

Comments on Review of DOE Report  
"Monitored Retrievable Storage (MRS) Facility Annotated  
Outline for the Preparation of a License Application,"  
Dated August 31, 1992

**REVIEW OF:**

**DOE REPORT "MONITORED RETRIEVABLE  
STORAGE (MRS) FACILITY  
ANNOTATED OUTLINE FOR THE PREPARATION OF A  
LICENSE APPLICATION,"  
DATED AUGUST 31, 1992**

*Prepared for*

**Nuclear Regulatory Commission  
Contract NRC-02-88-005**

Intermediate Milestone No. 20-3707-003-020-001

*Prepared by*

**John P. Hageman  
Hengameh Karimi  
Chuck Tschoepe  
Asadul H. Chowdhury  
Renner Hofmann  
Patrick LaPlante**

**Center for Nuclear Waste Regulatory Analyses  
San Antonio, Texas**

October 1992

# 1 INTRODUCTION

Reviews of the Department of Energy's (DOE) "Monitored Retrievable Storage (MRS) Facility Annotated Outline for the Preparation of a License Application (LA)," dated August 31, 1992 (DOE, 1992a) and the DOE's "Monitored Retrievable Storage (MRS) Facility Annotated Outline for the Preparation of a License Application, Safety Analysis Report (SAR)," dated August 31, 1992 (DOE, 1992b) have been conducted in accordance with contractual direction. [Refer to the "Task Guidance for Fiscal Years 1992 and 1993" for Task 3 of the Monitored Retrievable Storage (MRS) Program Element received from the NRC Contract Officer, S. D. Mearse transmittal of Modification No. 50 to Contract No. NRC-02-88-005 to R. E. Chatten on May 22, 1992.] According to this task guidance, the scope of this activity is limited to the review of the LA and SAR Annotated Outlines (DOE, 1992a and 1992b) to determine if the material presented: (i) conforms with NRC's Regulatory Guide 3.48, (NRC, 1989a), and Regulatory Guide 3.50 (NRC, 1989b), and (ii) is sufficient to make determinations against the requirements in the Commission's regulations. Although the scope of this review does not include technical analysis of the information provided, in order to provide guidance to DOE, it is expected that the review would determine the appropriateness of the information provided and the technical methods anticipated.

The review comments are presented in the form of general and specific comments. Note that the Center for Nuclear Waste Regulatory Analyses (CNWRA) provided comments on the March 31, 1992, version of the MRS Annotated Outline (DOE, 1992c) to the Nuclear Regulatory Commission (NRC) on July 2, 1992. Most of these earlier comments are still applicable to the August 31, 1992 LA and SAR Annotated Outlines (DOE, 1992a and 1992b), but have not been duplicated in this document. There were no new comments on the LA Annotated Outline (DOE, 1992a).

# 2 GENERAL COMMENTS

1. Some sections of Regulatory Guide 3.48 (NRC, 1989a) may not be addressed (e.g., Sections 2.6.5.1 through 2.6.5.4, 4.1.2.5, and 4.3.4). Not including these sections, without explanation, may cause delays with the review of the SAR. To the extent practicable, the SAR sections should be made consistent with the format of Regulatory Guide 3.48 (NRC, 1989a) or the rationale for exclusion should be given. Including the title of a section, that is not applicable, with a sentence stating the section does not apply would preserve the suggested format for the SAR.

Some sections (e.g., 2.1.2.1, 4.3.1.1, and 4.3.1.2) of the SAR Annotated Outline (DOE, 1992b) do not have a parallel section in Regulatory Guide 3.48 (NRC, 1989a) and were placed within the middle of a series of sections listed in Regulatory Guide 3.48 (NRC, 1989a). As the size and complexity of the SAR expands, this method of insertion may make the SAR more time consuming to review. It is suggested that the DOE follow the numbering sequence of Regulatory Guide 3.48 (NRC, 1989a), to the extent practicable, perhaps by placing additional sections at the end of a series.

2. The following suggestions are provided to help expedite the review process for the LA and SAR:

4

(i) Prepare a comprehensive index for the LA and SAR Annotated Outlines (DOE, 1992a and 1992b). This index would list specific or key terms used in the documents and identify the pages where each specific term appears. This would help to ensure that the same terminology is used consistently and would help the reviewers to locate all the sections related to a specific term or topic. An example of such an index is Volume IX of the DOE Site Characterization Plan: Yucca Mountain Site (DOE, 1988).

(ii) Prepare a list of approved acronyms for the LA and SAR Annotated Outline and conduct a keyword search to assure that all acronyms are applied consistently.

(iii) Conduct word searches for such terms as "system+" and "area+." A listing of all the different systems and areas currently named and their page numbers would also facilitate integration and review.

3. Clarify whether the appropriate sections of the SAR Annotated Outline (DOE, 1992b) which deal with fire protection (refer to Sections 3.3.6, 4.1.2.3.1, 4.3.7, 7.7, and 9.4.3.10) will address provisions to protect against adverse effects of either the operation or failure of the fire suppression system, per 10 CFR 72.122(c), related to criticality safety.

### 3 SPECIFIC COMMENTS ON THE SAFETY ANALYSIS REPORT

#### Chapter 1.0 - Introduction and General Description of Installation

##### Section 1.1.3.2 - Description of an MRS

4. Discussions on the transfer facility should consider the possibility of using a dual or multipurpose cask design (e.g., those with transportation and storage capabilities), where removal of the SNF from shipping casks is not required.

##### Section 1.2.4 - General Arrangements

5. Clarify whether there is one "Protected Area" or are there several "Protected Areas." This could be done in the text and/or by providing the referenced Figure 1.2-B.

##### Section 1.2.4.2 - Main Structures

6. This section lists the major structures, however, it does not provide information on the "arrangement" of these structures. Regulatory Guide 3.48 (NRC, 1989a) Section 1.2 - "General Description of Installation," requests a description of the "arrangement of major structures and equipment." Clarify whether this information will be provided by means of appropriate text and/or figures.

## Chapter 3.0 - Principal Design Criteria

### Section 3.2.3 - Seismic Design

7. 10 CFR 72.102(f) refers to 10 CFR Part 100, Appendix A for establishing the design earthquake for an MRS sited in the western United States: "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." It is notable that 10 CFR Part 100 is currently being considered for revision. Consequently, its prescription for the Safe Shutdown Earthquake (SSE) for nuclear power plants may change significantly. The potential for revisions to 10 CFR Part 100 should be anticipated.

## Chapter 4.0 - Installation Design

### Section 4.1.2.1 - Site Boundary

8. Clarify whether the site boundary is intended to be the same as the controlled area boundary.

### Section 4.3 - Auxiliary Systems

9. Clarify the apparent contradiction between the first and fourth paragraphs, regarding utility and support systems being important to safety.

#### Section 4.3.1 - Ventilation and Off-gas

10. Clarify where the major components and operating characteristics will be described. Refer to Section 4.3.1.1 of Regulatory Guide 3.48 (NRC, 1989a).

#### Section 4.3.3 - Air Supply System

11. Clarify whether breathing quality air is only supplied through the use of individual self-contained breathing apparatuses.
12. Clarify the meaning of "critical components" and "IRS."

##### Section 4.3.3.2 - Instrument Air

13. Clarify the safety class or category of the Instrument Air System in the text and/or Table 4.3-H.

##### Section 4.3.4.3 - Component Cooling Water System

14. Clarify whether component cooling water will be required to cool the emergency power generators.

#### Section 4.5 - Shipping Cask Repair and Maintenance

15. Clarify whether this section will address contamination control and occupational exposure reduction, as requested by Regulatory Guide 3.48 (NRC, 1989a).

#### Section 4.7.1 - Structural Specifications

16. Clarify the intent of the second paragraph and its relation to other methods of grouping the MRS structures, systems, and components (i.e., important to safety).

#### Section 4.7.1.3.1 - Transfer Facility

17. Clarify whether the location of the change room, next to the transfer cell, has been considered in MRS design to keep exposures as low as is reasonably achievable (ALARA). Refer to Figure 4.7-C, page 5 of 5, of the SAR Annotated Outline (DOE, 1992b).

#### Chapter 5.0 - Operation Systems

#### Section 5.6.1 - Facilities

18. Clarify whether laboratory facilities are part of the Auxiliary Systems, discussed in Section 4.3 of the SAR Annotated Outline (DOE, 1992b).

#### Chapter 6.0 - Site-Generated Waste Confinement Management

#### Section 6.1.1.3 - Solid Waste Systems Wastes

19. Clarify whether the last paragraph would be more appropriate in Section 6.1.3 - "Non-Radiological Waste."

#### Section 6.2 - Offgas Treatment and Ventilation

20. Clarify whether there is one Offgas Treatment System and one Ventilation System, multiples of these two systems, or just one combined-function Offgas Treatment and Ventilation System. Several different terms are used throughout this section, its subsections, and other related sections. For example, refer to SAR Sections: 4.3.1.1 - "Ventilation Systems," 4.3.1.2 - "Offgas Systems," and 6.2.1 - "System Description and Performance."

#### Section 6.2.1.1 - Ventilation Systems

21. The Zone IV System Description refers to accident analyses. Clarify whether other SAR sections should be referenced (e.g., Chapter 8 - "Accident Analysis").
22. Clarify how Zones I — IV are consistent with Zones I — VII of Section 7.3.1 - "Installation Design Features."

7

Section 6.2.1.2 - Offgas Systems

23. Clarify whether the waste storage casks will require offgas suction, such as provided for the liquid waste treatment and monitor tanks.

Section 6.3.2 - Equipment and Systems Description

24. Clarify whether the sources of mixed wastes will be identified.
25. Clarify whether there is one liquid radwaste treatment system or are there several systems (refer to page 6.3-1).
26. Add the Clean Water Act to the list of references.
27. Clarify whether the Safe Drinking Water Act should be referenced.

Section 6.5.3 - Solid Wastes

28. Clarify the bases for a "compaction ratio of 10 to 1," given on page 6.5-3.

Chapter 7.0 - Radiation Protection

Section 7.1 - Ensuring that Occupational Radiation Exposures are ALARA

In addition to the previous Comments 40 through 47 (NRC, 1992) the following are added.

29. Clarify which manual is referred to at the top of page 7.1-3.
30. On page 7.1-5, clarify what the term "company" refers to.
31. Clarify where in Chapter 6 the "discussions on ... the application of the ALARA philosophy" are located; give the specific section number/s.
32. Clarify whether the MRS will be designed to include means to prevent the accumulation of radioactive material in those systems requiring access and designed to include means to decontaminate those systems to which access is required, per 10 CFR 72.126(a)(1) and (2).
33. Clarify why Section 7.3.4.1 - "Area Radiation Monitoring System" discusses monitoring for ALARA, and Section 7.1.3 - "Operational Considerations" does not.

Section 7.2.2 - Airborne Radioactive Material Sources

34. Verify the units of the conversion factor ( $2.833 \times 10^4$  ml/ft<sup>3</sup>/min) on page 7.2-4, then verify the equation given on page 7.2-3.

Section 7.3.1 - Installation Design Features

35. For Zone V, clarify how 10 CFR 20.1902 provides a limit of 15 mrem/hr.

36. Clarify how Zones I — VII are consistent with Zones I — IV, identified in Section 6.2.1.2 - "Ventilation Systems" and Section 4.3.1.1 - "Ventilation Systems."

Section 7.3.4.1.1 - Description

37. Clarify the basis for "twenty detectors."

Section 7.5.2.1.2 - Portable Radiation Monitoring Instruments and Equipment

38. Clarify how "Respiratory protection equipment" (item D) is associated with portable radiation monitoring instrument and equipment.

Section 7.5.2.2 - Inplant Radiation Monitoring

39. Clarify whether Table 7.5-C will include a column for off-normal operating conditions.

Section 7.5.2.3.4 - Control Points for Entrance to and Exit from the RCA

40. Clarify whether "whole body detectors" are portal monitors or body burden analyzers.

Section 7.5.3.2 - Dosimetry and Exposure Records

41. Clarify what value will be used for the "quarterly allowable dose" (refer to 10 CFR 20.1201).
42. Clarify the meaning of the term "maximum permissible organ burden (mpob)." Refer to page 7.5-16.

Section 7.7.3 - Criticality Evaluation

43. Clarify whether the analyses will demonstrate criticality safety under conditions other than "normal conditions," as specified in 10 CFR 72.124(a).

Chapter 8.0 - Accident Analysis

Section 8.2 - Accidents

44. Within Section 8.2 - "Accidents," it is stated, "These events include any accident which could result in a dose of  $\geq 25$  mrem beyond the controlled area." It is assumed that the term "these events" includes both the third and fourth types of events (Design Events III and IV) given in American Nuclear Society (ANS) Standard - ANSI/ANS-57.9 (ANS, 1984). The basis for this statement is requested. It is our understanding that for any type three events [Design Event III - events that could be normally expected to occur during the lifetime of the facility (ANS, 1984)] all radiation exposure limits must be met. The design should be such that the structures, systems, and components important to safety must assure that the necessary safety functions are met for those events that are expected to occur. For the fourth type of events [Design Event IV (ANS, 1984)], the limits of 10 CFR Part 20 and 10 CFR 72.104 may be exceeded, but the limits of 10 CFR 72.106 must be met by having an appropriate controlled area.

Section 8.2.1 - Fuel Drop in Transfer Cell

- 45. The impression is given that the worst case design basis accident has been determined to be a single fuel assembly drop accident. This section should provide the basis for this determination.

Section 8.2.1.2 - Accident Analysis

- 46. Clarify whether the "site boundary dose" is the same as the dose at the boundary of the controlled area.
- 47. Clarify whether the reference to ICRP 30 should be replaced with ICRP 48, and add the appropriate one to the list of references.

Chapter 9.0 - Conduct of Operation

Section 9.1.1.3 - Interrelationships With Contractors and Supplies

- 48. As requested in Section 9.1.1.3 of Regulatory Guide 3.48 (NRC, 1989a), this section is entitled "Interrelationships with Contractors and Suppliers." The SAR Annotated Outline (DOE, 1992b) references an information request (RGE-85) to provide the information on interrelations. The referenced information request (RGE-85) only calls for organization charts and responsibilities for all contractors, but does not mention interrelationships and organizational interfaces between contractors. Clarify whether the interfaces between contractors will be addressed.

Section 9.1.1.4 - Applicant's Technical Staff

- 49. This section relies on information request (RGE-85) to supply the information. Regulatory Guide 3.48 (NRC, 1989a) requests the qualifications, background, and experience of technical staff. Again, the information request (RGE-85) only calls for organization charts and responsibilities of staff. Clarify whether the requested information will be addressed. Note: qualification of technical staff may be covered by information request (RGE-87) which is not referenced by this section.

Section 9.1.2.2 - Personnel Functions, Responsibilities, and Authorities

- 50. Succession of responsibility, as requested by Section 9.1.2.2 of Regulatory Guide 3.48 (NRC, 1989a), may not be explicitly addressed. Although it may be implied through the identification of the deputy site manager, this would still require further clarification.

Section 9.2.2 - Test Program Description

- 51. The parallel section of Regulatory Guide 3.48 (NRC, 1989a) requests a description of the acceptance criteria which will be used to evaluate test results, however, there is no mention of such criteria in this section. Clarify whether this information will be provided.

Section 9.4.4 - Records

- 52. Regulatory Guide 3.48 (NRC, 1989a), Section 9.4.2 - "Records," specifies the types of records to be described, which include quality assurance (QA) records. The SAR Annotated Outline (DOE, 1992b), Section 9.4.4 - "Records," has subsections which cover most of the record types requested, but does not discuss, or have a subsection for, QA records. Clarify whether this information will be provided.

**4 REFERENCES**

ANS. 1984. Design Criteria for an Independent Spent Fuel Storage Installation (Dry Storage Type). ANSI/ANS-57.9-1984. ANS. La Grange Lark, IL.

DOE. 1988. Site Characterization Plan: Yucca Mountain Site, Nevada Research and Development Area, Nevada. Vol. IX. DOE. Oak Ridge, TN.

DOE. 1992a. Monitored Retrievable Storage (MRS) Facility Annotated Outline for the Preparation of a License Application. Vol. I. Dated August 31, 1992. DOE. Washington, DC.

DOE. 1992b. Monitored Retrievable Storage (MRS) Facility Annotated Outline for the Preparation of a License Application, Safety Analysis Report. Vol. II. Books I and II. Dated August 31, 1992. DOE. Washington, DC.

DOE. 1992c. Monitored Retrievable Storage (MRS) Facility Annotated Outline Skeleton Text for the Preparation of a License Application. Vol. I and II. Dated March 31, 1992. DOE. Washington, DC.

NRC. 1989a. Standard Format and Content for the Safety Analysis Report for an Independent Spent Fuel Storage Installation or Monitored Retrievable Storage Installation (Dry Storage). Regulatory Guide 3.48. Rev. 1. NRC. Washington, DC.

NRC. 1989b. Standard Format and Content For a License Application to Store Spent Fuel and High-Level Radioactive Waste. Regulatory Guide 3.50. Rev. 1. NRC. Washington, DC.

NRC. 1992. NRC Comments on DOE Report "Monitored Retrievable Storage (MRS) Facility Annotated Outline Skeletal Text for the Preparation of a License Application." Letter. Dated September 28, 1992. NRC. Washington, DC.