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REVIEW OF

Mined Geologic Disposal System License Application Annotated Outline: Section 4.3 Assessment of Compliance for Shafts or Ramps

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ABSTRACT

A review of the Mined Geologic Disposal System License Application Annotated Outline (LAAO), Section 4.3—Assessment of Compliance for Shafts or Ramps was conducted by the Center for Nuclear Waste Regulatory Analyses (CNWRA) in accordance with requirements specified by the Nuclear Regulatory Commission (NRC). The aforementioned outline was prepared by the U.S. Department of Energy as a predecessor to its License Application to be submitted to the NRC for construction of a geologic repository for high-level radioactive waste at Yucca Mountain, Nevada. The CNWRA review of the LAAO described in this report focused on the following areas: (i) a review of the LAAO—Section 4.3 to determine the extent to which it addresses unresolved Open Items (OIs) as identified in the Open Item Tracking System, and (ii) a review of the LAAO—Section 4.3 to identify any new OIs that the CNWRA considers appropriate.

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QUALITY OF DATA, ANALYSIS, AND CODE DEVELOPMENT

ANALYSES AND CODES: No CNWRA-generated data or computer codes were used for analyses contained in this report.

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1 INTRODUCTION

The Mined Geologic Disposal System (MGDS) License Application Annotated Outline (LAAO) Section 4.3—Assessment of Compliance for Shafts or Ramps (U.S. Department of Energy, 1995) was reviewed. and the results of this review are summarized in this report. This review was conducted in accordance with direction from the Nuclear Regulatory Commission (NRC) (Jagannath, 1995). Hereafter, this document will be referred to simply as the LAAO.

In accordance with the NRC direction, the Center for Nuclear Waste Regulatory Analyses (CNWRA) review and the structure of this report are focused on the following areas:

(i) Review of the LAAO with respect to any information presented that could close any of the existing unresolved Open Items (OIs) identified in the Open Item Tracking System (OITS). If no information is presented in the LAAO that could close the item, this review recommends that the item remain open.

(ii) Review of the LAAO with respect to any information presented that is new.

The content of this report is necessarily limited because the U.S. Department of Energy (DOE), in this iteration of the LAAO, has mostly listed the information needs to satisfy the applicable regulatory requirements.

3 NEW COMMENTS OR CONCERNS WITH THE LICENSE APPLICATION ANNOTATED OUTLINE

3.1 SECTION 4.3—ASSESSMENT OF COMPLIANCE FOR SHAFTS OR RAMPS

In the general discussion under this heading, it is stated that this section and subsequent sections of the LAAO provide the DOE demonstration of compliance for the GROA shafts and ramps with the preclosure performance objectives of 10 CFR 60.111(a), and the general and specific design requirements contained in 10 CFR 60.130, 60.131, 60.134, and 60.137. Although the requirement for retrievability [10 CFR 60.111 (b)] is applicable to the shafts or ramps design, it is stated that this will be covered in Section 4.5.2 of the license application (LA). The LAAO states that descriptive information for the GROA shafts and ramps is contained in Section 4.1.2. In addition, LAAO subsections 4.3.0.1 (Compliance with 10 CFR 60 Requirements), 4.3.0.2 (Accident Analyses), 4.3.0.3 (Basis for Identification of SSCs Important to Safety), and 4.3.0.4 (Description of Models) list information needed to address the applicable descriptive regulatory requirements of 10 CFR 60.21; however, the text does not state that addressing these requirements is indeed the intent of the information provided in these subsections. It is suggested that either in the introduction to Section 4.3.0 or in the title of Section 4.3.0.1 some reference be made to the fact that the compliance is with regard to 10 CFR 60.21 requirements. The information needs presented in Subsections 4.3.0.1 through 4.3.0.4, as well as in Section 4.1.2, appear incomplete in that they do not address all the applicable regulatory requirements of 10 CFR 60.21. The NRC, in its License Application Review Plan (LARP), has identified the following applicable requirements for the description of GROA shafts and ramps design [10 CFR 60.21(c)(1)(i); 60.21(c)(1)(ii)(A),(C),(D),(E),(F); 60.21(c)(2),(3),(6),(7),(9),(11),(12), and (14)].

Table 4.3.0.1-1 is intended to list all the shaft and ramp Structures, Systems, and Components (SSCs) that are subject to 10 CFR 60 requirements. It would be more appropriate to have separate tables for each type of shaft or ramp system (e.g., waste ramp, emplacement ramp, etc.) showing the specific SSCs in each system subject to 10 CFR 60 requirements.

3.2 SECTION 4.3.1—APPLICABLE REQUIREMENTS AND CRITERIA

It is stated in the text that Subsections 4.3.1.1 through 4.3.1.19 of the LAAO address the overall compliance of the shafts and ramps systems with each of the general design criteria for the GROA (10 CFR 60.130 and 60.131) with referenced requirements from Part 20, with additional design criteria for the shafts and ramps (10 CFR 60.134), and with the general requirements for performance confirmation (10 CFR 60.137). However, in reviewing LAAO Subsections 4.3.1.1 through 4.3.1.19, it was found that, in fact, there is no mention of the overall compliance of the shafts and ramps systems with the design criteria of 10 CFR 60.130 (additional design criteria and safety features considered to be necessary for shafts and ramps) or with the performance confirmation criteria of 10 CFR 60.137. Compliance with 10 CFR 60.111(b) is not listed; however, it is stated that this will be addressed in Section 4.5.2 of the LA. LAAO Subsections 4.3.1.1 through 4.3.1.3 cover only radiation protection in restricted areas as required by 10 CFR 60.131(a). These subsections contain no reference to compliance with 10 CFR 60.111(a) dealing with radiation protection in unrestricted areas of the GROA, which is also applicable to shaft and ramp systems. It is recommended that additional subsections under 4.3.1 of the

LAAO be added to adequately address the compliance with the requirements of 10 CFR 60.111(a), 60.130, and 60.137.

3.3 SECTION 4.3.1.1—AIRBORNE RADIOACTIVE MATERIALS

In the bullet list of information needs within this section, it states that restricted areas potentially contaminated with airborne radioactivity that are accessible to operating personnel will be identified. However, 10 CFR 60.131(a)(5), requires that the design include means to control access to high radiation areas or airborne radioactivity areas. Likewise, it is stated that estimates of maximum individual and total person-hours of occupancy will be provided. However, it is also necessary to demonstrate that the design includes means to limit the time required to perform work in the vicinity of radioactive materials, including, as appropriate, designing equipment for ease of repair and replacement and providing adequate space for ease of operation [10 CFR 60.131(a)(2)]. The design also needs to show that such restricted areas contain adequate shielding for radiological protection [10 CFR 60.131(a)(3)], and that restricted areas contain radiation alarm systems to warn of significant increases in radiation levels, concentrations of radioactive material in air, and of increased radioactivity released in effluents [10 CFR 60.131(a)(6)].

3.4 SECTIONS 4.3.1.2 THROUGH 4.3.1.9

These sections contain no detailed information. The CNWRA has no comments.

3.5 SECTION 4.3.1.10—CONTROL OF RADIOACTIVE MATERIALS

This subsection or a separate subsection of the LAAO needs also to demonstrate that the design of the GROA includes onsite facilities and services that ensure a safe and timely response to emergency conditions and that facilitate the use of available offsite services [10 CFR 60.131(b)(4)(ii)]. This section currently addresses only the 10 CFR 60.131(b)(4)(i) requirement.

3.6 SECTION 4.3.1.11 THROUGH 4.3.1.19

These sections contain no detailed information. The CNWRA has no comments.

3.7 SECTION 4.3.2—SYSTEM SPECIFIC COMPLIANCE WITH APPLICABLE REQUIREMENTS AND CRITERIA

This section of the LAAO is meant to document how specific designs or design features, as embodied in the structures, systems, and components selected for the shafts and ramps, meet the 10 CFR Part 60 compliance requirements. Table 4.3.2-1 in the LAAO shows a preliminary tabular representation of the compliance requirements allocated to the major shaft or ramp systems (e.g., waste shaft or ramp, muck shaft or ramp, ventilation intake shaft, ventilation exhaust shaft, personnel and materials shafts, decommissioning system, etc.). The following comments are based on the review of this table:

(i) The table gives no mention of the additional design requirements to comply with 10 CFR 60.130 (e.g., 10 CFR 60.133 as applicable) for the shaft and ramp systems. Also, the table does not include the requirements for radiation protection in unrestricted areas [10 CFR 60.111(a)] and the requirement for implementation of a performance confirmation program (10 CFR 60.137). Thus, it is recommended that Table 4.3.2-1 be enhanced to

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list all applicable 10 CFR Part 60 requirements and criteria for shaft and ramp structures, systems, and components.

(ii) Seals for a personnel and materials ramp would also have to meet the general design criterion that they be designed so that following permanent closure, they do not become preferential pathways for liquid or gas flow [10 CFR 60.134(a)]. Table 4.3.2-1 currently shows that this general seal design criterion does not apply to a personnel and materials ramp. Also, if the personnel and materials ramp is located on the emplacement side, it would be subject to the appropriate radiation safety criteria.

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