Program is $11K overspent. This will be corrected in September. An additional $470K has been approved from OGR and will be in the September cost summary.

CAPITAL STATUS

With additional capital money carried forward from FY 1984, the MCC has a total of $408,926 for FY 1986. Total unallocated is $17,926.

B. MCC Quality Assurance

Quality Assurance Coordination - Two audits of the MCC were conducted during August. A PNL internal audit examined all aspects of compliance to PNL-MA-60, Quality Assurance Manual for license related programs. An audit of the MCC QA program for activities in support of the Transportation Technology Center at SNL was held and resulted in one finding and one observation. In a West Valley review of MCC Quality Assurance activities, problems were found with laboratory record book entries.

Activities continued for upgrading the QA performance of all MCC groups.

C. MCC Support to the Office of Geologic Repositories (RW-20) DB-05-11-03

PROGRESS DURING REPORT PERIOD

Acquisition of Spent Fuel Approved Testing Materials [ATMs] - Due to uncertainties concerning the timely removal of stainless-steel-clad assemblies H-07 and G-11 from the BCL hot cells,Northeast Utilities Service Company (NUSCO) is unwilling to provide a mixture of rods from the two assemblies. They are willing to provide both assemblies; however, this large quantity of

relatively moderate priority stainless-steel-clad fuel would tax the available storage space in the hot cell. NUSCO was asked if they would be willing to provide another assembly from the Connecticut Yankee Reactor. They are currently evaluating the question.

Nine rods of spent fuel ATM-106 (high-fission-gas-releasing, high-burnup PWR fuel) and eight rods of ATM-104 (low-releasing, high-burnup PWR fuel) have been retrieved for characterization. After retrieval of three ATM-103 rods (low-releasing, moderate burnup PWR fuel), a manipulator was damaged. The time required to repair the manipulator, in combination with personnel vacations, has delayed retrieval of the remaining ATM-103 rods until mid-September.

The fission-gas-sampler-rewelder is fully operational, including a new pump which evacuates the system more rapidly.

The fuel rod gamma-scanner has been aligned, and all electrical connections have been completed.

One-hundred and six grams of crushed ATM-101 spent fuel was shipped to BWIP.

Report: Fabrication and Characterization of ATM-11 - A BWIP review of the report PNL-5577-11 "Fabrication and Characterization of MCC Approved Testing Material ATM-11" (J. W. Wald and J. L. Daniel) was received; the corresponding revisions of the report were prepared and informally approved by the BWIP cognizant scientist. Clearance by DOE/RL is in progress.

MAJOR PROBLEMS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

- Characterization of ATMs -103, -104, and -106 will be initiated.
- Complete and issue PNL-5577-11.
- Continue review of published aqueous dissolution studies.
- Work on the ASTM C26.07 Task Group on Accelerated Testing will continue. Two meetings are planned before the next ASTM C26 meeting in Tampa, January 1987. Tentative dates are October 21 in Denver and a second date during the week of the Materials Research Society Meeting in Boston, December 1-4, 1986.
- The ASTM version of MCC-1 Static Leach Test Method will be revised to be consistent with the Handbook version and to incorporate comments from the last ASTM ballot and will be resubmitted to the C26.07 subcommittee for ballot.

D. MCC Support to the Salt Repository Project DB-01-03-02

PROGRESS DURING REPORT PERIOD

Coordination of Technical Peer Review of SRP-WPP Procedures - The draft of SRP-BNL-1 Salt Irradiation Test Method and the related Perspective and Test Experience documents were revised in response to the BNL comments and submitted to the SRP.

Work continued on the draft of SRP-WPP-31 Determination of Different Oxidation States of Plutonium and Neptunium Using Solvent Extraction Techniques. The final review of SRP-WPP-31 by D. Rai was completed, but he expressed a preference for waiting until mid-September for submission, to check the effectiveness of a technique to separate more completely plutonium ionic species. The MCC agreed to delay submission but to proceed with the current version, which will be ready for submission in the event the different technique does not perform as expected.

A draft of SRP-WPP-39 Standard Practice for Preparation and Analysis of Simulated Permian Basin Brines and Dry Salts was completed and the draft was reviewed internally. Considerable revision and additions are required.

MAJOR PROBLEMS AND ACTION TAKEN

None.

PLANNED WORK FOR SUBSEQUENT MONTHS

- SRP-WPP-31 and -39 will be completed in September and submitted to SRP for the first time.
- An MCC staff member will visit LBL as soon as staff at LBL revise drafts of the various procedures supporting the SRP-LBL-1 Actinide Solubility Test Method. The visit will facilitate MCC preparation of a draft of the test method.

E. MCC Support to the Basalt Waste Isolation Project DB-01-01-02 and DB-05-11-05

PROGRESS DURING REPORT PERIOD

Development of the BWIP/MCC-14.4 Waste Form Compliance Test Method - Preliminary testing has begun. Vessels with the dip-leg and rupture disk attached were tested for leakage under hydrothermal conditions. There was no loss in weight. This test will determine if improved results are obtained by sampling at temperature rather than cooling before sampling. There has been considerable controversy over the fact that cooling before sampling may cause so-called "quench effects,"which would cause the solution concentration of some components to change. Sampling at temperature, via the dip-leg, would eliminate this possible source of error.

Development of Basalt-Specific Corrosion Tests - The analyses of corrosion specimens from the BWIP/MCC-105.4 Flowby Test (300-day, 100°C) were incorporated in the first draft of the Reference Conditions Test Report to be completed in September.

The preparation of the BWIP/MCC-105.5 Air/Steam (30and 120 day, 300°C) Test Report at Reference Conditions was initiated.

Two sections for the BWIP Study Plan for General Corrosion were written and were submitted to the BWIP. An annotated outline of the Study Plan was also prepared and was submitted to the BWIP. The results of the MCC activities will be combined with WHC input by the BWIP and incorporated into the Site Characterization Plan.

MAJOR PROBLEMS AND ACTION TAKEN

Funding for the BWIP corrosion work was increased by an additional $30K (total of $339K) as a result of discussions with R. P. Anantatmula. The necessary change of work form was submitted to the BWIP and was approved. An additional milestone to complete BWIP/MCC-105.5 Air/Steam Test Report at Reference Conditions was added and a draft will be prepared in September.

The initiation of the BWIP/MCC-105.1 Radiation Corrosion Test will be 2 months behind schedule because of delays in getting heaters for the test vessels. Approval to conduct the tests in the larger vessels, for which heaters are available, with the same number of specimens and amounts of packing material as used by HEDL was discussed with the sponsor technical contact, and it was decided to delay initiation and use the same size vessels as HEDL to avoid potential differences in results due to vessel size.

PLANNED WORK FOR SUBSEQUENT MONTHS

- A Statement of Work for FY 1987 will be prepared in September.
- BWIP/MCC-105.4 Flowby Corrosion Test Report at Reference Conditions (30- and 120-day, 100°C) will be submitted to the MRB as soon as concurrence is obtained from the BWIP.
- Drafting of the BWIP/MCC-105.4 Flowby Test Report at Reference Conditions (300-day, 100°C) and BWIP/MCC-105.5 Air/Steam Test Report at Reference Conditions (30 and 120-day, 300°C) will be completed in September. The Flowby Report will be submitted to the BWIP in September for concurrence on submission to the MRB.
- The BWIP/MCC-105.1 Radiation Corrosion Tests (120-day, 200°C approximately 200 R/h) will be initiated in October.
- Preparations for dip tube feasibility studies are being made; experiments will begin within the week. The status of these studies, even if not complete, will be reported this fiscal year. Additional experiments to determine the effect of rotation rate on leach data will also be started. The results of these tests will not be reported until next fiscal year.

F. MCC Support to the Defense HLW Technology Program (DP-12) AR-05-15-10

PROGRESS DURING REPORTING PERIOD

WBS 2.5 Waste Acceptance Specifications Data Acquisition Plan (MCC)

Waste Acceptance Specifications Data Acquisition Plan

Long Term Chemical Durability Testing - Testing with ATM-11 (an actinide doped SRL glass) was initiated in August. As described in previous monthly reports, this testing consists of contacting crushed glass with deionized water leachant in a Teflon container. Periodically, an aliquot of leachate is removed for analysis and replaced with an equal volume of fresh leachant. This leachant-leachate exchange is intended to approximate a slow leachant flow condition. In the current series of tests, leachate-leachant exchanges will be performed every 56 days. In subsequent tests,other replacement periods will be used (e.g., 28 and 112-day).

Revision of MCC-1 Static Leach Test - In May of 1986, a task force of PNL personnel made recommendations about how MCC-1 should be changed prior to its resubmission to the Materials Review Board (MRB). The major changes that were recommended were to focus the method on glass waste form testing, to include a saw cutting procedure that should ensure a greater degree of lab-to-lab specimen surface finish uniformity, and to allow the testing of fully radioactive materials through the use of fused silica and 304L stainless steel leach containers. Other minor changes included allowing the reuse of Teflon leach containers and de-emphasizing the use of the test as a source of data for the Nuclear Waste Materials Handbook. A revised draft of MCC-1 has been prepared that incorporates these and other changes. This draft will be circulated for comment within the MCC during September. Subsequent to the completion of the saw cut round robin (described in the June and July monthly reports) the method will be resubmitted to the MRB, probably in December, 1986.

Development of MCC-17 Recommended Practice for Assuring the Quality of Chemical Analyses - This method will specify recommended practices that will be intended to help assure the quality of chemical analyses associated with the development, testing, and production of nuclear waste forms. The method will not deal with particular analytical methods; instead it will address practices that should be used to assure the quality of chemical analyses, regardless of the analytical technique employed. The practices to be covered in the method will include items such as the use of standard reference materials, control standards, and control charts. A statement of the scope of the method has been drafted. The method will be developed in FY 1987.

Glass Durability Data Base - The literature review of published aqueous-dissolution studies of nuclear waste forms (excluding spent fuel) was continued during August. Preparation began on those sections of the draft progress report (milestone OGR 09B - September 1986) that summarize the dissolution properties of waste forms and the range of waste-form compositions and physicochemical conditions used for aqueous-dissolution (i.e., corrosion) testing. R. A. Hagen continued preparation of the summary of the aqueous dissolution properties of glassy geologic materials that have been studied as possible analogues to nuclear waste glasses.

Modeling - Seventeen of the references dealing with durability models identified in the literature search performed the prior month were reviewed and summarized.

Dr. Carol Jantzen (Savannah River Laboratory)--whose durability model is widely used--called to clarify some points raised in the report "Glass Durability as it Relates to the Free Energy of Hydration" presented in the June MCC report.

Thermal Processing Parameters - A ternary diagram with 303 glass compositions on it (the total number in the data base right now) has been plotted showing the general areas of the glasses being investigated, along with the compositions of the current major industry standards. As this is expanded to other properties, it should reinforce the comprehensive nature of the data base and be useful for glass producers, repositories, and licensers to illustrate the breadth of data surrounding the nuclear waste glass compositions.

Classification of the computer software support and documentation of the data base design is nearly complete to comply with QA procedures.

WBS 2.6 Canister Qualification Test Methods (MCC)

Canister Qualification Test Methods - A draft of the MCC-18 Waste Canister Thermal Test Method was circulated for comment in late July. Comments have been received, and the process of incorporating those comments has begun. The final draft of the method will be issued in September.

WBS 3.4 Hanford Grout Qualification Test Method (MCC)

Hanford Grout Test Method - Preliminary results for the first set of Cladding Removal Waste (CRW) grout flow-through leach tests and combined leach-soil adsorption tests were obtained. In a leach-soil adsorption test, a cylinder of grout is packed in Hanford soil within a column. Hanford groundwater is slowly percolated through the column at a rate of approximately one pore volume per day. In a flow-through leach test, an identical cylinder of grout is suspended in a column, without Hanford soil, and Hanford groundwater flows slowly past the sample. The resulting leachate for both types of tests is collected in small aliquots and analyzed for radionuclides and total chemistry.

To date tests have been performed with grout samples that contain either Sr-85 and Cs-137 or Tc-99 and I-125, -129. In the flow-through tests both grouts initially release radionuclides at relatively high concentrations. Leachate activities were then found to drop approximately exponentially with time during the course of the testing. In the leach-soil adsorption tests, I and Tc were found to appear within the first two pore volumes. Their concentrations in the leachate then dropped in a fashion similar to the behavior observed for the flow through tests. This indicates that the soil does not significantly retard the migration of any I and Tc leached from the grout. For tests that included the Sr and Cs doped grouts, no radionuclides were found in the column effluent, even after 20 pore volumes had percolated through the column. The soil adsorbs the Sr and Cs that leaches from the grout cylinder. To date, the flow through column experiments agree qualitatively with the mobilities predicted from the batch Kd (adsorption) data previously obtained by this program.

Also, during August, a suite of combined leach-soil adsorption tests were started in which the grout was crushed to increase its surface area. The surface area of the crushed material was measured using ethylene glycol adsorption, a standard soils analysis method. One purpose of these tests will be to compare the net radionuclide migration rates of the crushed grout (measured surface area) with the rates for the intact grout (calculated geometric surface area). In addition, the migrations of stable constituents such as F^-, NO_3^-, Na^+ and K^+ will be determined.

MAJOR PROBLEM AREAS AND ACTION TAKEN

None

PLANNED WORK FOR SUBSEQUENT MONTHS

- Long-term leach testing of ATM-11, a doped SRL-165 glass, will continue. Testing of ATM-18, a doped HWVP glass will be initiated when this glass has been fabricated.
- A report will be written that documents the FY-1986 activities related to long-term defense waste glass leach testing.
- A revised saw-cutting procedure for preparing MCC-1 leach test specimens will be sent with ARM-1 glass to various labs. These labs will prepare leach specimens for testing by MCC.
- Review comments on the MCC-18 procedure will be addressed and a final draft version will be issued.
- Flow-through leach testing and combined grout-sediment testing with CRW grout will continue.
- A draft test method will be issued that presents a procedure for determining the source term release of hazardous constituents from Hanford defense wastes, solidified in grout, that are buried in Hanford sediments.
- Continue preparation of the Comprehensive Data Base.

G. MCC Support to Transportation Technology Center (AR-05-15-30)

PROGRESS DURING REPORTING PERIOD

Canister Impact Testing - A revised Statement of Work was issued and approved this month which reflects the addition of the development of a procedure to measure the waste form leakage from a hypothetical canister flaw after impact. Funding was increased by $13K for this work. The estimate for the additional work was $20K, and the shortfall is being compensated by eliminating the strain circles from the canister impact tests.

Two carbon steel canisters were impacted for use in developing the canister flaw leak-test procedure. These canisters were dropped from 1 foot and 30 feet, as will be required of the full-scale DWPF canisters. A draft run plan for the development of the flaw leak-test procedure has been issued for

review. A draft run plan for impact testing of the two full-scale DWPF canisters has also been drafted. This plan will be reviewed and issued for approval in early September.

An audit was conducted in August by Sandia National Laboratories. This audit focused on the work done by MCC in support of the Safety Analysis Report for the shipping cask. One finding and one observation were noted by the audit team. These items are presently being addressed.

MAJOR PROBLEM AREAS AND ACTION TAKEN

The actual costs for development of the canister flaw leak-test procedure are higher than originally estimated and higher than the additional funding supplied. Work has stopped and the approach is being reviewed in order to identify ways of streamlining this effort.

I suppose this means dropped?

PLANNED WORK FOR SUBSEQUENT MONTHS

- Two DWPF canisters will be impacted in September.
- Development of the canister flaw leak-test procedure will be completed in September if the planned approach proves acceptable.
- The reference flaw leak-test procedure will be conducted on the DWPF canisters during the first quarter of FY 1987. Subsequent to this work, the canisters will be disassembled and the size distribution of the glass determined in accordance with the procedure specified in MCC-15.

H. MCC Support to West Valley Demonstration Project (AH-10-30)

PROGRESS DURING REPORTING PERIOD

Reference Glass Chemical Durability Testing - MCC-1 leach testing of CTS glass was completed through 28 days and leachate analyses by ICP for these tests have also been completed. The raw data for this testing are shown in Table 1 for selected elements. Also shown is the data for the blanks and ARM-1 specimens that were tested with the CTS glass. There appears to be a possibility of Ca and Mg contamination of the 7 and 14 day blanks, and possibly Ba contamination of the 7 day blank. The source of this contamination will be investigated, as will the possibility that similar contamination of the CTS and ARM-1 leach tests may have occurred. Final normalized leach rates will be reported in the annual report of reference glass chemical durability testing.

Pulsed-flow testing of the CTS glass was initiated. As with the MCC-1 testing, ARM-1 glass will also be tested, and the test matrix includes appropriate blank samples. SRP testing will begin in September. The testing to be started will be essentially the same as the MCC-1 testing except that a brine leachant will be used and excess salt will be present. In early FY 1987 a second phase of SRP testing will be initiated. This will involve using the MCC-3 procedure (in which crushed glass is tested) in order to obtain data at larger values of the ratio of sample surface area to leachant volume. As in the SRP-MCC-1 testing, a brine leachant will be used and excess salt will be present.

TABLE 1. West Valley Reference Glass Leaching Data - MCC-1 Test at 90°C*
(g/m^2)

	CTS Glass					ARM-1 Glass			Blanks			
Element	7d	14d	28d	28d	28d	28d	28d	28d	7d	14d	28d	28d
Al	1.46	1.81	2.33	2.24	2.18	2.45	2.57	2.49	0.07	--	--	0.05
B	3.82	5.06	6.50	6.35	6.10	4.02	4.19	4.10	0.036	0.027	0.024	0.024
Ba	0.110	0.245	0.013	0.009	0.013	0.080	0.072	0.074	0.303	0.072	0.022	0.025
Ca	0.33	0.27	0.034	0.029	0.032	1.13	1.08	1.09	0.47	0.36	0.034	0.056
Fe	0.58	0.32	0.27	0.196	0.223	0.149	0.131	0.110	0.76	0.29	0.13	0.175
K	4.4	3.6	4.7	4.8	4.8	--	--	--	--	--	--	--
Li	1.54	2.06	2.57	2.53	2.45	2.33	2.39	2.34	0.008	--	0.011	0.005
Mg	1.01	0.20	0.20	0.14	0.19	0.262	0.321	0.167	1.97	0.93	0.26	0.45
Na	9.8	13.0	16.5	16.2	15.5	7.66	8.02	8.00	--	--	--	--
Si	19.0	25.0	31.6	30.8	29.8	19.7	20.4	20.0	0.51	0.17	0.08	0.12

*Each entry is for a separate test.

Approved Testing Material ATM-10 - Preparation of ATM-10 continued. The preparation has followed the steps specified by the two approved run plans for Batch and Glass preparation. The second cycle through Steps 4.2 and 4.3 ("Control Loop") was completed, and the analyses conducted.

Analyses of the test bar from the second Control Loop run were completed, using the ICP, XRF, radiochemistry, spectrophotometry, and laser-excited fluorescence methods required to comply with Run Plan specifications. Initial study of the data shows that the mean concentration values of all 25 nonradioactive elements specified in the run plan are within the required limits, but the 95% confidence interval extends beyond permissible limits for four of those elements. For the six radioactive elements, the mean concentration value for two are outside specifications: Pu, confirming the high value obtained on the first loop run: and Tc, for which excess Tc was added in the second test loop run to compensate for the expected Tc loss rate demonstrated in the first run. These results are undergoing further study and discussion regarding the most effective method of completing the preparation of a satisfactory ATM-10 West Valley glass.

The response received from the third reviewer of the Characterization Plan for ATM-10 (Roger Aines, NNWSI) required addition of substantially more detail for the planned characterization methods, and strongly recommended a more comprehensive "survey" analysis covering all ATM-10 bars to be produced (not just the statistical sampling proposed initially by MCC). The Characterization Plan has been revised to respond to comments received from the three reviewers, and is ready for redistribution for internal review by the cognizant PNL staff.

MAJOR PROBLEMS AND ACTION TAKEN

The preparation schedule of ATM-10 continues to be delayed by the length of time required to obtain necessary analyses of intermediate products. Quality control, adherence to run plan specifications, and verification of achievement of product specifications remain the first priority.

Milestone 05D, Initiate Reference Glass Testing with SRP Method, has not been completed because MCC and West Valley had not been able to obtain confirmation from SRP about the appropriate test methodology. Testing will begin in September as this confirmation has been obtained.

PLANNED WORK FOR SUBSEQUENT MONTHS

- Continue preparation and characterization of ATM-10.
- MCC-1 and PFT testing with CTS glass will be completed. MCC-1 and PFT testing with ATM-10 glass will be initiated, and SRP testing of both ATM-10 and CTS glass will be started.
- A report covering the FY 1986 reference glass chemical durability testing work will be forwarded to West Valley.

IV. MATERIALS REVIEW BOARD

MCC-3 had been sent to the Procedures Panel in July for consideration for provisional approval. On August 14, 1986 additional material was sent to the Procedures Panel in support of MCC-3.

This is better test than MCC-1

ARGONNE NATIONAL LABORATORY
9700 South Cass Avenue, Argonne, Illinois 60439

Telephone: (312)972-6497

September 12, 1986

Mr. J. C. Haugen
U.S. Department of Energy
Chicago Operations Office
Technical Management Division
Building 201
9800 South Cass Avenue
Argonne, IL 60439

Dear Joel:

The monthly report of activities of the Materials Characterization Organization (MCO) during July 1986 is attached for your information. This report is distributed to help maintain good communications between the MCO and other participants of Nuclear Waste Programs with which the MCO interfaces.

Questions regarding the attached report may be addressed to me, to J. Mendel, MCC (FTS 509-375-2905), or to M. Steindler, MRB (FTS 972-4314).

Sincerely yours,

Sy Vogler
Materials Integration Office
Technical Support

SV:cew

Attachment: Monthly Report

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R. G. Baxter

WVNS

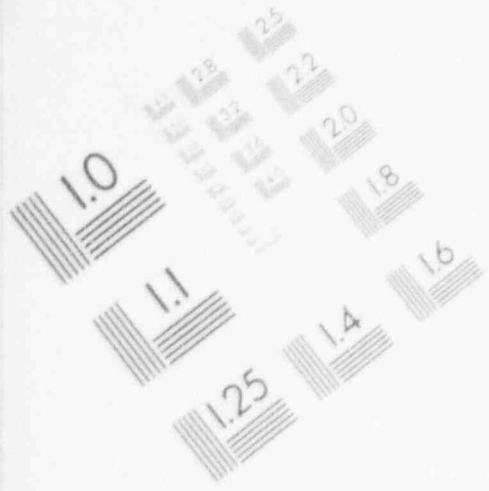
J. Pope

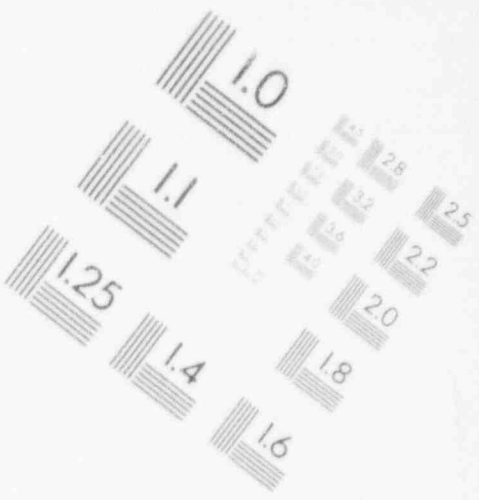
WESTON

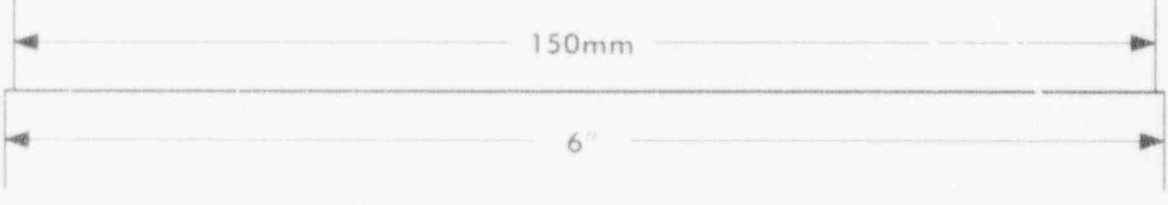
E. Benz

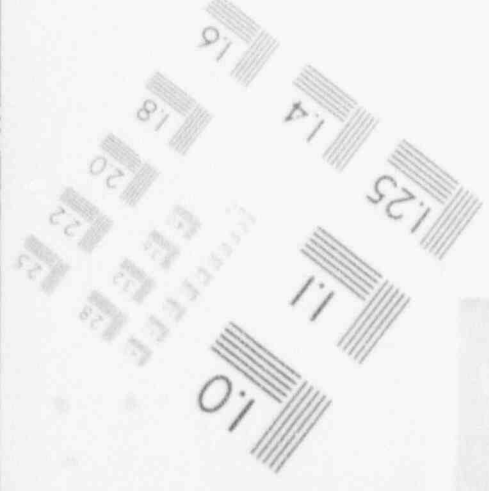
1

IMAGE EVALUATION TEST TARGET (MT-3)









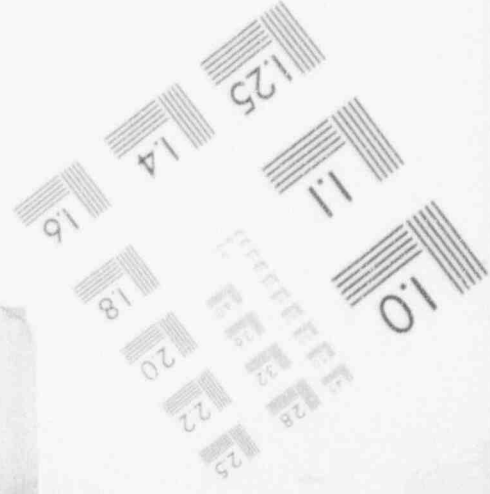


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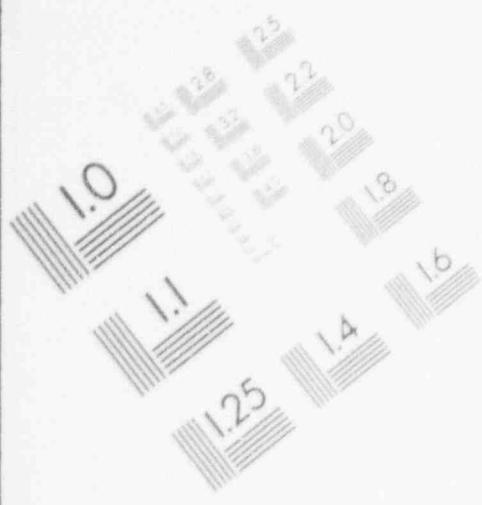
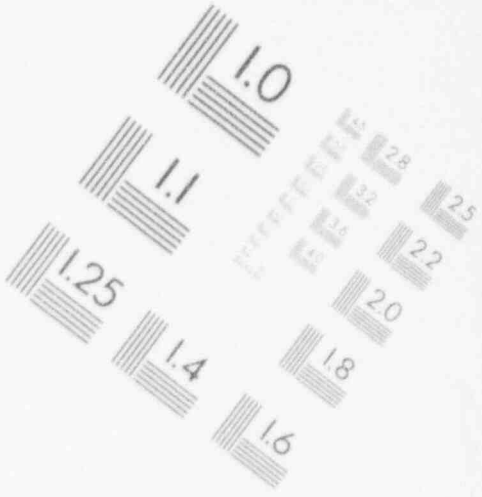
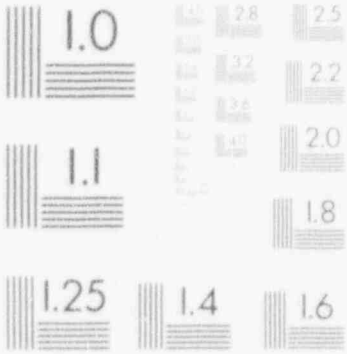
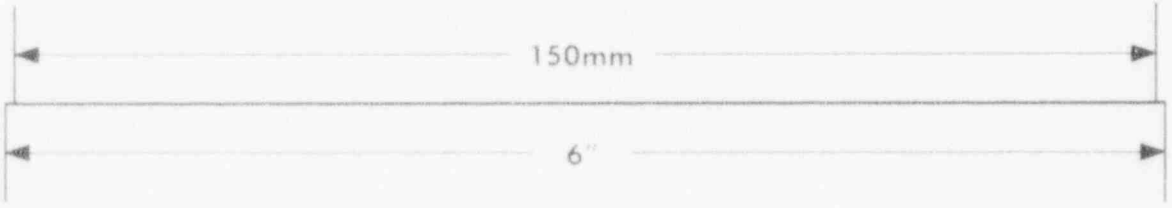
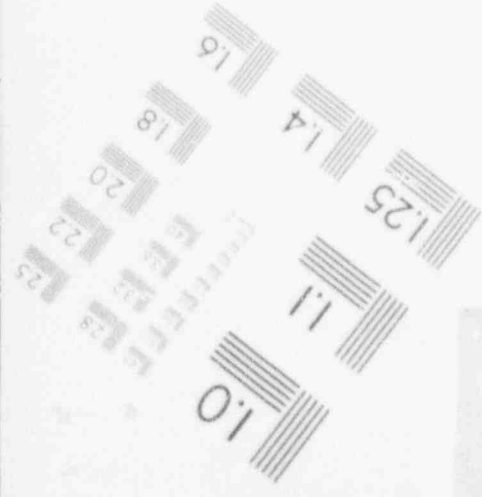
IMAGE EVALUATION TEST TARGET (MT-3)

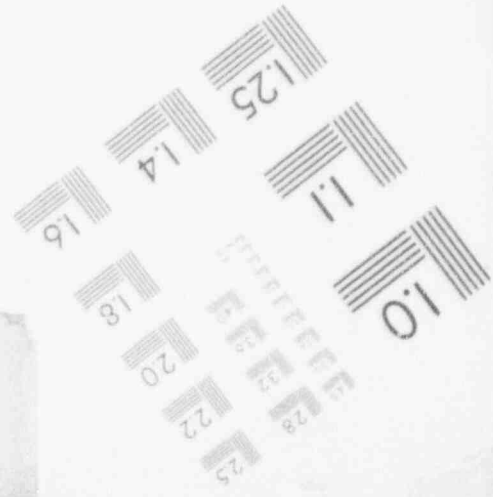












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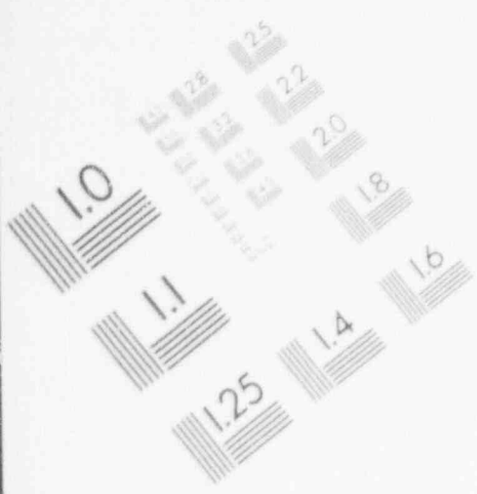

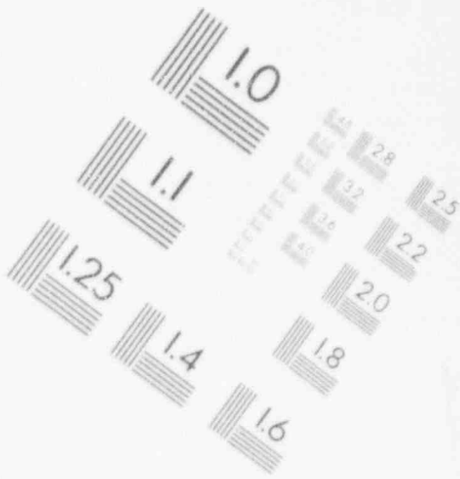

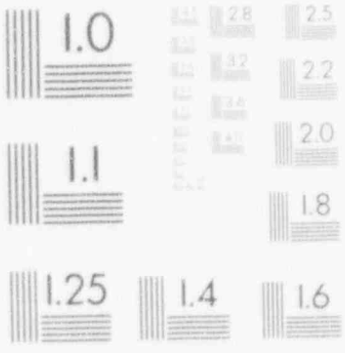

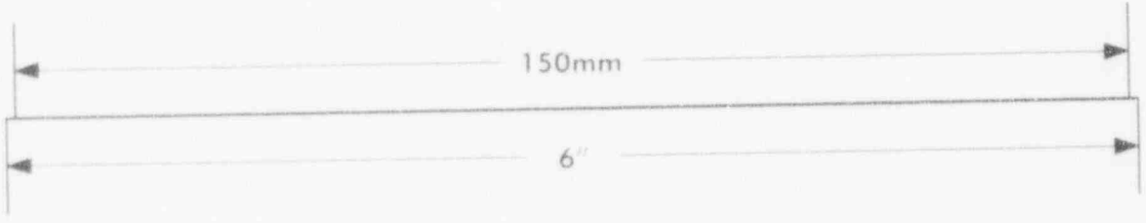

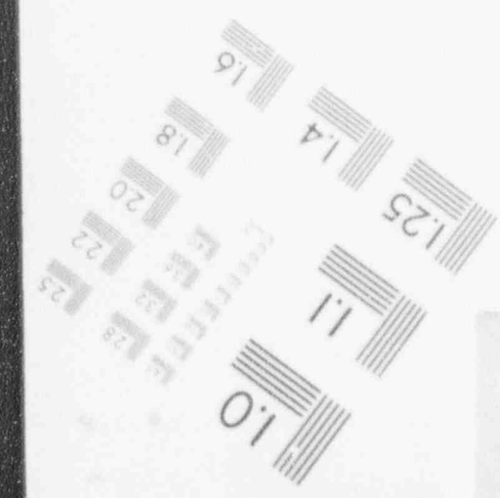

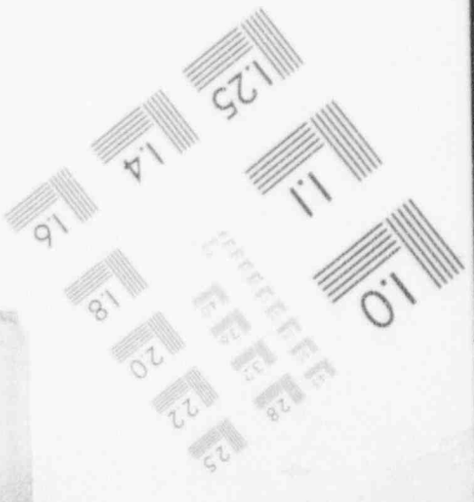

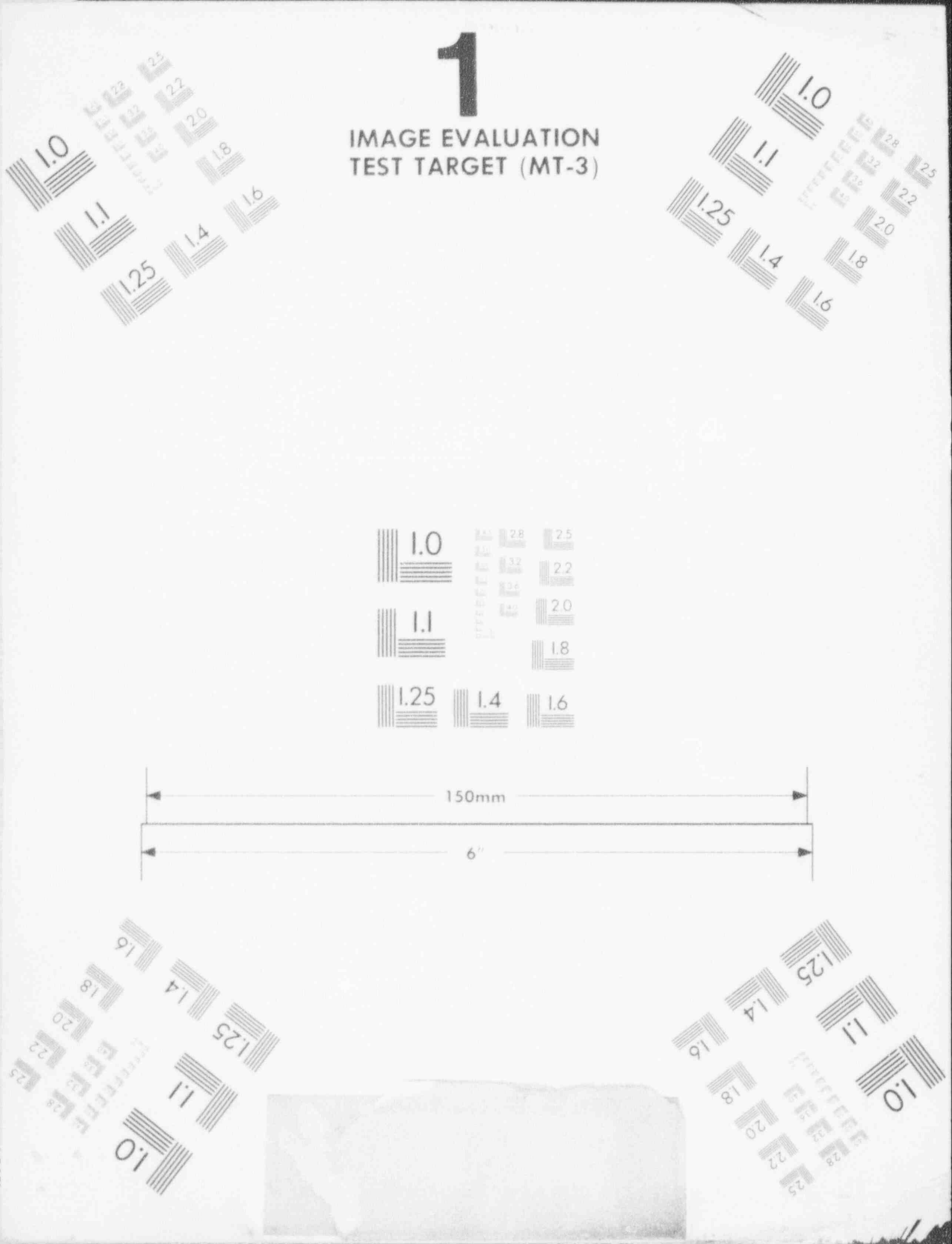
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IMAGE EVALUATION
TEST TARGET (MT-3)
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1.1
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1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
150mm
6"

MATERIALS INTEGRATION OFFICE MONTHLY REPORT

JULY 1986

SUMMARY

MILESTONE STATUS

OGR 2B Report PNL-5577-9 Fabrication and Characterization of MCC Appoved Testing Material ATM-9 was published and distributed.

BWIP IID BWIP/MCC-105.4 Flowby Corrosion Test Report at Reference Conditions (30- and 120-day, 100°C) was submitted to the BWIP for approval for submission to the MRB.

DW 04D A draft report "Laboratory Leach Tests of HFW Grout and Leachate Adsorption Tests Using Hanford Sediment" has been prepared.

The FY 1987 Technical Program Plan and FTP/A on MCC Support to the Salt Repository Project was submitted to DOE-RL on 7/29/86.

A request for full approval of BWIP/MCC-105.1 Test Method was sent to the Office of the Chairman of the Materials Review Board (OTC/MRB).

A report of a method by J. L. Daniel, "Analysis of Aqueous Leachates from Nuclear Materials Using Inductively Coupled Plasma Spectroscopy" is being reviewed for inclusion as an ASTM standard.

Members of the MCC participated in a ASTM meeting on Accelerated Testing held in Seattle.

Appropriate MCC records will be sent for lifetime storage in the National Archives.

Activities continue to improve the MCC adherence to QA Standards.

GEOLOGICAL REPOSITORIES

Negotiations continued for the acquisition of stainless-steel clad spent fuel assemblies. The utility owner of the fuel is expected to submit a formal proposal in August.

Installation of the spent fuel characterization equipment is essentially complete and selected rod retrieval is scheduled for the first week in August.

SALT REPOSITORY PROJECT

Work is continuing in preparing test method procedures that are suitable for submission to the MRB. Nine such procedures are awaiting SRP approval.

BASALT WASTE ISOLATION PROJECT

Run plans for BWIP/MCC-14.4 Test Method Development for FY86, 87 were submitted to BWIP for approval. Submission of this method for MRB review will be delayed until current testing is complete.

BWIP/MCC-105.4 Flowby Corrosion Test Report at Reference Conditions (30- and 120-day, 100°C) was completed and submitted to BWIP for concurrence on submittal to the MRB.

BWIP/MCC-105.1 Static Corrosion Test Method and the Test Report at Reference Conditions (300 day, 100°C) were submitted to the MRB.

The analyses of corrosion specimens from the BWIP/MCC 105.4 Flowby Test (300-day, 100°C) and BWIP/MCC-105.5 Air/Steam Test (30-day, 120-day, 300°C) were completed.

DEFENSE HIGH LEVEL WASTE

The cutting procedure for preparing MCC-1 specimens was reviewed and comments were returned. A revised procedure will be completed in August. The uncertainty introduced into the MCC-1 measurements with this cutting procedure will be ascertained.

A draft of the MCC-18 Waste Canister Thermal Test Method has been completed and is being reviewed within the MCC.

The literature review of published aqueous-dissolution studies of nuclear waste forms was continued. A literature search keying on the words "model" and the respective property was performed.

The thermal properties of glasses are being collected.

A draft report of the 0.5 liter Hanford Facilities Waste (HFW) grout flow-through leach testing is being internally reviewed (Milestone DW 040). Cladding Removal Waste (CRW) grout flow-through tests are in progress.

TRANSPORTATION TECHNOLOGY CENTER

A Statement of Work was written that covers the development of a procedure for characterizing the waste form that escapes a canister through a reference flaw.

Two DWPF canisters have been received from SRL and will be impact tested in August.

WEST VALLEY DEMONSTRATION PROJECT

MCC-1 testing with Component Test Stand (CTS) glass was completed through 28 days; testing will continue for 56 and 91 days.

The preparation of ATM-10 continued. However, West Valley staff has specified a change in the composition based on leach test data. The change is to increase the Al_2O_3 content from 2.83% to 6.5% and maintaining the SiO_2 content at 44.9%.

There are several problems related to ATM-10 preparation. In test bars from the first control loop run, the Tc_2O_7 content was about 68% low and PuO_2 content was 35% high at 1.03 E-2.

MATERIALS REVIEW BOARD

MCC-3 was sent to the Procedures Panel for mail ballot for provisional approval.

A revision of MCC-105.1 was submitted to the Office of the Chairman of the MRB for consideration for full approval.

MATERIALS INTEGRATION OFFICE MONTHLY REPORT

JUNE 1986

I. Program Objectives

The objectives of the Materials Integration Office are to assure that waste package materials data from RW, DP, and NE programs, identified as key to waste acceptance and licensing, are of sufficient quality to be capable of showing that the waste package will meet NRC and EPA criteria. These data, and the test procedures by which they are obtained, are published in the Nuclear Waste Materials Handbook for use by the Programs in assuring compliance with waste acceptance criteria and in supporting repository license applications.

II. Milestone Status

The following MCC milestones were completed this month.

OGR 2B Report PNL-5577-9 Fabrication and Characterization of MCC Appoved Testing Material ATM-9 was published and distributed.

BWIP IID BWIP/MCC-105.4 Flowby Corrosion Test Report at Reference Conditions (30- and 120-day, 100°C) was submitted to the BWIP for approval for submission to the MRB.

DW 04D A draft report "Laboratory Leach Tests of HFW Grout and Leachate Adsorption Tests Using Hanford Sediment" has been prepared.

A. MCC Program Administration

Program Planning - The FY 1987 Technical Program Plan and FTP/A on MCC Support to the Salt Repository Project was submitted to R. D. Izatt, DOE-RL, 7/29/86.

A facility walk-through safety inspection of MCC facilities in the 314, 3720, and 3730 Buildings was conducted with DOE-RL representatives on 7/1/86.

A Project Change Request was submitted to and approved by the BWIP for $30K additional funding to complete work planned for FY 1986 under SOW L2D2P.

Nuclear Waste Materials Handbook - Revision package No. 7, containing the approved MCC-7P, Method for Preparation of Isothermally Heat-Treated Waste Forms was distributed to holders of the Nuclear Waste Materials Handbook.

Interactions with the Materials Review Board (MRB) - A request for full approval of BWIP/MCC-105.1S Test Method (MCC:0465) was sent to the Office of the Chairman of the Materials Review Board (OTC/MRB) on 7/10/86.

On 7/24/86 J. E. Mendel met with J. C. Haugen (DOE-CH-MIO), S. Vogler (ANL-MIO), W. B. Seefeldt (ANL-MRB), and M. J. Steindler (ANL-MRB) to discuss a draft white paper, "Functions of the Nuclear Waste Materials Characterization Center."

ASTM Interactions - J. L. Daniel participated in the semiannual meeting of ASTM Committee C26 in Seattle. The standard method "Analysis of Aqueous Leachates from Nuclear Materials Using Inductively Coupled Plasma Spectroscopy" has received additional reviewer comments that will require minor revisions of the current draft by J. L. Daniel. Subcommittee balloting on that standard is still in progress.

J. L. Daniel will serve as a co-editor of the ASTM Special Technical Publication (STP) covering the plasma analytical methods symposium which was conducted by the C26 Plasma Methods task group at the ASTM meeting in January 1986. Work has begun on assembling and reviewing the papers.

M. D. Merz attended a meeting in Seattle of the ASTM C26.07 Task Group on Accelerated Testing. Members of the Task Group were R. Blauvelt (Mound), E. Kuhn (Stone & Webster), M.D. Merz (PNL), T. Johnson (NRC), T. Thornton (ONWI), and B. Brooks (TVA). Others attending were P. Salter and R. Fish (BWIP) and A. Berusch (DOE/OGR). The participants discussed the potential benefits of revising ASTM E632-82 Standard Practice for Developing Accelerated Tests to Aid Prediction of the Service Life of Building Components and Materials to a standard for developing accelerated tests for waste package materials. A preliminary draft of such a revision, prepared by M. D. Merz for the Task Group, was given to the participants for their review and comment. The Task Group discussed tentative definitions of "predictive testing" and "accelerated testing" useful for waste package materials evaluation.

W. M. Bowen attended the meetings of ASTM Committee C26 in Seattle, Washington.

VARIANCE EXPLANATION

Supplementary funds were received during July for support to the OGR project. The cost summary for the total MCC Program was restructured incorporating this additional funding creating a zero variance.

CAPITAL STATUS

A total of $350K has been allocated for FY 1986 MCC capital equipment. To date purchase requisitions and work packages are in place for $316K. The remaining $34K has been identified for specific purposes.

B. MCC Quality Assurance

Quality Assurance Coordination - Finding #2 of the PNL Audit covering the issuance, revision and distribution of the Nuclear Waste Materials Handbook and PNL-3990 remains open. It is awaiting sponsor concurrence on the change in the MCC QA plan. Finding #4 covering procedures remains open: MCC-TP-6 on

developing test methods was sent to BWIP for approval on 5/19/86. This approval has not yet been received. Spent fuel procedures are also in the review/approval cycle.

Two QA audits of the MCC are scheduled for August. The first is an internal audit of the MCC the first week of August by the PNL QA Department. The second audit will be conducted on 7/12/86 by Sandia National Laboratory and DOE-AL personnel on the MCC activities in support of the Transportation Technology Center.

Records generated under BWIP SOW L2-10A85 were transferred to the sponsor on 7/2/86. Three hundred and one documents totalling 1343 pages were sent. A biennial transfer of records generated by work in support of the Salt Repository Project is due at the end of FY 86. On 7/28/86, D. L. Alamia and W. E. Brooks, PNL Records Management, met with S. L. Sutter to plan the transfer.

A meeting was held on 7/10/86 to discuss lifetime storage of the MCC records. W. E. Brooks, through the PNL record system, will assume responsibility for this work. When the records are deemed ready for storage, the MCC will write a memo beginning the transfer. W. E. Brooks will then deliver them for lifetime storage in the National Archives.

PNL is committed to DOE-RL to upgrade Quality Assurance Manuals, PNL-MA-65 (to be designated PNL-MA-70) and PNL-MA-60 by the end of this fiscal year. In support of this effort, 30 procedures were reviewed and comments submitted to P. H. Bruce, PNL Procedure Coordinator, during July.

Check lists to aid MCC staff implement QA procedures were completed and sent for final project management, QA, and editorial review.

C. MCC Support to the Office of Geologic Repositories (RW-20) DB-05-11-03

PROGRESS DURING REPORT PERIOD

Acquisition of Spent Fuel Approved Testing Materials [ATMs] - Negotiations continued with Northeast Utilities Service Company (NUSCO) for the acquisition of ATM-107, i.e., approximately 205 rods of stainless steel clad fuel from the Connecticut Yankee Reactor. NUSCO is expected to submit a formal proposal for the fuel during August 1986.

The status of the major spent fuel characterization equipment is:

- Twenty-four fuel rod storage container: This storage container has been installed in A-cell, 324 Building in preparation for rod retrieval during the first week in August 1986.

- Fission-Gas-Sampler/Rewelder: All gallery and in-cell components have been installed and the equipment is operational. A more efficient vacuum pump has been ordered to shorten the pump-down period.

- Fuel-Rod Gamma Scanner: All in-cell and gallery equipment has been installed. Electrical wiring in the support gallery has been completed; however, connection of gallery equipment to in-cell equipment was delayed pending issuance of a final wiring drawing, which has now been completed.

- Fuel-Rod Handling Strongback: This equipment has been installed in the hot cell.

- Fuel-Rod Retrieval Equipment: Difficulties resulted in a three-week delay in installation of this equipment in A-cell, 324 Building; however, the equipment is now installed and selected rods from ATMs -103, -104, and -106 are scheduled for retrieval the first week in August 1986. The difficulties involved air-lock scheduling conflicts with other programs, the replacement of ten wall plugs, the decontamination of the areas adjacent to the holes for the required wall plugs (a temporary "greenhouse" was required to prevent spread of contamination during the cleanup), and certification of A-cell as a fissile material handling area for spent fuel.

At the request of BWIP, 106 g of spent fuel ATM-101 from rod segment D10C was crushed to -60+45 mesh granules. This material will be delivered the first week of August 1986.

Publication: Shielded Analytical Instruments - Report PNL-5862 describing current MCC shielded analytical facilities, "Shielded Analytical Instruments for Characterization of Highly Radioactive Materials" by J. L. Daniel and H. E. Kjarmo, was published and distributed.

Report: Fabrication and Characterization of ATM-9 - The report PNL-5577-9, "Fabrication and Characterization of MCC Approved Testing Material ATM-9" by J. W. Wald, was published and distributed.

Report: Fabrication and Characterization of ATM-11 - All PNL reviews of the report PNL-5577-11, "Fabrication and Characterization of MCC Approved Testing Material ATM-11" by J. W. Wald and J. L. Daniel were completed. A comment copy was submitted to the BWIP cognizant scientist and the report was submitted for clearance for publications.

MAJOR PROBLEMS AND ACTION TAKEN

None

PLANNED WORK FOR SUBSEQUENT MONTHS

- Initial rods of ATMs -103, -104, and -106 will be removed from the assemblies and characterization initiated.

- Work on the ASTM C26.07 Task Group on Accelerated Testing will continue. Two meetings are planned before the next ASTM C26 meeting in Tampa, January 1987. Tentative dates are 10/21/86 in Denver and a second date during the week of the Materials Research Society Meeting in Boston, 12/1-4/86.

- The ASTM version of MCC 1 Static Leach Test Method will be revised to be consistent with the Handbook version and to incorporate comments from the last ASTM ballot and will be resubmitted to the C26.07 subcommittee for ballot.

D. MCC Support to the Salt Repository Project DB-01-03-02

PROGRESS DURING REPORT PERIOD

Coordination of Technical Peer Review of SRP Procedures - Fourteen SRP test methods have been identified for MCC coordination of technical peer review (e.g., MRB review). On 4/24/85 the MCC recommended in writing to the SRP that submission of the SRP-WPP-40/MCC-202 Radiolysis of Salt Brines be suspended indefinitely pending more experience with the test. The status of the remaining thirteen (13) test methods is as follows:

Three submittal packages, SRP-WPP-41/MCC-14.7, SRP-WPP-44/MCC-204, and SRP-WPP-45/MCC-206, were forwarded to SRP in July with requests for approval to submit to the MRB. This makes a total of nine submittal packages that are awaiting SRP approval to be submitted to the MRB.

Work continued on the drafts of SRP-WPP-31/MCC-203 Determination of Different Oxidation States of Plutonium and Neptunium Using Solvent Extraction Techniques and SRP-WPP-39/MCC-205 Standard Practice for Preparation and Analysis of Simulated Permian Basin Brines and Dry Salts. SRP-WPP-31/MCC-203 is undergoing final review by D. Rai. SRP-WPP-39/ MCC-205 is still being drafted.

Drafts of the Perspective and Test Experience in support of the SRP-BNL-1 Salt Irradiation Test Method were prepared and were sent to BNL.

BNL completed their review of the draft SRP-BNL-1 Salt Irradiation Test Method and transmitted the review comments to the MCC for further revision of the test method.

SRP-WPP-18/MCC-102.1 was balloted by the ASTM C26.07 subcommittee and was passed. This corrosion test method will be submitted for committee ballot in August.

MAJOR PROBLEMS AND ACTION TAKEN

None

PLANNED WORK FOR SUBSEQUENT MONTHS

- SRP-WPP-31 and -39 will be completed in August and submitted to SRP for the first time.
- SRP-BNL-1 Salt Irradiation Effects Test Method will be revised in response to the BNL review comments.

E. MCC Support to the Basalt Waste Isolation Project DB-01-01-02 and DB-05-11-05

PROGRESS DURING REPORT PERIOD

Development of the BWIP/MCC-14.4 Waste Form Compliance Test Method -An "FY 1986 Run Plan for BWIP/MCC-14.4 Test Method Development using ARM-1 Reference Glass" and an "FY 1987 Run Plan for BWIP/MCC-14.4 Test Method Requirement using ARM-1 Reference Glass, ATM-11 Savannah River Glass, and ATM-10 West Valley (Commercial) Glass" were submitted to the BWIP for review. A letter on "Recommendation of Date for Submission of the BWIP/MCC-14.4 Test Method to the MRB" was sent to the BWIP which recommended withholding MRB submission until after currently scheduled testing is completed in late FY 1987. No new experimental work was begun during this period. Engineering work is still under way on the relocation of the ovens from the 3720 facility to the leaching facility in the 325 Building. It is expected to be completed by the second week of August. All vessels, covers, and dip leg attachments have arrived and have been approved for use.

Development of Basalt-Specific Corrosion Tests - BWIP/MCC-105.4 Flowby Corrosion Test Report at Reference Conditions (30- and 120-day, 100°C) was completed and was submitted to the BWIP for review and concurrence on submittal to the MRB. The report will be used to support the workability of the BWIP/MCC-105.4 Flowby Test Method, which was submitted to the MRB earlier this year.

BWIP/MCC-105.1 Static Corrosion Test Method and the Test Report at Reference Conditions (300-day, 100°C) were submitted to the MRB after obtaining concurrence from the BWIP.

The analyses of corrosion specimens from the BWIP/MCC-105.4 Flowby Test (300-day, 100°C) and BWIP/MCC-105.5 Air/Steam Test (30-day and 120-day, 300°C) were completed. These results will be incorporated in Reference Conditions Test Reports to be completed in September.

A statistical analysis of the 30-day penetration and penetration rate data from the air/steam corrosion test revealed the following major effects:

- Oven 2 yielded significantly higher average penetration and penetration rate values than Oven 1.

- Chamber 2 yielded significantly higher average penetration and penetration rate values than Chamber 1.

- The position of a coupon on a rod had a significant effect on penetration and penetration rate. Specifically, coupons at the front of the oven showed significantly lower penetration and penetration rate values than coupons at the rear of the oven, but the trend of increase from front to rear was different for the two ovens. However, there is no effect due to the height of the rod or whether the coupon is on the left or right rod at each height.

- The small coupons had significantly higher overall penetration and penetration rate averages than the large coupons.

MAJOR PROBLEMS AND ACTION TAKEN

The initiation of the BWIP/MCC-105.1 Radiation Corrosion Tests is two months behind schedule because of delays in getting heaters for the test vessels. Approval to conduct the tests in the larger vessels, for which heaters are available, with the same number of specimens and amounts of packing material as used by HEDL will be requested if this delay is unacceptable to the BWIP technical contact.

PLANNED WORK FOR SUBSEQUENT MONTHS

- Statement of Work for FY 1987 will be prepared in August.

- BWIP/MCC-105.4 Flowby Corrosion Test Report at Reference Conditions (30- and 120-day, 100°C) will be submitted to the MRB as soon as concurrence is obtained from the BWIP.

- Drafting of the BWIP/MCC-105.4 Flowby Test Report at Reference Conditions (300-day, 100°C) and BWIP/MCC-105.5 Air/Steam Test Report at Reference Condition (30-day and 120-day, 300°C) will be initiated in August.

- The BWIP/MCC-105.1 Radiation Corrosion Tests (120-day, 200°C, approximately 200 R/h) will be initiated in October.

- Dip tube feasibility studies will begin in August. These studies will be reported this fiscal year. Additional experiments to determine the effect of rotation rate on leach data will also be started. The results of these tests will not be reported until next fiscal year.

F. MCC Support to the Defense HLW Technology Program (DP 12) AR-05-15-10

PROGRESS DURING REPORTING PERIOD

WBS 2.5 Waste Acceptance Specifications Data Acquisition Plan (MCC)

MRB Approval of MCC-1 Static Leach Test - As discussed in the June Monthly Report, a saw cutting procedure for preparing MCC-1 leach test specimens was developed and circulated for comment. Comments were received from a number of reviewers. Their consensus is that use of a procedure of this type is the correct way to control surface finish variability. Certain modifications were suggested. These will be considered for inclusion in the final version of the procedure, which will be completed in early August. This revised procedure will be sent to the procedure reviewers with portions of ARM-1 glass from which the reviewers will be asked to cut leach test specimens. The MCC will conduct MCC-1 testing with these specimens. The results will be used for estimating the amount of experimental uncertainty that surface finish variability may introduce into the results of MCC-1 when the procedure is followed. A revised Statement of Precision and Accuracy is also being drafted for inclusion in MCC-1.

Canister Qualification Test Methods - A draft of the MCC-18 Waste Canister Thermal Test Method has been completed and has been circulated within the MCC for review and comment. The procedure's format is similar to that of MCC-15 Waste/Canister Accident Testing and Analysis Method. MCC-18 is written assuming that the canister to be tested has been filled with glass, and possibly impacted prior to MCC-18 testing. The sections that discuss canister non-destructive examination and canister disassembly refer the reader to the appropriate sections of MCC-15.

Glass Durability Data Base - The literature review of published aqueous-dissolution studies of nuclear waste forms (excluding spent fuel) was continued during July. A summary of the glassy geological materials that have been studied as possible analogues to nuclear waste glasses is being prepared. Copies of the computer literature search completed last month were provided to C. H. Kindle and J. E. Mendel with whom this work is being conducted.

Modeling - A literature search keying on the words "model" and the respective property was performed. The purpose was to ascertain if there is sufficient specificity to pull together the models for a critical evaluation and applicability determination.

Thermal and Processing Parameters - Most of the work this month has been in collecting about 10 tables of data. The most extensive is Chick's West Valley Glass study of 102 glasses with 7 components; the least extensive tables are of three 5-component glasses and four 3-component glasses. More data have been ordered from the PNL library. Some of the data have arrived so that about 20 tables are currently envisioned.

A form is being constructed to include all information for computer storage.

The thermal properties being collected are [as listed in Comprehensive Data Base Plan (4/1/86)]:

- Thermal conductivity - no data yet.
- Specific heat - no data yet.
- Thermal Expansion - this property is sometimes found.
- Viscosity - the properties of melting point, softening point.
- Melting point - annealing point, working point, and other such points given as functions of viscosity and temperature are being collected as "Viscosities"--Electrical conductivity is sometimes found, and is being collected.

R. A. Hagan, K. M. Olson, and G. M. Faldetta are providing assistance to this task.

WBS 3.4 Hanford Grout Qualification Test Methods (MCC)

Hanford Grout Test Methods - A draft of the document that reports the results of 0.5 liter Hanford Facilities Waste (HFW) grout block flow-through leach testing and combined leach-soil adsorption testing is undergoing internal peer review and editing. This report, entitled "Laboratory Leach Test of HFW Grout and Leachate Adsorption Tests Using Hanford Sediment" fulfills the requirement of Milestone DW 04D of the FY 1986 MCC Technical Program Plan.

In general, the cumulative amounts of radionuclides and stable chemicals removed from the grout or combined grout-sediment system after one year are similar to, or less than, the amounts predicted from ANSI 16.1 leach tests. The release rates from the combined grout-sediment column are significantly lower for nitrate, Sr-85, Cs-137, and Co-60 than for the grout only test.

One unexplained observation is that the rate of leaching of constituents from the grout or grout-sediment system does not generally follow diffusion theory (leach rate is proportional to the square root of t), nor

does it follow matrix dissolution theory (leach rate is constant with t). Instead the data show leach rates that increase with time. A literature search found only two studies where solid waste forms were leached using flow-through methods. In one study, cement waste forms qualitatively exhibited diffusion controlled release behavior. In the other study, in which doped borosilicate glass was tested, most constituents leached by matrix dissolution while others were diffusion limited. However, a few did show increasing leach rates with time. No explanation was given for this unexpected increase. The ongoing Cladding Removal Waste (CRW) grout flow-through leach tests will be studied to determine whether the interpretation of the HFW grout tests was confounded by speeding up the flow rates several times; constant flow rates will be maintained in the CRW tests.

The first group of CRW grout leachate-Hanford sediment batch Kd experiments have been completed. The CRW grout flow-through leach tests and combined grout-sediment tests are under way. Variables being studied are surface area of grout to sediment weight ratio and position of grout in sediment (to investigate hydrologic effects).

MAJOR PROBLEM AREAS AND ACTION TAKEN

None

PLANNED WORK FOR SUBSEQUENT MONTHS

- Long term leach testing of ATM-11, a doped SRL-165 glass, will be initiated. Testing of ATM-18, a doped HWVP glass, will be initiated when this glass has been fabricated.
- A revised saw cutting procedure for preparation of MCC-1 leach test specimens will be sent with ARM-1 glass to various labs. These labs will prepare leach specimens for testing by MCC.
- Review comments on the MCC-18 procedure will be addressed and a final draft version will be issued.
- Flow-through leach testing and combined grout-sediment testing with CRW grout will continue.
- A report will be issued that recommends the experimental strategy for Hanford grout testing.
- Continue preparation of the Comprehensive Data Base.

G. MCC Support to Transportation Technology Center (AR-05-15-30)

PROGRESS DURING REPORTING PERIOD

Canister Impact Testing - A Statement of Work was written that covers the development of a procedure for characterizing the waste form that escapes a

canister through a reference flaw. The procedure will include flaws of two sizes: a 3/32-inch diameter hole for normal transportation conditions, and a 3/8-inch diameter hole for accident conditions. In addition, the canister will be pressurized to 2 psig for normal conditions and to 3 psig for the accident test. The measurements will be made by collecting the material that leaves through the canister flaw into a device that can count and measure the particle size. Candidate instruments are a cascade impactor, and a laser counting device. An existing PNL canister from previous pilot scale melter experiments will be used to demonstrate the procedure.

Two DWPF canisters were shipped from SRL to PNL in July. These canisters will be impacted in August. One will be dropped from 1.0 ft and the other from 30.0 ft. Procedures and Statements of Work are being written in preparation for the impacts and subsequent analyses. Measuring and test equipment needed for the tests has been identified and will be calibrated as required before the tests.

The impact pad is complete and will be available for development of the new canister flaw procedure and the impacts of DWPF canisters in August.

MAJOR PROBLEM AREAS AND ACTION TAKEN

Completion of milestone 02A by 8/86 was dependant on delivery of two full scale DWPF canisters to PNL by 4/30/86. The canisters were delivered in July, and the three month delay in milestone delivery results from the delay in canister delivery. The milestone involves documenting the results of impact tests on these canisters.

PLANNED WORK FOR SUBSEQUENT MONTHS

- Impact testing of the two DWPF canisters will be completed.
- The canister flaw leak test procedure will be developed, and implemented using the DWPF canisters.

H. MCC Support to West Valley Demonstration Project (AH-10-30

PROGRESS DURING REPORTING PERIOD

Reference Glass Chemical Durability Testing - MCC-1 testing with CTS glass was completed through 28 days. The remaining testing (56 and 91 days) will be completed by the end of FY 86. The MCC was advised by West Valley that an initial agreement was reached with SRP about the type of testing that MCC should pursue at this time to satisfy that project's radionuclide release specification. The test will be similar to the MCC-1 method but with a brine leachant and with excess salt present. This testing will be initiated in August. A run plan that covers this testing is being drafted. Due to delays in installation of the anoxic chamber, which will provide a CO_2-free atmosphere during Pulsed Flow Test (PFT) leachate exchange, testing with this

method was not started in July. Installation will be completed during the first week in August, and testing will then be initiated with CTS glass. Testing of ATM-10 with the MCC-1, SRP and PFT methods will proceed when this material becomes available.

Approved Testing Material ATM-10 - Preparation of ATM-10 continued. The preparation has followed the steps specified by the two approved run plans for Batch and Glass preparation, and has progressed satisfactorily through steps 4.2-4.3 ("Control Loop") of the Glass preparation. Two factors have caused a delay at this point in the final preparation of the glass.

1. The West Valley staff has specified a change in the composition of ATM-10 based on a review of their recent leach test data from glass approximating the initially specified composition of ATM-10. The changes are:

   a) Increase the Al_2O_3 target concentration to 6.5% (initially was 2.83%).

   b) Add sufficient SiO_2 to maintain the initially specified 44.9%.

   c) The resulting proportionate reduction in concentration of all other components is acceptable.

   d) The acceptable deviation from the target values for Al_2O_3 and SiO_2 is increased to 10% (instead of 5%) because of the potentially greater error in adjusting initial concentrations by blending small additional quantities of dry materials to existing powder under radiation control glove box conditions.

2. Analysis of the test bars from the first Control Loop run showed that glass deviates from specifications in three respects:

   a) The Fe+2/Fe+3 ratio was about 0.3 (target value = 0.1 ± 0.08). The difference from the earlier test run is thought to be due to the increased sample size and decreased surface of the melt, resulting in increased reduction efficiency by the carbon in the melt.

   b) The Tc_2O_7 content was about 68% low (6.7E-4 instead of 2.1E-3; the specification allows 25% deviation). Data from the preparation of earlier ATM glasses containing Tc had suggested that the loss factor from the drying and melting steps might be proportional to the Tc concentration, and Tc doping of the ATM-10 was conducted accordingly. These new data indicate instead that the Tc loss in those steps is likely to be around 60 to 80%, regardless of the concentration level.

   c) The PuO_2 content was about 35% high (1.03E-2 instead of 7.60E-3; specifications allow 10% deviation). The cause of the high concentration is not known.

Therefore, the following action has been taken in the continuation of preparation of ATM-10.

1. A 350 g batch of glass (ATM-10-M1R) was modified to the new specified content of Al_2O_3 and SiO_2 doped with Tc_2O_7 and was melted satisfactorily. The viscosity of the melt was noticeably higher than for the previous composition; viscosity was estimated to be about 175 poise. A slight surface discoloration also occurred on the melt.

2. Graphite was added to the crushed melt from step 1 above and the second melt of the glass was conducted satisfactorily on 7/25/86. The melt showed a slight tendency toward increased foaming, compared to the melts of the previous composition, but no processing problem occurred and the product shows good quality. Bar annealing was conducted.

3. Analytical samples preparation and distribution were completed. No further preparation work on ATM-10 will be conducted until initial analyses are received, about 8/8/86.

Responses have been received from two reviewers of the Characterization Plan for ATM-10 which was distributed to West Valley and the three repository projects for comment and concurrence last month. Further responses are being sought before the requested changes are made.

MAJOR PROBLEM AREAS AND ACTION TAKEN

Milestone 05D, Initiate Reference Glass Testing with SRP Method, has not been completed because MCC and West Valley had not been able to obtain confirmation from SRP about the appropriate test methodology. Testing can begin in August as this confirmation has been obtained.

The preparation schedule of ATM-10 has been further delayed by the ATM-10 specification changes requested by West Valley, and by the unexpected reactions which occurred in the first radioactive test glass preparation. Use of stuff overtime hours and concurrent scheduling of analytical laboratory activities are being used to minimize the delays. Quality control and verification of achievement of product specifications remain the first priority.

PLANNED WORK FOR SUBSEQUENT MONTHS

- Continue preparation and characterization of ATM-10.

- MCC-1 testing with CTS glass will continue. MCC-1 testing with ATM-10 glass will be initiated, and SRP and PFT testing of both ATM-10 and CTS glass will be started.

V. Materials Review Board (MRB)

MCC-3 was sent to the Procedures Panel for mail ballot for provisional approval.

Publication mats for MCC-7 (Provisional Approval) were approved and initialed by the Chairman.

A revision of MCC-105.1 was submitted to the Office of the Chairman of the MRB for consideration for full approval.

DOE/RW-XXXX
Volume 1 of 3 Volumes

Nuclear Waste Policy Act

Monitored Retrievable Storage Submission to Congress

Volume 1

Proposal for the Construction of a Monitored Retrievable Storage Facility

U.S. Department of Energy
Office of Civilian Radioactive Waste Management
Washington, D.C. 20585

PROPOSAL

In response to Section 141 of the Nuclear Waste Policy Act of 1982, the Department of Energy hereby submits a proposal for the construction of a facility for monitored retrievable storage (MRS). The approval of this proposal by Congress would specifically--

- Approve the construction of an MRS facility at a site on the Clinch River in the Roane County portion of Oak Ridge, Tennessee.
- Limit the storage capacity at the MRS site to 15,000 metric tons of uranium.
- Preclude waste acceptance by the MRS facility until a construction authorization for the first repository is received from the Nuclear Regulatory Commission.
- Direct the Department of Energy to implement measures responsive to the concerns and recommendations of the State of Tennessee and local governments, as specifically outlined in Section 4 of this proposal.
- Direct the Department of Energy to implement the program plan submitted in this proposal (Volume 3).

The actions recommended herein are consistent with, and meet the requirements of, the Nuclear Waste Policy Act.

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1 EXECUTIVE OVERVIEW

The U.S. Department of Energy (DOE) proposes to construct and operate a facility for the monitored retrievable storage (MRS) of spent fuel at a site on the Clinch River in the Roane County portion of Oak Ridge, Tennessee. This proposal was prepared in response to Section 141 of the Nuclear Waste Policy Act of 1982 (the Act), which directs the Secretary of Energy to perform a detailed study of the need for, and the feasibility of, monitored retrievable storage and to submit to Congress a proposal for the construction of one or more MRS facilities.

As required by the Act, the DOE developed designs for two alternative storage concepts at three alternative sites. The preferred storage concept is surface storage in sealed concrete casks; the alternative is storage in field drywells. The three alternative sites are all located in the State of Tennessee on land owned and controlled by the Federal Government. The preferred site is the former site of the Clinch River Breeder Reactor in Oak Ridge; the alternatives are a site on the DOE Oak Ridge Reservation and the former site of a proposed nuclear power plant in Hartsville. The Secretary of Energy is to recommend the site-and-design combination that he deems preferable.

In accordance with the Act, this proposal includes an environmental assessment (Volume 2) that examines the three alternative sites and six site-and-design combinations as well as a program plan (Volume 3) that includes plans for funding and plans for integrating the MRS facility into the DOE's waste-management system. Site-specific designs, specifications, and cost estimates are included by reference in Volumes 2 and 3. Also provided will be [are] comments by the State of Tennessee, the Clinch River MRS Task Force, the Nuclear Regulatory Commission, and the Administrator of the Environmental Protection Agency. The facility recommended in this proposal would be capable of performing all of the functions specified by the Act in Section 141(b)(1).

The Act provides the framework for a comprehensive system for the safe and environmentally sound management of spent nuclear fuel and high-level waste,* including disposal in one or more geologic repositories that would permanently isolate the waste from the accessible environment. An important objective of the study of MRS need and feasibility was to determine whether and how an MRS facility could most effectively contribute to the achievement of this goal.

Having completed the need-and-feasibility study, a careful analysis of the provisions of the Act, and an evaluation of programmatic options, the DOE has concluded that an MRS facility located at the Clinch River site and designed to be an integral component of the waste-management system would significantly improve the performance of the system. This conclusion was also influenced by the experience of the past 3 years in implementing the provisions of the Act and the resultant perception of the managerial,

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*For brevity, the terms "radioactive waste" and simply "waste" are often used here to denote both spent fuel and high-level waste.

regulatory, and institutional complexities of waste management, particularly of the activities that must precede final disposal, which are often underestimated.

An MRS facility would receive and prepare spent fuel for emplacement in the geologic repository. The principal waste-preparation functions would be spent-fuel consolidation and loading into canisters. Being uniform in size and free of surface contamination with radioactive material, these canisters would facilitate handling, shipping, and further processing at the repository. Consolidation would be performed by extracting the spent-fuel rods from the hardware that holds them together in assemblies and rearranging them in a tighter array for greater efficiency in storage, handling, transportation, and disposal.

The canisters of spent fuel would be loaded into shipping casks and shipped to the repository in dedicated trains. An area for temporarily storing the spent-fuel canisters pending shipment to the repository would be provided in the principal waste-handling building of the MRS facility. The MRS facility would also contain a large storage yard in which the canisters of spent fuel would be stored in sealed concrete casks that would allow radiation monitoring and easy retrieval for shipment to the repository. The DOE is proposing that the total storage capacity be limited to 15,000 MTU; this will provide significant operational benefits to the Federal portion of the waste-management system and provide a firmer and earlier basis for the utilities to plan their storage needs.

The MRS facility would be designed and operated with the fundamental objective of protecting the health and safety of the public, the workers at the facility, and the quality of the environment. It would be licensed by the Nuclear Regulatory Commission and hence subject to both routine and unannounced inspections by NRC staff. It would be a shielded confinement-and-containment facility that would limit any releases of radioactive material to well below established regulatory limits, and its safety-related features would be based on available and proved technology.

For improved logistics, the MRS facility would not receive any spent fuel from reactors located in the western United States (west of longitude 100°). The spent fuel discharged by these reactors, which will constitute less than 10 percent of the total U.S. spent-fuel inventory, would be shipped directly to the repository for preparation and disposal.

The construction and operation of the MRS facility would be under the purview of a DOE project office established in the DOE Oak Ridge Operations Office. The day-to-day management of the facility would be the responsibility of a DOE project manager during the preoperational phase and a plant manager during operations. This DOE manager would have formal responsibilities relative to an MRS Steering Committee that would include members recommended by and representing the State and local governments.

The most significant advantages of an integral MRS facility can be summarized as follows:

1. Improvements in system development. The MRS facility would allow the DOE to separate a major part of the waste-management process (acceptance, transportation from the reactor sites, consolidation,

and sealing in canisters) from uncertainties about the repository and to proceed immediately with detailed planning for, and implementation of, that part. This would provide the utilities with a firmer basis for planning the transfer of spent fuel to the DOE. The development and specification of the transportation system would also be advanced because the approval of the MRS facility would allow specific routing, logistics, and equipment requirements for shipments from reactors to be determined up to 5 years earlier. The early accomplishment of these separable steps of the waste-management process would significantly enhance confidence in the schedule for the operation of the total system. Moreover, the facility would provide a focal point for early system integration.

2. Accelerated waste acceptance from the utilities. By starting in 1996 and reaching full operations by 1998, the MRS facility would allow the system to receive spent fuel at full-scale rates 5 years sooner than does the system without an MRS facility. This would significantly reduce the need for new temporary storage capacity at reactor sites and the attendant spent-fuel handling operations, licensing efforts, and costs. It would also provide greater assurance that the Federal waste-management system will begin operations by 1998 as prescribed in the Act and specified in the contracts between the DOE and the owners and generators of spent fuel.

3. Improvements in the reliability and flexibility of the waste-management system. These improvements would be realized by separating the acceptance of spent fuel from reactors from emplacement in the repository and adding significant operational storage capacity to the system. They would produce identifiable improvements in the manageability of the system and allow the DOE to better accommodate the circumstances of the future.

4. Advantages for the repository. By performing waste-preparation functions, the MRS facility would simplify the waste-handling facilities and operations of the repository. Furthermore, the repository would receive fewer shipments; the waste canisters received from the MRS facility would be uniform in size and free from surface contamination with radioactive material; and a large portion of the inventory-accountability function would be performed at the MRS facility. Another important advantage would be the constant rate of waste throughput, which would enhance the efficiency of repository operations.

5. Improvements in the specification and performance of the transportation system. Since consolidated fuel would be shipped in dedicated trains, the MRS facility would significantly reduce the number of shipments to the repository and minimize the distances of spent fuel shipments in less-efficient truck-mounted casks. Being centrally located for most reactors, it would serve as a hub for transportation operations, focus the control and management of transportation operations, and reduce the number of cross-country shipping routes. Moreover, by allowing early identification of routes to the MRS site, the MRS facility would provide institutional benefits because it would increase the time available to work with the States, Indian Tribes, and the public in route-specific planning.

6. Institutional benefits. The development of the MRS facility would produce institutional benefits through the experience gained from interactions with the State of Tennessee and by allowing the DOE to demonstrate earlier that it is willing and able to be a responsible corporate citizen and neighbor. Early progress in waste management, starting with the designation of a specific site and facility construction, would help provide needed momentum for implementing the entire system.

Studies performed for this proposal show that, though there are other ways to achieve some of the advantages of an integral MRS facility, none of the alternatives examined in the need-and-feasibility study presents the same range of benefits while also providing equivalent benefits in terms of feasibility, flexibility, system development, and managerial control.

The expenditures for the MRS project from the time of Congressional approval to the start of operations are estimated at $970 million in constant 1985 dollars, of which about $700 million would be used for construction. The annual operating expenses for the facility, which would employ about 600 workers, would be about $70 million, not including financial-assistance and tax-equivalency payments. All costs would be borne by the waste generators and hence paid from the Nuclear Waste Fund. The DOE has made provision for the MRS project in the President's FY87 budget proposal should Congress approve the system. The cost of the total improved-performance system is estimated to be no more than 5 to 8 percent higher than that of the system without an MRS facility; the cost is thus within the range of uncertainty associated with cost estimates for a total system without an MRS facility and is considered small in comparison with the benefits. The costs of constructing and operating an MRS facility would be partially offset by savings in the cost of constructing and operating the repository surface facilities, which would be simplified; by the savings realized by the ratepayers in not needing to pay for additional at-reactor storage; and by the savings resulting from the institutional benefits, discussed in this proposal, to the overall waste-management system. The increase of 5 to 8 percent is considered an upper bound because the estimates for MRS implementation are based on well-developed designs at specific sites, whereas the costs of the remainder of the total system are subject to more uncertainty.

No significant incremental adverse environmental impacts are expected from an integral MRS facility. Quantitatively, the estimated total-system risks and environmental costs do not differ significantly between systems with and without an MRS facility. The social and economic impacts that might result from the MRS facility would be prevented or mitigated by the measures proposed herein.

Some potential adverse programmatic effects have also been postulated by various parties, but most are perceived and avoidable rather than inevitable. The one most often cited is concern that an MRS facility would diminish the resolve to develop a geologic repository. To allay such concerns and to reinforce this country's unwavering commitment to the geologic-repository program, the DOE proposes that Congress link the startup of the MRS facility to the schedule of the repository: no waste may be accepted at the MRS facility until a construction authorization for the first repository is received from the Nuclear Regulatory Commission. Furthermore, the DOE proposes that Congress limit the MRS storage capacity to 15,000 MTU.

The institutional challenges faced by the waste-management program were anticipated by Congress in the Act, which prescribes unprecedented measures for public involvement as well as consultation and cooperation with affected States and Indian Tribes. The MRS project has a unique opportunity to establish its credibility as a responsible corporate citizen and neighbor, and the DOE is proposing measures to make the most of this opportunity. These measures include (1) the provision of opportunities for State and local governments to participate in the project, (2) assurances about safety and environmental quality, and (3) financial assistance. They are based in part on comments submitted by the State of Tennessee and the Clinch River MRS Task Force. The former has provided comments but has not taken a position to date. The latter is a 31-member group appointed by Roane County and the city of Oak Ridge to determine whether the community they represent should accept an MRS facility and if so, under what conditions. After the Task Force identified these conditions and formulated recommendations for meeting them, the City Council of Oak Ridge and Roane County Commission passed conditional resolutions accepting the development of an MRS facility at the Clinch River site.

Immediately after the approval of this proposal, the DOE would seek to enter into a written consultation-and-cooperation agreement with the State of Tennessee. This agreement would serve as an "umbrella" contract between the DOE and the State of Tennessee and would formalize arrangements for further State and local involvement. The DOE proposes that one of the key features of such involvement be the establishment of an MRS Steering Committee that would provide advice, conduct performance evaluations, and recommend corrective actions. The Committee could play an important role in providing information to the public about the safety of the facility as well as ensuring that State and local perspectives are fully considered in all key programmatic decisions. For example, the Committee could participate in the planning for the collection of preoperational data on the environmental, demographic, and socioeconomic conditions of the site and the local community. The collection of such data would continue throughout the lifetime of the facility and would provide a basis for demonstrating the safety of the project.

To allow the State and the local communities to plan and prepare for the MRS facility, the DOE proposes to provide the State and local governments annual financial-assistance payments during the preoperational period. For the operational phase, financial assistance would be provided to the State and local units of government in the form of impact-mitigation funds and annual payments equal to the taxes that would have been collected had the MRS facility been subject to taxation. This financial assistance would be in addition to reimbursements to the State and local governments for work performed for the MRS project.

Recognizing the harmful effects incurred by the local community from the canceled breeder-reactor project, mindful of the community's desire to diversify its industrial and commercial base, and aware that the Clinch River site was considered the prime site for this diversification, the DOE also proposes certain considerations in procurement for the MRS facility and in land usage should land at the DOE's Oak Ridge Reservation become surplus to the DOE's programmatic needs.

In summary, the DOE recommends that Congress approve an integral MRS facility constructed at the Clinch River site in Roane County, Tennessee; limit the interim-storage capacity of the MRS facility to 15,000 MTU and preclude waste acceptance by the MRS facility until a construction authorization for the first repository is received from the Nuclear Regulatory Commission; authorize the DOE to implement its recommended program for State and local participation, including the financial assistance plans proposed for both the preoperational and operational phases; and direct the DOE to proceed in the manner prescribed in the program plan.

2 INTRODUCTION

The United States has no facilities for the permanent disposal of the spent fuel and high-level radioactive waste generated during the production of electricity in nuclear power plants and during the production of nuclear materials for national defense. As more commercial nuclear power plants have come on line in recent years, the rate at which the resulting spent fuel has been accumulating has been increasing, and a number of utilities are beginning to run out of storage space.

Although nuclear activities produce small volumes of wastes in comparison with many other activities that generate hazardous wastes, nuclear wastes have the unique characteristic of being radioactive, and therefore they require special handling and storage. While such wastes have been safely stored for decades without significant adverse effects on the health and safety of the public, they will remain potentially hazardous for long periods of time. The Federal Government has established the principle that the management and the disposal of these wastes are the responsibility of the present generation and should not be left for future generations. Recognizing that a national problem has been created by the accumulation of radioactive wastes and that a safe and environmentally acceptable method of permanent disposal is needed, the Congress enacted the Nuclear Waste Policy Act of 1982.

The Act assigned to the U.S. Department of Energy the responsibility for disposing of these wastes and created the Office of Civilian Radioactive Waste Management for that purpose. The method of disposal is to be permanent isolation in geologic repositories. The Act requires the DOE to site, construct, and operate geologic repositories in a manner that "will provide reasonable assurance that the public and the environment can be protected" and establishes a schedule for the siting of two repositories. Recognizing the importance of institutional issues, it provides for a system of checks and balances through public involvement as well as consultation and cooperation with the affected States and Indian Tribes. Furthermore, the Act mandates that the costs of commercial-waste disposal are to be paid in full by those who benefit from the electricity generated in nuclear power plants and establishes a special Nuclear Waste Fund for this purpose.

In addition, Section 141 of the Act directs the DOE to examine the need for monitored retrievable storage (MRS) and to submit a proposal to Congress for the construction of one or more such facilities. According to Section 141(b)(1), such a facility is to accommodate civilian spent fuel and high-level waste; permit continuous monitoring, management, and maintenance of these wastes; provide for the ready retrieval of these wastes for further processing and disposal; and safely store such wastes as long as may be necessary by maintaining the MRS facility.

As specified in Section 141(b)(2), the proposal is to follow a detailed study of the need for, and feasibility of, an MRS facility and is to include the following:

1. The establishment of a program for the siting, development, construction, and operation of MRS facilities.

2. A plan for the funding of the construction and operation of MRS facilities.

3. Site-specific designs, specifications, and cost estimates sufficient to solicit bids for the construction of the MRS facility, support Congressional authorization of the construction, and enable the completion and operation of an MRS facility as soon as practicable after Congressional authorization.

4. A plan for integrating the MRS facilities with other storage and disposal facilities authorized by the Act.

In formulating the proposal, the Secretary of Energy is to consult with the Nuclear Regulatory Commission and the Administrator of the Environmental Protection Agency and is to submit their comments to Congress at the time the proposal is submitted (Section 141(b)(3)).

The Act (Section 141(b)(4)) also directs the DOE to consider in the proposal at least three alternative sites and at least five combinations of proposed sites and facility designs. The advantages and disadvantages of these six site-and-design combinations are to be fully analyzed in an environmental assessment that is required by Section 141(c) to accompany the proposal.

The proposal required by Section 141(b) of the Act is hereby submitted in three volumes. This document (Volume 1) presents the proposal itself and explains the rationale. Volume 2 is the environmental assessment required by Section 141(c). In addition to the site-and-design analyses required by Section 141(b)(4), it includes the need-and-feasibility study referred to in Section 141(b)(1). Incorporated by reference into Volume 2 is a conceptual design report prepared by an architect-engineer; this document contains the site-specific designs and cost estimates required by Section 141(b)(2)(C). Volume 3 is a program plan. It presents the MRS program, a plan for funding the MRS project, and a plan for integrating the MRS facility into the DOE's waste-management system, as required by Sections 141(b)(2)(A), (B), and (D). Also submitted will be [are] comments by the State of Tennessee, the Clinch River MRS Task Force, the Nuclear Regulatory Commission, and the Administrator of the Environmental Protection Agency.

3 THE RECOMMENDED MRS FACILITY: FUNCTIONS, ADVANTAGES, AND COSTS

Summarized in this section are the functions, advantages, and costs of the recommended MRS facility. The discussion is based on the more-detailed descriptions given in Part 2 of Volume 2, the MRS environmental assessment as well as the need-and-feasibility analysis presented in Part 1 of Volume 2. Site-specific designs, specifications, and cost estimates can be found in the conceptual design report that is referenced in Volume 2. To provide some background information, this section begins with a brief description of the DOE's waste-management system and a plan that would improve its performance through the implementation of the MRS project.

3.1 THE WASTE-MANAGEMENT SYSTEM AND THE PLAN FOR IMPROVING ITS PERFORMANCE

As shown in Figure 1, the Act provides for a number of key activities for the DOE's waste-management system: the siting and construction of a geologic repository, the development of a transportation system for moving the waste to the repository, and, if needed, Federal interim storage (FIS) for a small quantity of spent fuel. All of the facilities included in the system (except FIS under certain conditions) are subject to licensing by the Nuclear Regulatory Commission.

The most demanding of the waste-management facilities is the repository, which will permanently isolate the waste from the accessible environment without the need for caretaking or supervision in the future. Because permanent isolation requires the site of the repository and the host rock to have suitable geologic characteristics, the site must be carefully selected; the prescribed site-screening and selection process is complex and requires several years. These tasks are rendered more complex by the institutional challenges attendant on a first-of-a-kind project and the public apprehension associated with radioactive materials. Recognizing these challenges, Congress set January 31, 1998, as the date for the DOE to begin accepting spent fuel for disposal and specified a schedule for the siting of the repository.

The repository will consist of both surface and underground facilities. The most important of the surface facilities will be the buildings in which the waste will be handled and prepared for disposal--that is, emplacement in the underground rooms. The principal steps in waste preparation will be consolidation, which will be discussed later, and encapsulation in a metal disposal container to satisfy regulatory requirements. Together with the waste, this container and packing material between the container and the wall of the host rock will constitute the "waste package."

The repository program has completed a number of important milestones. Among them was the publication, in December 1984, of draft environmental assessments for five sites being considered for nomination for the first repository. Three of these sites were tentatively proposed as being preferred for site characterization, the next step in the site-selection process: a basalt site in the State of Washington; a bedded-salt site in Texas; and a tuff site in Nevada. Although in finalizing the environmental assessments the proposed preferred sites may change, for purposes of the transportation analysis of this proposal it was assumed that these sites will be the candidate sites for the first repository.

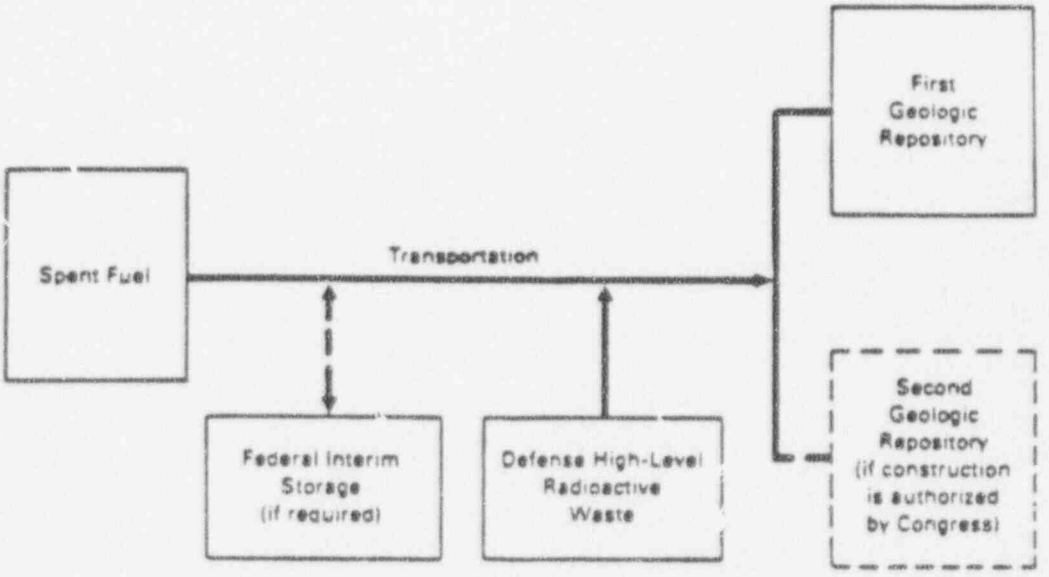

Figure 1. The waste-management system without an MRS facility.

Recognizing that options for enhancing the waste-management system may be available, Congress directed the DOE to study the need for, and the feasibility of, an MRS facility (Section 141 of the Act). Careful analyses of the provisions of the Act and of programmatic options--as well as various studies of the waste-management system--have indeed shown that performance could be enhanced by integrating an MRS facility, centrally located to most of the commercial nuclear reactors, into the system. The resulting improved-performance system is diagrammed in Figure 2. The preferred site for an MRS facility is 25 miles west of Knoxville, Tennessee. Comparisons of the system without an MRS facility with the improved-performance system are given in Part 1 of the MRS environmental assessment (Volume 2 of this proposal).

The time allowed by Congress for the MRS study (3 years) has enabled this proposal to benefit from the DOE's experience to date in implementing the requirements of the Act. This experience has produced a keen appreciation for the management complexities, regulatory issues, and institutional challenges involved in the receipt, preparation, and transportation of spent fuel (from more than 100 reactors expected to be operating) in addition to those associated with the development of a geologic repository. During this time, the DOE has also been apprised of the views and concerns of a number of interested or potentially affected parties about an MRS facility. Among them are the Nuclear Regulatory Commission, the Administrator of the Environmental Protection Agency, the State of Tennessee, and the Clinch River MRS Task Force, which represents the local communities in the area of the preferred site.

3.2 THE MRS FACILITY AND ITS OPERATIONS

Presented below is a brief description of the location, facilities and operations, decontamination and decommissioning, safety and feasibility, schedule, and management of the MRS facility. A conceptual drawing of the facility is shown in Figure 3.

3.2.1 Location

The MRS facility would be constructed on the Clinch River site in the eastern part of Roane County, 25 miles west of Knoxville and 9 miles southwest of the center of the city of Oak Ridge, Tennessee. The site is owned by the Federal Government and in the custody of the Tennessee Valley Authority (TVA). The alternative sites are a site on the Oak Ridge Federal Reservation, about 3 miles northeast of the Clinch River site, and a site in central Tennessee on Federal land in the custody of the TVA, near the city of Hartsville. Called the Hartsville site, this land was formerly dedicated to a nuclear power plant whose construction was canceled.

The process for the identification of the three sites mentioned above was based on the following primary considerations:

1. To locate places where an MRS facility could be constructed and operated safely with minimal adverse impacts on the local community and the environment.

2. To enhance the role of an MRS facility as an integral part of the Federal waste-management system.

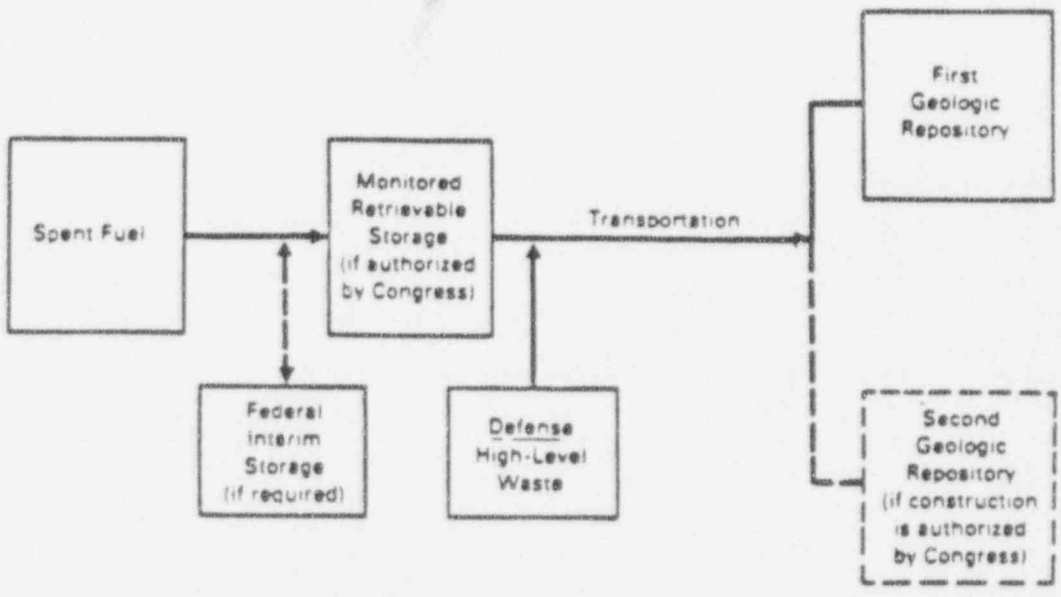

Figure 2. The improved-performance waste-management system with an integral MRS facility.

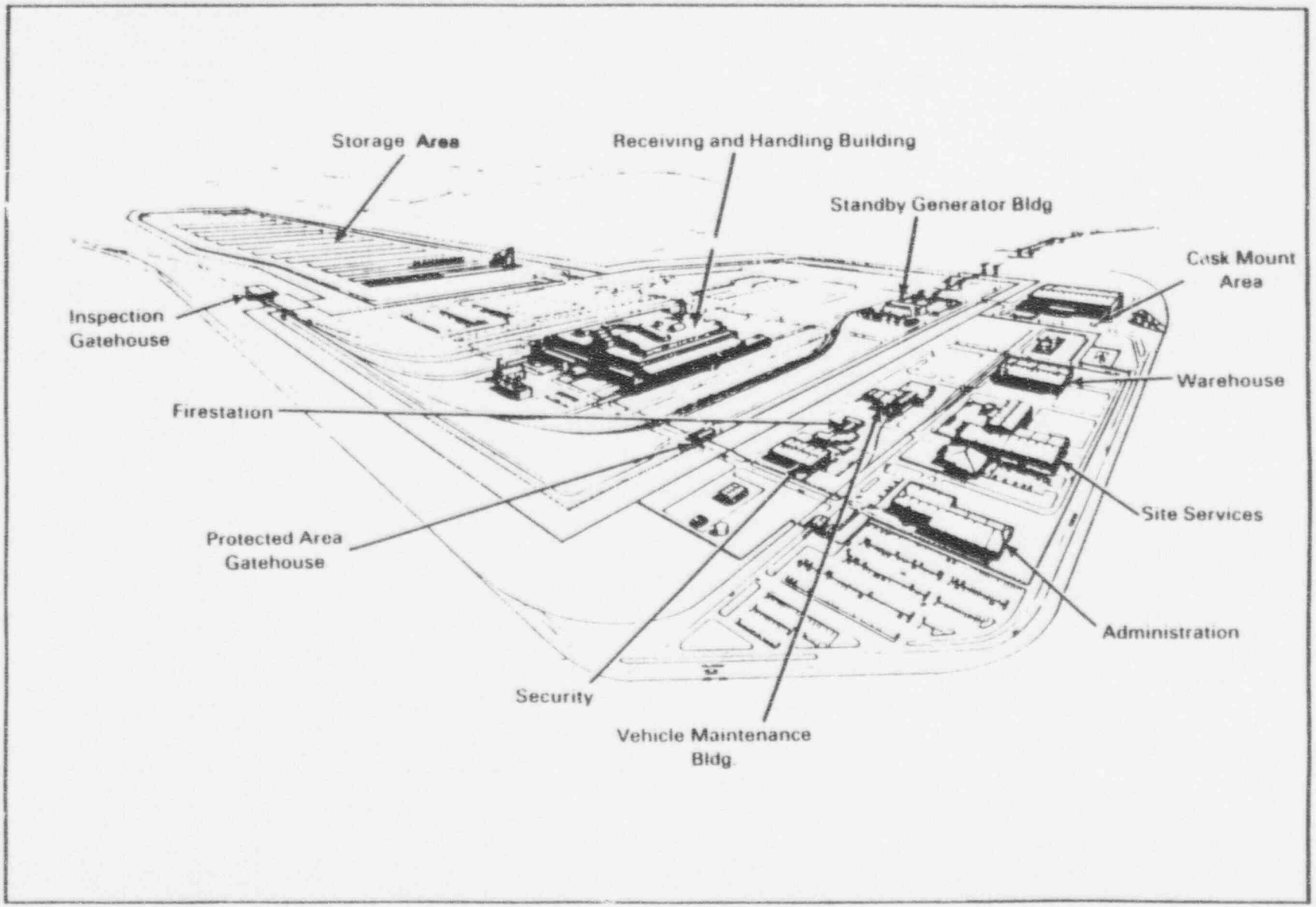

Figure 3. Conceptual drawing of the MRS facility. The principal structure would be the receiving-and-handling building. The storage area is shown to contain a row of upright sealed concrete casks as well as some horizontally stored dual-purpose casks.

The process began by considering the transportation of spent fuel and radioactive wastes throughout the Federal system; this disclosed a region of the country in which an MRS facility would substantially reduce the total shipment-miles, thus limiting the impacts of transportation. This region was found to contain sites that are controlled by the DOE and currently used for nuclear activities as well as sites for which license applications have been submitted to the Nuclear Regulatory Commission. The latter have the advantage of having extensive bases of environmental and socioeconomic data that are applicable for assessing the suitability of an MRS site. In addition, such sites are expected to be more suitable for an MRS facility than sites chosen at random or sites chosen for specific physical characteristics. Finally, only sites with sufficient available acreage without known land-use conflicts (such as operating nuclear reactors or reactors under construction) were considered.

This process led to the identification of 11 sites as potentially suitable, and an evaluation of these sites led to the conclusion that MRS development in compliance with health, safety, and environmental requirements was feasible at any of the sites. Further screening against criteria like Federal ownership, potential land-use competition, potential competition with environmental regulatory objectives (e.g., location in a Class I air-quality area), the presence of geotechnical conditions considered undesirable by the Nuclear Regulatory Commission, access to transportation corridors, proximity to population centers, and the availability of an adequate base of environmental data led to the selection of the three sites mentioned above for more-detailed analyses.

The basis for the identification of these sites, which was announced on April 25, 1985, is presented in a report entitled Screening and Identification of Sites for a Monitored Retrievable Storage Facility (DOE/RW-0023, April 1985). Since that time, additional data have been collected, site-specific MRS designs have been developed, and the environmental effects of constructing and operating an MRS facility at those sites have been studied in considerable detail. A full analysis of the potential environmental effects and the relative advantages and disadvantages of the six site-and-design combinations is presented in Part 2 of the MRS environmental assessment (Volume 2).

Of the three candidate sites, the Clinch River site in the Roane County portion of Oak Ridge is recommended to Congress as the preferred site for the following reasons:

1. The site is owned by the Federal Government and is in the custody of the TVA.

2. Since the site is adjacent to the DOE's Oak Ridge Reservation, nuclear activities are compatible with the present land usage.

3. Part of the site has already been disrupted by preparation for the construction of the Clinch River Breeder Reactor. The alternative Oak Ridge site is undisturbed.

4. The site has excellent access for any mode of transportation, being within 5 miles of the nearest interstate highway, within 1.5 miles of a main rail line, and on a navigable waterway. Access to the Hartsville site is not as good.

5. The local community can supply experienced technical personnel for the MRS project.

6. An extensive base of environmental data is available for the site. Data for the alternative Oak Ridge site are not nearly as extensive or current.

7. The NRC had granted for this site a limited work authorization for the construction of a breeder reactor--a far more complex nuclear installation than the MRS facility. The alternative Oak Ridge site has not been similarly reviewed.

As indicated, many of the advantages listed above also apply to the two alternative sites, but neither alternative has all of them. Costs do not provide a basis for discriminating among these sites; cost differences are estimated to account for less than 1 percent of the total costs projected for MRS development and operation and hence are within the uncertainty range of these estimates.

On the basis of informal discussions between DOE and TVA officials, the transfer of the site to the DOE is not expected to be a problem. If this proposal is approved by Congress, the DOE will initiate actions to transfer full custody and control of the proposed site to the DOE.

3.2.2 Facilities and Operations

At the Clinch River site, the MRS facility would require less than 500 acres. In addition to the principal structure--the receiving-and-handling building--it would consist of an area for monitored retrievable storage, a plant for manufacturing the concrete storage casks, and various support facilities (an administration building, visitors center, maintenance shops, warehouse for supplies, fire station, water-treatment facility, etc.).

After arriving by truck or rail in a shipping cask, the waste would be unloaded into the receiving-and-handling building, a multilevel structure with a ground-floor area of about 290,000 square feet, where it would be prepared for emplacement in a repository. Many of the waste-handling operations in this building would be performed by remote control inside shielded "hot cells" to protect the workers from exposure to radiation. Included in the building is a lag storage area A simplified diagram of the building is shown in Figure 4.

An important step in waste preparation is the consolidation of spent fuel. Its objective is to optimize transportation and emplacement operations by minimizing the number of waste packages that must be handled. Consolidation would be accomplished by removing the spent-fuel rods from the hardware that holds them together in square assemblies and then rearranging them in a tighter, circular, array. The non-fuel-bearing scrap of the fuel assemblies would be compacted and loaded into containers for shipment to the repository. After consolidation, the spent-fuel rods would be loaded and sealed into clean metal canisters for temporary storage at the MRS facility or shipment to the repository. The exterior surfaces of the canisters would be additionally cleaned to remove any contamination with radioactive material. At this point, the canisters would be ready for any needed temporary storage at the MRS facility.

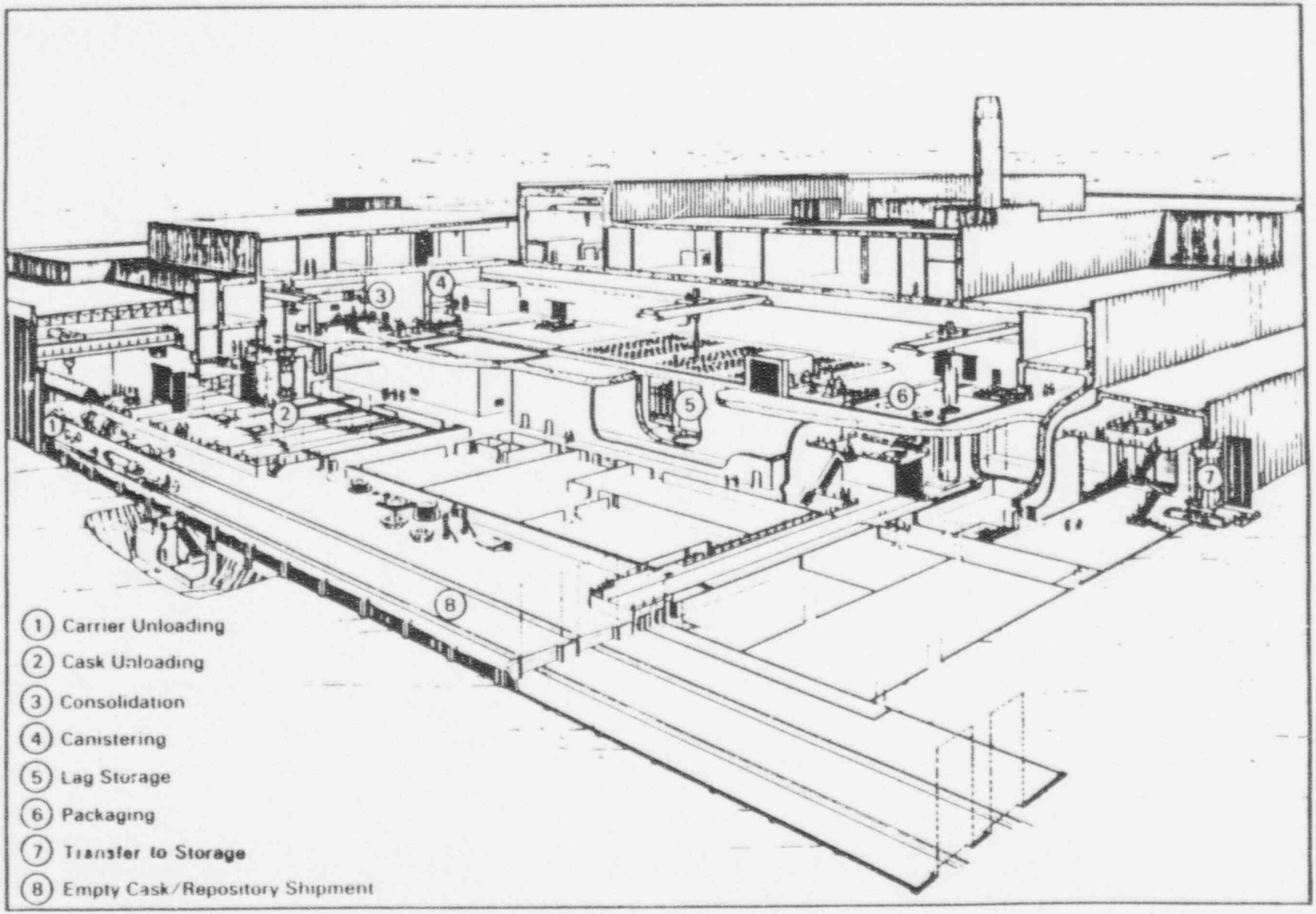

Figure 4. Cutaway view of the receiving-and-handling building and the principal operations that would be performed there.

After a detailed evaluation of eight alternative concepts for dry storage, the DOE selected surface storage in sealed concrete casks as the preferred method for monitored storage, with field drywells selected as the alternative means. (See Part 2 of Volume 2 for a more deta..ed discussion.) Both methods have been safely used in similar applications for a number of years; both are low in cost, and both are simple as well as flexible in design. The capacity of such storage would be limited to a total of 15,000 MTU.

A sealed storage cask (Figure 5) is a large steel-lined reinforced-concrete cylinder that holds welded stainless-steel canisters of spent fuel and is closed with a thick concrete shield plug and a welded steel lid. Depending on the type of waste being stored, the casks may range from 17 to 22 feet in height, measure 12 feet in outside diameter, and weigh up to 220 tons when loaded.

The field drywell is an in-ground sealed metal enclosure that would extend approximately 20 feet into the ground.

The design would also include provisions for accommodating steel storage casks that can also be used for transportation. Such dual-purpose casks could be used by individual utilities to solve at-reactor storage problems that may occur before the startup of the MRS facility or the repository.

The proposed MRS facility would be capable of a throughput rate equal to the rate of waste emplacement at the repository. The waste-acceptance rate of the overall system would be greater than the rate of spent-fuel discharge from reactors in order to curb and eventually reduce the backlog of spent fuel accumulated at reactor sites.

3.2.3 Decontamination and Decommissioning

At the end of its mission, the MRS facility would be decommissioned, and its site would be prepared for unrestricted use. An outline of the decontamination and decommissioning activities is presented in the MRS environmental assessment (Volume 2). As part of the license application for the facility, the DOE is required to include a detailed plan for such activities for consideration by the Nuclear Regulatory Commission.

3.2.4 Schedule and Other Programmatic Considerations

The MRS facility could start accepting waste in 1996. The proposed schedule for its construction and operation is shown in Figure 6 and discussed in Volume 3 of this proposal. At the end of its operating period, the facility would be decommissioned and the site made available for other uses.

The relationship of the MRS facility to the second repository is not addressed in Volumes 2 and 3 of this proposal. As planning for the second repository advances and candidate sites are identified, the role of the MRS facility in preparing waste for the second repository will be examined in detail. Any decision to use the facility in this capacity would be based on the potential for reducing transportation impacts as well as improving the operations and economics of the waste-management system.

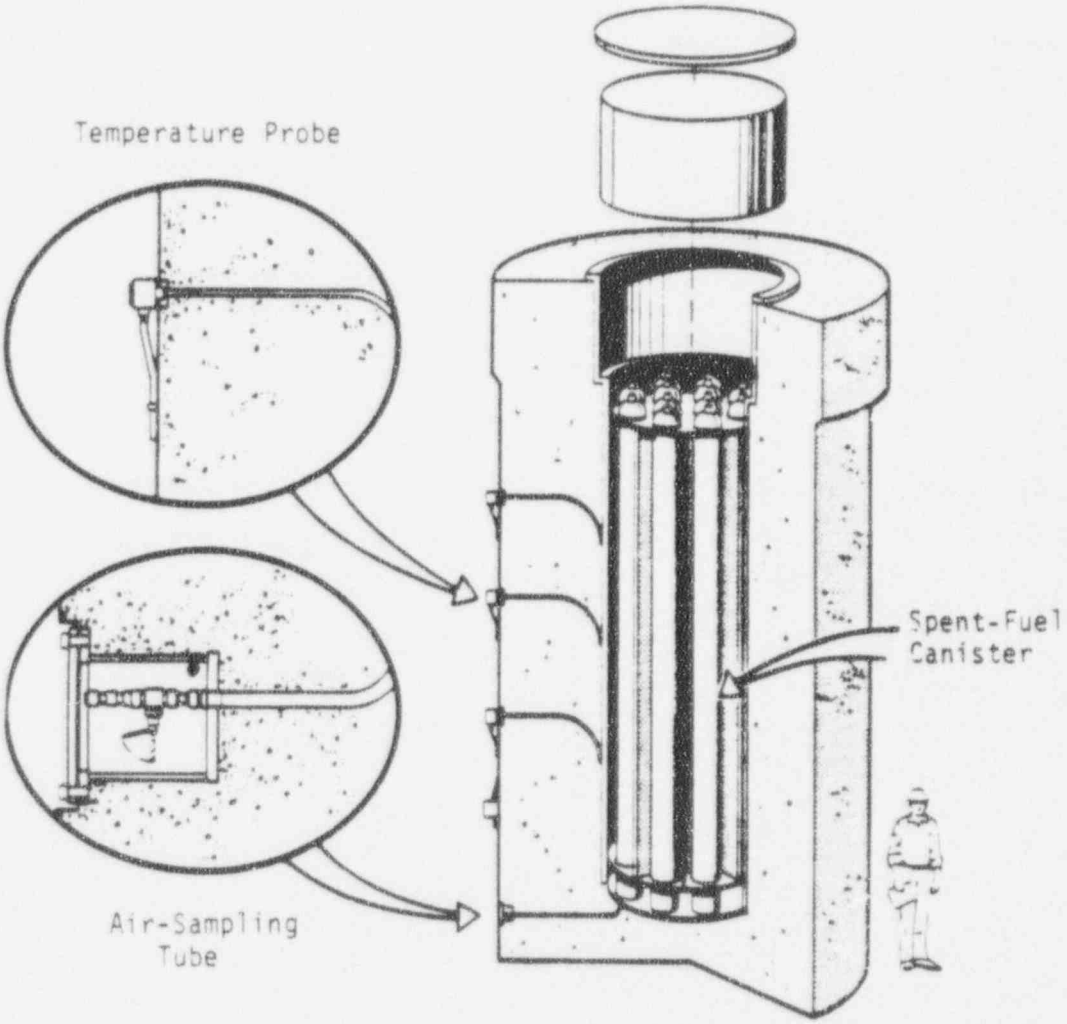

Figure 5. The preferred storage concept for the MRS facility: monitored surface storage in large sealed concrete casks. Each cask would house several spent-fuel canisters; it would be 22 feet high and 12 feet in diameter. The temperature probe and the air-sampling tube would allow continuous monitoring.

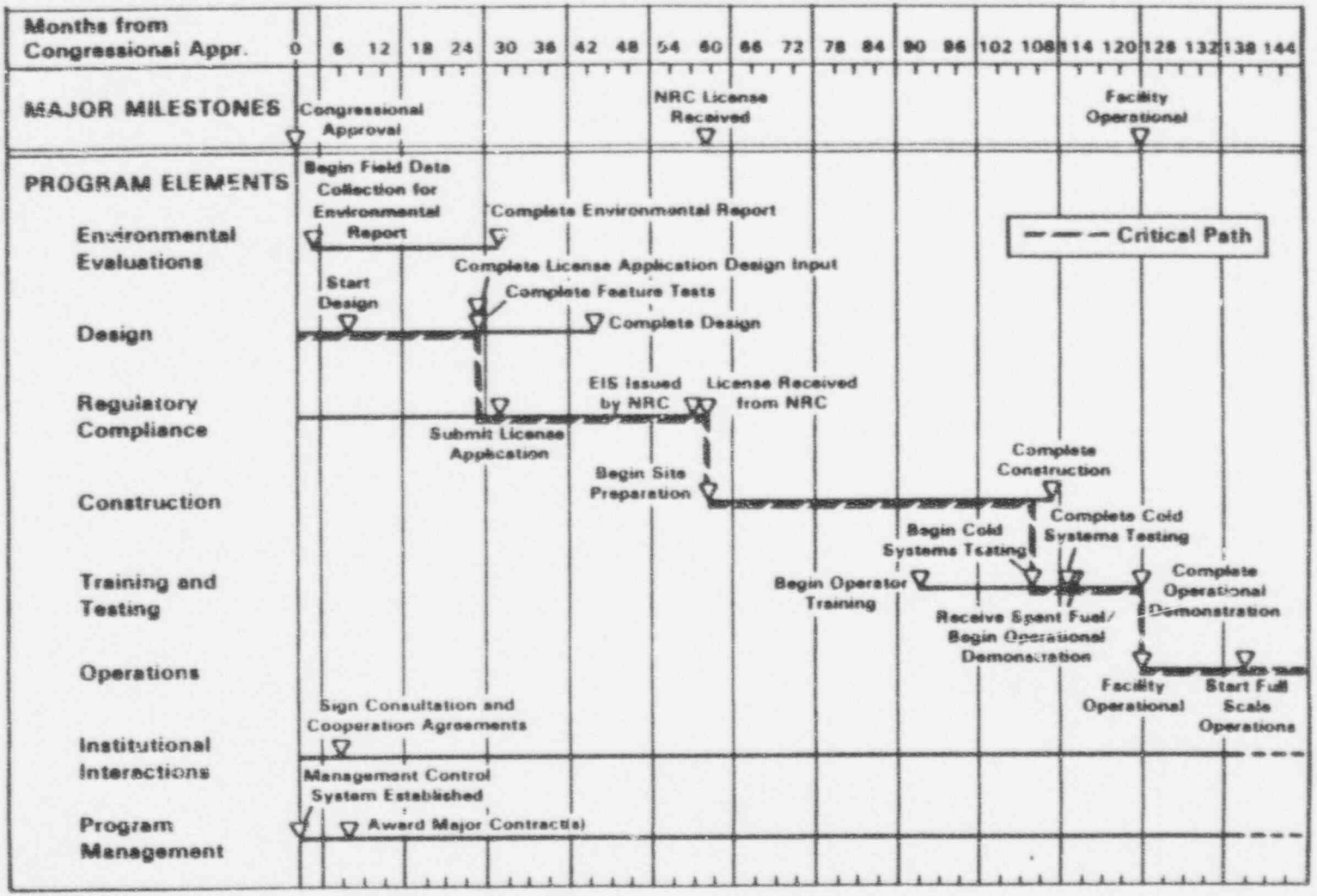

Figure 6. Schedule for the design, construction, and operation of the MRS facility.

3.2.5 Safety and Feasibility

The MRS facility has been designed to contain solid radioactive materials, with any gaseous releases kept well below the limits established by regulation. The site-and-design analyses reported in Part 2 of Volume 2 show that any exposure of the public to radiation would be far below regulatory limits, and no adverse environmental impacts are expected from operation. Similarly, the occupational exposures received by workers at the facility would be significantly less than the exposures allowed by NRC regulations. The safety performance of the facility would be based on available and proven technologies, such as the use of heavy shielding in waste-handling areas, remotely controlled equipment, multiple banks of high-efficiency air filters in ventilation systems, and appropriate shielding in the storage casks.

Since the DOE must obtain a license for the MRS facility from the Nuclear Regulatory Commission, its safety performance would have to be demonstrated to the satisfaction of the Commission. The data and analyses needed for this demonstration would be reported in the safety analysis report, the environmental report, the safeguards contingency plan, the quality-assurance plan, and various other documents that would be submitted with the license application. Furthermore, the demonstrations of safety performance would extend beyond data and analyses: they would include both routine and unannounced inspections by NRC inspectors (including provisions for resident inspectors) throughout the operational lifetime of the facility. Independent inspection and monitoring by the State of Tennessee may also be conducted, as provided for in the consultation-and cooperation agreement.

The MRS facility and its operation are feasible: analyses show that the technical and engineering requirements can be met with current technology; the facility can be constructed and operated for approximately the costs reported in the program plan (Volume 3); and the facility can be licensed as safe and would meet all applicable environmental and land-use requirements of the Federal Government, the State of Tennessee, and Roane County.

3.2.6 Management

Responsibility for implementing the MRS project would be assigned to the DOE Oak Ridge Operations Office, which would establish an MRS Project Office for that purpose. Guidance and direction for the project would be provided by the Storage Division of the Office of Storage and Transportation Systems, which is part of the Office of Civilian Radioactive Waste Management (OCRWM).

The day-to-day management of the construction or operation of the facility would be assigned to a DOE project manager (a plant manager once the facility starts operating). This manager would be responsible for both safety and the achievement of program goals. The manager would be responsible to the Director of the OCRWM (or his designee) through the manager of the DOE Oak Ridge Operations Office; the manager would also have formal responsibilities relative to the MRS Steering Committee, which is discussed in Section 4.1.

3.3 SYSTEM CONFIGURATION

If the integral MRS facility is approved by Congress, the DOE expects to operate the improved-performance system as described below. The recommended configuration was defined after considering several alternative configurations

for the overall system with and without an MRS facility. The evaluation of alternatives is presented in Part 1 of Volume 2.

3.3.1 Waste Acceptance

As provided in its contracts with the utilities, the DOE plans to begin accepting spent fuel for disposal not later than January 31, 1998. Acceptance will occur at the reactor site after the utility has loaded the spent fuel into a transportation cask certified by the Nuclear Regulatory Commission. If this proposal is approved by Congress, spent fuel from all reactors located east of the Rocky Mountains will be transported to the MRS facility for preparation, which could begin in 1996. Full-scale operation at a rate of about 2500 to 3000 MTU per year would be achieved by 1998.

According to current plans, the MRS facility would continue to accept spent fuel for as long as needed to serve an operating repository. In the analyses performed for this proposal, an operating period of 26 years was assumed, because the MRS facility, operating at the throughput rates assumed for this analysis, would have transferred 53,000 MTU of spent fuel to the first repository by the end of this period. Assuming 9000 MTU of spent fuel from western reactors and the equivalent of 8000 MTU in defense waste, the equivalent of 70,000 MTU would thus have been emplaced in the first repository, which is the capacity limit for the first repository until such time as a second repository starts operations (Section 114(d)) of the Act.

Spent fuel from western reactors (constituting less than 10 percent of the total U.S. inventory) would be accepted for shipment directly to the repository, which, as already mentioned, is assumed to be in the west. Defense high-level waste and the small quantity of commercial high-level waste from a demonstration project in West Valley, New York, would be shipped directly to the repository. However, the MRS facility would have the capability to coordinate shipments from nearby defense-waste facilities with its own dedicated-train shipments of consolidated spent fuel should a future need arise.

3.3.2 Waste Preparation

At the MRS facility, spent fuel would be prepared for geologic disposal by being consolidated (see Section 3.2.2) and loaded into canisters. At the repository, the canisters would be encapsulated in the disposal container before underground emplacement. The MRS facility would also have the capability to encapsulate the spent fuel into disposal containers if this step proves to be more efficient at the MRS site than at the repository.

The repository would encapsulate the spent fuel it receives directly from the western reactors. It would also encapsulate in disposal containers the high-level waste.

3.3.3 Transportation

An MRS facility at the Clinch River site would divide the spent-fuel transportation function into two segments: transportation from reactors to the MRS facility and a longer leg from the MRS facility to the repository. The spent fuel from reactors would be shipped in casks certified by the Nuclear Regulatory Commission. The shipments would be made by truck or rail,

depending on the cask-handling capabilities of the reactor, but wherever possible rail shipments would be used, in order to reduce the number of shipments.

The spent fuel consolidated at the MRS facility would be shipped to the repository by dedicated trains, with each train consisting of several (five to ten) large rail casks also certified by the Commission. Because these rail casks would not be constrained by the cask-handling capabilities of the reactors, they could be somewhat larger than the rail casks expected for the reactor-to-MRS segment. Consolidation and the use of larger rail casks in dedicated trains would significantly reduce the number of shipments to the repository.

3.3.4 Storage

As already mentioned, the proposed MRS facility would be able to store up to 15,000 MTU of spent fuel in sealed storage casks especially designed for easy monitoring and retrieval.

3.3.5 Disposal

The method specified by the Act for permanent disposal is isolation in geologic repositories. The Act provides for the construction of one repository and establishes the process for siting two repositories. (The construction of the second repository is not authorized at present, although the first repository can accept no more than 70,000 MTU of waste before the second repository starts operations.)

3.4 ADVANTAGES AND BENEFITS OF DEVELOPING AN MRS FACILITY

The development of the proposed MRS facility would yield significant advantages and benefits for the waste-management system by (1) improving system development by allowing many first-of-a-kind licensing and planning activities in the waste-management program to be carried out in advance of repository activities, (2) accelerating waste acceptance from the utilities, (3) providing increased reliability and flexibility in operating the system, (4) facilitating the operations of the repository, and (5) improving the performance of the transportation system. In addition, the development of the MRS facility is expected to produce institutional benefits that could have a positive effect on the progress of the geologic repository program and enhance the public acceptance of geologic repositories.

3.4.1 Improvements in System Development

The MRS facility would accelerate the system-development schedule because it would allow the DOE to plan, design, and deploy major components of the waste-management system in advance of the geologic repository. These major system components include the pre-waste-emplacement functions: acceptance of spent fuel from the utilities, transportation from the reactor sites to the MRS facility, spent-fuel consolidation, and loading into canisters. The two-step approach to system development (i.e., first the MRS facility and transfer of spent fuel from the reactors and second the geologic repository) would lead to a number of advantages, including the following:

1. The development of the entire waste-management system would be made more manageable and hence easier. The delineation and development of

separable segments of this system would facilitate the enormous task of developing, implementing, and managing the entire system. With early approval of the MRS project, the development of the pre-waste-emplacement functions of the system can proceed on the basis of more-complete and more-certain information. Efforts to develop the repository can be more narrowly focused and made similarly more manageable.

2. The basis for establishing the final schedule for spent-fuel acceptance from the utilities in 1991 would be improved because definitive facility designs for the first part of the system would be available several years earlier.

3. The parameters needed to develop the transportation system would be defined earlier because route-specific planning, logistics planning, and equipment procurement could begin after the MRS proposal is approved.

4. The licensing of the surface facilities of the repository could be simplified since the MRS facility would reduce the size and operations of the waste-handling surface facilities of the repository.

5. A single focal point for early system integration would be established.

6. The detailed planning and management of the first part of the system would no longer be dependent on repository-development activities.

3.4.2 Accelerated Waste Acceptance from Utilities

Since the MRS facility would begin operations in late 1996 and reach full-scale operations by 1998, the waste-acceptance rates of the waste-management system would start exceeding reactor-discharge rates 5 years earlier than would otherwise be possible. Without an MRS facility, up to 4000 MTU of new temporary storage capacity would be needed at some 20 to 25 reactors by the year 2002, when the repository would start operating at full capacity. New temporary storage capacity--and possibly rod consolidation--will have to be provided at some reactor sites in any event, but to a far smaller degree with an MRS facility added to the system. The necessary incremental storage can be provided at the MRS facility more efficiently and at less cost, mainly because a single facility specifically designed and licensed for that purpose would be used instead of many separately designed and licensed independent spent-fuel-storage and rod-consolidation installations at various reactors or spent-fuel transshipments from reactor sites with filled-up storage pools to sites with available storage capacity.

Early progress in the development of the MRS facility with up to 15,000 MTU of storage capacity would allow utilities to plan at-reactor storage requirements with more certainty and efficiency, and it would allow more confidence in agreements with the DOE on spent-fuel transfer amounts, specifications, and dates.

3.4.3 Improvements in System Reliability and Flexibility

The addition of an MRS facility at the Clinch River site would significantly improve the reliability and flexibility of the waste-management

system; these improvements would benefit nearly all operations of the waste-management system, from the unloading of reactor storage pools to final waste emplacement in a geologic repository. The inclusion of significant storage capability at the MRS facility would provide a system buffer that would allow the unloading of reactor storage pools to be independent of the loading of the repository. This system-buffer capability is important because the optimal rates and sequences for unloading the individual reactor storage pools will differ from waste-acceptance rates conducive to an efficient loading of the repository. Monitored retrievable storage would also provide additional options for optimizing these separate operations in a coordinated fashion. Furthermore, delays or disruptions in one component of the system would be less likely to affect the progress of the entire system.

The improvement in system flexibility and reliability, which would be realized immediately and thereafter sustained at a notably higher level, would produce identifiable improvements in the manageability of the system. Enhanced flexibility is particularly important in a program of long duration (extending at least 50 years into the future) because it would allow the DOE to better accommodate the circumstances of the future.

3.4.4 Advantages for the Repository

The MRS facility would provide several advantages to the repository, both during development and operations. Because many of the major waste-preparation functions would be performed at the MRS facility, the waste-handling surface facilities at the repository and the associated operations would be simplified. This simplification could facilitate the licensing of this portion of the repository.

When the repository begins receiving waste, the operations necessary for preparing the spent fuel for underground emplacement would be reduced to the extent that these operations are performed at the MRS facility. Other operational advantages include the following:

1. The repository would receive fewer shipments, all shipments from the MRS facility would arrive in one mode (by rail), and the control over transportation operations (e.g., schedules) would be increased.

2. Because of its large inventory of spent fuel, the MRS facility would be able to selectively prepare or ship canisters with particular heat-generation rates to provide a desired repository heat-loading sequence. Such preparation would not be practical at the repository because the repository would not contain a sufficient inventory of waste during the first years of its operation.

3. The MRS facility would ship to the repository canisters that are free of surface contamination with radioactive material.

4. The MRS facility would perform a large portion of the inventory-accountability function, which will include labeling each canister, coding, etc.

5. The MRS facility would facilitate control of the rate of waste transfer to the repository, which would enhance the efficiency of repository operations.

3.4.5 Improvements in the Transportation System

Since the preferred site for the MRS facility has already been identified, approval of the facility would allow the DOE to proceed with developing the transportation system more efficiently and with greater certainty. If the MRS facility is not approved, some of these developments may have to await the selection of the repository site (currently scheduled for 1991).

Since all of the spent fuel consolidated at the MRS facility would be shipped in dedicated trains, the number of shipments to the repository would be significantly reduced. Furthermore, the MRS facility would minimize the distances of spent-fuel shipments by truck, in less-efficient casks. Being centrally located to most reactors, the MRS facility would serve as a hub for transportation operations, significantly enhance the control and management of transportation operations, and reduce the number of cross-country shipping routes.

Among the most important transportation benefits of the MRS facility would be the institutional ones. By allowing early identification of transportation routes to the MRS site, the MRS facility would increase the time available to work with State and local governments, Indian Tribes, and the public in route-specific planning and the resolution of attendant issues. The affected States would know specific transportation requirements, and site-specific planning for emergency preparedness can begin earlier.

3.4.6 Institutional Benefits

The development of an MRS facility is expected to produce institutional benefits broader than those mentioned above for transportation. For example, the experience gained from interactions with the State of Tennessee would allow better definition of certain institutional arrangements for the repository system. Furthermore, it would allow the DOE to demonstrate to the potential repository host States, potentially affected Indian Tribes, local governments, and the public that it is willing and able to be a responsible corporate citizen and neighbor. The expected reduction in transportation impacts should further enhance public confidence. Moreover, the acceptability of the repository may be further enhanced by the perception of siting equity if the site of the repository is located in the Western United States and the MRS facility is sited in the eastern portion of the country. Also not to be overlooked are the licensing and institutional impediments that would be avoided by reducing the need for additional at-reactor storage.

Locally, the MRS facility would result in some economic benefits through the creation of direct and secondary employment, increases in tax revenues, payments, and other economic benefits associated with a large-scale project. It should be noted that the local community, because of its long association with nuclear projects and its technical sophistication, is particularly able to provide skilled and knowledgeable personnel for the MRS facility.

Other benefits include the flexibility of the MRS facility for servicing the second repository, if authorized, and to facilitate the decommissioning of commercial reactors that have reached the end of their useful lives but have spent fuel that has not been sufficiently aged for acceptance at the repository. Without an MRS facility, this fuel would remain at these shutdown reactor sites until the repository is able to receive it.

Most of the benefits cited in this section are not quantifiable, but none is more difficult to quantify than the value of having a portion of the waste-management system operational ahead of the waste-acceptance date mandated by law.

3.5 THE COSTS AND IMPACTS OF DEVELOPING AN MRS FACILITY

The major costs and impacts of developing an MRS facility and achieving the benefits previously described are grouped and discussed in three categories: financial, environmental, and programmatic impacts.

3.5.1 Financial Impacts

Detailed cost estimates based on site-specific conceptual designs have been prepared for the engineering, construction, operation, and decommissioning of an MRS facility and are fully explained in the program plan.

The expenditures for the MRS program from the time of Congressional approval until the facility becomes operational are estimated at approximately $970 million, of which approximately $700 million would be used for construction. The annual operating costs of the facility, which would employ about 600 workers, would be approximately $70 million, not including financial-assistance or tax-equivalency payments. The estimates are higher for the initial years of operation, when up to 1600 sealed storage casks must be fabricated, and lower in the later years, when the MRS facility stops receiving spent fuel and is only shipping spent-fuel canisters to the repository. Decommissioning would cost approximately $70 million. The estimated expenditures do not cover site transfer or the institutional measures proposed in Section 4.

All MRS expenditures would be paid out of the Nuclear Waste Fund established by the Act. The revenues collected for this fund are derived from the fees charged to the generators of the waste; at present these fees include a charge of 1 mill per kilowatt-hour to utilities that generate spent fuel, but this charge may be adjusted by Congress if needed to cover program costs. The life-cycle expenditures for the waste-management program are estimated to range from $25 billion to $31 billion in constant 1985 dollars. The net incremental system costs of the recommended MRS facility are estimated to range from $1.4 billion to $2.0 billion, not including avoided costs, financial assistance, and intangible benefits, discussed below. The incremental system costs would therefore constitute a small percentage of the total-system cost; in fact, they are within the uncertainty range of current cost estimates for a waste-management system without an MRS. The current utility fee is considered adequate to fund the program in the near term, and it will be reviewed annually to ensure that it is sufficient to cover all program costs and adjustments proposed to Congress if needed.

The financial costs of adding an MRS facility are considered small in comparison with the benefits. Furthermore, the costs borne by the utility ratepayers would be offset by the savings in at-reactor storage costs, which would be avoided because an MRS facility would allow the DOE to accept spent fuel at an earlier time, and, under certain scenarios, it is possible that the addition of an MRS facility would result in net and overall system cost savings.

The DOE has included in the President's FY87 budget the funds required for the execution of the program proposed herein. Included are funds for direct costs and for State and local payments. The program plan (Volume 3) presents the projected expenditures for direct program costs. State and local payments will be projected in the consultation-and-cooperation agreement between the DOE and the State of Tennessee.

3.5.2 Environmental Impacts

The environmental impacts of the MRS facility are discussed extensively in the environmental assessment (Volume 2). The construction, operation, and decommissioning of an MRS facility at any of the three candidate sites would entail slight environmental impacts, all well below applicable Federal and State standards. The estimated total waste-system risks and environmental costs do not differ significantly for systems with and without an MRS facility. The primary effect of adding an MRS facility would be to redistribute some of these risks and environmental costs among facilities and transportation corridors. In a system with an MRS facility, most spent-fuel shipments would converge at the MRS site rather than the repository site, even though the expected overall transportation-system impacts would be reduced. With an MRS facility, the facility impacts would be reduced somewhat at the repository, but impacts in the MRS host state would obviously increase.

The Act specifies the environmental information that is to accompany this proposal. That information is provided in the environmental assessment that accompanies this proposal. Included in that document are a comparative analysis of alternative overall system designs (with and without an MRS facility) as well as detailed analyses of alternative site-specific designs for an MRS facility.

If an MRS facility is approved by Congress, detailed analyses of potential environmental impacts will be presented in an environmental report that will be submitted to the Nuclear Regulatory Commission. The analyses that would be performed for this report are described in the program plan. The Nuclear Regulatory Commission would prepare an environmental impact statement as part of the licensing process.

3.5.3 Perceived and Potential Programmatic Impacts

The perceived and potential programmatic impacts of adding an MRS facility are the weakening of resolve to develop a repository, the potential for diverting the resources needed to develop a repository, and the enlargement of the system to be implemented. Earlier efforts to provide Federal storage facilities have raised the concern that the ready availability of Federal storage would make it easy for the nation to defer the difficult political decisions required to site a geologic repository. Conversely, the history of the waste-management program suggests that the credibility of any interim-storage measures will be suspect unless there is confidence that a permanent repository will be available within a reasonable period of time.

To dispel doubts about the resolve to develop a repository, the DOE proposes a direct linkage of MRS operations to the development of a repository. Specifically, the DOE proposes that waste acceptance at the MRS facility be precluded until a construction authorization for the first repository is received from the Nuclear Regulatory Commission. In addition,

the DOE recommends that the storage capacity of the MRS facility be limited to 15,000 MTU. This capacity is sufficient to offset potential storage shortfalls at reactors for approximately 5 years, but it is less than one-third of the spent-fuel inventory expected by the year 2000. Finally, the DOE has a statutory obligation to develop a geologic repository, and progress in achieving this mandate is monitored very closely by a wide range of interested and potentially affected parties (e.g., States, Indian Tribes, and utilities) in addition to the Congress as well as Government audit and accounting groups. This close scrutiny and commitment provide additional assurance that progress will be sustained or else corrective measures taken.

The financial and manpower resources projected for an MRS facility are modest considering the scope of the existing program. Competition for these resources can be minimized, if not prevented, through proper management and planning, as shown in the program plan (Volume 3). By these means the DOE can ensure that a priority on resources is maintained for the repository and that the MRS program does not take away or limit any resources needed by the repository program. Furthermore, the maturity of the technologies for spent-fuel handling and storage and the extensive consideration the DOE has given to the technical, economic, schedule, and institutional feasibility of an MRS facility should minimize the demands placed on the upper management of the DOE and further contribute to confidence that an MRS facility can be constructed and operated without compromising the repository schedule.

In the final analysis, the Congressional mandate that assures that permanent disposal in a geologic repository is the national choice also assures that the MRS facility will serve the intended--and only the intended--purpose for the MRS.

4 RECOMMENDATIONS FOR INSTITUTIONAL PROVISIONS

Recognizing the complex institutional challenges faced by the waste-management program, Congress set forth in the Nuclear Waste Policy Act of 1982 one of the most comprehensive outreach and public involvement plans ever mandated. The major institutional provisions of the Act include requirements for notifying affected parties of certain of the DOE's planned activities and soliciting their comments; consulting and cooperating with States and affected Indian Tribes and committing plans for such interactions to written agreements; assessing the effects of program activities on States, affected Indian Tribes, and local communities at frequent intervals throughout the program; and a substantial commitment to avoid or mitigate any negative impacts.

One of the potential benefits of developing the integral MRS facility is the early opportunity to demonstrate that a major Federal waste-management facility developed under the Act can be not only safe and environmentally sound but also a responsible "corporate citizen." Such an early demonstration would not only benefit the State and the local community hosting the MRS facility but could also help assure potential repository host States that the DOE's actions in response to their concerns will be similarly addressed.

The participation of the government of the candidate host State is particularly important to an efficient and effective MRS program. To facilitate its participation, the DOE awarded to the State of Tennessee a grant for evaluating the MRS proposal as well as for various preliminary interactions. After the announcement in April 1985 that three Tennessee sites were to be considered for the MRS facility, Governor Lamar Alexander initiated a review of the proposal and directed that it be coordinated by Tennessee's Safe Growth Cabinet Council. The Safe Growth Council then initiated a range of efforts, drawing on the expertise of a large number of State and local officials and respected professionals from the academic and technical communities. Roane County and the City of Oak Ridge, the local governments sharing jurisdiction over the sites identified as the DOE's preferred and alternative choices, were among those invited to participate, and a similar invitation was extended to the local government in the Hartsville area, the location of the other alternative site. To evaluate the acceptability of an MRS facility at the Oak Ridge sites, the Clinch River MRS Task Force was established in July 1985. The Task Force limited its activities to the determination of whether the proposed MRS facility would be acceptable to the Roane County and Oak Ridge governments and, if so, under what conditions. The State has not completed its evaluation to date, pending the receipt of additional information from the DOE on its proposal.

As discussed in its report, the Clinch River MRS Task Force found that the MRS facility "could be made acceptable to the communities of Roane County and Oak Ridge" if the DOE complies with the conditions recommended by the Task Force. The issues, potential impacts, and mitigating measures identified by the Task Force in this context--and its special insights into local conditions and attitudes--and by the Safe Growth Cabinet Council were important in the formulation of the following portions of this proposal. These items are discussed below under three topics: the involvement of State and local governments, assurance about safety and environmental quality, and financial assistance.

If Congress approves the MRS facility, the institutional measures summarized here will be critical to the successful implementation of the MRS program. In considering these measures, it should be noted that many of them are a direct result of the unique provisions of the Nuclear Waste Policy Act. The activities proposed here would be funded out of the Nuclear Waste Fund and hence fully paid for by the owners and generators of the waste. They are not intended to establish precedents for other DOE activities, and the DOE's endorsement of the activities proposed here should in no way be construed as an endorsement of their application to other DOE activities.

4.1 THE INVOLVEMENT OF STATE AND LOCAL GOVERNMENTS

Important to the successful implementation of the MRS project is the establishment of an effective working relationship among the DOE, the State of Tennessee, and the local governments. Two measures for achieving such a relationship are proposed here: (1) the establishment of an MRS Steering Committee and (2) the development of a consultation-and-cooperation agreement between the DOE and the State of Tennessee.

4.1.1 MRS Steering Committee

To provide a mechanism for State and local involvement in the implementation of the MRS project and for obtaining input, including recommendations and evaluations, regarding the design, construction, operation, and decommissioning of the proposed MRS facility, the DOE proposes the establishment of an MRS Steering Committee that would provide guidance, conduct performance evaluations, and recommend corrective actions. As described below, State and local governments would have representatives of their choosing serve as members of the Steering Committee.

The DOE MRS project manager will have formally assigned responsibilities to respond to the recommendations of the MRS Steering Committee. Should the project manager take exception to the elements of a formal Committee recommendation, the Committee would be so informed in writing, with a complete explanation of the reason. Should the Committee disagree with the response, it would have recourse to an appeal procedure that would directly involve first the Manager of the DOE Oak Ridge Operations Office and eventually, if necessary, the Director of the Office of Civilian Radioactive Waste Management to ensure that the disagreement is fully and openly aired and resolved fairly, equitably, and promptly.

The membership of the Committee is proposed to be as follows:

1. A chairman named by the DOE in consultation with the Governor of Tennessee.

2. Two members representing the State of Tennessee.

3. One member representing Roane County.

4. One member representing the City of Oak Ridge.

5. One member representing the utilities paying into the Nuclear Waste Fund.

6. One member representing other public interests.

7. Two members representing the DOE, one of whom would represent the DOE's Assistant Secretary for Environment, Safety and Health.

The chairman would serve for a 4-year term and would have staff support from the MRS project.

The Steering Committee would have complete and full access to information concerning the MRS that is available to the manager.

The formation and functions of the Steering Committee could be specified in the consultation-and-cooperation agreement signed with the State of Tennessee and take into account the provisions of the Federal Advisory Committee Act; this agreement could also provide for the periodic examination of the effic ency and effectiveness of the Committee. The DOE expects that the Committee would have complete and full access to the resident NRC inspector and other applicable regulatory authorities, and procedures would be established whereby it could petition these authorities to cause a suspension of MRS operations if conditions so warrant.

The Committee would have the authority to convene and maintain specialized subcommittees or ad hoc committees to review or provide oversight on particular areas of interest or concern. The subcommittees would consist of no more than nine members and have particular expertise or ties with the State and local communities. The specific subcommittees are briefly discussed below; they would work through the Steering Committee. The existence of these subcommittees would not preclude the formation and funding of separate independent groups reporting to other authorities.

Subcommittee on Environment, Safety, and Health

This subcommittee would represent the environmental, safety, and health interests of the State and local communities during the final planning, design, construction, operation, and decommissioning the MRS facility. It would participate in the development or review of approaches for meeting regulatory requirements for the environmental, health, and safety performance of the MRS facility and in the review of the final design and operations against these requirements. This would include involvement in the scoping and review of the environmental report prepared by the DOE and subsequent activities related to the Nuclear Regulatory Commission's preparation of an environmental impact statement. The subcommittee is expected to have full access to, and evaluate information from, independent monitoring and inspection of the facility as provided for under the consultation-and-cooperation provisions of the Act.

Subcommittee on Transportation

Since transportation is of major concern to both the State and the local community, a transportation subcommittee could be established to oversee or review transportation planning, development, and operational activities applicable to the MRS facility. In particular, it would be involved in planning for road or rail-track upgrades, plans for shipping-cask development and procurement, operational planning (including inspection and enforcement), and the review of actual operations. (Other measures proposed to alleviate concerns about transportation are described in Section 4.2.2.)

Subcommittee on Public Information

Public acceptance is indispensable to the success of any large project, and there is concern, at both the State and the local level, that an erroneous perception of, or misconception about, the MRS facility. To promote an understanding of the MRS facility and its operations and to avoid such misunderstandings, a subcommittee on public information is proposed. It would recommend and oversee policies and programs directed at public information. Such involvement by a credible and independent source could improve public confidence in the MRS project, lessen concerns about potential risks and impacts, and minimize misconceptions.

Subcommittee on Financial Matters

This subcommittee would recommend and review policies and oversee the execution of programs representing the financial commitments of the DOE to the State and local community. In particular, it would oversee the development and execution of the measures for financial assistance described in Section 4.3 of this proposal. These include measures for preventing or mitigating the impacts of MRS construction and operation as well as for assisting the local community in the expansion and diversification of its commercial and industrial base. This subcommittee would help to determine which State and local efforts qualify for direct reimbursement. It would also help ensure that State and local resources (e.g., training facilities and local supplies) are used to the full extent allowed by Federal regulations where applicable.

4.1.2 Consultation-and-Cooperation Agreement

The MRS Steering Committee would provide a mechanism for the direct and continuous involvement of State and local governments in the management and oversight of the MRS project. It would be part of a baseline agreement, called a consultation-and-cooperation agreement, between the DOE and the State of Tennessee. Such an agreement is provided for under Section 117 of the Act, which would become applicable if an MRS facility is approved by Congress.

In accordance with this provision, the DOE would seek to enter into a binding written consultation-and-cooperation agreement with the State of Tennessee within 60 days of Congressional approval of the proposal. The agreement would be an "umbrella contract" between the DOE and the State of Tennessee. It would cover all items considered important by the DOE, the State, and the local community in addition to or as part of the specific requirements of the Act for this agreement. This would include procedures by which--

1. The MRS Steering Committee would be formed and function to (a) determine the possible impacts of the MRS facility and recommendations with regard to such impacts; (b) provide to the DOE the recommendations of the State and local governments; (c) oversee the administration of the financial assistance, transportation, and other provisions of this proposal; and (d) accomplish other goals envisioned by the DOE, the State of Tennessee, and the local governments.

2. The DOE and the State may review or modify the agreement.

3. The DOE shall assist the State and units of local government in resolving their offsite concerns, including road upgrading, emergency preparedness, and periodic monitoring of the health of residents in neighboring communities.

4. The DOE shall consult and cooperate with the State on a regular basis and provide for an orderly process and schedule for State review and evaluation.

5. The DOE shall notify the State before transporting any waste to the MRS facility and implement other agreements related to transportation.

6. The State or local authorities may conduct reasonable independent monitoring and testing activities at the MRS site.

7. The sharing of technical and licensing information, the use of available expertise, the facilitating of permit procedures, joint project review, and the formation of joint surveillance and monitoring arrangements to carry out applicable Federal and State laws are implemented.

8. The objections of the State are resolved at any stage of the project through negotiation, mediation, or other mechanisms.

It would be up to the State of Tennessee to ensure that local interests are accommodated in the consultation-and-cooperation agreement. Local governments should work with the State to determine the nature and extent of their involvement in the negotiation and signing of the consultation-and-cooperation agreement. This would include the degree to which issues of direct local concern would be left as a matter of negotiation or agreement directly between the DOE and units of local government.

4.2 ASSURANCES ABOUT SAFETY AND ENVIRONMENTAL QUALITY

The public must be assured that the MRS facility and the overall waste-management program are operated in accordance with the fundamental objective of protecting the health and safety of the public and the quality of the environment. Summarized below are particular measures and policies that should help to provide assurances about plant operation, transportation, and decommissioning and decontamination. The discussion ends with a brief look at an issue of local concern--the waste-management practices at other DOE Oak Ridge facilities.

4.2.1 Plant Operation

As already mentioned in Section 3.2.5, the major goals of the MRS design effort are to provide for the safety and health of MRS workers, the health and safety of the public, and the quality of the environment. Furthermore, the DOE will need to demonstrate to the satisfaction of the Nuclear Regulatory Commission that these goals are met and can be maintained; to this end, the Commission can maintain a resident NRC inspector at the site.

An important role in assuring the public that MRS facilities and operations meet and maintain the design goals of protecting the public and the environment could be played by the MRS Steering Committee, which has been

discussed in Section 4.1.1. For example, the Steering Committee, through one of its subcommittees, could be actively involved in the programs for gathering and evaluating data on the environmental, demographic, and socioeconomic conditions occurring in the local communities before the construction of the facility, including efforts involved in the preparation of the environmental report. This effort should begin as soon as possible after Congressional approval in order to establish a firm base of preconstruction data and continue until the decommissioning of the MRS facility has been completed. The data collected during construction, operation, and decommissioning would be used to monitor and document any effects attributable to the facility. The data would be available to the public.

The data base can be used by the Steering Committee to evaluate the safety performance of the facility and plans for responding to potential releases of radioactive material. Public hearings on the performance and response plans could be held to ensure public understanding and opportunity to comment.

The DOE will remain sensitive to the concerns of surrounding property owners in the design and construction of the MRS facility. Landscaping and buffers will be used to the maximum extent to mitigate construction and aesthetic impacts. The Steering Committee would have full access to, and be involved in, planning in this regard; it would also have ample opportunity to affect these plans and their implementation.

4.2.2 Transportation

As a potential host State for the MRS facility, Tennessee has a particular interest in, and unique needs in regard to, the transportation of radioactive waste. Transportation is also of major interest to all States through which shipments will pass, with or without an MRS facility. Indeed, the issues identified by State and local entities in Tennessee typify concerns expressed by other States and Indian Tribes need to be considered in a national context. In an effort to foster a climate conducive to the timely resolution of transportation issues, the DOE has been working with State and local representatives from Tennessee and many other interested States. These interactions have led to the identification of many procedural, operational, and financial issues in transportation, and policies responsive to these concerns are being developed.

Because the transportation concerns are not limited to the region in which the MRS facility would be located and to encourage participation by the concerned public, the DOE has taken several actions to open the process of transportation planning to a wide range of parties. In particular, two major planning documents, a Transportation Business Plan and a Transportation Institutional Plan, have been drafted, released for public comment, and openly discussed in a variety of forums. As part of the latter plan, discussion papers on specific transportation issues have been developed. These papers are being assembled into a Transportation Issues Discussion Document that will be used to detail policy options, examine transportation strategies, and note progress toward issue resolution. This document, to be first issued in the spring of 1986, will be revised annually to reflect new information, program events and decisions, and comments from the public. Tennessee's participation in this national effort will help ensure an integrated transportation system and contribute to a consensus approach in the development of transportation equipment and procedures.

One of the mechanisms for Tennessee's participation in the planning and operation of the transportation system is the subcommittee on transportation of the MRS Steering Committee (see Section 4.1.1). This subcommittee would provide a locally based mechanism for direct State and local participation in the development and operation of the transportation system specific to the MRS facility and in the transportation of the waste into and out of Tennessee. The transportation subcommittee would be able to directly affect and monitor the design and operation of the transportation system through the MRS Steering Committee and help ensure that the recommendations and concerns of State transportation authorities are being adequately considered and addressed.

The DOE will work with the State of Tennessee, local governments, and the Steering Committee to resolve transportation issues. In response to specific concerns expressed by both State and local groups, the following measures are proposed:

1. Upgrading of the Tennessee transportation infrastructure. State officials and the Clinch River MRS Task Force have indicated a need to substantially improve SR-58 and SR-95 to provide for the safe transportation of spent fuel from the nearby interstate system to the proposed MRS site. The DOE will work closely with the State and local representatives to identify the other improvements that may be needed. The process for determining the improvements that are necessary for waste shipments will be addressed in the consultation-and-cooperation agreement with the State of Tennessee.

2. Prenotification. The technology for the satellite-based real-time tracking of waste shipments is expected to be available when the transfer of spent fuel to the MRS facility begins. If, however, the technology is not used, the DOE will notify designated State and local officials in advance of each shipment.

3. Emergency response. Assistance will be provided to the State of Tennessee in ensuring that adequate emergency-response capabilities and equipment are available. The DOE will work with State and local representatives in developing training standards for emergency-response personnel and will ensure that a comprehensive training program is developed for use by interested officials.

4. Inspections. The DOE encourages and will support funding for the participation of State authorities in comprehensive inspections of spent-fuel shipments arriving and leaving the MRS facility.

Other issues--such as escorts for waste shipments, methods of transportation, intermodal transportation, route restrictions, training provisions, travel speeds, and preferred routes--are of keen interest nationwide, and additional consultations are required for their resolution. To the extent that these issues are not addressed in this proposal, the DOE proposes to address them in the consultation-and-cooperation agreement entered into pursuant to the approval of this proposal by Congress. The DOE is committed to reinforcing the confidence of States, Indian Tribes, and the public in its ability to operate a safe and efficient transportation system in support of the MRS facility.

If the MRS facility is approved, the State of Tennessee and the DOE Oak Ridge Operations Office will play a significant role in the transportation of the nation's spent fuel to the geologic repositories. Accordingly, the management of the operation of the civilian radioactive-waste transportation system would be assigned to the DOE Oak Ridge Operations Office. In a similar vein, the DOE proposes to establish a Transportation Operations and Research Center in the Oak Ridge area. Such a center would coordinate research on, and the development of, a consistent and comprehensive system for planning and conducting transportation operations. This transportation center would be the location for MRS transportation personnel training and qualification, and it would be expected to play a major role in determining procedures for equipment inspection and maintenance, procedures for real-time satellite tracking and communication, and other procedures for meeting the requirements of Federal, State, and local regulations.

To accommodate the concerns of other States through which waste shipments may pass, the DOE is investigating the potential for informal cooperative agreements. The institutional network necessary for such agreements will be based on established contacts within Governors' offices, other State agencies and legislatures, State and regional organizations, and the governments of Indian Tribes. To the extent practicable, the DOE will incorporate State-supported options in its planning.

4.2.3 Decontamination and Decommissioning

As already mentioned in Section 3.2.3, the MRS facility would be decommissioned at the end of its mission, and the site would be prepared for unrestricted use. Monitoring by the Steering Committee would continue through the completion of decommissioning.

No radioactive material would be left at the site after decommissioning. Any radioactive waste that is generated at the MRS facility during operations would be shipped off the site for disposal; none would be buried at the site. This approach would also be used for any material that remains radioactive after decontamination.

4.2.4 Other Oak Ridge Facilities

The local community has requested that the DOE establish a schedule for bringing all DOE Oak Ridge facilities into compliance with applicable State and Federal environmental regulations and that these programs be implemented before the start of MRS operations. This issue is being addressed separately by the DOE Oak Ridge Operations Office.

Specifically, the DOE has signed with the U.S. Environmental Protection Agency (EPA) and the State of Tennessee a memorandum of understanding that commits the DOE to work with the State and the EPA to resolve all current questions concerning waste-management practices at the Y-12 plant. To facilitate coordination, the memorandum of understanding establishes a joint task force consisting of representatives from the DOE, the EPA, and the State of Tennessee. The task force has developed a 5-year plan for resolving the environmental issues related to ongoing operations at Y-12 and has developed cost estimates for implementing this plan. Remedial actions are also required, and planning is under way to identify and complete them. It is not certain when these remedial actions will be completed, but planning must come

first in any event. The DOE is committed to resolving these problems as soon as agreement with the State of Tennessee and the EPA can be reached on the appropriate cleanup techniques and funding is available. Similar activities are under way regarding the facilities and sites used by the Oak Ridge National Laboratory and the Oak Ridge Gaseous Diffusion Plant.

The DOE will continue to provide information and periodic briefings to the officials of local governments to ensure full communication about plans, programs, and problems.

4.3 FINANCIAL ASSISTANCE

The MRS facility will result in some economic benefits through the creation of direct and secondary employment and other beneficial effects normally associated with large-scale projects. However, the preparation for, and the accommodation of, a major waste-management facility also imposes a variety of burdens on the host community and the State. The potential effects of MRS development and operation have been evaluated at both the State and the local level. The State and units of local government have both reported on these effects and identified a number of concerns, including potential social and economic impacts, that can be appropriately addressed through some form of financial assistance.

Section 141(f) of the Act mandates impact aid payments to units of general local government in order to mitigate any social or economic impacts resulting from the construction and operation of an MRS facility, but the Act is silent regarding measures beyond those applicable to units of general local government.* Nonetheless, on the basis of information provided by the DOE, the State has identified social and economic impacts beyond those that would affect just local jurisdictions, and the DOE believes that actions to address these impacts as well are appropriate. Accordingly, proposed herein are measures that would go beyond the limited requirements of Section 141(f) while also meeting those requirements. In addition, the DOE would take appropriate actions to encourage the diversification of the local industrial base and thus contribute to greater stability in the socioeconomic environment.

Separately and apart from any assistance for mitigating social or economic impacts and payments equivalent to taxes, the DOE would fully reimburse the State for reasonable and direct expenses incurred in association with the MRS facility. The designation of eligible activities would be accomplished through the consultation-and-cooperation agreement.

Financial assistance is proposed for two different MRS phases: the period preceding MRS operations and the period commencing with the start of operations and continuing through decommissioning. During the first phase, financial assistance is required to begin planning for the mitigation and prevention of the effects of the facility and to implement these plans.

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*Section 116(c) of the Act addresses financial assistance to the States involved in the repository program, but this section is not made applicable to the MRS program.

Financial needs will change as the development of the MRS facility and the transportation system progresses through final design, licensing, and construction. Once the MRS facility starts operating, the financial needs are expected to stabilize.

The financial assistance programs proposed for these two phases would be defined in consultation with, and administered through, the State and local governments. As described below, for the preoperational phase the DOE recommends that, if Congress approves this proposal, sufficient monies be provided annually to address State and local concerns. The financial assistance proposed for the operational period is payments based on the operations or the assessed value of the facility; such payments would be similar to the taxes paid by taxable facilities.

In addition, the DOE expects to use procurement provisions available under existing Federal regulations and to take other specific measures to ensure that the State and local governments will not be negatively affected by the development and operation of the MRS facility and the transportation of waste to and from the site.

4.3.1 Preoperational Phase

To address State and local concerns regarding social and economics impacts before the startup of the MRS facility, the DOE proposes to provide financial-assistance payments. (For example, an allocation of $85 million invested at 8 percent would provide $12.5 million annually to the State and local governments for a 10-year period.) The necessary funding would be projected in the consultation-and-cooperation agreement.

It is proposed that the payments made annually during the preoperational phase to the State and local governments would approximate the taxes that would eventually be paid by a fully operational MRS facility valued at $1 billion. This would provide the State of Tennessee and the local governments with an assured source of funds for financial assistance so that adequate preparation can be made for MRS deployment and transportation operations.

This financial assistance would continue until the end of construction, at which time the operational program, discussed in the next section, would begin. This would meet and exceed the requirements of Section 141(f) of the Act, which directs that impact-mitigation payments to units of local government begin after Congressional authorization to construct an MRS facility.

One of the social and economic impacts of concern to adjacent-property owners is that the MRS facility would have a negative effect on real-estate values. The measures proposed herein should help to prevent or mitigate such impacts.

Another impact of concern is the potentially negative impact of the MRS facility on economic development efforts. The Clinch River MRS Task Force has identified the need for a significant public education program to provide accurate information on the MRS facility. The State's socioeconomic consultants have identified similar problems in their preliminary studies, heightening concern that the MRS facility would negatively affect the region's industrial recruitment activities and eastern Tennessee's vital tourist

business. These impacts would be addressed through payments allocated for the mitigation of any such impacts. In addition, the DOE would use its Museum of Science and Energy to provide public information on the MRS facility, would ensure that the appearance of the facility is aesthetically pleasing, and would build and staff a visitors center at the facility so that the MRS makes a positive contribution to the region's favorable image.

4.3.2 Operational Phase

During the operational phase of the MRS facility, it is proposed that State and units of local government be assured that during each fiscal year of facility operations they will receive, in addition to impact-mitigation assistance as under Section 116(c)(2), payments equal to the amounts they would receive from taxing the MRS facility like other real property and industrial activity within their jurisdictions as under Section 116(c)(3). This approach would be consistent with the mandate of the Act for repository States and units of local government. The DOE believes that these provisions should apply to the MRS facility because it will perform many of the waste acceptance and preparation functions that were planned for the repository and because the transportation and other operational impacts would be virtually identical with those otherwise occurring at a repository site.

To implement such a program, the DOE proposes that the binding consultation-and-cooperation agreement define a specific plan for administering this program, including the valuation formulas and the use of a mediation board or alternative means to settle disputes.

4.3.3 Specific Actions

There are several areas where specific actions other than those described above could be taken to ensure responsible corporate citizenship. These actions are mostly related to procurement for the MRS project. For the development of the MRS facility and the transportation system, the DOE would rely to the maximum extent possible on the private sector. Private-sector facilities and operations are taxable, and their use would contribute to the expansion and diversification of the local and regional economic base. Proximity to the host community and the attendant cost savings would be significant factors in the selection of contractors. Consistent with the above, training programs would be provided, whenever feasible, through State and local educational institutions. In the selection of major contractors, any proposed measures by bidders that would further contribute to the expansion and diversification of the local and State interests would also be considered.

The Oak Ridge community was depending on the availability of the Clinch River site in its efforts to expand and diversify its industrial base, but the approval of the MRS facility would remove the Clinch River site from consideration as a prime site for industrial development. To assist the community's continued industrial-development activities and to compensate for the loss of the Clinch River site, the DOE will make available, under existing Federal law, an industrial site in the Roane County portion of Oak Ridge if the land for such a site becomes excess to the DOE's programmatic needs.

IN THE UNITED STATES COURT OF APPEALS

FOR THE SIXTH CIRCUIT

STATE OF TENNESSEE, Plaintiff-Appellee (86-5087-5168) Plaintiff (85-3859) VS. JOHN HERRINGTON, Secretary of the UNITED STATES DEPARTMENT OF ENERGY, Defendant-Appellant (86-5087-5168) Defendant (85-3859)	]]]]]]]]]]]]]	Nos. 85-3859 86-5087 86-5168

REPLY BRIEF OF THE STATE OF TENNESSEE

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I. THE DEPARTMENT OF ENERGY'S INTERPRETATION OF § 10161(h) FAILS TO APPECTUATE THE INTENT OF CONGRESS IN ESTABLISHING THE STATE CONSULTATION AND COOPERATION PROCESS EMBODIED THEREIN.

In considering DOE's Brief, as well as that of the amici, it is critical to keep in mind the real issues of this case and the proper manner in which they must be resolved. Woven throughout DOE's Brief and the amici's brief is the recurring theme that the provisions of the Nuclear Waste Policy Act must be interpreted only in a manner consistent with the expeditious construction of an MRS facility in Tennessee. Such argument hardly frames or resolves the substantive issue of this case.

The sole substantive issue before this Court is whether the consultation and cooperation mandated by 42 U.S.C. § 10161(h) of the Nuclear Waste Policy Act (hereinafter Act) is to occur during formulation of a congressional proposal for an MRS in Tennessee or only after Congress authorizes construction of the facility. There is no dispute among the parties that § 10161(h) requires a consultation and cooperation process with the state affected by the MRS. Again, the issue before the Court is when that process must take place. Resolution of this issue hinges on an interpretation of the language in § 10161(h). The opera-

tive language of the section provides that "[a]ny facility authorized pursuant to this section shall be subject to. . ." the consultation and cooperation process spelled out in 42 U.S.C. § 10137. DOE argues that "authorized" means "authorized by Congress;" thus, consultation and cooperation is required only after Congress directs construction of the facility. Tennessee, on the other hand, takes the position that the term "authorized" refers to a facility generally contemplated for study and development by the Secretary for presentation to Congress. A proper resolution of this question of statutory construction can be accomplished only by interpreting the language of § 10161(h) to effectuate the intent and purpose of Congress when it enacted the provision. The interpretation of § 10161(h) by DOE falls short of fulfilling the obvious congressional intent and purpose embodied in the section.

DOE attempts to support its interpretation that "authorized" in § 10161(h) means "congressional authorization" by two separate arguments, neither of which is valid and both of which ignore the legislative purpose behind consultation and cooperation with an affected state. DOE first argues that § 10161 is clear on its face that "authorized" in subsection (h) means "congressional authorization". This is so, according to DOE's thinking, because the six other times "authorized" appears in § 10161, the word is used to

mean congressional authorization. What "authorized" means in subsection (h) does not, however, ultimately rest on what it means elsewhere in § 10161. DOE's reasoning would most likely be rejected by one Tennessee jurist as "unwaivering conformity to purposeless uniformity." State of Tennessee v. Champion International Corp., ___ S.W.2d ___ (Tenn. 1986) (April 21, 1986) (dissenting opinion).

The District Court rejected DOE's simplistic interpretation of § 10161(h) in favor of a more critical analysis. The District Court first looked at the language of the statute to ascertain the congressional intent. State of Tennessee v. Herrington, 626 F.Supp. 1345, 1356 (M.D. Tenn. 1986). The Court agreed with DOE that "authorized" was used six other times in § 10161 and in each instance, either explicitly or by clear implication, referred to "congressional authorization". With respect to § 10161(h), however, there was no such clarity of intent. Id. at 1357.

Thus, the Court looked beyond the statutory language to the purpose of the law. After a thorough review of the legislative history of the Act, the Court concluded that Congress intended the State to play an active role in the MRS siting process to the same extent that public participation was provided in the process of siting a repository. As such, the Court rejected DOE's argument that

consultation and cooperation was to take place only after congressional authorization of construction of an MRS. As the Court concluded:

> The legislative history and the statutory language of the NWPA dictate the conclusion that the provisions incorporated in section 141(h) of the Act, 42 U.S.C. § 10161(h), must be given effect prior to Congressional authorization of MRS construction. This result is consistent with the goals the statute is attempting to achieve, while the Secretary's interpretation by contrast would frustrate the express will of Congress.

Id. at 1359.

DOE attempts to circumvent the District Court's careful reading of the legislative history by yet another simplistic analysis. DOE begins with the correct premise that Congress intended states affected by an MRS to have the same participation rights under the Act as states affected by a repository.[1] Since participation by repository states does not take place until after Congress authorized the repository, according to DOE, no participation by an MRS

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[1] See Remarks of Senator McClure, Cong. Rec., S. 15642 (Dec. 20, 1982):

> "Full state participation is provided for the MRS program in exactly the same way as it is provided in the case of repository sites."

state should take place until after congressional authorization.

This syllogistic reasoning belies the very different natures of the repository and MRS siting processes. Congressional authorization of an MRS has radically different implications than authorization of a repository with respect to the ability of a state to participate in the consultation and cooperation process. When Congress authorized a deep geological repository pursuant to 42 U.S.C. § 10132, it did so in concept only. The location of the repository was not selected by Congress, but left to the executive branch. This site selection procedure refers to the state consultation and cooperation process and is elaborately spelled out in the Act. On the other hand, Congress, in the Act, chose not to authorize immediate construction of an MRS, even in concept. It chose only to direct DOE to study the matter and submit a proposal back to Congress. The proposal submitted to Congress is to identify a location for an MRS and contain a detailed design of the facility sufficient to let the project out for for bid if Congress approves construction.

Under DOE's logic, the agency does not have to consult and cooperate with Tennessee until after construction of the facility is imminent. Consultation and cooperation

at this point is a far cry from the "[f]ull state participation" in the MRS program, comparable to the repository program, as envisioned by Senator McClure. See footnote 1, supra.

Not only does DOE's interpretation of "authorized" in § 10161(h) subvert Congress' intent for consultation and cooperation with an affected state in the MRS siting process, it renders useless two other rights assured Tennessee under § 10161(h). See Brief of the State of Tennessee, p. 44. In addition to the consultation and cooperation provided for under § 10161(h), the section also references into the MRS process the notice provisions of 42 U.S.C. § 10136(a). These provisions require DOE to identify potential sites for an MRS within 90 days of the effective date of the Act and within 90 days thereafter, to notify the affected states. Under DOE's interpretation of "authorized" in § 10161(h), however, this notice provision would not become operative until after construction of an MRS facility was a certainty. DOE attempts to explain away this gross inconsistency by dismissing it as an "anomaly." Brief for the Secretary of Energy, p. 30.

Section 10161(h) also references into the MRS siting process the provisions of 42 U.S.C. § 10135 and § 10136(b). These provisions give the governor or legisla-

ture of a state affected by an MRS or repository the right to submit to Congress a notice of its disapproval of the site selection. Under these provisions, unless Congress by joint resolution overrides this notice of disapproval, a facility could not be built on the site in question. As with the other provisions of § 10161(h), DOE would not have this disapproval process triggered until after Congress passed a law requiring the MRS facility to be built. DOE recognizes that disapproval after authorization may be "too late to be meaningful." See Brief for the Secretary of Energy, p. 27. Nevertheless, DOE sees the demise of Tennessee's disapproval rights as simply a "consequence" of the ultimate role Congress has in deciding where the MRS will be located.

In short, Congress enacted § 10161(h) for a very specific and clear purpose. The purpose behind the section is to provide meaningful and active participation of states affected by an MRS in the process of siting and developing such a facility. Any proper interpretation of § 10161(h) must be consistent with this purpose or the will of Congress will be frustrated. This Court should, therefore, be loathe to give effect to DOE's interpretation of the statute that serves only to counteract a clearly expressed legislative intent.

II. DOE'S CONTENTION THAT THE COURT MUST DEFER TO ANY RATIONAL INTERPRETATION THE AGENCY MAY GIVE TO "AUTHORIZE" IN § 10161(h) IS WITHOUT MERIT AND MERELY SELF-SERVING TO THE INTEREST OF DOE.

DOE alternatively argues that if the Court does not find Congress' intent clear on the face of § 10161(h) with respect to the meaning of the word "authorized," then it must defer to any "rational" interpretation of that language by DOE whose job it is to administer the statute. DOE's argument in this regard is erroneous in two respects. First, the principle of judicial deference to an administrative agency's interpretation of a statute is not applicable in the instant case. The principle of deferring to an agency's interpretation of a statute relied upon by DOE is set forth in Chemical Manufacturer's Assoc. v. Natural Resource Defense Council, ___ U.S. ___, 105 S.Ct. 1102, 84 L.Ed.2d 90 (1985). In that case, the Court stated:

> [The] view of the agency charged with administering the statute is entitled to considerable deference, and to sustain it, we need not find that it is the only permissible construction that [the agency] might have adopted but only that [the agency's] understanding of this very 'complex statute' is a sufficiently rational one to preclude a court from substituting its judgment for that of [the agency]. Of course, if Congress has clearly expressed an intent contrary to that of the Agency, our duty is to enforce the will of Congress. (Citations omitted).

Id., 105 S.Ct. at 1108, 84 L.Ed.2d at 98. As noted above, Congress has expressed a clear intent that states effected

by development of a repository or an MRS are to have meaningful input and involvement in that development process. To the extent that DOE's interpretation of "authorize" in § 10161(h) is contrary to that intent, it cannot be given the considerable deference which is sought.

In any event, the reasons asserted by DOE as supporting the rationality of its interpretation of § 10161(h) are without merit. These reasons have nothing to do with the meaningful involvement of the State of Tennessee in the MRS siting process; rather, they argue for the most expedient and least burdensome means of building an MRS in Tennessee. First, DOE argues that consultation and cooperation as set forth in the repository siting process at § 10137 cannot be referenced into the MRS process as contemplated by § 10161(h). DOE notes that under § 10137(b), consultation and cooperation in the repository process is triggered when the Secretary conducts a study of an area within a state which has been designated by the President for site characterization under 42 U.S.C. § 10132(c) to determine its suitablity for a repository. Admittedly, the MRS siting process contains no provision for site characterization of an area upon designation by the President similar to § 10132(c). Due to this fact, and for reasons not readily apparent, DOE automatically concludes that consultation and cooperation makes more sense after congressional authorization than before.

The consultation and cooperation provisions of § 10137 dealing with the repository can be meshed into the MRS siting process, however. By eliding the language pertaining to presidential designation for site characterization that is superfluous to the MRS process, a rational result effectuating the intent of Congress can be accomplished. State of Tennessee v. Herrington, 626 F.Supp. at 1360.

DOE also advances two other related reasons in support of its argument that consultation and cooperation takes place with Tennessee only after congressional authorization of an MRS. The agency claims that developing an MRS would be quicker and involve a less burdensome process if consultation and cooperation came after congressional authorization. Therefore, DOE concludes that Congress must have intended the consultation and cooperation process to take place after a congressional mandate for an MRS. This reasoning fails on two counts.

First, there is nothing in the record to indicate that DOE could not have consulted and cooperated with Tennessee and other affected states simultaneously with conducting its massive 1,700 page study of the eleven sites in the six affected states to determine their suitability for

an MRS.[2] See Monitored Retrievable Storage Facility Site Screening and Evaluation, DOE/RW0023. (R.1, Ex. D). Indeed, DOE admittedly did not make the slightest attempt to consult and cooperate with these affected states. The agency should be estopped from arguing that it could not have reasonably engaged in the process without first attempting to do so. It is similarly difficult to fathom how DOE can claim such consultation and cooperation would be "unproductive" without engaging in the process. Certainly, the citizens of a state under close scrutiny and study for what could be the nation's first high-level radioactive waste storage site would find the consultation and cooperation process most productive.

Tennessee recognizes that the Act places certain time constraints on DOE in developing a repository or MRS. The Act, which became effective in January of 1983 gave DOE until March of 1987 to locate a repository site and until June 1, 1985, to select an MRS location. While the time frame for locating an MRS site is shorter than that for a repository, the process for locating an MRS site is also

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[2]Tennessee has never argued that DOE must consult and cooperate with every single state it considers as a potential MRS site. DOE must only do what the law requires. When it conducts a study of an area within a state to determine its suitability for an MRS as it did with the eleven sites in the study, then it must consult and cooperate with the affected states.

far less complex than that of a repository. For example, DOE does not have to engage in the time-consuming and intricate task of geological site characterization nor seek approval from the President for its chosen MRS location. It stands to reason that the consultation and cooperation process relative to an MRS would, therefore, be less time consuming under such circumstances than the process necessary in the repository siting program. In reality, the time bind within which DOE now finds itself has apparently been occasioned by reasons known only to DOE. Even without consultation and cooperation with Tennessee, DOE was over eight months late in preparing its MRS proposal for presentation to Congress when enjoined by the District Court. DOE's dilatory conduct should not serve as an excuse for its failure to consult and cooperate with Tennessee.

DOE's attempt to have the supposedly burdensome nature of the consultation and cooperation process dictate the interpretation of § 10161(h) must fail for reasons beyond the inadequacy of the specific arguments themselves. The reasonableness of a statute's interpretation should not hinge on the ease, simplicity, or expedience with which it can be effectuated by an agency of the executive branch of government. What should control the interpretation of any statute is whether or not it carries out the purpose of the law and the congressional intent embodied therein. In the

instant case, as noted above, Congress obviously intended DOE to engage the states in a meaningful process of consultation and cooperation in the course of developing plans to build an MRS. To effectuate that purpose, consultation and cooperation cannot be put off to such time as the facility is in the process of being built.

III. THE PROGRAM OF "INFORMATION TRANSFER" UNDERTAKEN BY DOE WITH TENNESSEE SUBSEQUENT TO ANNOUNCEMENT OF THE PLANNED MRS IS NOT A SUBSTITUTE FOR THE CONSULTATION AND COOPERATION PROCESS REQUIRED BY § 10161(h).

DOE steadfastly argues that it is not required to consult and cooperate with Tennessee until after the MRS facility is authorized by Congress. Indeed, early on, when the MRS proposal was first announced, DOE stated that it was not going to engage in consultation and cooperation with Tennessee. See Brief of the State of Tennessee, pp. 33-34. Nevertheless, DOE initiated a process of "information transfer" so that the State of Tennessee could form its own independent opinion on the MRS prior to the proposal going to Congress. DOE characterizes this process as an "accommodation" to the spirit of the Nuclear Waste Policy Act. For reasons never clearly stated, DOE spends considerable time in its brief discussing this program of "information transfer." See, e.g., Brief for the Secretary of Energy at pp. 17-18, 25, 31-34. This process of "information transfer," however, has no relevance to the issues in this lawsuit.

DOE is obviously trying to "have its cake and eat it too". While adhering to its legal position that it is not now required to consult and cooperate with Tennessee, DOE is attempting to show that there was somehow de facto

consultation and cooperation. In other words, DOE would have the Court believe it did everything it could have done for Tennessee and consulation and cooperation would accomplish nothing more. What Tennessee received from DOE, however, was what it was promised -- "information transfer" to form an independent opinion so Tennessee could lobby Congress. The consultation and cooperation requirement of § 10137 contemplates something much different. Consultation and cooperation requires that DOE, while in the process of conducting a study of an area of the state, consult and cooperate with the state. The obvious goal of such dialogue is to resolve or minimize any problems or differences. As such, consultation and cooperation is aimed at avoiding the independent and conflicting views that DOE's "information transfer" process is meant to formulate.[3]

The process followed by DOE in preparing the site selection and identification study which is the subject of this lawsuit is the antithesis of meaningful cooperation and consultation. When the study was publicly released on

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[3]Furthermore, DOE claims that the purpose of the "information transfer" process is to enhance future lobbying efforts by Tennessee if the MRS proposal is presented to Congress. The State, however, retains its ability to lobby Congress on any matter, irrespective of information provided by DOE. The purpose of the NWPA consultation and cooperation provisions, by contrast, is to grant affected states a greater voice in the development of the MRS proposal by DOE.

April 25, 1985, it was in the form of a final and complete study. There was no participation in preparation of the study by any Tennessee officials. There was no public comment period announced in the Federal Register or elsewhere. Neither the study nor its conclusions were changed during the course of the "information transfer." Tennessee was given no meaningful input into the development of the study as contemplated by the consultation and cooperation process of § 10137.

IV. ARTICLE II, SECTION 3 OF THE UNITED STATES CONSTITUTION DOES NOT PROHIBIT THE DISTRICT COURT FROM ENJOINING DOE'S SUBMISSION OF AN MRS PROPOSAL TO CONGRESS IN VIOLATION OF THE NUCLEAR WASTE POLICY ACT.

DOE raises for the first time on appeal a constitutional argument not raised in the District Court. DOE claims that Article II, Section 3 of the United States Constitution prevents the District Court, under a separation of powers theory, from in any manner enjoining DOE from recommending an MRS proposal to Congress.[4] Why DOE failed to present this argument in the District Court for briefing by the parties is, at best, unclear. This is especially frustrating since Tennessee alleged in its Complaint filed in the District Court on August 20, 1985, and consistently argued thereafter, that it was entitled to injunctive relief to prevent the MRS proposal from going to Congress.

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[4]Article II, Section 3 of the United States Constitution provides:

> [The President] shall from time to time give to the congress information of the state of the Union, and recommend to their consideration such measures as he shall judge necessary and expedient; he may, on extraordinary occasions, convene both houses, or either of them, and in case of disagreement between them, with respect to the time of adjournment, he may adjourn them to such time as he shall thing proper; he shall receive ambassadors and other public ministers; he shall take care that the laws be faithfully executed. . ..

In any event, DOE's claim under Article II, Section 3 lacks merit. Article II, Section 3 does not apply in the instant case. This constitutional provision protects only recommendations initiated by the Executive Branch to the Congress.

In the instant case, DOE is not initiating a recommendation but responding to a directive of Congress to prepare and present an MRS proposal in a specified manner. The permanent injunction of the District Court is simply an order enforcing this congressional mandate. It is clearly within the constitutional duty of the courts to require the executive branch of government to act within the limits prescribed by Congress. See, e.g., National Treasury Employees Union v. Nixon, 492 F.2d 587 (D.C. Cir. 1974). If DOE is dissatisfied with the current nature of the Nuclear Waste Policy Act, it can petition Congress for a change in the law.[5] Until such time, DOE has a duty to comply with the wishes of Congress. Indeed, Article II, Section 3 imposes an affirmative duty on DOE in this regard.

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[5]The District Court's injunction does not prohibit DOE from its normal and routine communication to Congress. See, e.g., Annual Report to Congress, DOE/RW-0004 (March 1986); Department of Energy FY 1987 Congressional Budget Request: Construction Project Data Sheets, 99th Congress, 2nd Session; congressional testimony of Ben Rusche, Director of the Office of Civilian Radioactive Waste Management on February 7, 1986, before the House Subcommittee on Energy; on February 15, 1986, at a field hearing before Representative Bill Boner in Nashville, Tennessee; on March

CONCLUSION

For reasons set forth above and in its original Brief, the State of Tennessee respectfully requests that this Court affirm in all respects the rulings of the United States District Court for the Middle District of Tennessee in Appeals Nos. 86-5087 and 86-5168; or, in the alternative, that it issue a declaratory judgment and grant injunctive relief in accordance with the original Complaint filed in this Court by the State of Tennessee. Specifically, Tennessee asks that this Court declare that the defendant, the Secretary of the United States Department of Energy, violated 42 U.S.C. § 10137(b) of the Nuclear Waste Policy Act in preparing certain studies of areas in Tennessee to determine their suitabilty for an MRS.

Respectfully submitted,

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4, 1986, before the House Subcommittee on Energy Research and Production (written testimony only); on March 10, 1986, before the House Subcommittee on Energy and Water Development; on March 13, 1986, before the Senate Subcommittee on Energy and Water Development; on April 23, 1986, before the House Subcommittee on Energy Conservation and Power; on April 29, 1986, before the Senate Subcommittee on Energy Research and Development; and on May 1, 1986, before the House Subcommittee on Energy Conservation and Power.

CERTIFICATE OF SERVICE

I hereby certify that two (2) true and exact copies of the foregoing Reply Brief of the State of Tennessee have been forwarded to Ms. J. Carol Williams, Department of Justice, Land and Natural Resources, Room 2339, 10th and Pennsylvania Avenue, Northwest, Washington, D.C., 20530, via first-class U.S. Mail, postage prepaid, on this the 1st day of May, 1986.

Frank J. Scanlon

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