

DRAFT

PRELIMINARY SITE REQUIREMENTS AND CONSIDERATIONS  
FOR A  
MONITORED RETRIEVABLE STORAGE FACILITY

JUNE 20, 1990

PREPARED BY  
ROY F. WESTON, INC.  
WASHINGTON, D.C.

FOR  
U.S. DEPARTMENT OF ENERGY  
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

## EXECUTIVE SUMMARY

In the November 1989 Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program (DOE/RW-0247), the Secretary of Energy announced an initiative for developing a monitored retrievable storage (MRS) facility that is to start spent-fuel acceptance in 1998. The Nuclear Waste Policy Amendments Act of 1987, which authorized the Department of Energy (DOE) to site, construct, and operate the MRS facility, establishes two alternative paths for siting the facility: site selection by a DOE survey-and-evaluation process and Congressional enactment of a proposed agreement developed by a potential host State or Indian Tribe and the Nuclear Waste Negotiator (the Negotiator), which was established for that purpose. The Negotiator is to seek to negotiate a proposed agreement with a State or Indian Tribe to site an MRS facility at a technically qualified site. Examination of the applicable Federal statutes, regulations, executive orders, and DOE orders and past experience with comparable facilities suggests that many places within the contiguous United States would be technically suitable.

Siting through negotiation is the path preferred by the DOE. To facilitate this process the DOE has prepared the preliminary site requirements and considerations presented in this report. These preliminary site requirements and considerations are intended as guidance to the Negotiator and to States and Indian Tribes that may be willing to host the MRS facility.

The site requirements are based on specific requirements of the applicable Federal statutes or regulations including the general design criteria in 10 CFR 72, Subpart F; they are exclusionary requirements that exclude areas from further consideration unless they are met.

The site requirements cover the following:

- Colocation with a geologic repository
- Site size
- Single-use protected lands
- Coastal barriers
- Critical habitat for endangered species
- Hazardous wastes

If a site meets the site requirements, then it should be technically suitable. The site considerations can be used to identify the enhancing and favorable attributes of a technically qualified site and enhance the ease with which compliance with applicable Federal regulations can be demonstrated. If a potential host is considering multiple sites for potential negotiations, then the potential sites should be examined in terms of the site considerations. The site considerations, which are based on Federal statutes and regulations and program preferences, identify conditions that are preferable, although not mandatory.

The site considerations are divided into five groups: (1) geologic and other hazards, (2) environmental (3) socioeconomic (4) transportation, and (5) cost and development time. They cover the following:

- Geologic and other hazard considerations
  - Natural seismic hazard
  - Induced seismicity
  - Surface faulting
  - Floodplains
  - Ground stability
  - Volcanism
  - Other extreme natural phenomena
  - Man-made hazards
  
- Environmental considerations
  - Wetlands and coastal zones
  - Preservation of ground-water quality
  - Preservation of air quality
  - Protected species
  - Historical, cultural, or archaeological impacts
  
- Socioeconomic considerations
  - Land use and ownership
  
- Transportation considerations
  
- Cost and development-time considerations

The preliminary site requirements and considerations are based primarily on Federal statutory and regulatory requirements. Special emphasis is on 10 CFR Part 72, the regulation promulgated by the Nuclear Regulatory Commission (NRC) for the MRS facility. The preliminary site requirements and considerations are not currently part of DOE's technical baseline of requirements and are not intended to fully cover all regulatory requirements or to cover requirements for the license application that will be

submitted to the NRC. They are intended to provide guidance for wide applicability. Their purpose is to permit a reasonable determination, on the basis of available information without extensive analysis, that a site is potentially technically suitable for the MRS facility. If sufficient data are not available for analysis, then additional data may need to be gathered.

The concept proposed by the DOE for the MRS facility in their June 1989 position paper, The DOE Position on the MRS Facility (DOE/RW-0239), was for an integral facility that could be deployed in stages. The functions performed by the MRS facility would be: receiving commercial spent-fuel from the utilities in transportation casks, transferring the spent-fuel to on-site storage facilities for limited storage, and providing for onward spent-fuel transportation to the repository. Other functions such as spent-fuel preparation and placement into a final disposal container will be determined on the basis of overall benefits to the system.

Design and construction of an MRS facility will be consistent with MRS systems requirements documents which will be developed by the DOE. Prior to submittal of a MRS facility license application to the NRC the negotiated site will be characterized to demonstrate compliance with 10 CFR 72.

## TABLE OF CONTENTS

	<u>Page</u>
■ ■ EXECUTIVE SUMMARY .....	i
1.0 INTRODUCTION .....	1
2.0 PRELIMINARY SITE REQUIREMENTS AND CONSIDERATIONS FOR A MONITORED RETRIEVABLE STORAGE FACILITY .....	3
2.1 Site Requirements .....	15
2.1.1 Colocation With a Geologic Repository .....	15
2.1.2 Site Size .....	16
2.1.3 Single Use Protected Lands .....	17
2.1.4 Coastal Barriers .....	18
2.1.5 Critical Habitat for Endangered Species .....	19
2.1.6 Hazardous Waste .....	19
2.2 Site Considerations .....	20
2.2.1 Geologic and Other Hazard Considerations .....	20
2.2.1.1 Natural Seismic Hazard .....	20
2.2.1.2 Induced Seismicity .....	22
2.2.1.3 Surface Faulting .....	23
2.2.1.4 Flood Plains .....	23
2.2.1.5 Ground Stability .....	24
2.2.1.6 Volcanism .....	25
2.2.1.7 Other Extreme Natural Phenomena .....	25
2.2.1.8 Human Activities .....	26
2.2.2 Environmental Considerations .....	27
2.2.2.1 Wetlands and Coastal Zones .....	27
2.2.2.2 Preservation of Ground- Water Quality .....	28
2.2.2.3 Preservation of Air Quality .....	28
2.2.2.4 Protected Species .....	29

TABLE OF CONTENTS

(continued)

	<u>Page</u>
2.2.2.5 Historical, Cultural, or Archaeological Impacts . . . . .	30
2.2.3 Socioeconomic Considerations . . . . .	31
2.2.3.1 Land Use and Ownership . . . . .	31
2.2.4 Transportation Considerations . . . . .	32
2.2.5 Cost and Development-Time Considerations . . . . .	33
REFERENCES . . . . .	34
INDEX TO APPENDICES . . . . .	36
Appendix A Statutes . . . . .	A-1
Appendix B Regulations . . . . .	B-1
Appendix C Executive Orders . . . . .	C-1
Appendix D DOE Orders . . . . .	D-1

## LIST OF TABLES

Table

1	Requirements and Considerations Matrix of Federal Statutes and Regulations . . . . .	4
2	Siting Requirements . . . . .	5
	Siting Considerations . . . . .	7
3	Geologic and Other Hazard Considerations . . . . .	7
4	Environmental Considerations . . . . .	10
5	Socioeconomic Considerations . . . . .	12
6	Transportation Considerations . . . . .	13
7	Cost and Development Time Considerations . . . . .	14

# PRELIMINARY SITE REQUIREMENTS AND CONSIDERATIONS FOR A MONITORED RETRIEVABLE STORAGE FACILITY

## 1.0 INTRODUCTION

This report presents preliminary site requirements and considerations for a monitored retrievable storage (MRS) facility. It was prepared to support the implementation of the MRS initiative described in the November 1989 Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program (the "60-Day Report"). In the 60-Day Report, the Secretary of Energy announced plans to develop an MRS facility that is to start spent-fuel acceptance in 1998.

The concept preferred by the DOE is an integral MRS facility that is designed to allow development in stages. "Integral" means a facility that is fully integrated into a waste-management system in which all elements and components are optimized as part of a single system. It is an in-line facility that will receive commercial spent-fuel, provide a limited amount of storage, provide staging for transportation to the geologic repository, and perform other functions if determined necessary or desirable by future analyses.

In the first stage, the MRS facility would have a building for receiving and handling spent-fuel. It would receive and inspect spent-fuel, store it, and ship it to the repository at a rate and schedule consistent with repository operations. The spent fuel would be received in transportation casks shipped by truck and rail, unloaded from the shipping cask, inspected, and loaded into storage modules. All shipments from the MRS facility to the repository would be made exclusively by railroad in dedicated trains, which would minimize the number of shipments to the repository. During steady-state operation, when the receipt rate is equal to the shipping rate, the MRS facility would serve as a staging facility for transportation: spent-fuel received in truck and rail casks would be transferred to large-capacity rail casks for shipment to the repository by dedicated train.

Examination of the applicable Federal statutes, regulations, executive orders, and DOE orders suggests that suitable sites for an MRS facility could be found throughout the contiguous United States. To identify the areas that would be excluded from further consideration, site requirements were identified. They are based on specific requirements in applicable Federal statutes or regulations, with special emphasis on 10 CFR Part 72, the regulation promulgated by the Nuclear Regulatory Commission (NRC) that will be applied to the MRS facility, and general design criteria (10 CFR Part 72, Subpart F). Many areas are expected to meet these site requirements and thus, are likely to have potential sites.

The site considerations (Table 2) are derived from Federal statutes or regulations and identify conditions that are preferable. If a site meets the site requirements, then it should be technically suitable and could then be examined in terms of the site considerations. The site considerations can be used to identify favorable attributes of a technically qualified site and they enhance the ease with which compliance with applicable regulations can be demonstrated.

The preliminary site requirements and considerations are proposed as a basis for assessing the technical suitability of a potential site for an MRS facility. Their purpose is to provide guidance to the Nuclear Waste Negotiator (the Negotiator) and to potential volunteer host States and Indian Tribes for assessing the technical suitability of a potential site. If a potential host is considering multiple sites for potential negotiations, then the potential sites should be examined in terms of the site considerations. They are not intended to cover all regulatory requirements and are not currently part of the DOE's Waste Management Systems Requirements which are still being developed for an MRS facility.

The preliminary site requirements and considerations are also intended to provide guidance for wide applicability. Their purpose is to permit a reasonable determination on the basis of available information and without extensive analysis, that a site is suitable for an MRS facility. Thus, in order to identify a potential site, a State or an Indian Tribe should be able to use these site requirements and considerations on the basis of available and existing information. If sufficient data are not available for analysis, then additional data may need to be obtained to complete an analysis.

Socioeconomic considerations, other than land use and ownership (Section 2.2.3.1), are not included in this document. Upon the request of the Negotiator, the DOE will prepare an environmental assessment (EA) which will include a detailed statement of the probable impacts of construction and operation of an MRS facility at a site. Potential socioeconomic impacts, as well as environmental, and other impacts, will be assessed in an EA prepared pursuant to Section 404 of the NWPA as amended.

Once a potential MRS site is negotiated, a detailed analysis of the regulatory requirements will be completed to support the design and licensing of the facility. This analysis will include consideration of the detailed site specific parameters that are needed to support design. Many of the site specific parameters will be those parameters that are necessary to demonstrate compliance with the regulatory requirements used to develop the site considerations described in this report. Prior to submittal of an MRS facility license application to the NRC the negotiated site will be characterized to demonstrate compliance with 10 CFR 72.

## 2.0 PRELIMINARY SITE REQUIREMENTS FOR SITING AN MRS FACILITY

This section identifies and describes the preliminary site requirements and considerations to be used to assess the technical suitability of potential sites for an MRS facility. The preliminary site requirements are based largely on the Federal statutory and regulatory requirements applicable to an MRS facility. The Federal statutory and regulatory requirements that are applicable to an MRS are listed on Table 1; they were derived from the Nuclear Waste Policy Act as amended (NWPA, 42 USC 10101 et seq.), the regulations in 10 CFR Part 72, and applicable environmental statutes and regulations (see Appendixes A, B, C, and D). In addition, the site requirements include site size (Section 2.1.2). Although it is neither a statutory nor a regulatory requirement, a preliminary minimum size for a candidate area can be defined on the basis of the current conceptual MRS design concepts and the regulatory requirement (10 CFR 72.106(b)) for a buffer zone around the facility (see Appendix B).

The considerations involved in siting an MRS facility cover a wide range of technical areas. Geologic and other hazards (Section 2.2.1) must be evaluated for any prospective MRS site in order to assess the potential effects of these location-specific hazards on the safety of the facility. It is also necessary to consider environmental (Section 2.2.2) and socioeconomic (Section 2.2.3) factors, assessing how they might be affected by the construction and operation of the MRS facility, and to evaluate transportation conditions and potential impacts (Section 2.2.4). Finally, in order to discriminate among potential sites, cost and development time may be considered (Section 2.2.5).

The proposed preliminary site requirements and considerations for an MRS facility are presented in Tables 2 through 7, respectively; they are discussed in Sections 2.1 and 2.2, respectively.

**TABLE 1. REQUIREMENTS AND CONSIDERATIONS MATRIX OF FEDERAL STATUTES AND REGULATIONS\***

PRELIMINARY MRS FACILITY SITE REQUIREMENTS AND CONSIDERATIONS	STATUTES		REGULATIONS		EXECUTIVE ORDERS		DEPARTMENT OF ENERGY ORDERS	
	7 USC 5621-5624	7 USC 5621-5624	42 USC 9601-9613	42 USC 9601-9613	50 CFR Part 28	50 CFR Part 29	50 CFR Part 29	DOE Order 4300-1B
<b>SITE REQUIREMENTS</b>								
Collocation with a geologic repository								
Site size								
Single-use protected lands								
Coastal barriers								
Critical habitat for endangered species								
Hazardous wastes								
<b>SITE CONSIDERATIONS</b>								
Natural seismic risk								
Induced seismicity								
Surface heaving								
Floodplains								
Ground stability								
Volcanism								
Other extreme natural phenomena								
Human activities								
Wetlands and coastal zones								
Preservation of ground-water quality								
Preservation of air quality								
Protected species								
Historical, Cultural, or Archeological Impacts								
Land use and ownership								
Transportation								
Coal and development time								

\*Descriptions of federal statutes and regulations are found in the appendices

**Table 2 SITE REQUIREMENTS**

<u>Category</u>	<u>Requirement</u>	<u>References</u>
<b>Colocation with a Geologic Repository</b> (Section 2.1.1)	A potential site for an MRS facility shall not be located in the State of Nevada	42 USC 10101, Sec. 145(g)
<b>Site size</b> (Section 2.1.2)	Current estimates for an undeveloped site based on engineering studies provide for a land requirement of about 450 acres.  For proposed sites at existing nuclear facilities the specific site area requirements would be assessed on a case by case basis in accordance with the facility requirements and the applicable NRC regulations (10 CFR 72.104 and 106)	10 CFR 72.106(a) 10 CFR 72.106(b)
<b>Single Use Protected Lands</b> (Section 2.1.3)	A potential site for an MRS facility shall not be located on Federally protected land dedicated to single use not compatible with the construction and operation of an MRS facility	16 USC 1 16 USC 668dd 16 USC 1131 16 USC 1273 36 CFR 293 43 CFR 8560 50 CFR 29 50 CFR 35
<b>Coastal Barriers</b> (Section 2.1.4)	A potential site for an MRS facility shall not be located within the Coastal Barrier Resources System	16 USC 3501

Table 2 SITE REQUIREMENTS (continued)

<u>Category</u>	<u>Requirement</u>	<u>References</u>
<b>Critical Habitat for Endangered Species</b> (Section 2.1.5)	A potential site for an MRS facility shall not be located in areas designated as critical habitat for any Federally endangered species	16 USC 1531
<b>Hazardous Wastes</b> (Section 2.1.6)	Potential MRS sites that are located beyond 200 feet from a Holocene-age fault can be considered. Proposed amendments to regulations may indicate that potential MRS sites outside 100-year floodplains, and not within or adjacent to wetlands can be considered	40 CFR 264.18

**Table 3 SITE CONSIDERATIONS  
Geologic and Other Hazards**

<u>Category</u>	<u>Consideration</u>	<u>References</u>
<b>Natural Seismic Hazards</b> (Section 2.2.1.1)	Sites beyond the range of strong near-field ground motion from historical earthquakes on large capable faults are preferred	10 CFR 72.90 10 CFR 72.92 10 CFR 72.98 10 CFR 72.102 10 CFR 100, Appendix A
<b>Induced Seismicity</b> (Section 2.2.1.2)	Sites are preferred without the potential for seismicity induced by human activities like explosive blasts; the withdrawal of fluid from, or addition to, the subsurface; the extraction of minerals; or the loading effects of dams or reservoirs are preferred	10 CFR 72.90(b) 10 CFR 72.94
<b>Surface Faulting</b> (Section 2.2.1.3)	Sites that do not show evidence at or near the surface, of differential ground displacement caused directly by Quaternary fault movement, as distinct from nontectonic types of ground disruption, are preferred.	10 CFR 72.90 10 CFR 72.102 40 CFR 264.18
<b>Floodplains</b> (Section 2.2.1.4)	Sites outside 100 year floodplains are preferred. The MRS facility should be sited to avoid, to the extent feasible, adverse impacts from floods or areas that would require extensive modification of floodplains. If proposed amendments to RCRA are adopted, floodplains should be avoided to maintain operational flexibility.	10 CFR 72.90(f) 10 CFR 1022 40 CFR 264.18 EO 11988

**Table 3 SITE CONSIDERATIONS (Continued)**  
**Geologic and Other Hazards**

<u>Category</u>	<u>Consideration</u>	<u>References</u>
<b>Ground Stability</b> (Section 2.2.1.5)	Sites without soil or bedrock conditions that have potential for ground movement from liquefaction, subsidence, or landslides are preferred.	10 CFR 72.90 10 CFR 72.102
<b>Volcanism</b> (Section 2.2.1.6)	Sites without potential volcanic hazards that would adversely affect the safe operation of an MRS facility are preferred	10 CFR 72.90 10 CFR 72.92(b)
<b>Other Extreme Natural Phenomena</b> (Section 2.2.1.7)	Sites located outside a region of extreme natural phenomena or severe weather that may adversely affect the design and safe operation of an MRS are preferred	10 CFR 72.122(b)
<b>Human Activities</b> (Section 2.2.1.8)	Sites away from man-made hazards that could affect the safe operation of an MRS facility are preferred. Areas would be preferred if they do not contain exploitable mineral and energy resources, are not located adjacent to airports or facilities that store or produce toxic chemicals or explosives.	10 CFR 72.90 (b) 10 CFR 72.94

**Table 3 SITE CONSIDERATIONS (Continued)**  
**Geologic and Other Hazards**

<u>Category</u>	<u>Consideration</u>	<u>References</u>
<b>Human Activities</b> (continued)	<p>This siting consideration is intended to direct site evaluation efforts to consider the hazards from human activities in close proximity to a candidate site.</p> <p>In addition, if an MRS facility is located within 50 miles of the first high-level waste (HLW) repository, then the combined quantity of spent fuel must not be in excess of 70,000 metric tons of heavy metal until a second repository is in operation.</p>	<p>10 CFR 72.96(c)</p>

**Table 4 SITE CONSIDERATIONS**  
**Environmental Considerations**

<u>Category</u>	<u>Consideration</u>	<u>References</u>
<b>Wetlands and Coastal Zones</b> (Section 2.2.2.1)	Sites outside wetlands and coastal zones are preferred.	16 USC 1451 10 CFR 11022 EO 11990
<b>Preservation of Groundwater Quality</b> (Section 2.2.2.2)	Sites outside the recharge areas for sole-source aquifers/well-head protection areas or sites not located above major water resources are preferred.	42 USC 300f 42 USC 10164 10 CFR 72.22(b)(4)
<b>Preservation of Air Quality</b> (Section 2.2.2.3)	To facilitate compliance with air-quality regulations, it would be preferable to site an MRS facility outside air-quality Class I areas and outside areas designated air-quality nonattainment areas.	42 USC 7401
<b>Protected Species</b> (Section 2.2.2.4)	Areas where an MRS facility would not adversely effect protected species, that is species listed by the Federal Government as threatened or endangered such as bald and golden eagles, migratory birds, wild free-roaming horses and burros, and species protected by the States are preferred.	16 USC 668 16 USC 703 16 USC 1531 16 USC 1331

**Table 4 SITE CONSIDERATIONS(Continued)  
Environmental Considerations**

<u>Category</u>	<u>Consideration</u>	<u>References</u>
<b>Historical, Cultural or Archaeological Impacts</b> (Section 2.2.2.5)	Sites not containing significant historical, cultural, or archaeological resources and where the MRS facility would not interfere with Native American religious activities are preferred.	16 USC 431 16 USC 461 16 USC 469 16 USC 470 16 USC 470aa 16 USC 1996 36 CFR 800

**Table 5 SITE CONSIDERATIONS**  
**Socioeconomic Considerations**

<u>Category</u>	<u>Consideration</u>	<u>References</u>
<b>Land Use and  Ownership</b> (Section 2.2.3.1)	Sites located so that land-use and ownership issues do not cause unacceptable delays in siting and constructing an MRS facility are preferred.	7 USC 4201 16 USC 521 16 UCS 1246 16 USC 1273 43 USC 315 49 USC 303 7 CFR 658

**Table 6 SITE CONSIDERATIONS**  
**Transportation Considerations**

<u>Category</u>	<u>Consideration</u>	<u>References</u>
<b>Transportation</b> (Section 2.2.4)	Sites with access to an adequate transportation infrastructure that would enable safe and reasonable passage are preferred. It is preferred that the natural terrain not include steep grades, sharp switchbacks, rivers, lakes, landslides, and rock slides.	10 CFR 72.108

Table 7 SITE CONSIDERATIONS

Development Time Considerations

Cost and

Category

Consideration

References

**Cost and Development-Time**  
(Section 2.2.5)

No specific considerations for cost and development time are specified, as there are no specific Federal statutory or regulatory bases for such considerations. However, in the event that potentially suitable sites are compared, and the site considerations of Section 2.2 do not clearly indicate preference for a particular sites, then cost and development time could be considered.

DOE Order 5700.2C

## 2.1 SITE REQUIREMENTS

The site requirements presented in this section are to be used in identifying a potential site by eliminating from further consideration sites or areas where an MRS facility cannot be sited because of statutory or regulatory restrictions. In addition, a minimum size for an MRS facility site has been identified on the basis of the conceptual designs for the MRS facility currently planned and the regulatory requirements in 10 CFR Part 72 (see Appendix B). Each of the site requirements is specified below, followed by a statement of its basis and the applicable references.

### 2.1.1 Colocation with a Geologic Repository

#### Requirement

A potential site for an MRS facility shall not be located in the State of Nevada.

#### Basis

The NWPA as amended prohibits the construction of an MRS facility in the State of Nevada. An MRS facility must not be sited in any State in which there is located any site approved for characterization for a repository.

#### References

Nuclear Waste Policy Act, Section 145(g), 42 USC Section 10101  
(see Appendix A, page A-15).

## 2.1.2 Site Size

### Requirement

The potential site will require a sufficient surface land area to provide for spent fuel transfer and storage facilities and the supporting site services and a sufficient area immediately surrounding the proposed MRS facility to assure that limits on direct radiation exposure are satisfied and that there is an adequate controlled area in accordance with the applicable NRC regulations (10 CFR Part 72.104, and 106). Current estimates for an undeveloped site based on engineering studies provide for a land requirement of about 450 acres. For proposed sites at existing nuclear facilities the specific site area requirements would be assessed on a case by case basis in accordance with the facility requirements and the applicable NRC regulations cited above (10 CFR Part 72.104, and 106).

### Basis

An MRS site facility is comprised of 2 distinct areas: (a) the protected area where facilities for handling spent fuel in radiation shielded buildings and storing spent fuel in shielded modular storage units are located, and (b) the limited access area that houses the site support buildings and services. Engineering estimates for a handling facility in the protected area, and for a limited access area are approximately 80 and 50 acres, respectively. The area required for a storage area within the protected area is dependent on the dry storage technology employed and the amount of spent fuel stored. For example, if sealed concrete dry storage casks are used an additional area of about 50 acres would be needed for 15,000 metric tons of heavy metal (MTHM) spent fuel storage. For storage in the form of field drywells, the site requirements are dependent on field soil thermal conductivity. Engineering studies based on conservative soil heat dissipation have estimated a requirements of about 295 acres for storage of 15,000 MTHM of spent fuel.

The dose limits identified in Section 72.104 and 72.106 are used as criteria to establish site boundaries and ensure the capability of siting the MRS facility with respect to radiation factors. The area required is based on the location of the storage units in the storage facility and the space required adjacent to the facilities or structures. However, the area required for the MRS facility varies with the storage concept. For example, in the sealed concrete storage cask concept, the boundary is estimated to be 450 meters from the nearest cask position relative to the area perimeter. In this case based on 15,000 MTHM of stored spent fuel, a total facility land requirement of about 420 acres has been estimated. Similar engineering studies for an MRS facility using field drywell storage instead of sealed concrete storage casks, gave estimates of about 450 acres for 15,000 MTHM of spent fuel storage. In this case the perimeter is estimated at the minimum distance provided in the NRC regulations

(10 CFR 72.106 (b)) of 100 meters from the location of the field storage drywells and the spent fuel handling facilities.

Preliminary calculations have been performed to assess the potential release of radioactive effluents during operating or postulated accident conditions, using the outer controlled area fence as the site boundary for both concepts. The results of these calculations show that the limits identified in 10 CFR 72.104 (a) and 10 CFR 72.106 (b) would not be exceeded. Site and design-specific calculations demonstrating radiological health and safety will be contained in the application to the Nuclear Regulatory Commission for a license for an MRS facility.

### References

10 CFR 72.104(a) (see Appendix B, page B-7)

10 CFR 72.106(b) (see Appendix B, page B-7).

Analyses of Alternative Designs and Operating Approaches for a Monitored Retrievable Storage Facility, MRS Action Plan Task B Report, PNL-6770, Pacific Northwest Laboratories, 1988.

### 2.1.3 Single-Use Protected Lands

#### Requirement

A potential site for an MRS facility shall not be located on federally protected land dedicated to a single use not compatible with the construction and operation of an MRS facility.

#### Basis

Siting an MRS facility on lands protected by Federal statutes or regulations that dedicate land for a single use is prohibited because an MRS facility would not be compatible with the purpose for which these lands are set aside. This requirement excludes from consideration land dedicated to such uses as national parks, national wildlife refuges, and wilderness areas.

## References

The Organic Act of the National Park Service, 16 USC 1 et seq.  
(see Appendix A, page A-1).

National Wildlife Refuge System Administrative Act, 16 USC 668dd et seq.  
(see Appendix A, page A-6).

National Wild and Scenic Rivers System, 16 USC 1273 et seq.  
(See Appendix A, page A-9)

National Wilderness Preservation Act, 16 USC Sections 1131 et seq.  
(see Appendix A, page A-8).

Wilderness - Primitive Areas, 36 CFR Part 293 (see Appendix B, page B-11).

Wilderness Areas, 43 CFR Part 8560 (see Appendix B, page B-12).

Land Use Management, 50 CFR Part 29 (see Appendix B, page B-13).

Wilderness Preservation and Management, 50 CFR Part 35  
(see Appendix B, page B-14).

### 2.1.4 Coastal Barriers

#### Requirement

A potential site for an MRS facility shall not be located within the Coastal Barrier Resources System (CBRS), which consists of undeveloped coastal land along the Atlantic and Gulf Coasts and adjacent wetlands and inlets.

#### Basis

New Federal expenditures for construction within the CBRS are prohibited. Undeveloped coastal land along the Atlantic and Gulf Coasts and adjacent wetlands and inlets are therefore excluded from further consideration.

#### Reference

Coastal Barriers Resources Act, 16 U.S.C 3501 et seq. (see Appendix A, page A-13).

### 2.1.5 Critical Habitat for Endangered Species

#### Requirement

A potential site for an MRS facility shall not be located in areas designated as critical habitat for any federal endangered species.

#### Basis

The presence of an endangered species at and in the vicinity of a potential MRS site does not exclude a site from consideration. However, the presence of an area designated a "critical habitat" would preclude the use of a site for an MRS facility. The Endangered Species Act requires that any action authorized, funded, or carried out by a Federal agency in the United States must not be likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat.

#### Reference

Endangered Species Act, 16 USC 1531 et seq. (see Appendix A, page A-11.)

### 2.1.6 Hazardous Wastes

#### Requirement

Potential MRS sites that are located beyond 200 feet from a Holocene-age fault, outside a 100-year floodplain, and not within or adjacent to wetlands can be considered.

#### Basis

To maintain flexibility for MRS facility operations, it is assumed, for the sake of conservatism, that the Resource Conservation and Recovery Act (40 CFR 264.18) would be applicable. Currently, sites for hazardous waste management facilities are permitted beyond 200 feet from Holocene age (last 10,000 years) faults. Amendments are under consideration that would require facilities that use or produce hazardous wastes to be located outside 100-year floodplains or in areas not within or adjacent to wetlands.

#### Reference

Resource Conservation and Recovery Act, 40 CFR 264.18  
(see Appendix B, page B-12).

## 2.2 SITE CONSIDERATIONS

The site considerations are grouped into five categories: geologic and other hazard considerations (Section 2.2.1), environmental considerations (Section 2.2.2), socioeconomic considerations (Section 2.2.3), transportation considerations (Section 2.2.4), and cost and development time considerations (Section 2.2.5).

The sections that follow present a statement of each consideration, a brief discussion of its regulatory basis, and the applicable references. In addition to the references cited, DOE Orders 6430.1A and 4300.1B (see Appendix D) also refer to considerations to be used in siting facilities; these considerations, however, are captured in the cited regulations.

### 2.2.1 Geologic and Other Hazard Considerations

Geologic and other hazards should be considered in site selection because of their potential impacts on the construction and operation of an MRS facility.

The geologic and man-made hazards identified in this section do not cover all of the regulatory approvals that will be needed for licensing an MRS facility. The considerations focus instead on a reasonable determination that could be made on the basis of available information and without extensive analysis as part of the process for identifying potential sites.

#### 2.2.1.1 Natural Seismic Hazard

##### Consideration

Sites beyond the range of strong near-field ground motion from historical earthquakes on large capable faults are preferred.

##### Basis

The consideration of natural seismic hazard is required by NRC regulations because seismicity might affect the safety of MRS operations. However, many sites in the contiguous United States should be found suitable in terms of this consideration.

East of the Rocky Mountain Front (i.e., east of approximately 104 degrees west longitude), except in areas of known seismic activity (e.g., New Madrid, Missouri; Charleston, South Carolina; and Attica, New York), most potential sites will be acceptable because the potential vibratory ground motion is less than an appropriate response spectrum anchored at 0.2g. A design earthquake and response spectra anchored at 0.25g would generally be considered conservative and may expedite licensing since the NRC would not require a full review under 10 CFR Part 100, Appendix A (see 10 CFR 72.102).

For sites west of the Rocky Mountain Front and in other areas of known seismic activity, it will be necessary to evaluate seismicity in accordance with the techniques specified in 10 CFR Part 100, Appendix A.

In evaluating the seismic hazard for a potential MRS site, sites where nuclear power facilities have been licensed would have advantages in that the potential for seismic hazards would have been evaluated in a formal license proceeding and found acceptable before a facility could be built.

While the site considerations associated with natural seismic hazard reference 10 CFR Part 100 Appendix A (referenced in 10 CFR Part 72), DOE has expressed concerns over the use of Appendix A for a non-reactor facility such as the surface facility for a nuclear waste repository or an MRS facility. Appendix A was specifically written for nuclear power reactors and was based on scientific and engineering practices of the late 1960's and early 1970's. Many technical advancements have occurred since that time that are not reflected in Appendix A. The siting considerations proposed by this paper should be based on state-of-the-art scientific methods, as appropriate. If at some point in time the reference to Appendix A in 10 CFR 72 creates regulatory requirements that can be shown not to add to public health and safety, the Department will investigate all options for the MRS facility which may include a request for a regulatory change updating 10 CFR 72 to reflect current state-of-the-art scientific practices related to seismic hazard evaluation and seismic design.

## References

Siting Evaluation Factors - General Considerations, 10 CFR 72.90  
(see Appendix B, page B-1).

Design Basis External Natural Events, 10 CFR 72.92  
(see Appendix B, page B-2).

Identifying Regions around an ISFSI or MRS site, 10 CFR 72.98  
(see Appendix B, page B-4).

Geological and Seismological Characteristics, 10 CFR 72.102 et seq.  
(see Appendix B, page B-5).

Seismic and Geologic Siting Criteria for Nuclear Power Plants, 10 CFR Part 100,  
Appendix A, Section V(a)(1)(iv) (see Appendix B, page B-10).

### 2.2.1.2 Induced Seismicity

#### Consideration

Sites are preferred without the potential for seismicity induced by human activities, such as explosive blasts; the withdrawal of fluid from, or addition to, the subsurface; the extraction of minerals; or the loading effects of dams or reservoirs.

#### Basis

Since certain facilities or activities may induce ground motion, such frequency and severity of "external natural and man-induced events" that could affect the safety of the MRS facility should be considered. The locations of past or present activities that may be causes of induced seismicity should be determined, and both past and present facilities or activities should be evaluated. Sites away from causes of induced seismicity are preferred.

#### References

General Considerations, 10 CFR 72.90(b) (see Appendix B, page B-1).

Design Basis External Man-Induced Events, 10 CFR 72.94 et seq.  
(see Appendix B, page B-3).

### **2.2.1.3 Surface Faulting**

#### Consideration

Sites that do not display evidence, at or near the surface, of differential ground displacement caused directly by Quaternary fault movement, as distinct from nontectonic types of ground disruptions, are preferred.

#### Basis

Because surface faulting could cause differential ground displacement that might affect MRS structures or operations and is considered in NRC regulations, its potential at the site must be evaluated. Candidate site areas where licensed nuclear and other critical facilities already exist may be preferable since the nature of capable faults or other Quaternary faults within 200 miles of the site and their potential effects have been previously evaluated. This consideration is not widely applicable to sites east of the Rocky Mountain Front, where only two capable faults have been recognized.

To maintain operational flexibility, RCRA is assumed to apply to an MRS facility, and areas within 200 feet of a Holocene fault would be excluded from further consideration (see Section 2.1.6).

#### References

General Considerations, 10 CFR 72.90 (see Appendix B, page B-1).

Geological and Seismological Characteristics, 10 CFR 72.102 et seq. (see Appendix B, page B-5).

Resource Conservation and Recovery Act, 40 CFR 264.18 (see Appendix B, page B-12).

### **2.2.1.4 Floodplains**

#### Consideration

Sites outside 100-year floodplains are preferred. The MRS facility should be sited to avoid, to the extent possible, the long- and short-term adverse impacts from floods (from surface-water bodies or surface runoff) or areas where extensive modification of floodplains would be required.

### Basis

This guideline is concerned with (1) the potential effects of floods on an MRS facility located in a floodplain and (2) the potential effects of the MRS facility in the floodplain, especially if extensive modifications of the floodplain are required. Like seismic activity and surface displacement, the frequency and severity of flooding is an important natural hazard that should be considered in MRS siting. Moreover, the adverse impacts associated with the occupancy and modification of floodplains should be avoided. Thus, sites without potential adverse impacts associated with the occupancy and modification of floodplains are preferred.

To maintain operational flexibility, RCRA is assumed to apply to an MRS facility, and sites outside 100-year floodplains should be considered (Section 2.1.6).

### References

Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste, 10 CFR 72.90 (f) (see Appendix B, page B-1).

Compliance with Floodplain/Wetlands Environmental Review Requirements, 10 CFR 1022 (see Appendix B, page B-11).

Resource Conservation and Recovery Act, 40 CFR 264.18 (see Appendix B, page B-12).

Floodplain Management, Executive Order 11988 (see Appendix C, page C-1).

#### 2.2.1.5 Ground Stability

##### Consideration

Sites without soil or bedrock conditions that have potential for ground movement from liquefaction, subsidence, or landslides are preferred. A site should be located to avoid adverse impacts from nearby ground movement. The soil bearing capacity of the potential site should be adequate for the proposed foundation loading.

##### Basis

Sites with stable geologic and foundation engineering characteristics are preferred. Sites should be evaluated for the potential for ground movement from liquefaction, subsidence, landslides, or other soil instabilities due to vibratory ground motion or the withdrawal of subsurface materials.

## References

Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste, 10 CFR 72.90 (see Appendix B, page B-1).

Geological and Seismological Characteristics, 10 CFR 72.102 et seq. (see Appendix B, page B-5).

### **2.2.1.6 Volcanism**

#### Consideration

Sites without potential volcanic hazards that would adversely affect the safe operation of an MRS facility are preferred.

#### Basis

The potential occurrence and severity of volcanism should be evaluated. Volcanism that may exist or can occur in the region of a proposed site should be identified and assessed in terms of its potential effects on the safe operation of the MRS facility. Sites outside areas of explosive volcanism, resulting mudflows, or other conditions that would require extraordinary engineering measures are preferred.

#### References

Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste, General Considerations, 10 CFR 72.90 (see Appendix B, page B-1).

Design Basis External Natural Events, 10 CFR 72.92 (b) et seq. (see Appendix B, page B-2).

### **2.2.1.7 Other Extreme Natural Phenomena**

#### Consideration

Sites located outside a region of extreme natural phenomena or severe weather that may adversely affect the design and safe operation of an MRS facility are preferred.

### Basis

The potential for, and the frequency and severity of, severe-weather events should be evaluated. Severe-weather events like tornadoes, lightning, and hurricanes and seismicity induced phenomena such as tsunamis and seiches should be evaluated in terms of their potential for occurring in the region of the site and their effects on the design and safety of the MRS facility. Since the potential for severe weather may require extraordinary engineering measures in the design of the MRS facility, sites located in regions without a significant potential for severe weather are preferred.

### Reference

Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste, General Design Criteria, 10 CFR 72.122II(b)(1)(2)(i)(ii)(b) (see Appendix B, page B-8).

#### 2.2.1.8 Human Activities

##### Consideration

Sites away from man-made hazards that could affect the safe operation of an MRS facility are preferred. In addition, regulations indicate that sites more than 50 miles from the first high-level waste repository are preferred.

##### Basis

This siting consideration addresses hazards from human activities in close proximity to a candidate site. Sites are preferred if they do not contain exploitable mineral and energy resources and are not adjacent to airports, toxic chemical manufacturing, facilities with explosives, and refineries. In addition, if an MRS facility is located within 50 miles of the first high-level waste repository, then the combined quantity of spent fuel must not exceed 70,000 metric tons of heavy metal until a second repository is in operation.

##### References

Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste, General Considerations, 10 CFR 72.90(b)(c) (see Appendix B, page B-1).

Design Basis External Man-Induced Events, 10 CFR 72.94 et seq. (see Appendix B, page B-3).

### 2.2.2 Environmental Considerations

The potential for significant adverse environmental impacts should be considered in selecting the site for an MRS facility. Efforts should be made to minimize significant adverse impacts that might be caused by the construction and operation of an MRS facility on regional or local natural ecosystems, air and water quality, endangered species, and the human population. The environmental siting considerations and their bases are given below.

The environmental siting considerations identified here do not cover all of the regulatory approvals that will be needed for licensing an MRS facility. Rather, the criteria focus instead on a reasonable determination that should be made on the basis of available information and without extensive analysis as part of the process for identifying potential sites.

#### 2.2.2.1 Wetlands and Coastal Zones

##### Consideration

Sites outside wetlands and coastal zones are preferred.

##### Basis

A site should be located to minimize adverse impacts on wetlands and coastal areas. However, if no practicable alternatives exist, then the DOE must assess the adverse impacts that could result from the occupancy and modification of wetlands. Siting should consider both State coastal zone management programs and national policy to preserve and protect coastal zones. To maintain operational flexibility RCRA is assumed to apply to an MRS facility and sites outside wetlands should be considered.

##### References

Coastal Zone Management Act, 16 USC 1451 et seq. (see Appendix A, page A-10).

Compliance with Floodplain/Wetlands Environmental Review Requirements, 10 CFR 1022 (see Appendix B, page B-11).

Protection of Wetlands, Executive Order 11990 (see Appendix C, page C-2).

### 2.2.2.2 Preservation of Ground-Water Quality

#### Consideration

Sites outside the recharge areas for sole-source aquifers or well-head protection areas are preferred. Sites not located above major water resources are preferred.

#### Basis

A site should be so located that regulations for preserving ground-water quality are not violated by the construction or operation of an MRS facility. Siting outside the recharge area for a sole-source aquifer or a well-head protection area as determined by the EPA will protect from potential contamination a sole or principal drinking-water source for an area. This does not preclude the siting of an MRS facility in recharge areas for multiple-source aquifers or areas with more than one water source. If an MRS site is located over an aquifer which is a major water resource, measures must be taken to preclude the transport of radioactive materials to the environment through this potential pathway.

#### References

Safe Drinking Water Act, 42 USC 300f, Section 1427 and 1428 et seq.  
(see Appendix A, page A-13).

Nuclear Waste Policy Act as amended, 42 USC 10101 et seq.,  
(see Appendix A, page A-15).

Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste, 10 CFR 72 et seq., (Appendix B, page B-1).

### 2.2.2.3 Preservation of Air Quality

#### Consideration

To facilitate compliance with air-quality regulations, it would be preferable to site an MRS facility outside air-quality Class I areas and outside areas designated air-quality nonattainment areas.

## Basis

In Class I areas it may be difficult to comply with the very low values set for the maximum allowable increases in the total concentrations of sulfur dioxide and particulate matter--5 and 2 micrograms per cubic meter, respectively. For the same reason, compliance with air-quality standards might be difficult if the facility is near a Class I area. Nonattainment areas are not preferred because approval to site a new facility in a nonattainment area may be very difficult, if not impossible to obtain.

## References

Clean Air Act, 42 USC 7401 et seq. (see Appendix A, page A-14).

### 2.2.2.4 Protected Species

#### Consideration

Areas where an MRS facility would not adversely affect protected species--that is species listed by the Federal Government as threatened or endangered such as bald and golden eagles, migratory birds, wild free-roaming horses and burros, and species protected by the State--are preferred.

#### Basis

In siting, consideration should be given to possible impacts on federally protected species. Threatened, endangered, and otherwise protected species and their habitats should not be jeopardized. If threatened or endangered species are present at a candidate site, biological assessments must be conducted to evaluate the potential impact on the species.

#### References

Bald and Golden Eagle Protection Act, 16 USC 668 et seq.  
(see Appendix A, page A-6).

Migratory Bird Treaty Act, 16 USC 703 et seq. (see Appendix A, page A-8).

Endangered Species Act, 16 USC 1531 et seq. (see Appendix A, page A-11).

Wild Free-Roaming Horses and Burros Act, 16 USC 1331 et seq.  
(see Appendix A, page A-10).

### 2.2.2.5 Historical, Cultural, or Archaeological Impacts

#### Consideration

Sites not containing significant historical, cultural, or archaeological resources and where the MRS facility would not interfere with Native American religious activities are preferred.

#### Basis

In identifying potential sites, consideration should be given to minimizing adverse impacts on historical, archaeological, and cultural resources. An assessment should be made of the potential effects of MRS construction and operation on any district, site, building, structure, or object on the National Register of Historic Places, and the Advisory Council on Historic Preservation should be given a reasonable opportunity to comment. If MRS construction activities might cause irreparable loss or destruction of significant scientific, historical, or archaeological resources, then the applicable regulatory agencies must be notified. A survey of the area should be used to identify significant resources; excavation could be used to recover and preserve the resources.

The DOE is required to consider the effect of the MRS project on Native American access to sites, use and possession of sacred objects, and the freedom to worship through ceremonial rites and practices.

#### References

Antiquities Act, 16 USC 431 et seq. (see Appendix A, page A-2).

Historic Sites, Buildings and Antiquities Act, 16 USC 461 et seq.  
(see Appendix A, page A-2).

Archaeological and Historic Preservation Act, 16 USC 469  
(see Appendix A, page A-3).

National Historic Preservation Act, 16 USC 470 et seq. (Appendix A, page A-3).

Archaeological Resources Protection Act, 16 USC 470aa et seq.  
(see Appendix A, page A-5).

American Indian Religious Freedom Act, 16 USC 1996 (see Appendix A, page A-12).

National Historic Preservation Act Regulations, 36 CFR 800

### 2.2.3 Socioeconomic Considerations

Socioeconomic conditions and potential impacts on the local community, the region, the State, and Indian Tribes should be considered in site identification. The socioeconomic considerations address potential impacts on land use and ownership. Socioeconomic considerations, other than land use and ownership (Section 2.2.3.1), are not included in this document. Upon the request of the Negotiator, the DOE will prepare an EA which will include a detailed statement of the probable impacts of construction, and operation of an MRS facility at a site. Potential socioeconomic impacts, as well as environmental and other impacts, will be assessed in an EA prepared pursuant to Section 404 of the NWPA as amended.

#### 2.2.3.1 Land Use and Ownership

##### Consideration

Sites located so that land-use and ownership issues do not cause unacceptable delays in siting and constructing an MRS facility are preferred.

##### Basis

Consideration should be given to existing land ownership, the ease of land acquisition, and the time required to obtain access to and control of the lands. Sites should be evaluated in terms of whether their use for an MRS facility would conform to existing land-use and zoning plans. If an MRS facility represents a nonconforming use under current plans, the feasibility of timely siting in that location should be assessed.

Consideration should also be given to minimizing the extent to which the MRS facility contributes to the unnecessary and irretrievable conversion of farmlands to nonagricultural uses. Department of Agriculture (USDA) criteria would be used to identify and evaluate the adverse effects of the MRS facility on the preservation of farmlands, especially prime and unique farmland, including a consideration of alternatives.

Furthermore, a site should be evaluated in terms of (1) its consistency with the National Forest System and resources management and (2) the need for any special-use authorization required from the Forest Service.

## References

Farmland Protection Policy Act, 7 USC 4201 et seq. (see Appendix A, page A-1).

National Forest Organic Act, 16 USC 521 (see Appendix A, page A-6).

National Trails System Act, 16 USC 1246 (see Appendix A, page A-9).

Wild and Scenic Rivers Act, 16 USC 1273 (see Appendix A, page A-9).

Taylor Grazing Act, 43 USC 315 (see Appendix A, page A-16).

The Department of Transportation Acts, 49 USC 303, and 23 USC 138 (see Appendix A, page A-16).

Farmland Protection Policy Act Regulations, 7 CFR 658 (see Appendix B, page B-1).

### 2.2.4 Transportation

#### Consideration

Sites with access to an adequate transportation infrastructure that would enable safe and reasonable passage are preferred. It is preferred that the natural terrain not include steep grades, sharp switchbacks, rivers, lakes, landslides, and rock slides.

#### Basis

A site should be evaluated to determine (1) extent of existing suitable road, rail, and/or barge access to the site (regional transportation impacts on the environment), (2) the extent to which the local community traffic flow patterns would be altered, and (3) the extent to which regional/local routes to the site minimize routing constraints.

If the construction of extensive new roads or rail systems or the extensive upgrading of existing facilities is required, the potential environmental impacts of these activities also should be considered. If the existing transportation infrastructure in the region is inadequate, then additional consideration should be given to the time required to obtain right-of-way approval and to construct improvements.

#### References

Spent Fuel or High-Level Radioactive Waste Transportation, 10 CFR 72.108 et seq. (see Appendix B, page B-8).

### 2.2.5 Cost and Development-Time Considerations

No specific considerations for cost and development time are specified, as there are no specific statutory or regulatory bases for such considerations. However, in the event that potential sites are compared, and the siting considerations of Section 2.2 do not clearly indicate preference for a particular site, then cost and development time could be considered.

Cost may be of significance if conditions at a site may require extensive or complex design and construction measures to meet applicable regulatory requirements or to permit efficient operations. The cost implications of relative distances from utilities, a railhead, or a major highway system and the potential economic penalties of new accesses and upgrades of transportation networks could be factors to be considered.

Development time may also be of significance if conditions at a site require extensive time for permitting or could result in extensive licensing time before the start of construction.

#### Reference

Cost Estimation, Analysis, and Standardization, DOE Order 5700.2C  
(see Appendix D, page D-1).

## REFERENCES

### STATUTES

- 7 USC 4201 et seq., Farmland Protection Policy Act.
- 16 USC 1 et seq., The Organic Act of the National Park Service.
- 16 USC 431 et seq., Antiquities Act.
- 16 USC 461 et seq., Historic Sites, Buildings, and Antiquities Act.
- 16 USC 469 et seq., Archaeological and Historic Preservation Act.
  
- 16 USC 470 et seq., National Historic Preservation Act.
- 16 USC 470aa et seq., Archaeological Resources Protection Act.
- 16 USC 521 et seq., National Forest Organic Act.
- 16 USC 668 et seq., Bald and Golden Eagle Protection Act.
- 16 USC 668dd et seq., National Wildlife Refuge System Administration Act.
  
- 16 USC 703 et seq., Migratory Bird Treaty Act.
- 16 USC 1131 et seq., National Wilderness Preservation Act.
- 16 USC 1246 et seq., National Trails System Act.
- 16 USC 1273 et seq., National Wild and Scenic Rivers System.
- 16 USC 1331 et seq., Wild Free-Roaming Horses and Burros: Protection, Management, and Control.
  
- 16 USC 1451 et seq., Coastal Zone Management.
- 16 USC 1531 et seq., Endangered Species Act.
- 16 USC 1533 et seq., Determination of Endangered Species and Threatened Species.
- 16 USC 1996 et seq., American Indian Religious Freedom Act.
- 16 USC 3501 et seq., Coastal Barrier Resources Act.
  
- 42 USC 300f et seq., Safe Drinking Water Act.
- 42 USC 7401 et seq., Title 1 - Air Pollution Prevention and Control.
- 42 USC 10101 et seq., Nuclear Waste Policy Act of 1982 and Nuclear Waste Policy Amendments Act of 1987.
- 43 USC 315 et seq., Taylor Grazing Act.
- 49 USC 303 et seq., The Department of Transportation Acts.

## REFERENCES

(continued)

### REGULATIONS

- 7 CFR 658 et seq., Farmland Protection Policy Act.
- 10 CFR 72 et seq., Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste.
- 10 CFR 100 et seq., App. A, Seismic and Geologic Siting Criteria for Nuclear Power Plants.
- 10 CFR 1022 et seq., Compliance with Floodplain/Wetlands Environmental Review Requirements.
- 36 CFR 293 et seq., Wilderness -- Primitive Areas.
- 36 CFR 800 et seq., National Historic Preservation Act Regulations
- 40 CFR 264 et seq., Resource Conservation and Recovery Act.
- 43 CFR 8560 et seq., Wilderness Areas.
- 50 CFR 29 et seq., Land Use Management.
- 50 CFR 35 et seq., Wilderness Preservation and Management.

### EXECUTIVE ORDERS

- Executive Order 11593, Protection and Enhancement of Cultural Environment.
- Executive Order 11988, Floodplain Management.
- Executive Order 11990, Protection of Wetlands.

### DEPARTMENT OF ENERGY ORDERS

- DOE Order 4300.1B, Real Property and Site Development Planning.
- DOE Order 5700.2C, Cost Estimation, Analysis and Standardization.
- DOE Order 6430.1A, General Design Criteria (GDC).

Analyses of Alternative Designs and Operating Approaches for a Monitored Retrievable Storage Facility, MRS Action Plan Task B Report, PNL-6770, Pacific Northwest Laboratories, 1988.

MRS Submission to Congress, DOE/RW-0035, U.S. Department of Energy, 1987, Volume II, Chapter 6.

The DOE Position on the MRS Facility, DOE/RW-0239, U.S. Department of Energy, June 1989

Report to Congress on Rassessment of the Civilian Radioactive Waste Management Program, DOE/RW-0247, U.S. Department of Energy, November 1989.

## INDEX TO APPENDICES

### Appendix A

<u>STATUTES</u>	<u>Page</u>
7 USC 4201 et seq., Farmland Protection Policy Act . . . . .	A-1
16 USC 1 et seq., The Organic Act of the National Park Service . . . . .	A-1
16 USC 431 et seq., Antiquities Act . . . . .	A-2
16 USC 461 et seq., Historic Sites, Buildings, and Antiquities Act . . . . .	A-2
16 USC 469 et seq., Archaeological and Historic Preservation Act . . . . .	A-3
16 USC 470 et seq., National Historic Preservation Act . . . . .	A-3
16 USC 470aa et seq., Archaeological Resources Protection Act . . . . .	A-5
16 USC 521 et seq., National Forest Organic Act . . . . .	A-6
16 USC 668 et seq., Bald and Golden Eagle Protection Act . . . . .	A-6
16 USC 668dd et seq., National Wildlife Refuge System Administration Act . . . . .	A-6
16 USC 703 et seq., Migratory Bird Treaty Act . . . . .	A-8
16 USC 1131 et seq., National Wilderness Preservation Act . . . . .	A-8
16 USC 1246 et seq., National Trails System Act . . . . .	A-9
16 USC 1273 et seq., National Wild and Scenic Rivers System . . . . .	A-9
16 USC 1331 et seq., Wild Free-Roaming Horses and Burros: Protection, Management, and Control . . . . .	A-10
16 USC 1451 et seq., Coastal Zone Management . . . . .	A-10
16 USC 1531 et seq., Endangered Species Act . . . . .	A-11
16 USC 1533 et seq., Determination of Endangered Species and Threatened Species . . . . .	A-11
16 USC 1996 et seq., American Indian Religious Freedom Act . . . . .	A-12
16 USC 3501 et seq., Coastal Barrier Resources Act . . . . .	A-13
42 USC 300f et seq., Safe Drinking Water Act . . . . .	A-13
42 USC 7401 et seq., Title 1 - Air Pollution Prevention and Control . . . . .	A-14
42 USC 10101 et seq., Nuclear Waste Policy Act of 1982 and Nuclear Waste Policy Amendments Act of 1987 . . . . .	A-15
43 USC 315 et seq., Taylor Grazing Act . . . . .	A-15
49 USC 303 et seq., The Department of Transportation Acts . . . . .	A-16

INDEX TO APPENDICES  
(continued)

Appendix B

<u>REGULATIONS</u>	<u>Page</u>
7 CFR 658 et seq., Farmland Protection Policy Act . . . . .	B-1
10 CFR 72 et seq., Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste . . . . .	B-1
10 CFR 100 et seq., App. A, Seismic and Geologic Siting Criteria for Nuclear Power Plants . . . . .	B-9
10 CFR 1022 et seq., Compliance with Floodplain/Wetlands Environmental Review Requirements . . . . .	B-11
36 CFR 293 et seq., Wilderness -- Primitive Areas . . . . .	B-11
40 CFR 264 et seq., Resource Conservation and Recovery Act . . . . .	B-12
43 CFR 8560 et seq., Wilderness Areas . . . . .	B-12
50 CFR 29 et seq., Land Use Management . . . . .	B-13
50 CFR 35 et seq., Wilderness Preservation and Management . . . . .	B-14

Appendix C

<u>EXECUTIVE ORDERS</u>	<u>Page</u>
Executive Order 11593, Protection and Enhancement of Cultural Environment .	C-1
Executive Order 11988, Floodplain Management . . . . .	C-1
Executive Order 11990, Protection of Wetlands . . . . .	C-2

Appendix D

<u>DEPARTMENT OF ENERGY ORDERS</u>	<u>Page</u>
DOE Order 4300.1B, Real Property and Site Development Planning . . . . .	D-1
DOE Order 5700.2C, Cost Estimation, Analysis and Standardization . . . . .	D-1
DOE Order 6430.1A, General Design Criteria (GDC) . . . . .	D-1

## Appendix A

### STATUTES

#### 7 U.S.C. Section 4201 et seq., Farmland Protection Policy Act

Section 4201 states that:

"(b) *Use of criteria to identify*

*Departments, agencies, independent commissions, and other units of the Federal Government shall use the criteria established under subsection (a) of this section, to identify and take into account the adverse effects of Federal programs on the preservation of farmland; consider alternative actions, as appropriate, that could lessen such adverse effects; and assure that such federal programs, to the extent practicable, are compatible with State, unit of local government, and private programs and policies to protect farmland."*

This Act seeks to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses. This is the basis for a site consideration (Section 2.2.3.1, Land Use and Ownership).

#### 16 U.S.C. Section 1 et seq., the Organic Act of the National Park Service

Section 1 states that:

*"... which purpose is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations."*

This Act serves to preserve National Parks, and to leave them unimpaired for future generations. This is the basis for a site requirement (Section 2.1.3, Single Use Protected Lands). An MRS facility can not be sited within a National Park. Such a facility is not compatible with the purpose of the National Park system.

## 16 U.S.C. Section 431 et seq., Antiquities Act

Section 431 states that:

*"The President of the United States is authorized, in his discretion, to declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States to be national monuments, and may reserve as a part thereof parcels of land, the limits of which in all cases shall be confined to the smallest area compatible with the proper care and management of the objects to be protected."*

This Act protects historic and prehistoric ruins, monuments, and objects of antiquity located on lands owned or controlled by the Federal government. This is the basis for a site consideration (Section 2.2.2.5, Historical, Cultural, Archaeological Impacts). Potential MRS facility locations that do not conflict with ruins, monuments and objects of antiquity are preferred. While siting an MRS facility on or near these areas is possible, it is not preferred under the current constraints of the DOE's schedule for waste acceptance.

## 16 U.S.C. Section 461 et seq., Historic Sites, Buildings, and Antiquities Act

Section 461, Declaration of national policy states that:

*"It is declared that it is a national policy to preserve for public use historic sites, buildings, and objects of national significance for the inspiration and benefit of the people of the United States."*

This Act protects districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture, that are included in, or eligible for inclusion in, the National Register. This is the basis for a site consideration (Section 2.2.2.5, Historical, Cultural, or Archaeological Impacts). The DOE prefers to avoid sites that include districts, sites, structures and objects either in or eligible for inclusion in the National Register because of the length of time required to gain access and the potential impact to these sites or objects.

## 16 U.S.C. Section 469 et seq., Archaeological and Historic Preservation Act

Section 469, Preservation of historical and archaeological data threatened by construction or alterations of terrain, states that:

*"It is the purpose of sections 469 to 469c-1 of this title to further the policy set forth in sections 461 to 467 of this title, by specifically providing for the preservation of historical and archaeological data (including relics and specimens) which might otherwise be irreparably lost or destroyed as the result of (1) flooding, the building of access roads, the erection of workmen's communities, the relocation of railroads and highways, and other alterations of the terrain caused by the construction of a dam by any agency of the United States, or by any private person or corporation holding a license issued by any such agency or (2) any alteration of the terrain caused as a result of any Federal construction project or federally licensed activity or program."*

This Act protects districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture, that are included in, or eligible for inclusion in, the National Register. This is the basis for a site consideration (Section 2.2.2.5, Historical, Cultural, or Archaeological Impacts). The DOE prefers to avoid sites that include districts, sites, structures and objects either in or eligible for inclusion in the National Register because of the length of time required to gain access and potential impact to such objects.

## 16 U.S.C. Section 470 et seq., National Historic Preservation Act

Section 470-1, Declaration of policy of the Federal Government states that:

*"It shall be the policy of the Federal Government, in cooperation with other nations and in partnership with the States, local governments, Indian tribes, and private organizations and individuals to -*

- (1) use measures, including financial and technical assistance, to foster conditions under which our modern society and our prehistoric and historic resources can exist in productive harmony and fulfill the social, economic, and other requirements of present and future generations;*
- (2) provide leadership in the preservation of the prehistoric and historic resources of the United States and of the international community of nations;*

- (3) *administer federally owned, administered, or controlled prehistoric and historic resources in a spirit of stewardship for the inspiration and benefit of present and future generations;*
- (4) *contribute to the preservation of nonfederally owned prehistoric and historic resources and give maximum encouragement to organizations and individuals undertaking preservation by private means;*
- (5) *encourage the public and private preservation and utilization of all usable elements of the Nation's historic built environment, and*
- (6) *assist State and local governments and the National Trust for Historic Preservation in the United States to expand and accelerate their historic preservation programs and activities."*

Section 470, Effect of Federal undertakings upon property listed in National Register; comment by Advisory Council on Historic Preservation:

*"The head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. The head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under Title II of this Act a reasonable opportunity to comment with regard to such undertaking."*

This Act protects districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture, that are included in, or eligible for inclusion in, the National Register. Section 470 (and its implementing regulation, 36 CFR Part 800) requires that the head of any Federal agency having jurisdiction over a Federal action review whether the action involves any district, site, building, structure or object that is included in or eligible for inclusion in the National Register; and that the head of the agency consult with the Advisory Council on Historic Preservation.

Section 470h-2, Historic Properties owned or controlled by Federal agencies, has recently been incorporated into the Act. It is taken from Executive Order 11593, Protection and Enhancement of the Cultural Environment (Appendix C, page C-1) and therefore is not restated here. The requirements are similar to those stated in the implementing regulations 36 CFR Part 800. This Act is the basis for a site consideration (Section 2.2.2.5, Historical, Cultural, or Archaeological Impacts). The DOE prefers to avoid sites that include districts, sites, structures and objects either in or eligible for inclusion in the National Register because of the length of time required to gain access and potential impact to such objects.

**16 U.S.C. Section 470aa et seq., Archaeological Resources Protection Act**

Section 470aa, Congressional findings and declaration of purpose, states that:

*"(b) The purpose of this chapter is to secure, for the present and future benefit of the American people, the protection of archaeological resources and sites which are on public lands and Indian lands, and to foster increased cooperation and exchange of information between governmental authorities, the professional archaeological community, and private individuals having collections of archaeological resources and data which were obtained before October 31, 1979."*

This Act protects archaeological resources located on U.S. public lands (including most Federal lands) or Indian lands and includes prohibitions against vandalism. The implementing regulations for this statute are 36 CFR Part 296 and 43 CFR Part 7.

This is the basis for a site consideration (Section 2.2.2.5, Historical, Cultural, or Archaeological Impacts). The DOE prefers sites that do not have archaeological resources. Assessment and consultation with the State Historic Preservation Office (SHPO) are required if resources are discovered at a proposed site. The length of time required to complete the assessment should be considered.

## 16 U.S.C. Section 521 et seq., National Forest Organic Act

Section 521. Lands acquired to be reserved, held, and administered as national forest lands; designation states that:

*"Subject to the provisions of section 519 of this title the lands acquired under this Act shall be permanently reserved, held, and administered as national forest lands under the provisions of section 471 of this title and acts supplemental to and amendatory thereof. And the Secretary of Agriculture may from time to time divide the lands acquired under this Act into such specific national forest and so designate the same as he may deem best for administrative purposes."*

This Act protects and improves National Forests, which are established for outdoor recreation, range, timber, watershed, and fish and wildlife purposes. This is the basis for a site consideration (Section 2.2.3.1, Land Use and Ownership).

## 16 U.S.C. Section 668 et seq., Bald and Golden Eagle Protection Act

Section 668 states that:

*"(a) Prohibited acts; criminal penalties*

*Whoever, within the United States or any place subject to the jurisdiction thereof, without being permitted to do so as provided in this subchapter, shall knowingly, ...take, possess, sell, ...at any time or in any manner any bald eagle commonly known as the American eagle or any golden eagle, alive or dead, or any part, nest, or egg thereof of the foregoing eagles, or whoever violates any permit or regulation issued pursuant to this subchapter, shall be fined...or imprisoned..."*

This act prohibits possessing, killing, transporting, disturbing, etc., of bald and golden eagles, their nests, or eggs. Potential sites are preferred which avoid impacts, including indirect effects, to bald and golden eagles, their nest, and eggs. This is the basis for a site consideration (Section 2.2.2.4, Protected Species). MRS facility activities must avoid harm to the eagles or their nesting habitat. Although relocation of golden eagles is possible, public perception may generate ill will toward the DOE.

## 16 U.S.C. Section 668ddd et seq., National Wildlife Refuge System Administration Act

*"(a) Designation; administration; continuance of resources-management-programs for refuge lands in Alaska; disposal of acquired lands; proceeds*

(1) *For the purposes of consolidating the authorities relating to the various categories of areas that are administered by the Secretary of the Interior for the conservation of fish and wildlife, all lands, waters, and interests therein administered by the Secretary as wildlife refuges, areas for the protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, or water-fowl production areas are hereby designated as the 'National Wildlife Refuge System...'*

(c) *Prohibited and permitted activities; applications of mining and mineral leasing laws, hunting or fishing regulations, and State laws or regulations*

*No person shall knowingly disturb, injure, cut, burn, remove, destroy, or possess any real or personal property of the United States, including natural growth, in any area of the System; or enter, use, or otherwise occupy any such area for any purpose; unless such activities are permitted either under subsection (d) of this section or by express provision of the law, proclamation, Executive Order, or public land order establishing the area or amendment thereof...*

(d)(1) *The Secretary is authorized, under such regulations as he may prescribe, to--*

(A) *permit the use of any area within the System for any purpose ... whenever he determines that such uses are compatible with the major purposes for which such areas were established.*

(B) *permit the use of, or grant easements in, over, across, upon, through, or under any areas within the System ... whenever he determines that such uses are compatible with the purposes for which these areas are established."*

This Act established the National Wildlife Refuge System by consolidating authority over fish and wildlife conservation areas under the Secretary of Interior, U.S. Fish and Wildlife service. Its function is to protect and conserve wildlife refuges. This is the basis for an exclusionary requirement (2.1.3, Single Use Protected Lands). An MRS facility can not be sited within the National Wildlife Refuge System. An MRS is not compatible with the purpose of Wildlife Refuges.

16 U.S.C. Section 703 et seq., Migratory Bird Treaty Act

Section 703 states that:

*"Unless and except as permitted by regulations made as hereinafter provided in this subchapter, it shall be unlawful at any time, by any means or in any manner, to take any migratory bird, any part, nest, or eggs of any such bird, or any product, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof..."*

This Act prohibits killing, capturing, transporting, etc., of protected migratory birds, their nests, and eggs. Siting activities must avoid harm, including indirect effects, to migratory birds, their nests, and eggs. This is the basis for a siting consideration (Section 2.2.2.4, Protected Species). Proposed sites that do not potentially impact protected migratory birds or their nesting areas are preferred. Consultation with the Fish and Wildlife Service (FWS) and State agencies is encouraged. The difficulties associated with siting an MRS facility in these locations involve both time for consultation and a potentially negative public perception.

16 U.S.C. Section 1131 et seq., National Wilderness Preservation Act

Section 1131,

*"(a) Establishment; Congressional declaration of policy; wilderness areas; administration for public use and enjoyment, protection, preservation, and gathering and dissemination of information; provisions for designation as wilderness areas*

*In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness. For this purpose there is hereby established a National Wilderness Preservation System to be composed of federally owned areas designated by Congress as 'wilderness areas', and these shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the*

*gathering and dissemination of information regarding their use and enjoyment as wilderness; and no Federal lands shall be designated as 'wilderness areas' except as provided for in this chapter or by a subsequent Act."*

This Act establishes a National Wilderness Preservation System for public recreational, scenic, scientific, educational, conservation and historic use. This is the basis for a site requirement, (Section 2.1.3, Single Use Protected Lands). An MRS facility may not be sited within the National Wilderness Preservation System, since it is not compatible with the purposes of a Wilderness Area.

#### **16 U.S.C. Section 1246 et seq., National Trails System Act**

Section 1246,

*"(c) ...uses along the trail, which will not substantially interfere with the nature and purposes of the trail, may be permitted by the Secretary charged with the administration of the trail...to the extent practicable, efforts shall be made to avoid activities incompatible with the purposes for which such trails were established."*

This Act establishes and protects National Recreation, National Scenic, and National Historic Trails. This is the basis for a site consideration (Section 2.2.3.1, Land Use and Ownership). Proposed sites in the vicinity of a National Trail should be avoided because the MRS facility may be incompatible with the purpose of the National Trails System Act.

#### **16 U.S.C. Section 1273 et seq., National Wild and Scenic Rivers System**

Section 1273,

*"The national wild and scenic rivers system shall comprise rivers (i) that are authorized for inclusion therein by Act of Congress, or (ii) that are designated as wild, scenic or recreational rivers by or pursuant to an act of the legislature of the State or States through which they flow."*

This Act prohibits construction on or directly affecting any river that is designated a component of the National Wild and Scenic River (NWSR) system, or any river designated for addition to the system, that would adversely affect the values of the NWSR system. This is the basis for a site requirement (Section 2.1.3., Single Use Protected Lands) and a site consideration (Section 2.2.3.1, Land Use and Ownership). Potential sites which are not part of the NWSR system are preferred.

**16 U.S.C. Section 1331 et seq., Wild Free-Roaming Horses and Burros: Protection, Management, and Control**

Section 1331 states that:

*"Congress finds and declares that wild free-roaming horses and burros are living symbols of the historic and pioneer spirit of the West; that they contribute to the diversity of life forms within the Nation and enrich the lives of the American people; and these horses and burros are fast disappearing from the American scene. It is the policy of Congress that wild free-roaming horses and burros shall be protected from capture, branding, harassment, or death; and to accomplish this they are to be considered in the area where presently found, as an integral part of the natural system of the public lands."*

This Act protects all unbranded and unclaimed horses and burros on public lands administered by the Bureau of Land Management and the U.S. Forest Service. This is the basis for a site consideration (Section 2.2.2.4, Protected Species). A site should avoid harm, including indirect effects, to wild free-roaming horses and burros on public lands.

**16 U.S.C. Section 1451 et seq., Coastal Zone Management**

Section 1451 states that:

*"The Congress finds and declares that it is the national policy -*

- (1) to preserve, protect, develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone for this and succeeding generations;..."*

This Act ensures that any Federal project in the coastal zone of a state, or directly affecting the coastal zone, is consistent with approved state management programs. This is the basis for a site consideration (Section 2.2.2.1, Wetlands and Coastal Zones). If a potential site is located in a coastal zone, then the State or Indian Tribe must determine if a Coastal Zone Management Program (CZMP) exists and if plans for an MRS facility are compatible.

16 U.S.C. Section 1531 et seq., Endangered Species Act

Section 1531,

"(b) *Purposes*

*The purposes of this chapter are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the treaties and conventions set forth in subsection (a) of this section.*

(c) *Policy*

- (1) *It is further declared to be the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this chapter.*
- (2) *It is further declared to be the policy of Congress that Federal agencies shall cooperate with State and local agencies to resolve water resource issues in concert with conservation of endangered species."*

Section 1533, Determination of Endangered Species and Threatened Species

"(a)(3) *The Secretary...*

- (A) *shall, concurrently with making a determination under paragraph (1) that a species is an endangered species or a threatened species, designate any habitat of such species which is then considered to be critical habitat; and...*
- (b) *Basis for determinations -- The Secretary determines,...based on the best scientific and commercial data available, that the failure to designate such area as critical habitat will result in the extinction of the species concerned."*

The MRS facility must not be sited in the critical habitat of any endangered species. The presence of an endangered species at and in the vicinity of a potential site does not exclude a site from consideration. However, the presence of an area designated as a "critical habitat" would preclude development of a site for an MRS facility. The referenced Act includes the following requirements: Any action a federal agency authorizes, funds, or carries out, in the United States or upon the high seas, must not be likely to jeopardize the continued existence of any federally listed species or result in the destruction or adverse modification of critical habitat. If such species are present, then a biological assessment must be conducted to evaluate the projects' impact on species and/or habitat and involves consultation with Fish and Wildlife Service (FWS).

This forms the basis for a site requirement (Section 2.1.5, Protected Species Critical Habitat) and a site consideration (Section 2.2.2.4, Protected Species).

#### 16 U.S.C. Section 1996 et seq., American Indian Religious Freedom Act

Section 1996 states that:

*"On and after August 11, 1978, it shall be the policy of the United States to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites.*

*Section 2 of P. L. 95-341 provided that the President direct the various Federal departments, agencies, and other instrumentalities responsible for administering relevant laws to evaluate their policies and procedures in consultation with native traditional religious leaders to determine change necessary to preserve Native American religious and cultural rights and practices..."*

This Act protects and preserves Native American religions and practices. Sites associated with Native American religious practices are protected.

This is the basis for a site consideration (Section 2.2.2.5, Historical, Cultural, or Archaeological Impacts). Proposed sites are preferred that do not involve sites of religious significance to Native Americans.

## 16 U.S.C. Section 3501 et seq., Coastal Barrier Resources Act

Section 3501, Limitation on Federal expenditures affecting the System, states that:

*"... no new expenditures or new financial assistance may be made available under authority of any Federal law for any purpose within the Coastal Barrier Resources System..."*

This Act prohibits new expenditures of Federal funds for any activity within the Coastal Barrier Resources System. This is the basis for a site requirement (Section 2.1.4, Coastal Barriers). An MRS facility must not be sited within the Coastal Barrier Resources System.

## 42 U.S.C. 300f et seq., Safe Drinking Water Act

### Section 300h-6. Sole Source Aquifer Demonstration Program

- "(a) The purpose of this section is to establish procedures for development, implementation, and assessment of demonstration programs designed to protect critical aquifer protection areas located within areas designated as sole or principal source aquifers under section 1424(e) of this Act..."*
  
- (c) Any State, municipal or local government or political subdivision thereof or any planning entity (including any interstate regional planning entity) that identifies a critical aquifer protection area over which it has authority or jurisdiction may apply to the Administrator for the selection of such area for a demonstration program under this section.*
  
- (f)(1) The objective of a comprehensive management plan submitted by an applicant under this section shall be to maintain the quality of the ground water in the critical protection area in a manner reasonably expected to protect human health, the environment and ground water resources. In order to achieve such objective, the plan may be designed to maintain, to the maximum extent possible, the natural vegetative and hydrogeological conditions."*

Section 300h-7. State Programs to Establish Wellhead Protection Areas.

*"(h) Each department, agency, and instrumentality of the executive, legislative, and judicial branches of the Federal Government having jurisdiction over any potential source of contaminants identified by a State program pursuant to the provisions of subsection (a)(3) shall be subject to and comply with all requirements of the State program developed according to subsection (a)(4) applicable to such potential source of contaminants, both substantive and procedural, in the same manner, and to the same extent, as any other person is subject to such requirements, including payment of reasonable charges and fees. The President may exempt any potential source under the jurisdiction of any department, agency, or instrumentality in the executive branch if the President determines it to be in the paramount interest of the United States to do so."*

The purpose of this Act is to regulate public water supply systems and to prevent pollution of underground sources of drinking water. The Federal government has delegated responsibility to the States for developing well-head protection programs. This is the basis for a site consideration (Section 2.2.2.2, Preservation of Ground Water Quality). A potential site is preferred which is not in a well-head protection area.

42 U.S.C. Section 7401 et seq., Title 1 - Air Pollution Prevention and Control (Clean Air Act)

Part A - Air Quality and Emission Limitations

Section 7410, State Implementation Plans, states that:

*"(I) ... no major stationary source shall be constructed or modified in any nonattainment area (as defined in section 171(2)) to which such plans apply, if the emissions from such facility will cause or contribute to concentrations of any pollutant for which a national ambient air quality standard is exceeded in such areas..."*

Part C - Prevention of Significant Deterioration of Air Quality; Subpart 2, Visibility for Federal Class I Areas

*"Section 7491(a)(1) Congress hereby declares as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory class I Federal areas which impairment results from manmade air pollution."*

This Act establishes air emissions limitations, air quality standards and requires States to develop an implementation plan strategy for attaining and maintaining air-quality standards. This is the basis for a site consideration (Section 2.2.2.3, Protection of Air Quality). Potential sites are preferred in areas that are not Class I areas. If the MRS facility and existing facilities emit more than 250 tons per year of a criteria pollutant, then non-attainment areas for that pollutant should be avoided.

**42 U.S.C. Section 10101 et seq., Nuclear Waste Policy Act of 1982 (NWPA) and Nuclear Waste Policy Amendments Act of 1987 (NWPAA)**

Section 10161, Monitored Retrievable Storage (Section 141 of NWPA, as amended)

*"(g) Limitation. -- No monitored retrievable storage facility developed pursuant to this section may be constructed in any State in which there is located any site approved for site characterization under section 112. The restriction in the preceding sentence shall only apply until such time as the Secretary decides that such candidate site is no longer a candidate site under consideration for development as a repository. Such restriction shall continue to apply to any site selected for construction as a repository."*

Section 10165 Site Selection (Section 145 of NWPA, as amended)

*"(g) Limitation. -- No monitored retrievable storage facility authorized pursuant to section 142(b) may be constructed in the State of Nevada."*

These sections prohibit building an MRS facility in a State that has a site approved for characterization as a geologic repository. This is the basis for a site requirement (Section 2.1.1, Colocation with a Geologic Repository) and a site consideration (Section 2.2.2.2, Preservation of Ground-Water Quality). It prohibits building an MRS facility in the State of Nevada since the Yucca Mountain site is located in Nevada. The Yucca Mountain site is the only site approved for characterization, therefore Nevada is the only state excluded under this act.

43 USC Section 315 et seq., Taylor Grazing Act

Section 315. Grazing districts; establishment; restrictions; prior rights; rights-of-way; hearing and notice; hunting or fishing rights...states:

*"...that the publication of such notice [public notice] shall have the effect of withdrawing all public lands within the exterior boundary of such proposed grazing districts from all forms of entry of settlement..."*

- (a) *"The Secretary of the Interior shall make provision for the protection, administration, regulation, and improvement of such grazing district as may be created under the authority of section 315 of this title, and he shall make such rules and regulations and establish such service, enter into such cooperative agreements, and do any and all things necessary to accomplish the purposes of this subchapter and to insure the objects of such grazing districts, namely, to regulate their occupancy and use, to preserve the land and its resources from destruction or unnecessary injury, to provide for the orderly use, improvement, and development of the range; ..."*

This Act creates, protects, and regulates Federal grazing districts to provide for the orderly use and development of rangeland. This is the basis for a site consideration (Section 2.2.3.1, Land Use and Ownership). Proposed sites which are not located on a BLM grazing allotment are preferred. It is possible to negotiate a right-of-way or withdrawal of grazing allotment land agreement with BLM, however the time frame may not be consistent with the DOE schedule for waste acceptance.

49 U.S.C. Section 303 and 23 U.S.C. Section 138, The Department of Transportation Acts

Section 303, Policy on lands, wildlife and waterfowl refuges and historic sites, states that:

- (a) *It is the policy of the United States Government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites.*

- (c) *The Secretary may approve a transportation program or project requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance...only if*
- (1) *there is no prudent and feasible alternative to using that land; and*
  - (2) *the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use."*

This Act is intended to preserve the natural beauty of the countryside and public parks and recreation lands, wildlife and waterfowl refuges, and historic sites. This is the basis for a site consideration (Section 2.2.3.1, Land Use and Ownership). Potential sites which do not require construction of a transportation network that would adversely effect recreation lands, wildlife areas and historic sites are preferred.

## Appendix B

### REGULATIONS

#### 7 Part 658 - Farmland Protection Policy Act

The Farmland Protection Policy Act, which implements the Act, states that:

*"This part sets out the criteria developed by the Secretary of Agriculture, in cooperation with other Federal agencies, pursuant to section 1541(a) of the Farmland Protection Policy Act (FPPA or the Act) 7 USC 4202(a). As required by section 1541(b) of the Act, 7 USC 4202(b), Federal agencies are (a) to use the criteria to identify and take into account the adverse effects of their programs on the preservation of farmland, (b) to consider alternative actions, as appropriate, that could lessen adverse effects, and (c) to ensure that their programs, to the extent practicable, are compatible with state and units of local government and private programs and policies to protect farmland."*

This regulation seeks to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses. This is the basis for a site consideration (Section 2.2.3.1, Land Use and Ownership). Although locating on prime and unique farmland is possible, it is not practicable. The DOE prefers sites that do not involve such farmland.

#### 10 CFR Part 72. Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste

##### Section 72.90 General considerations.

- "(a) Site characteristics that may directly affect the safety or environmental impact of the ISFSI or MRS must be investigated and assessed.*
- (b) Proposed sites for the ISFSI or MRS must be examined with respect to the frequency and the severity of external natural and man-induced events that could affect the safe operation of the ISFSI or MRS.*
- (c) Design basis external events must be determined for each combination of proposed site and proposed ISFSI or MRS design.*
- (d) Proposed sites with design basis external events for which adequate protection cannot be provided through ISFSI or MRS design shall be deemed unsuitable for the location of the ISFSI or MRS.*

- (e) *Pursuant to Subpart A of Part 51 of this chapter for each proposed site for an ISFSI and pursuant to sections 141 or 148 of NWPA, as appropriate (96 Stat. 2241, 101 Stat. 1330-235, 42 U.S.C. 10161, 10168) for each proposed site for an MRS, the potential for radiological and other environmental impacts on the region must be evaluated with due consideration of the characteristics of the population, including its distribution, and of the regional environs, including its historical and esthetics values.*
- (f) *The facility must be sited so as to avoid to the extent possible the long-term and short-term adverse impacts associated with the occupancy and modification of floodplains."*

This section considers the effect that characteristics of a site would have on operation of the MRS facility as well as the possible effects operations of the MRS facility would have on a site.

This forms the basis for site considerations (Section 2.2.1.1, Natural Seismic Risk, Section 2.2.1.2, Induced Seismicity, Section 2.2.1.3, Surface Faulting, Section 2.2.1.4, Floodplains, Section 2.2.1.5, Ground Stability, Section 2.2.1.6, Volcanism, Section 2.2.1.8, Human Activities). A potential site that can be adequately protected from design basis external events is preferred.

Part 72.92 Design basis external natural events.

- "(a) *Natural phenomena that may exist or that can occur in the region of a proposed site must be identified and assessed according to their potential effects on the safe operation of the ISFSI or MRS. The important natural phenomena that affect the ISFSI or MRS design must be identified.*
- (b) *Records of the occurrence and severity of those important natural phenomena must be collected for the region and evaluated for reliability, accuracy, and completeness. The applicant shall retain these records until the license is issued.*

- (c) *Appropriate methods must be adopted for evaluating the design basis external natural events based on the characteristics of the region and the current state of knowledge about such events."*

This forms the basis for site considerations (Section 2.2.1.1, Natural Seismic Risk, Section 2.2.1.6, Volcanism, Section 2.2.1.7, Other Extreme Natural Phenomena).

Part 72.94 Design basis external man-induced events.

- "(a) *The region must be examined for both past and present man-made facilities and activities that might endanger the proposed ISFSI or MRS. The important potential man-induced events that affect the ISFSI or MRS design must be identified.*
- (b) *Information concerning the potential occurrence and severity of such events must be collected and evaluated for reliability, accuracy, and completeness.*
- (c) *Appropriate methods must be adopted for evaluating the design basis external man-induced events, based on the current state of knowledge about such events."*

These regulations require that a potential site must be examined for both past and present man-induced events which may affect the safe operation of an MRS facility. The examination should include the collection of records which are evaluated for reliability, accuracy and completeness. This forms the basis for site considerations (Section 2.2.1.2, Induced Seismicity, Section 2.2.1.8, Human Activities).

Part 72.96 Siting limitations.

- "(a) *An ISFSI which is owned and operated by DOE must not be located at any site within which there is a candidate site for a HLW repository. This limitation shall apply until such time as DOE decides that such candidate site is no longer a candidate site under consideration for development as a HLW repository.*

- (b) *An MRS must not be sited in any State in which there is located any site approved for site characterization for a HLW repository. This limitation shall apply until such time as DOE decides that the candidate site is no longer a candidate site under consideration for development as a repository. This limitation shall continue to apply to any site selected for construction as a repository.*
- (c) *If an MRS is located, or is planned to be located, within 50 miles of the first HLW repository, any Commission decision approving the first HLW repository application must limit the quantity of spent fuel or high-level radioactive waste that may be stored. This limitation shall prohibit the storage of a quantity of spent fuel containing in excess of 70,000 metric tons of heavy metal, or a quantity of solidified high-level radioactive waste resulting from the reprocessing of such a quantity of spent fuel, in both the repository and the MRS until such time as a second repository is in operation.*
- (d) *An MRS authorized by section 142(b) of NWFA (101 Stat. 1330-232, 42 U.S.C. 10162(b)) may not be constructed in the State of Nevada. The quantity of spent nuclear fuel or high-level radioactive waste that may be stored at an MRS authorized by section 142(b) of NWFA shall be subject to the limitations in Section 72.44(g) of this part instead of the limitations in paragraph (c) of this section."*

This section restricts where the potential MRS facility may be located in relation to a HLW repository. It also prohibits construction of an MRS facility in the State of Nevada. This is the basis for a site requirement (2.1.1, Colocation with a Geologic Repository).

Part 72.98 Identifying regions around an ISFSI or MRS site.

- "(a) *The regional extent of external phenomena, man-made or natural, that are used as a basis for the design of the ISFSI or MRS must be identified.*
- (b) *The potential regional impact due to the construction, operation or decommissioning of the ISFSI or MRS must be identified. The extent of regional impacts must be determined on the basis of potential measurable effects on the population or the environment from ISFSI or MRS activities.*
- (c) *Those regions identified pursuant to paragraphs (a) and (b) of this section must be investigated as appropriate with respect to:*

- (1) *The present and future character and the distribution of population,*
- (2) *Consideration of present and projected future uses of land and water within the region, and*
- (3) *Any special characteristics that may influence the potential consequences of a release of radioactive material during the operational lifetime of the ISFSI or MRS."*

This regulation relates to the identification of external phenomena, man-made or natural, (used as a basis for MRS facility design), and potential regional impacts on populations (with respect to distribution of population and projected usage of land and water) due to MRS facility activities. This is the basis for a site consideration (Section 2.2.1.1, Natural Seismic Risk).

Part 72.102 Geological and seismological characteristics.

- "(a)(1) East of the Rocky Mountain Front (east of approximately 104 degrees west longitude), except in the areas of known seismic activity including but not limited to the regions around New Madrid, MO, Charleston, SC, and Attica, NY, sites will be acceptable if the results from onsite foundation and geological investigation, literature review, and regional geological reconnaissance show no unstable geological characteristics, soil stability problems, or potential for vibratory ground motion at the site in excess of an appropriate response spectrum anchored at 0.2g.*

  - (2) *For those sites that have been evaluated under paragraph (a)(1) of this section that are east of the Rocky Mountain Front, and that are not in areas of known seismic activity, a standardized design earthquake (DE) described by an appropriate response spectrum anchored at 0.25g. may be used. Alternatively, a site-specific DE may be determined by using the criteria and level of investigations required by Appendix A of Part 100 of this chapter.*
- (b) *West of the Rocky Mountain Front (west of approximately 104 degrees west longitude), and in other areas of known potential seismic activity, seismicity will be evaluated by the techniques of Appendix A of Part 100 of this chapter. Sites that lie within the range of strong near-field ground motion from historical earthquakes on large capable faults should be avoided.*

- (c) *Sites other than bedrock sites must be evaluated for their liquefaction potential or other soil instability due to vibratory ground motion.*
- (d) *Site-specific investigations and laboratory analyses must show that soil conditions are adequate for the proposed foundation loading.*
- (e) *In an evaluation of alternative sites, those which require a minimum of engineered provisions to correct site deficiencies are preferred. Sites with unstable geologic characteristics should be avoided.*
- (f) *The design earthquake (DE) for use in the design of structures must be determined as follows:*
  - (1) *For sites that have been evaluated under the criteria of Appendix A of 10 CFR Part 100, the DE must be equivalent to the safe shutdown earthquake (SSE) for a nuclear power plant.*
  - (2) *Regardless of the results of the investigations anywhere in the continental U.S., the DE must have a value for the horizontal ground motion of no less than 0.10 g with the appropriate response spectrum."*

This regulation deals with seismological and geological characteristics. Sites without unstable geologic characteristics are preferred. Sites that lie outside the range of strong near-field ground motion from historical earthquakes on large capable faults are preferred. Sites east of the Rocky Mountain Front (except in areas of known seismic activity) should be evaluated on the basis of literature review, on site foundation and geologic investigation, etc., and should have a potential ground motion of less than 0.25 g from earthquakes with a return period of 500 years. Sites west of the Rocky Mountain Front should be evaluated by the techniques of Appendix A of Part 100. The design earthquake ground motion, regardless of any investigation, must be no less than 0.10 g.

This is the basis for site considerations (Section 2.2.1.1, Natural Seismic Risk, Section 2.2.1.3, Surface Faulting, Section 2.2.1.5, Ground Stability). Unstable geological characteristics and strong near-field ground motion from historical earthquakes on large capable faults are site considerations. Also, it is assumed that a site should have a design earthquake ground motion equal to or greater than 0.10g.

Part 72.104 Criteria for radioactive materials in effluents and direct radiation from an ISFSI or MRS.

- "(a) *During normal operations and anticipated occurrences, an annual dose equivalent to any real individual who is located beyond the controlled area must not exceed 25 mrem to the whole body, 75 mrem to the thyroid and 25 mrem to any other organ as a result of exposure to:*
- (1) *Planned discharges of radioactive materials, radon and its decay products excepted, to the general environment,*
  - (2) *Direct radiation from ISFSI or MRS operations, and*
  - (3) *Any other radiation from uranium fuel cycle operations within the region.*
- (b) *Operational restrictions must be established to meet as low as is reasonably achievable objectives for radioactive materials in effluents and direct radiation levels associated with ISFSI or MRS operations.*
- (c) *Operational limits must be established for radioactive materials in effluents and direct radiation levels associated with ISFSI or MRS operations to meet the limits given in paragraph (a) of this section."*

Part 72.106 Controlled area of an ISFSI or MRS.

- "(a) *For each ISFSI or MRS site, a controlled area must be established.*
- (b) *Any individual located on or beyond the nearest boundary of the controlled area shall not receive a dose greater than 5 rem to the whole body or any organ from any design basis accident. The minimum distance from the spent fuel or high-level radioactive waste handling and storage facilities to the nearest boundary of the controlled area shall be at least 100 meters.*

- (c) *The controlled area may be traversed by a highway, railroad or waterway, so long as appropriate and effective arrangements are made to control traffic and to protect public health and safety."*

These parts of the regulation establish limits on the size of the controlled area and on the maximum permissible dose at the controlled area boundary from any design basis accident.

The limit on the size of the controlled area is a site requirement (Section 2.1.2., Site Size) that needs to be factored into the amount of land required for a potential site. The dose at the controlled area boundary is neither a site requirement nor a site consideration because it is dependent on the design of the MRS facility, and not on the site location itself.

Part 72.108 Spent fuel or high-level radioactive waste transportation.

*"The proposed ISFSI or MRS must be evaluated with respect to the potential impact on the environment of the transportation of spent fuel or high-level radioactive waste within the region."*

The impact of transportation of spent-fuel on the environment is a site consideration (Section 2.2.4, Transportation).

Part 72.122 Overall requirements.

II (b)(1)(2)(i)(ii)

*"(b) Protection against environmental conditions and natural phenomena*

- (1) Structures, systems, and components important to safety must be designed to accommodate the effects of, and to be compatible with, site characteristics and environmental conditions associated with normal operation, maintenance, and testing of the ISFSI or MRS and to withstand postulated accidents.*
- (2) Structures, systems, and components important to safety must be designed to withstand the effects of natural phenomena such as earthquakes, tornados, lightning, hurricanes, floods, tsunami, and seiches, without impairing their capability to perform safety functions. The design bases for these structures, systems, and components must reflect:*

- (i) *Appropriate consideration of the most severe of the natural phenomena reported for the site and surrounding area, with appropriate margins to take into account the limitations of the data and the period of time in which the data have accumulated, and*
- (ii) *Appropriate combinations of the effects of normal and accident conditions and the effects of natural phenomena.*

*The ISFSI or MRS should also be designed to prevent massive collapse of building structures or the dropping of heavy objects as a result of building structural failure on the spent fuel or high-level radioactive waste or on to structures, systems, and components important to safety."*

This section of the regulation considers the possible effect that characteristics of the region around a site may have on operation and design of the MRS facility. This forms the basis for a site consideration (Section 2.2.1.7, Other Extreme Natural Phenomena).

- "(b)(4) *If the ISFSI or MRS is located over an aquifer which is a major water resource, measures must be taken to preclude the transport of radioactive materials to the environment through this potential pathway."*

This is a site consideration (2.2.2.2, Preservation of Ground Water Quality) in that it does not preclude a site from being located over an aquifer, however it specifies the measures that must be taken if it were so located.

#### **10 CFR Part 100. Appendix A - Seismic and Geologic Siting Criteria for Nuclear Power Plants.**

#### **IV. Required Investigations**

- "(a) *Required Investigation for Vibratory Ground Motion*
- (2) *The evaluation shall consider the possible effects caused by man's activities such as withdrawal of fluid from or addition of fluid to the subsurface, extraction of minerals, or the loading effects of dams or reservoirs.*

- (3) *Evaluation of physical evidence concerning the behavior during prior earthquakes of the surficial geologic materials and the substrata underlying the site from the lithologic, stratigraphic, and structural geologic studies.*
- (4) *Included should be properties needed to determine the behavior of the underlying material during earthquakes and the characteristics of the underlying material in transmitting earthquake-induced motions to the foundations of the plant, such as seismic wave velocities, density, water content, porosity, and strength.*
- (5) *The acceleration or intensity and duration of ground shaking at these foundations shall also be estimated.*

#### V. Seismic and Geologic Design Bases

*"(a) Determination of Design Basis for Vibratory Ground Motion*

*(1) Determination of Safe Shutdown Earthquake*

- (iv) The maximum vibratory accelerations of the Safe Shutdown Earthquake at each of the various foundation locations of the nuclear power plant structures at a given site shall be determined taking into account the characteristics of the underlying soil material in transmitting the earthquake-induced motions.*

*(b) Determination of Need to Design for Surface Faulting*

*In order to determine whether a nuclear power plant is required to be designed to withstand the effects of surface faulting, the location of the nuclear power plant with respect to capable faults shall be considered.*

(VI) *Application to Engineering Design*

(a) *Vibratory ground motion*

*The design of the nuclear power plant shall also take into account the possible effects of the Safe Shutdown Earthquake on the facility foundations by ground disruption, such as fissuring, differential consolidation, cratering, liquefaction, and landsliding.*

10 CFR Part 72.102 states that the seismicity of potential MRS sites located West of the Rocky Mountain Front and "other areas of known potential seismic activity" will be evaluated by the techniques of Appendix A of 10 CFR Part 100 (see Section 2.2.1.1, Natural Seismic Risk and Appendix B, page B-5 and B-6).

**10 CFR Part 1022, Compliance with Floodplain Wetlands Environmental Review Requirements**

*"(a) Avoid to the extent possible the long and short-term adverse impacts associated with the destruction of wetlands and the occupancy and modification of floodplains and wetlands, and avoid direct and indirect support of floodplain and wetlands development wherever there is a practicable alternative."*

This implementing regulation requires the implementation of plans that will protect wetlands and minimize adverse effects from development in floodplains. This is the basis for site considerations (Section 2.2.1.4, Floodplains, Section 2.2.2.1, Wetlands and Coastal Zones). It should be determined if wetlands or floodplains occur in a proposed site. A potential site without wetlands or a site beyond a 100-year floodplain are preferred.

**36 CFR Part 293, Wilderness -- Primitive Areas.**

Section 293.2

*"... National Forest Wilderness shall be so administered as to meet the public purposes of recreational, scenic, scientific, educational, conservation, and historical uses; and it shall also be administered for such other purposes for which it may have been established in such a manner as to preserve and protect its wilderness character."*

## Section 293.17 National Forest Primitive Areas

- "(a) *Within those areas of National Forests classified as 'Primitive' on the effective date of the Wilderness Act, September 3, 1964, there shall be no roads or other provision for motorized transportation, no commercial timber cutting, and no occupancy under special-use permit for hotels, stores, resorts, summer homes, organization camps, hunting and fishing lodges, or similar uses.*"

This regulation preserves the National Forest Wilderness and Primitive Areas for the purpose of recreational, educational and historical uses. This is a site requirement (Section 2.1.3, Single Use Protected Lands). A potential site can not be located in a National Forest Wilderness or Primitive Area.

## 40 CFR 264, Resource Conservation and Recovery Act

### Section 264.18, Location Standards

- "(a) *Seismic considerations. (1) Portions of new facilities where treatment, storage, or disposal of hazardous waste will be conducted must not be located within 61 meters (200 feet) of a fault which has had displacement in Holocene time.*"

To maintain flexibility for MRS facility operations, it is assumed, for the sake of conservatism, that the regulation would be applicable. Currently, sites for hazardous waste management facilities are permitted beyond 200 feet from Holocene-age (last 10,000 years) faults. The regulation may be amended in the near future so that facilities that use or produce hazardous wastes will be located outside 100-year floodplains or in areas not within or adjacent to wetlands. Therefore, only potential sites that are located beyond 200 feet from a Holocene-age fault, outside a 100-year floodplain, and not within or adjacent to wetlands can be considered. This is the basis of a site requirement (Section 2.1.6, Hazardous Wastes) and site considerations (Section 2.2.1.3, Surface Faulting, Section 2.2.1.4, Floodplains).

## 43 CFR Part 8560, Wilderness Areas

### Section 8560.0-6

*"Wilderness areas shall be managed to promote, perpetuate and, where necessary, restore the wilderness character of the land and its specific values ..."*

Part 8560.1-2 Prohibited Acts

*"... the following are prohibited in wilderness areas managed by the Bureau:*

- (b) Temporary or permanent roads;*
- (d) Use of motorized equipment, motor vehicles, motorboats or other forms of mechanical transport;*
- (g) Structures or installations*
- (h) Cutting of trees"*

This is the basis of a site requirement (Section 2.1.3, Single Use Protected Lands).

**50 CFR Part 29, Land Use Management**

Subpart F - Right-of-Way General Regulations

Section 29.21

*"(g) 'Compatible' means that the requested right-of-way or use will not interfere with or detract from the purposes for which units of the National Wildlife Refuge System are established..."*

Section 29.21-1

*'(a) National Wildlife Refuge System lands... No right-of-way will be approved unless it is determined by the Regional Director to be compatible."*

This regulation protects the National Wildlife Refuge System lands from right-of-way uses that are incompatible with the purpose of the System. This is a site requirement (Section 2.1.3, Single Use Protected Lands). A right-of-way in the National Wildlife Refuge System lands for the purpose of an MRS facility related activity would not be consistent with the purpose of the regulation.

## 50 CFR Part 35, Wilderness Preservation and Management

Section 35.5 Commercial enterprises, roads, motor vehicles, motorized equipment, motorboats, aircraft, mechanical transport, structures, and installations.

*"Except as specifically provided and subject to existing private rights, there shall be no commercial enterprise and no permanent road within a wilderness unit, and except as necessary to meet minimum requirements for the administration of the area..., there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanized transport, and no structure or installation within any such area."*

This is a site requirement (Section 2.1.3, Single Use Protected Lands). Federal single use lands that are dedicated to environmental preservation or resource protection should be excluded from consideration as a possible site. These lands include the National Parks, National Wildlife Refuges and Wilderness Areas.

## Appendix C

### EXECUTIVE ORDERS

#### EO 11593, Protection and Enhancement of the Cultural Environment

Section 1. *"Policy. The Federal Government shall provide leadership in preserving, restoring and maintaining the historic and cultural environment of the Nation. Agencies of the executive branch of the Government (hereinafter referred to as "Federal agencies") shall (1) administer the cultural properties under their control in a spirit of stewardship and trusteeship for future generations, (2) initiate measures necessary to direct their policies, plans, and programs in such a way that federally owned sites, structures, and objects of historical, architectural or archaeological significance are preserved, restored and maintained for the inspiration and benefit of the people, and (3), in consultation with the Advisory Council on Historic Preservation (16 U.S.C. 470i), institute procedures to assure that Federal plans and programs contribute to the preservation and enhancement of non-federally owned sites, structures and objects of historical, architectural or archaeological significance."*

This Executive Order requires Federal agencies to implement plans to protect and enhance cultural resources including sites, structures, and objects of historical, architectural or archaeological significance at federally owned lands. The Order also requires that Federal agencies consult with the Advisory Council on Historic Preservation to preserve non-federally owned sites. This Order has recently been adopted as part of the National Historic Preservation Act, 16 U.S.C. Section 470h-2, historic properties owned or controlled by Federal agencies.

#### Executive Order 11988, Floodplain Management

The intent of this order is *"...to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative..."*

Section 1. *"...Each agency shall...take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities..."*

*"(c) Each agency shall take floodplain management into account when formulating or evaluating any water and land use plans and shall*

*require land and water resources use appropriate to the degree of hazard involved.*

- (b) *If, after compliance with the requirements of this Order, new construction of structures or facilities are to be located in a floodplain, accepted floodproofing and other floodproofing and other flood protection measures shall be applied to new construction or rehabilitation. To achieve flood protection, agencies shall, whenever practicable, elevate structures above the base flood level rather than filling in land."*

This order requires Federal agencies to implement plans that will minimize adverse effects from development on floodplains. This is the basis for a site consideration (Section 2.2.1.4, Floodplains). It should be determined if a proposed site is in a floodplain. A potential site beyond a 100-year floodplain is preferred.

#### **Executive Order 11990, Protection Of Wetlands**

*The intent of this order is "... to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative, ...*

*Section 1(a) Each agency shall...take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities..."*

This order requires Federal agencies to implement plans that will protect wetlands . This is the basis for a site consideration (Section 2.2.2.1, Wetlands and Coastal Zones). It must be determined if wetlands occur in proposed sites. If wetlands are present, then these areas must be avoided to the extent possible.

## Appendix D

### DOE ORDERS

#### **DOE Order 4300.1B, Real Property and Site Development Planning**

This order establishes department-wide policies and procedures for planning the development and utilization of sites and their facilities. The selection of sites for new facilities must comply with DOE 4300.1B. The DOE must develop a Site Development Plan to locate the MRS facility on existing or new sites. The Site Development Plan assures effective site utilization, describes and analyzes existing site conditions, and describes capabilities and constraints to development. It is the base document for all special studies involving facilities at the site. The Site Development Plan contains information on applicable regulations, laws or agreements and any unique opportunities or constraints. Among those topics which may be considered are floodplains, hydrology, drainage, water table depth, fault locations, earthquake potential, slope stability, demographics, utilities, transportation, endangered species, wetlands and meteorological data.

#### **DOE Order 5700.2C, Cost Estimating, Analysis and Standardization**

This order establishes policy and responsibilities for developing and reviewing project cost estimates. This is the basis for a site consideration (Section 2.2.5., Cost and Development Time Considerations).

#### **DOE Order 6430.1A, General Design Criteria**

This order provides general design criteria for use in the acquisition of DOE facilities and establishes responsibilities and authorities for the development and maintenance of these criteria. It is the DOE policy that DOE facilities comply with all applicable Executive Orders, Federal statutes and regulations, and DOE facilities should be designed and constructed to be reasonable and adequate for their intended purpose and consistent with health, safety, security, and environmental protection requirements.

Among those conditions and requirements to be considered during facility siting (Section 0200-1) are:

*"Hazardous operations and consequences of potential accidents in adjacent facilities -*

*Natural hazards including seismic activity, wind, hurricane, tornado, flood, hail, volcanic ash, lightning and snow*

*Wave action within any natural or man-made body of water (in accordance with Coastal Engineering Research Center (CERC) Shore Protection Manual)*

*Security and safeguard requirements*

*Adequacy of existing or planned support and service facilities, including utilities, roads, and parking areas*

*Interrelationships between facilities and aesthetic compatibility..."*

*"Location analyses performed during the preparation of Conceptual Design Reports (CDRs) shall consider but not be limited to these same criteria."*

*"To the extent possible, facility siting shall preclude the use of floodplains or areas subject to flash floods and shall minimize destruction, loss, or degradation of wetlands."*

*"For those facilities in which radioactive materials are processed, used, or stored, or those facilities that incorporate radiation-producing machines, the acceptability of the site shall be evaluated in terms of potential radiological consequences."*